Milena (Olena)

User documentation 2.0 Id

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Chapter 2

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2.4.1 Basic interface

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```
box2d b(2,3);

// The bbox can be retrived in constant time.
std::cout << b.bbox() << std::endl;

// nsites can be retrieved in constant time.
std::cout << "nsites = " << b.nsites() << std::endl;
```

```
[(0,0)..(1,2)]
nsites = 6
```

```
p_array<point2d> arr;
arr.insert(point2d(1,0));
arr.insert(point2d(1,1));

// The bbox is computed thanks to bbox() algorithm.
box2d box = geom::bbox(arr);
std::cout << box << std::endl;

// p_array provides nsites(),
```

```
  // it can be retrieved in constant time.
  std::cout << "nsites = " << arr.nsites() << std::endl;
```

```
[(1,0)..(1,1)]
nsites = 2
```

2.5 Image

2.5.1 Definition

2.5.2 Possible image types

2.5.3 Possible value types

2.5.4 Domain

```
  // Define a box2d from (-2,-3) to (3,5).
  box2d b = make::box2d(-2,-3, 3,5);
  // Initialize an image with b as domain.
  image2d<int> ima(b);

  std::cout << "b = " << b << std::endl;
  std::cout << "domain = " << ima.domain() << std::endl;
```

```
b = [(-2,-3)..(3,5)]
domain = [(-2,-3)..(3,5)]
```

```
  // Create an image on a 2D box
  // with 10 columns and 10 rows.
  image2d<bool> ima(make::box2d(10, 10));

  mln_site_(image2d<bool>) p1(20, 20);
  mln_site_(image2d<bool>) p2(3, 3);

  std::cout << "has(p1)? "
            << (ima.has(p1) ? "true" : "false")
            << std::endl;

  std::cout << "has(p2)? "
            << (ima.has(p2) ? "true" : "false")
            << std::endl;
```

```
has(p1)? false
has(p2)? true
```

```
  point2d p(9,9);

  // At (9, 9), both values change.
  ima1(p) = 'M';
  ima2(p) = 'W';

  bool b = (ima1(p) == ima2(p));
  std::cout << (b ? "True" : "False") << std::endl;
```

```
False
```

2.5.5 Border and extension

2.5.5.1 Image border

```
bool vals[3][3] = { { 0, 1, 1 },
                    { 1, 0, 0 },
                    { 1, 1, 0 } };

image2d<bool> ima_def = make::image(vals);
border::fill(ima_def, false);
debug::println_with_border(ima_def);

std::cout << "===========" << std::endl << std::endl;

border::thickness = 0;
image2d<bool> ima_bt0 = make::image(vals);
debug::println_with_border(ima_bt0);
```

```
- - - - - - - - -
- - - - - - - - -
- - - - - - - - -
- - - - | | - - -
- - - | - - - - -
- - - | | - - - -
- - - - - - - - -
- - - - - - - - -
- - - - - - - - -

===========

- | |
| - -
| | -
```

2.5.5.2 Generality on image extension

imamorphed

2.5.5.3 Different extensions

```
image2d<rgb8> lena;
io::ppm::load(lena, MLN_IMG_DIR "/small.ppm");
box2d bbox_enlarged = lena.domain();
bbox_enlarged.enlarge(border::thickness);
mln_VAR(ima_roi, lena | fun::p2b::big_chess<box2d>(lena.domain(), 10));
```

2.5.5.3.1 Extension with a value

```
mln_VAR(ext_with_val, extended_to(extend(ima_roi, literal::blue), bbox_enlarged
    ));
```

2.5.5.3.2 Extension with a function

```
namespace mln
{

  struct my_ext : public Function_v2v<my_ext>
  {
```

```
    typedef value::rgb8 result;

    value::rgb8 operator()(const point2d& p) const
    {
      if ((p.row() + p.col()) % 20)
        return literal::black;
      return literal::white;
    }

  };

} // end of namespace mln
```

```
  mln_VAR(ext_with_fun, extended_to(extend(ima_roi, my_ext()), bbox_enlarged));
```

2.5.5.3.3 Extension with an image

```
  mln_VAR(ext_with_ima, extend(ima_roi, lena));
```

```
  // Default border size is set to 0.

  // Image defined on a box2d from
  // (0, 0) to (2, 2)
  image2d<int> ima1(2, 3);

  std::cout << "ima1.has(0, 0) : "
            << ima1.has(point2d(0, 0)) << std::endl;

  std::cout << "ima1.has(-3, 0) : "
            << ima1.has(point2d(-3, 0)) << std::endl;

  std::cout << "ima1.has(2, 5) : "
            << ima1.has(point2d(2, 5)) << std::endl;

  std::cout << "=========" << std::endl;

  // Set default border size to 0.
  border::thickness = 0;

  // Image defined on a box2d from
  // (0, 0) to (2, 2)
  image2d<int> ima2(2, 3);

  std::cout << "ima2.has(0, 0) : "
            << ima2.has(point2d(0, 0)) << std::endl;

  std::cout << "ima2.has(-3, 0) : "
            << ima2.has(point2d(-3, 0)) << std::endl;

  std::cout << "ima2.has(2, 5) : "
            << ima2.has(point2d(2, 5)) << std::endl;
```

```
ima1.has(0, 0) : 1
ima1.has(-3, 0) : 1
ima1.has(2, 5) : 1
=========
ima2.has(0, 0) : 1
ima2.has(-3, 0) : 0
ima2.has(2, 5) : 0
```

```
  border::thickness = 30;

  // Declare the image to be rotated.
```

```
image2d<value::rgb8> ima1_(220, 220);
data::fill(ima1_, literal::cyan);
border::fill(ima1_, literal::yellow);
// Set an infinite extension.
mln_VAR(ima1, extend(ima1_, pw::cst(literal::yellow)));

// Declare the output image.
image2d<value::rgb8> ima2(220, 220);
data::fill(ima2, literal::cyan);
border::fill(ima2, literal::yellow);

box2d extended_domain= ima1.domain();
extended_domain.enlarge(border::thickness);

// Draw the domain bounding box
draw::box(ima1, geom::bbox(ima1_), literal::red);
// Save the image, including its border.
doc::ppmsave(ima1 | extended_domain, "ima2d-rot");

// Define and apply a point-wise rotation
fun::x2x::rotation<2,float> rot1(0.5, literal::zero);
image2d<value::rgb8>::fwd_piter p(ima1.domain());
for_all(p)
{
  algebra::vec<2,float> pv = p.to_site().to_vec();
  algebra::vec<2,float> v = rot1.inv()(pv);
  ima2(p) = ima1(v);
}

draw::box(ima2, ima2.bbox(), literal::red);
doc::ppmsave(extended_to(ima2, extended_domain), "ima2d-rot");
```

```
my_routine(ima | ima.domain());
```

2.5.6 Interface

2.5.7 Load and save images

```
image2d<bool> ima;
io::pbm::load(ima, MLN_DOC_DIR "/img/small.pbm");
```

```
io::pbm::save(ima, MLN_DOC_DIR "/figures/ima_save.pbm");
```

2.5.8 Create an image

```
// Build an empty image;
image2d<value::int_u8> img1a;

// Build an image with 2 rows
// and 3 columns sites
image2d<value::int_u8> img1b(box2d(2, 3));
image2d<value::int_u8> img1c(2, 3);
```

```
bool vals[6][5] = {
    {0, 1, 1, 0, 0},
    {0, 1, 1, 0, 0},
    {0, 0, 0, 0, 0},
    {1, 1, 0, 1, 0},
    {1, 0, 1, 1, 1},
    {1, 0, 0, 0, 0}
};
image2d<bool> ima = make::image(vals);
```

```
image2d<value::int_u8> img2a(2, 3);
image2d<value::int_u8> img2b;

initialize(img2b, img2a);
data::fill(img2b, img2a);
```

Fill

2.5.9 Access and modify values

```
box2d b(2,3);
image2d<value::int_u8> ima(b);

// On image2d, Site <=> point2d
point2d p(1, 2);

// Associate '9' as value for the site/point2d (1,2).
// The value is returned by reference and can be changed.
opt::at(ima, 1,2) = 9;
std::cout << "opt::at(ima, 1,2) = " << opt::at(ima, 1,2)
          << std::endl;
std::cout << "ima(p) = " << ima(p) << std::endl;

std::cout << "---" << std::endl;


// Associate '2' as value for the site/point2d (1,2).
// The value is returned by reference
// and can be changed as well.
ima(p) = 2;
std::cout << "opt::at(ima, 1,2) = " << opt::at(ima, 1,2)
          << std::endl;
std::cout << "ima(p) = " << ima(p) << std::endl;
```

```
opt::at(ima, 1,2) = 9
ima(p) = 9
---
opt::at(ima, 1,2) = 2
ima(p) = 2
```

Iterators

2.5.10 Image size

```
image2d<int> ima(make::box2d(0,0, 10,12));

std::cout << "nrows = " << ima.nrows()
          << " - "
          << "ncols = " << ima.ncols()
          << std::endl;
```

```
nrows = 11 - ncols = 13
```

2.6 Structural elements: Window and neighborhood

2.6.1 Define an element

2.6.1.1 Window

2.6.1.2 Neighborhood

```
label_8 nlabels;
image2d<label_8> lbl = labeling::blobs(ima, c4(), nlabels);
```

2.6.1.3 Custom structural elements

```
window2d win;
win.insert(-1, -1);
win.insert(-1,  0);
win.insert(-1,  1);
```

```
o -
o X
o -
```

```
bool b[9]      =   { 1, 0, 0,
                     1, 0, 0,
                     1, 0, 0 };

bool b2[3][3] = { { 1, 0, 0 },
                  { 1, 0, 0 },
                  { 1, 0, 0 } };

window2d win = convert::to<window2d>(b);
window2d win2 = convert::to<window2d>(b2);
```

2.6.1.4 Conversion between Neighborhoods and Windows

2.7 Sites, psites and dpoints

2.7.1 Need for site

```
 c 0 1 2 3
r
  +-+-+-+-+
0 | |x| | |
  +-+-+-+-+
1 | | | | |
  +-+-+-+-+
```

2.7.2 Need for psite

```
unsigned my_values(const mln::point2d& p)
{
  if (p.row() == 0)
    return 8;
  return 9;
}
```

```
  p_array<point2d> arr;
  arr.append(point2d(3, 6));
  arr.append(point2d(3, 7));
  arr.append(point2d(3, 8));
  arr.append(point2d(4, 8));
  arr.append(point2d(4, 9));

  mln_VAR(ima, my_values | arr);
```

```
c   6 7 8 9
r
   +-+-+-+
3  | |x| |
   +-+-+-+-+
4      | | |
       +-+-+

arr[] = 0 1 2 3 4
       +-+-+-+-+-+
       | |x| | | |
       +-+-+-+-+-+
```

2.7.3 From psite to site

2.7.4 Dpoint

```
  dpoint2d dp(-1,0);
  point2d p(1,1);

  std::cout << p + dp << std::endl;
```

```
(0,1)
```

2.8 Iterators

```
  box2d b(3, 2);
  mln_piter_(box2d) p(b);

  for_all(p)
    std::cout << p; //prints every site coordinates.
```

```
(0,0)(0,1)(1,0)(1,1)(2,0)(2,1)
```

```
template <typename I>
void fill(I& ima, mln_value(I) v)
{
  mln_piter(I) p(ima.domain());
  for_all(p)
    ima(p) = v;
}

template <typename I, typename J>
void paste(const I& data, J& dest)
{
  mln_piter(I) p(data.domain());
  for_all(p)
  dest(p) = data(p);
}
```

Useful macros

2.9 Memory management

```
image2d<int> ima1(box2d(2, 3));
image2d<int> ima2;
point2d p(1,2);

ima2 = ima1; // ima1.id() == ima2.id()
// and both point to the same memory area.

ima2(p) = 2; // ima1 is modified as well.

// prints "2 - 2"
std::cout << ima2(p) << " - " << ima1(p) << std::endl;
// prints "true"
std::cout << (ima2.id_() == ima1.id_()) << std::endl;
```

```
image2d<int> ima1(5, 5);
image2d<int> ima3 = duplicate(ima1); // Makes a deep copy.

point2d p(2, 2);
ima3(p) = 3;

std::cout << ima3(p) << " - " << ima1(p) << std::endl;
std::cout << (ima3.id_() == ima1.id_()) << std::endl;
```

```
3 - 0
0
```

2.10 Basic routines

2.10.1 Fill

```
image2d<char> imga(5, 5);
```

```
data::fill(imga, 'a');
```

```
data::fill((imga | box2d(1,2)).rw(), 'a');
```

2.10.2 Paste

```
image2d<unsigned char> imgb(make::box2d(5,5, 7,8));
// Initialize imga with the same domain as imgb.
image2d<unsigned char> imga(imgb.domain());

// Initialize the image values.
data::fill(imgb, 'b');

// Paste the content of imgb in imga.
data::paste(imgb, imga);

debug::println(imga);
```

```
98 98 98 98
98 98 98 98
98 98 98 98
```

```
image2d<int> ima1(5, 5);
```

```
image2d<int> ima2(10, 10);

std::cout << "ima1.domain() = " << ima1.domain()
          << std::endl;
std::cout << "ima2.domain() = " << ima2.domain()
          << std::endl;
```

```
image2d<int> ima1(5, 5);
image2d<int> ima2(10, 10);

std::cout << "ima1.domain() = " << ima1.domain()
          << std::endl;
std::cout << "ima2.domain() = " << ima2.domain()
          << std::endl;
```

2.10.3 Blobs

```
bool vals[6][5] = {
    {0, 1, 1, 0, 0},
    {0, 1, 1, 0, 0},
    {0, 0, 0, 0, 0},
    {1, 1, 0, 1, 0},
    {1, 0, 1, 1, 1},
    {1, 0, 0, 0, 0}
};
image2d<bool> ima = make::image(vals);
```

```
label_8 nlabels;
image2d<label_8> lbl = labeling::blobs(ima, c4(), nlabels);
```

2.10.4 Logical not

```
bool vals[5][5] = {
  {1, 0, 1, 0, 0},
  {0, 1, 0, 1, 0},
  {1, 0, 1, 0, 0},
  {0, 1, 0, 1, 0},
  {0, 1, 0, 1, 0}
};
image2d<bool> ima = make::image(vals);
```

```
image2d<bool> ima_neg = logical::not_(ima);
```

```
logical::not_inplace(ima);
```

2.10.5 Compute

2.10.5.1 Accumulators

```
data::compute(accu::meta::stat::max, ima);
```

```
data::compute(accu::meta::stat::max(), ima);
```

2.10.5.2 Example with labeling::compute()

```
bool vals[6][5] = {
    {0, 1, 1, 0, 0},
```

```
      {0, 1, 1, 0, 0},
      {0, 0, 0, 0, 0},
      {1, 1, 0, 1, 0},
      {1, 0, 1, 1, 1},
      {1, 0, 0, 0, 0}
  };
  image2d<bool> ima = make::image(vals);


  label_8 nlabels;
  image2d<label_8> lbl = labeling::blobs(ima, c4(), nlabels);


  util::array<box2d> boxes =
      labeling::compute(accu::meta::shape::bbox(),
                        lbl,
                        nlabels);


  for (unsigned i = 1; i <= nlabels; ++i)
    std::cout << boxes[i] << std::endl;
```

```
[(0,1)..(1,2)]
[(3,0)..(5,1)]
[(3,2)..(4,4)]
```

```
  unsigned nsites = geom::nsites(ima);
```

2.10.6 Working with parts of an image

```
//function_p2b
bool my_function_p2b(mln::point2d p);

//function_p2v
//V is the value type used in the image.
template <typename V>
V my_function_p2v(mln::point2d p);
```

```
  bool vals[6][5] = {
      {0, 1, 1, 0, 0},
      {0, 1, 1, 0, 0},
      {0, 0, 0, 0, 0},
      {1, 1, 0, 1, 0},
      {1, 0, 1, 1, 1},
      {1, 0, 0, 0, 0}
  };
  image2d<bool> ima = make::image(vals);
```

2.10.6.1 Restrict an image with a site set

```
  p_array<point2d> arr;

  // We add two points in the array.
  arr.append(point2d(0, 1));
  arr.append(point2d(4, 0));

  // We restrict the image to the sites
  // contained in arr and fill these ones
  // with 0.
  // We must call "rw()" here.
  data::fill((ima | arr).rw(), 0);

  debug::println((ima | arr));
```

```
  mln_VAR(ima2, ima | arr);
  // We do not need to call "rw()" here.
  data::fill(ima2, 0);
```

-

-

-

-

2.10.6.2 Restrict an image with a predicate

```
  label_8 nlabels;
  image2d<label_8> lbl = labeling::blobs(ima, c4(), nlabels);

  mln_VAR(lbl_2, lbl | (pw::value(lbl) == pw::cst(2u)));

  image2d<rgb8> ima2;
  initialize(ima2, ima);
  data::fill(ima2, literal::black);

  data::fill((ima2 | lbl_2.domain()).rw(), literal::red);

  label_8 nlabels;
  image2d<label_8> lab = labeling::blobs(ima, c4(), nlabels);

  image2d<rgb8> ima2;
  initialize(ima2, ima);
  data::fill(ima2, literal::black);

  data::fill((ima2 | (pw::value(lab) == pw::cst(2u))).rw(), literal::red);
```

2.10.6.3 Restrict an image with a C function

```
bool row_oddity(mln::point2d p)
{
  return p.row() % 2;
}

  image2d<rgb8> ima2;
  initialize(ima2, ima);
  data::fill(ima2, literal::black);

  data::fill((ima2 | row_oddity).rw(), literal::red);
```

```
ima | sub_D
```

```
0 1 0
1 1 1
```

```
  mln_VAR(imab1, ima | (pw::value(ima) == pw::cst(1u)));
```

```
1
1 1 1
```

```
box2d b1(1,0, 1, 2);
mln_VAR(imac, imab1 | b1);

// Print:
// 1 1 1
debug::prinln(imac);

box2d b2(0,0, 1, 1);
// Will fail at runtime.
// ima.domain().has((0,0)) is false.
mln_VAR(imad, imab1 | b2);
debug::prinln(imad);
```

```
ima / sub_D
```

2.11 Input / Output

2.11.1 ImageMagick

2.11.2 GDCM

2.12 Graphs and images

2.12.1 Description

2.12.2 Example

```
     0 1 2 3 4
  .-----------
0 |  0       2
1 |    \   / |
2 |      1   |
3 |       \  |
4 |        3-4
```

```
  util::graph g;

  for (unsigned i = 0; i < 5; ++i)
    g.add_vertex(); // Add vertex 'i';
```

```
  g.add_edge(0, 1); // Associated to edge 0.
  g.add_edge(1, 2); // Associated to edge 1.
  g.add_edge(1, 3); // Associated to edge 2.
  g.add_edge(3, 4); // Associated to edge 3.
  g.add_edge(4, 2); // Associated to edge 4.
```

```
  typedef fun::i2v::array<point2d> F;
  F f(5); // We need to map 5 vertices.
  f(0) = point2d(0, 0);
  f(1) = point2d(2, 2);
  f(2) = point2d(0, 4);
  f(3) = point2d(4, 3);
  f(4) = point2d(4, 4);
```

```
  typedef p_vertices<util::graph, F> pv_t;
  pv_t pv(g, f);
```

```
template <typename S>
struct viota_t : public mln::Function_v2v< viota_t<S> >
{
  typedef unsigned result;

  viota_t(unsigned size)
  {
    v_.resize(size);
    for(unsigned i = 0; i < size; ++i)
      v_[i] = 10 + i;
  }

  unsigned
  operator()(const mln_psite(S)& p) const
  {
    return v_[p.v().id()];
  }

  protected:
    std::vector<result> v_;
};
```

```
  // Constructs an image
  viota_t<pv_t> viota(pv.nsites());
  mln_VAR(graph_vertices_ima, viota | pv);

  //Prints each vertex and its associated data.
  mln_piter_(graph_vertices_ima_t) p(graph_vertices_ima.domain());
  for_all(p)
    std::cout << "graph_vertices_ima(" << p << ") = "
              << graph_vertices_ima(p) << std::endl;
```

```
graph_vertices_ima((0,0)) = 10
graph_vertices_ima((2,2)) = 11
graph_vertices_ima((0,4)) = 12
graph_vertices_ima((4,3)) = 13
graph_vertices_ima((4,4)) = 14
```

```
  // Function which maps sites to data.
  viota_t viota(g.v_nmax());

  // Iterator on vertices.
  mln_vertex_iter_(util::graph) v(g);

  // Prints each vertex and its associated value.
  for_all(v)
    std::cout << v << " : " << viota(v) << std::endl;
```

```
0 : 10
1 : 11
2 : 12
3 : 13
4 : 14
```

```
    // Iterator on vertices.
    mln_vertex_iter_(util::graph) v(g);

    // Iterator on v's edges.
    mln_vertex_nbh_edge_iter_(util::graph) e(v);
```

```
// Prints the graph
// List all edges for each vertex.
for_all(v)
{
  std::cout << v << " : ";
  for_all(e)
    std::cout << e << " ";
  std::cout << std::endl;
}
```

```
0 : (0,1)
1 : (0,1) (1,2) (1,3)
2 : (1,2) (2,4)
3 : (1,3) (3,4)
4 : (3,4) (2,4)
```

```
// Iterator on edges.
mln_edge_iter_(util::graph) e(g);

// Iterator on edges adjacent to e.
mln_edge_nbh_edge_iter_(util::graph) ne(e);

// Prints the graph
// List all adjacent edges for each edge.
for_all(e)
{
  std::cout << e << " : ";
  for_all(ne)
    std::cout << ne << " ";
  std::cout << std::endl;
}
```

```
(0,1) : (1,2) (1,3)
(1,2) : (0,1) (1,3) (2,4)
(1,3) : (0,1) (1,2) (3,4)
(3,4) : (1,3) (2,4)
(2,4) : (1,2) (3,4)
```

```
// Iterator on vertices.
mln_vertex_iter_(util::graph) v(g);

// Iterator on vertices adjacent to v.
mln_vertex_nbh_vertex_iter_(util::graph) nv(v);

// Prints the graph
// List all adjacent edges for each edge.
for_all(v)
{
  std::cout << v << " : ";
  for_all(nv)
    std::cout << nv << " ";
  std::cout << std::endl;
}
```

```
0 : 1
1 : 0 2 3
2 : 1 4
3 : 1 4
4 : 3 2
```

2.13 Useful global variables

2.14 Useful macros

2.14.1 Variable declaration macros

2.14.2 Iterator type macros

2.14.2.1 Default iterator types

2.14.2.2 Forward iterator types

2.14.2.3 Backward iterators

2.14.2.4 Graph iterators

2.15 Common Compilation Errors

Chapter 3

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Welcome Getting started with Milena

3.3 Getting started with Milena

3.3.1 Getting familiar with genericity

```
// Java or C -like code

void fill(image *ima, unsigned char v)
{
   for (int i = 0; i < ima->nrows; ++i)
     for (int j = 0; j < ima->ncols; ++j)
        ima->data[i][j] = v;
}
```

```
template <typename I>
void fill(I& ima, mln_value(I) v)
{
  mln_piter(I) p(ima.domain());
  for_all(p)
    ima(p) = v;
}
```

```
  fill(ima, literal::green);
```

```
  box2d b(20,20);
  fill((ima | b).rw(), literal::green);
```

3.3.2 First generic algorithm

```
#include <mln/core/image/image2d.hh>
#include <mln/core/image/dmorph/image_if.hh>
#include <mln/core/alias/neighb2d.hh>

#include <mln/data/fill.hh>

#include <mln/labeling/blobs.hh>
#include <mln/labeling/compute.hh>
#include <mln/labeling/blobs.hh>

#include <mln/data/compare.hh>

#include <mln/util/array.hh>

#include <mln/value/label_8.hh>

#include <mln/accu/math/count.hh>

#include <mln/pw/all.hh>

#include <tests/data.hh>
#include <doc/tools/sample_utils.hh>

namespace mln
{

  template <typename I, typename N>
  mln_concrete(I)
  my_algorithm(const Image<I>& ima_,
               const Neighborhood<N>& nbh_)
  {
    trace::entering("my_algorithm");

    const I& ima = exact(ima_);
    const N& nbh = exact(nbh_);
```

```
    mln_precondition(ima.is_valid());
    mln_precondition(nbh.is_valid());

    typedef value::label_8 V;
    V nlabels;
    mln_ch_value(I,V) lbl = labeling::blobs(ima, nbh, nlabels);
    util::array<unsigned>
      count = labeling::compute(accu::meta::math::count(),
                                lbl,
                                nlabels);

    mln_concrete(I) output;
    initialize(output, ima);
    data::fill(output, literal::one);

    for (unsigned i = 1; i <= nlabels; ++i)
      if (count[i] < 10u)
        data::fill((output | (pw::value(lbl) == pw::cst(i))).rw(),
                   literal::zero);

    trace::exiting("my_algorithm");
    return output;
  }

} // end of namespace mln


  template <typename I, typename N>
  mln_concrete(I)
  my_algorithm(const Image<I>& ima_,
               const Neighborhood<N>& nbh_)


    trace::entering("my_algorithm");
```

Debug hints

```
    const I& ima = exact(ima_);
    const N& nbh = exact(nbh_);
    mln_precondition(ima.is_valid());
    mln_precondition(nbh.is_valid());


    typedef value::label_8 V;
    V nlabels;
    mln_ch_value(I,V) lbl = labeling::blobs(ima, nbh, nlabels);
    util::array<unsigned>
      count = labeling::compute(accu::meta::math::count(),
                                lbl,
                                nlabels);


    mln_concrete(I) output;
    initialize(output, ima);
    data::fill(output, literal::one);


    for (unsigned i = 1; i <= nlabels; ++i)
      if (count[i] < 10u)
        data::fill((output | (pw::value(lbl) == pw::cst(i))).rw(),
                   literal::zero);


    trace::exiting("my_algorithm");
    return output;
```

3.3.3 Compilation

3.3.3.1 Include path

3.3.3.2 Library linking

Input / Output

3.3.3.3 Disable Debug

3.3.3.4 Compiler optimization flags

3.3.3.4.1 GCC

3.3.3.4.2 Other compilers

3.3.4 Debug hints

3.3.4.1 Using assertions and GDB

3.3.4.2 Traces

```
// ...
trace::quiet = false;


labeling::blobs(ima, c4(), nlabels);

trace::quiet = true;

geom::bbox(ima);
// ...
```

3.3.4.3 Debug routines

```
  image2d<int_u8> ima(5,5);
  data::fill(ima, 2);
  debug::println(ima);
```

```
2 2 2 2 2
2 2 2 2 2
2 2 2 2 2
2 2 2 2 2
2 2 2 2 2
```

```
  image2d<int_u8> ima(5,5);
  data::fill(ima, 2);
  border::fill(ima, 7);
  debug::println_with_border(ima);
```

```
7 7 7 7 7 7 7 7 7 7 7
7 7 7 7 7 7 7 7 7 7 7
7 7 7 7 7 7 7 7 7 7 7
7 7 7 2 2 2 2 2 7 7 7
7 7 7 2 2 2 2 2 7 7 7
7 7 7 2 2 2 2 2 7 7 7
```

```
7 7 7 2 2 2 2 2 7 7 7
7 7 7 2 2 2 2 2 7 7 7
7 7 7 7 7 7 7 7 7 7 7
7 7 7 7 7 7 7 7 7 7 7
7 7 7 7 7 7 7 7 7 7 7
```

```
  int_u8 vals[25] = { 100, 100, 200, 200, 230,
                      100, 100, 200, 230, 230,
                      140, 140, 140,   0,   0,
                       65, 186, 65, 127, 127,
                       65,  65, 65, 127, 127 };

  image2d<int_u8> ima = make::image2d(vals);
  image2d<rgb8> ima_color = labeling::colorize(rgb8(), ima, 230);
```

Installation Data representation

3.4 Data representation

3.4.1 Sites

```
  point2d p(3,3);
  std::cout << p << std::endl;
```

```
(3,3)
```

3.4.2 Site sets

Site set

3.4.2.1 Creating a site set

```
  box2d b(4,4);
```

```
(0,0), (0,1), (0,2), (0,3), (1,0), (1,1), (1,2), (1,3), (2,0), (2,1), (2,2), (2,3
      ), (3,0), (3,1), (3,2), (3,3),
```

```
    mln_piter_(p_array<point2d>) p(arr);
    for_all(p)
      std::cout << p << ", ";
    std::cout << std::endl;
```

```
(-2,-2), (-2,-1), (-2,0), (-2,1), (-2,2), (-1,-2), (-1,-1), (-1,0), (-1,1), (-1,2
      ), (0,-2), (0,-1), (0,0), (0,1), (0,2), (1,-2), (1,-1), (1,0), (1,1), (1,2), (2,-
      2), (2,-1), (2,0), (2,1), (2,2),
```

```
  mln_piter_(box2d) p(b);
  for_all(p)
    std::cout << p << ", ";
  std::cout << std::endl;
```

```
(2,2), (1,2),
```

3.4.2.2 Getting access to sites

3.4.3 Images

3.4.3.1 Creating an image

3.4.3.2 Reading an image from a file

3.4.3.3 Accessing data

Getting started with Milena Load and save images

3.5 Load and save images

```
image2d<bool> ima;
io::pbm::load(ima, MLN_DOC_DIR "/img/small.pbm");
```

```
io::pbm::save(ima, MLN_DOC_DIR "/figures/ima_save.pbm");
```

Load and save images Data representation Create your first image

3.6 Create your first image

See also

tuto2_first_image.cc

```
bool vals[13][21] = {
    {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0},
    {0, 1, 0, 1, 0, 1, 1, 1, 0, 1, 0, 0, 0, 1, 0, 0, 0, 0, 1, 0, 0},
    {0, 1, 0, 1, 0, 1, 0, 0, 0, 1, 0, 0, 0, 1, 0, 0, 0, 1, 0, 1, 0},
    {0, 1, 1, 1, 0, 1, 1, 1, 0, 1, 0, 0, 0, 1, 0, 0, 0, 1, 0, 1, 0},
    {0, 1, 0, 1, 0, 1, 0, 0, 0, 1, 0, 0, 0, 1, 0, 0, 0, 1, 0, 1, 0},
    {0, 1, 0, 1, 0, 1, 1, 1, 0, 1, 1, 1, 0, 1, 1, 1, 0, 0, 1, 0, 0},
    {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0},
    {0, 1, 0, 1, 0, 0, 1, 0, 0, 1, 1, 0, 0, 1, 0, 0, 0, 1, 1, 0, 0},
    {0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 0, 0, 1, 0, 1, 0},
    {0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 1, 0, 0, 1, 0, 0, 0, 1, 0, 1, 0},
    {0, 1, 1, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 1, 0, 0, 0, 1, 0, 1, 0},
    {0, 1, 0, 1, 0, 0, 1, 0, 0, 1, 0, 1, 0, 1, 1, 1, 0, 1, 1, 0, 0},
    {0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0}
};
```

```
image2d<bool> ima = make::image(vals);
```

Create an image

```
debug::println(ima);
```

```
- - - - - - - - - - - - - - - - - - - - -
- | - | - | | | - | - - - | - - - - | - -
- | - | - | - - - | - - - | - - - | - | -
- | | | - | | | - | - - - | - - - | - | -
- | - | - | - - - | - - - | - - - | - | -
```

```
- | - | - | | | - | | | - | | | - - | - -
- - - - - - - - - - - - - - - - - - - - -
- | - | - - | - - | | - - | - - - | | - -
- | - | - | - | - | - | - | - - - | - | -
- | - | - | - | - | | - - | - - - | - | -
- | | | - | - | - | - | - | - - - | - | -
- | - | - - | - - | - | - | | | - | | - -
- - - - - - - - - - - - - - - - - - - - -
```

```
  doc::pbmsave(ima, "tuto2_first_image");
```

Possible value types Load and save images Read and write images

3.7 Read and write images

See also

tuto3_rw_image.cc

```
  image2d<value::rgb8> ima(40, 40);

  data::fill(ima, literal::red);

  for (def::coord row = 20; row < 30; ++row)
    for (def::coord col = 20; col < 30; ++col)
      ima(point2d(row, col)) = literal::blue;

  for (def::coord row = 20; row < 30; ++row)
    for (def::coord col = 20; col < 30; ++col)
      opt::at(ima, row, col) = literal::blue;

  image2d<value::rgb8> lena;
  io::ppm::load(lena, MLN_IMG_DIR "/small.ppm");

  data::fill(ima, lena);

  data::paste(ima, lena);
```

Access and modify values Fill Paste Create your first image Regions of interest

3.8 Regions of interest

See also

tuto4_genericity_and_algorithms.cc

```
  image2d<value::rgb8> lena;
  io::ppm::load(lena, MLN_IMG_DIR "/small.ppm");

namespace data
{

  template <typename I, typename D>
  void fill(Image<I>& ima, const D& data);

}
```

3.8.1 Image domain restricted by a site set

```
box2d roi = make::box2d(20, 20, 39, 39);
```

```
data::fill((lena | roi).rw(), literal::green);
```

3.8.2 Image domain restricted by a function

```
p_array<point2d> arr;
for (def::coord row = geom::min_row(lena); row < geom::max_row(lena); ++row)
  for (def::coord col = geom::min_row(lena); col < geom::max_col(lena); ++col)
    if (((row + col) % 2) == 0)
      arr.append(point2d(row, col));
```

```
for (def::coord row = geom::min_row(lena); row < geom::max_row(lena); ++row)
  for (def::coord col = geom::min_row(lena); col < geom::max_col(lena); ++col)
    if (((row + col) % 2) == 0)
      opt::at(lena, row, col) = literal::green;
```

```
data::fill((lena | fun::p2b::chess()).rw(), literal::green);
```

3.8.3 Image domain restricted by a mask

```
image2d<bool> mask;
initialize(mask, lena);
data::fill(mask, false);
data::fill((mask | make::box2d(10, 10, 14, 14)).rw(), true);
data::fill((mask | make::box2d(25, 15, 29, 18)).rw(), true);
data::fill((mask | make::box2d(50, 50, 54, 54)).rw(), true);
```

```
data::fill((lena | pw::value(mask)).rw(), literal::green);
```

3.8.4 Image domain restricted by a predicate

```
image2d<bool> lena_bw = binarization::binarization(lena, keep_specific_colors()
    );
value::label_8 nlabels;
image2d<value::label_8> label = labeling::blobs(lena_bw, c8(), nlabels);
```

```
data::fill((lena | (pw::value(label) == pw::cst(0u))).rw(), literal::blue);
```

Read and write images

Chapter 4

Module Index

4.1 Modules

Here is a list of all modules:

Chapter 5

Namespace Index

5.1 Namespace List

Here is a list of all documented namespaces with brief descriptions:

Chapter 6

Class Index

6.1 Class Hierarchy

This inheritance list is sorted roughly, but not completely, alphabetically:

Chapter 7

Class Index

7.1 Class List

Here are the classes, structs, unions and interfaces with brief descriptions:

Chapter 8

Module Documentation

8.1 On site sets

Accumulators working on site sets.

Classes

- struct mln::accu::center< P, V >

  Mass center accumulator.

- struct mln::accu::math::count< T >

  Generic counter accumulator.

- struct mln::accu::shape::bbox< P >

  Generic bounding box accumulator class.

- class mln::accu::site_set::rectangularity< P >

  Compute the rectangularity of a site set.

8.1.1 Detailed Description

Accumulators working on site sets.

8.2 On images

Accumulators working on images.

Classes

- struct mln::accu::count_adjacent_vertices< F, S >

  Accumulator class counting the number of vertices adjacent to a set of mln::p_edges_psite (i.e., a set of edges).

- struct mln::accu::max_site< I >

  Define an accumulator that computes the first site with the maximum value in an image.

- struct mln::accu::shape::height< I >

  Height accumulator.

- struct mln::accu::shape::volume< I >

  Volume accumulator class.

8.2.1 Detailed Description

Accumulators working on images.

8.3 On values

Accumulators working on image values.

Classes

- struct mln::accu::convolve< T1, T2, R >

  Generic convolution accumulator class.

- struct mln::accu::count_labels< L >

  Count the number of different labels in an image.

- struct mln::accu::count_value< V >

  Define an accumulator that counts the occurrence of a given value.

- struct mln::accu::histo< V >

  Generic histogram class over a value set with type `V`.

- struct mln::accu::label_used< L >

  References all the labels used.

- struct mln::accu::logic::land

  "Logical-and" accumulator.

- struct mln::accu::logic::land_basic

  "Logical-and" accumulator.

- struct mln::accu::logic::lor

  "Logical-or" accumulator.

- struct mln::accu::logic::lor_basic

  "Logical-or" accumulator class.

- struct mln::accu::maj_h< T >

  Compute the majority value.

- struct mln::accu::math::inf< T >

  Generic inf accumulator class.

- struct mln::accu::math::sum< T, S >

  Generic sum accumulator class.

- struct mln::accu::math::sup< T >

  Generic sup accumulator class.

- struct mln::accu::rms< T, V >

  Generic root mean square accumulator class.

- struct mln::accu::stat::deviation< T, S, M >

  Generic standard deviation accumulator class.

- struct mln::accu::stat::histo3d_rgb< V >

  Define a histogram as accumulator which returns an image3d.

- struct mln::accu::stat::max< T >

  Generic max accumulator class.

- struct mln::accu::stat::max_h< V >

  Generic max function based on histogram over a value set with type `V`.

- struct mln::accu::stat::mean< T, S, M >

  Generic mean accumulator class.

- struct mln::accu::stat::median_alt< S >

  Generic median_alt function based on histogram over a value set with type `S`.

- struct mln::accu::stat::median_h< V >

  Generic median function based on histogram over a value set with type `V`.

- struct mln::accu::stat::min< T >

  Generic min accumulator class.

- struct mln::accu::stat::min_h< V >

  Generic min function based on histogram over a value set with type `V`.

- struct mln::accu::stat::min_max< V >

  Generic min and max accumulator class.

- struct mln::accu::stat::rank< T >

  Generic rank accumulator class.

- struct mln::accu::stat::rank< bool >

  rank accumulator class for Boolean.

- struct mln::accu::stat::rank_high_quant< T >

  Generic rank accumulator class.

- struct mln::accu::stat::var< T >

  Var accumulator class.

- struct mln::accu::stat::variance< T, S, R >

  Variance accumulator class.

8.3.1 Detailed Description

Accumulators working on image values.

8.4 Multiple accumulators

Set of special accumulators for computing several accumulators at the same time.

Classes

- struct mln::accu::pair< A1, A2, T >

  Generic pair of accumulators.

- struct mln::accu::tuple< A, n, >

  Generic tuple of accumulators.

8.4.1 Detailed Description

Set of special accumulators for computing several accumulators at the same time.

8.5 Graphes

All graphes implementations.

Classes

- class mln::util::graph

  Undirected graph.

- class mln::util::line_graph< G >

  Undirected line graph of a graph of type `G`.

8.5.1 Detailed Description

All graphes implementations.

8.6 Images

All the generic image types provided in Olena.

Modules

- Basic types

  Concrete images.

- Image morphers

  Morpher on both image values and domain.

- Values morphers

  Morpher on image values.

- Domain morphers

  Morpher on image domain.

- Identity morphers

  Morpher adding new functionnalities.

8.6.1 Detailed Description

All the generic image types provided in Olena.

8.7 Basic types

Concrete images.

Classes

- class mln::complex_image< D, G, V >

  Image based on a complex.

- class mln::edge_image< P, V, G >

  Image based on graph edges.

- struct mln::flat_image< T, S >

  Image with a single value.

- struct mln::image1d< T >

Basic 1D image class.

- class mln::image2d< T >

  Basic 2D image class.

- struct mln::image2d_h< V >

  2d image based on an hexagonal mesh.

- struct mln::image3d< T >

  Basic 3D image class.

- class mln::pw::image< F, S >

  A generic point-wise image implementation.

- class mln::vertex_image< P, V, G >

  Image based on graph vertices.

8.7.1 Detailed Description

Concrete images.

8.8 Image morphers

Morpher on both image values and domain.

Morpher on both image values and domain.

8.9 Values morphers

Morpher on image values.

Classes

- struct mln::fun_image< F, I >

  Image read through a function.

- class mln::thru_image< I, F >

  Morph image values through a function.

- class mln::thrubin_image< I1, I2, F >

  Morphes values from two images through a binary function.

- struct mln::violent_cast_image< T, I >

  Violently cast image values to a given type.

8.9.1 Detailed Description

Morpher on image values.

8.10 Domain morphers

Morpher on image domain.

Classes

- struct mln::extended< I >

  Makes an image become restricted by a point set.

- class mln::extension_fun< I, F >

  Extends the domain of an image with a function.

- class mln::extension_ima< I, J >

  Extends the domain of an image with an image.

- class mln::extension_val< I >

  Extends the domain of an image with a value.

- struct mln::hexa< I >

  hexagonal image class.

- struct mln::image_if< I, F >

  Image which domain is restricted by a function 'site -> Boolean'.

- struct mln::p2p_image< I, F >

  FIXME: Doc!

- struct mln::slice_image< I >

  2D image extracted from a slice of a 3D image.

- class mln::sub_image< I, S >

  Image having its domain restricted by a site set.

- struct mln::sub_image_if< I, S >

  Image having its domain restricted by a site set and a function.

- struct mln::unproject_image< I, D, F >

  Un-projects an image.

8.10.1 Detailed Description

Morpher on image domain.

8.11 Identity morphers

Morpher adding new functionnalities.

Classes

- struct mln::decorated_image< I, D >

  Image that can have additional features.

- class mln::labeled_image< I >

  Morpher providing an improved interface for labeled image.

- struct mln::lazy_image< I, F, B >

  Image values are computed on the fly.

- class mln::plain< I >

  Prevents an image from sharing its data.

- class mln::safe_image< I >

  Makes an image accessible at undefined location.

- struct mln::tr_image< S, I, T >

  Transform an image by a given transformation.

8.11.1 Detailed Description

Morpher adding new functionnalities.

8.12 Types

Milena Object types.

Modules

- Graphes

  All graphes implementations.

- Images

  All the generic image types provided in Olena.

- Neighborhoods

  All the predefined generic neighborhoods.

- Site sets

  All Site set types.

- Utilities

  Miscalleneous useful containers/structures.

- Windows

  All the predefined generic windows.

8.12.1 Detailed Description

Milena Object types.

8.13 Accumulators

All accumulator types.

Modules

- On site sets

  Accumulators working on site sets.

- On images

  Accumulators working on images.

- On values

  Accumulators working on image values.

- Multiple accumulators

  Set of special accumulators for computing several accumulators at the same time.

8.13.1 Detailed Description

All accumulator types.

8.14 Routines

All algorithms/routines provided in Milena.

All algorithms/routines provided in Milena.

8.15 Canvas

All canvas.

All canvas.

8.16 Functions

All predefined functions.

Classes

- struct mln::Function< E >

  Base class for implementation of function-objects.

- struct mln::Function_n2v< E >

  Base class for implementation of function-objects from Nil to value.

- struct mln::Function_v2b< E >

  Base class for implementation of function-objects from a value to a Boolean.

- struct mln::Function_v2v< E >

  Base class for implementation of function-objects from value to value.

- struct mln::Function_vv2b< E >

  Base class for implementation of function-objects from a couple of values to a Boolean.

- struct mln::Function_vv2v< E >

  Base class for implementation of function-objects from a couple of values to a value.

Namespaces

- namespace mln::fun::i2v

  Namespace of integer-to-value functions.

- namespace mln::fun::n2v

  Namespace of functions from nil to value.

- namespace mln::fun::stat

  Namespace of statistical functions.

- namespace mln::fun::v2i

  Namespace of value-to-integer functions.

- namespace mln::fun::v2v

  Namespace of functions from value to value.

Modules

- v2w2v functions

  All bijective functions.

- v2w_w2v functions
  All bijective function.
- vv2b functions
  All functions mapping two values to a logical value.

8.16.1 Detailed Description

All predefined functions.

8.17 Neighborhoods

All the predefined generic neighborhoods.

Modules

- 1D neighborhoods
  Predefined 1D neighborhoods.
- 2D neighborhoods
  Predefined 2D neighborhoods.
- 3D neighborhoods
  Predefined 3D neighborhoods.

8.17.1 Detailed Description

All the predefined generic neighborhoods.

8.18 1D neighborhoods

Predefined 1D neighborhoods.

Typedefs

- typedef neighb< window1d > mln::neighb1d
  Type alias for a neighborhood defined on the 1D square grid with integer coordinates.

Functions

- const neighb1d & mln::c2 ()
  2-connectivity neighborhood on the 1D grid.

8.18.1 Detailed Description

Predefined 1D neighborhoods.

8.18.2 Typedef Documentation

8.18.2.1 typedef neighb<window1d> mln::neighb1d

Type alias for a neighborhood defined on the 1D square grid with integer coordinates.

Definition at line 47 of file neighb1d.hh.

8.18.3 Function Documentation

8.18.3.1 const neighb1d & mln::c2 ( ) `[inline]`

2-connectivity neighborhood on the 1D grid.

```
o x o
```

Returns

A neighb1d.

Definition at line 67 of file neighb1d.hh.

8.19 2D neighborhoods

Predefined 2D neighborhoods.

Typedefs

- typedef neighb< window2d > mln::neighb2d
  Type alias for a neighborhood defined on the 2D square grid with integer coordinates.

Functions

- const neighb2d & mln::c2_col ()
  Vertical 2-connectivity neighborhood on the 2D grid.
- const neighb2d & mln::c2_row ()
  Horizontal 2-connectivity neighborhood on the 2D grid.
- const neighb2d & mln::c4 ()
  4-connectivity neighborhood on the 2D grid.
- const neighb2d & mln::c8 ()
  8-connectivity neighborhood on the 2D grid.

8.19.1 Detailed Description

Predefined 2D neighborhoods.

8.19.2 Typedef Documentation

8.19.2.1 typedef neighb<window2d> mln::neighb2d

Type alias for a neighborhood defined on the 2D square grid with integer coordinates.

Definition at line 51 of file core/alias/neighb2d.hh.

8.19.3 Function Documentation

8.19.3.1 const neighb2d & mln::c2_col ( ) `[inline]`

Vertical 2-connectivity neighborhood on the 2D grid.

```
- o -
- x -
- o -
```

Returns

A neighb2d.

Definition at line 190 of file core/alias/neighb2d.hh.

8.19.3.2 const neighb2d & mln::c2_row ( ) `[inline]`

Horizontal 2-connectivity neighborhood on the 2D grid.

```
- - -
o x o
- - -
```

Returns

A neighb2d.

Definition at line 176 of file core/alias/neighb2d.hh.

8.19.3.3 const neighb2d & mln::c4 ( ) `[inline]`

4-connectivity neighborhood on the 2D grid.

```
- o -
o x o
- o -
```

Returns

A neighb2d.

Definition at line 148 of file core/alias/neighb2d.hh.

8.19.3.4 const neighb2d & mln::c8 ( ) [inline]

8-connectivity neighborhood on the 2D grid.

```
o o o
o x o
o o o
```

Returns

A neighb2d.

Definition at line 162 of file core/alias/neighb2d.hh.

8.20 3D neighborhoods

Predefined 3D neighborhoods.

Typedefs

- typedef neighb< window3d > mln::neighb3d
  Type alias for a neighborhood defined on the 3D square grid with integer coordinates.

Functions

- const neighb3d & mln::c18 ()
  18-connectivity neighborhood on the 3D grid.
- const neighb3d & mln::c26 ()
  26-connectivity neighborhood on the 3D grid.
- const neighb3d & mln::c2_3d_sli ()
  depth 2-connectivity neighborhood on the 3D grid.
- const neighb3d & mln::c4_3d ()
  4-connectivity neighborhood on the 3D grid.
- const neighb3d & mln::c6 ()
  6-connectivity neighborhood on the 3D grid.
- const neighb3d & mln::c8_3d ()
  8-connectivity neighborhood on the 3D grid.

8.20.1 Detailed Description

Predefined 3D neighborhoods.

8.20.2 Typedef Documentation

8.20.2.1 typedef neighb<window3d> mln::neighb3d

Type alias for a neighborhood defined on the 3D square grid with integer coordinates.

Definition at line 50 of file neighb3d.hh.

8.20.3 Function Documentation

8.20.3.1 const neighb3d & mln::c18 ( ) `[inline]`

18-connectivity neighborhood on the 3D grid.

```
    . o .
  o o o
. o .

    o o o
  o x o
o o o

    . o .
  o o o
. o .
```

Returns

A neighb3d.

Definition at line 288 of file neighb3d.hh.

References mln::c6(), mln::window< D >::insert(), and mln::win::sym().

Referenced by mln::c26().

8.20.3.2 const neighb3d & mln::c26 ( ) `[inline]`

26-connectivity neighborhood on the 3D grid.

```
    o o o
  o o o
o o o

    o o o
  o x o
o o o

    o o o
  o o o
```

```
o o o
```

Returns

A neighb3d.

Definition at line 309 of file neighb3d.hh.

References mln::c18(), mln::window< D >::insert(), and mln::win::sym().

8.20.3.3 const neighb3d & mln::c2_3d_sli ( ) [inline]

depth 2-connectivity neighborhood on the 3D grid.

```
   . . .
  . o .
 . . .

   . . .
  . x .
 . . .

   . . .
  . o .
 . . .
```

Returns

A neighb3d.

Definition at line 226 of file neighb3d.hh.

References mln::window< D >::insert().

8.20.3.4 const neighb3d & mln::c4_3d ( ) [inline]

4-connectivity neighborhood on the 3D grid.

```
   . . .
  . . .
 . . .

   . o .
  o x o
 . o .

   . . .
  . . .
 . . .
```

Returns

A neighb3d.

Definition at line 241 of file neighb3d.hh.

References mln::window< D >::insert(), and mln::win::sym().

8.20.3.5 const neighb3d & mln::c6 ( ) [inline]

6-connectivity neighborhood on the 3D grid.

```
    . . .
   . o .
  . . .

    . o .
   o x o
  . o .

    . . .
   . o .
  . . .
```

Returns

A neighb3d.

Definition at line 271 of file neighb3d.hh.

References mln::window< D >::insert(), and mln::win::sym().

Referenced by mln::c18().

8.20.3.6 const neighb3d & mln::c8_3d ( ) [inline]

8-connectivity neighborhood on the 3D grid.

```
    . . .
   . . .
  . . .

    o o o
   o x o
  o o o

    . . .
   . . .
  . . .
```

Returns

A neighb3d.

Definition at line 257 of file neighb3d.hh.

8.21 Site sets

All Site set types.

Modules

- Basic types
  Basic site sets.
- Graph based
  Site sets based on a graph.
- Complex based
  Site sets based on a complexes.
- Sparse types
  Sparse site sets.
- Queue based
  Site sets based on a queue.

8.21.1 Detailed Description

All Site set types.

8.22 Basic types

Basic site sets.

Classes

- class mln::box< P >
  Generic box class: site set containing points of a regular grid.
- class mln::p_line2d
  2D discrete line of points.
- class mln::p_mutable_array_of< S >
  p_mutable_array_of is a mutable array of site sets.
- class mln::p_run< P >
  Point set class in run.

8.22.1 Detailed Description

Basic site sets.

8.23 Graph based

Site sets based on a graph.

Classes

- class mln::p_edges< G, F >
  Site set mapping graph edges and image sites.
- struct mln::p_faces< N, D, P >
  A complex psite set based on a the N-faces of a complex of dimension D (a D-complex).
- class mln::p_vertices< G, F >
  Site set based mapping graph vertices to sites.

8.23.1 Detailed Description

Site sets based on a graph.

8.24 Complex based

Site sets based on a complexes.

Classes

- class mln::p_complex< D, G >
  A complex psite set based on the N-faces of a complex of dimension `D` (a `D-complex`).

8.24.1 Detailed Description

Site sets based on a complexes.

8.25 Sparse types

Sparse site sets.

Classes

- class mln::p_array< P >
  Multi-set of sites.
- class mln::p_centered< W >
  Site set corresponding to a window centered on a site.

- class mln::p_if< S, F >
  Site set restricted w.r.t.
- class mln::p_image< I >
  Site set based on an image of Booleans.
- class mln::p_set< P >
  Mathematical set of sites (based on util::set).
- class mln::p_transformed< S, F >
  Site set transformed through a function.
- class mln::p_vaccess< V, S >
  Site set in which sites are grouped by their associated value.

8.25.1 Detailed Description

Sparse site sets.

8.26 Queue based

Site sets based on a queue.

Classes

- class mln::p_key< K, P >
  Priority queue class.
- class mln::p_priority< P, Q >
  Priority queue.
- class mln::p_queue< P >
  Queue of sites (based on std::deque).
- class mln::p_queue_fast< P >
  Queue of sites class (based on p_array.

8.26.1 Detailed Description

Site sets based on a queue.

8.27 Utilities

Miscalleneous useful containers/structures.

Classes

- class mln::util::adjacency_matrix< V >

    A class of adjacency matrix.

- class mln::util::array< T >

    A dynamic array class.

- class mln::util::couple< T, U >

    Definition of a couple.

- struct mln::util::eat

    Eat structure.

- class mln::util::fibonacci_heap< P, T >

    Fibonacci heap.

- struct mln::util::ignore

    Ignore structure.

- struct mln::util::nil

    Nil structure.

- struct mln::util::ord_pair< T >

    Ordered pair structure s.a.

- class mln::util::set< T >

    An "efficient" mathematical set class.

- class mln::util::site_pair< P >

    A pair of sites.

- class mln::util::soft_heap< T, R >

    Soft heap.

- struct mln::util::tracked_ptr< T >

    Smart pointer for shared data with tracking.

- struct mln::util::yes

    Object that always says "yes".

8.27.1 Detailed Description

Miscalleneous useful containers/structures.

8.28 Windows

All the predefined generic windows.

Modules

- 1D windows

    Predefined 1D windows.

- 2D windows

    Predefined 2D windows.

- 3D windows

    Predefined 3D windows.

- N-D windows

    Predefined N-D windows.

- Multiple windows

    Generic multiple windows.

8.28.1 Detailed Description

All the predefined generic windows.

8.29 1D windows

Predefined 1D windows.

Typedefs

- typedef line< grid::tick, 0, def::coord > mln::win::segment1d

    Segment window defined on the 1D grid.

- typedef window< mln::dpoint1d > mln::window1d

    Type alias for a window with arbitrary shape, defined on the 1D square grid with integer coordinates.

8.29.1 Detailed Description

Predefined 1D windows.

8.29.2 Typedef Documentation

8.29.2.1 typedef line<grid::tick, 0, def::coord> mln::win::segment1d

Segment window defined on the 1D grid.

An segment1d is centered and symmetric; so its height (length) is odd.
For instance:

```
o x o
```

is defined with length = 3.

Definition at line 56 of file segment1d.hh.

8.29.2.2 typedef window<mln::dpoint1d> mln::window1d

Type alias for a window with arbitrary shape, defined on the 1D square grid with integer coordinates.

Definition at line 47 of file window1d.hh.

8.30 2D windows

Predefined 2D windows.

Classes

- struct mln::win::backdiag2d

  Diagonal line window defined on the 2D square grid.

- struct mln::win::diag2d

  Diagonal line window defined on the 2D square grid.

- struct mln::win::octagon2d

  Octagon window defined on the 2D square grid.

- struct mln::win::rectangle2d

  Rectangular window defined on the 2D square grid.

Typedefs

- typedef ball< grid::square, def::coord > mln::win::disk2d

  2D disk window; precisely, ball-shaped window defined on the 2D square grid.

- typedef line< grid::square, 1, def::coord > mln::win::hline2d

  Horizontal line window defined on the 2D square grid.

- typedef line< grid::square, 0, def::coord > mln::win::vline2d

  Vertical line window defined on the 2D square grid.

- typedef window< mln::dpoint2d > mln::window2d

  Type alias for a window with arbitrary shape, defined on the 2D square grid with integer coordinates.

Functions

- const window2d & mln::win_c4p ()

  4-connectivity window on the 2D grid, including the center.

- const window2d & mln::win_c8p ()

  8-connectivity window on the 2D grid, including the center.

8.30.1 Detailed Description

Predefined 2D windows.

8.30.2 Typedef Documentation

8.30.2.1 typedef ball<grid::square, def::coord> mln::win::disk2d

2D disk window; precisely, ball-shaped window defined on the 2D square grid.

Definition at line 49 of file disk2d.hh.

8.30.2.2 typedef line<grid::square, 1, def::coord> mln::win::hline2d

Horizontal line window defined on the 2D square grid.

An hline2d is centered and symmetric; so its height is 1 and its width (length) is odd.

For instance:

```
o o x o o
```

is defined with length = 5.

Definition at line 57 of file hline2d.hh.

8.30.2.3 typedef line<grid::square, 0, def::coord> mln::win::vline2d

Vertical line window defined on the 2D square grid.

An vline2d is centered and symmetric; so its width is 1 and its height (length) is odd.

For instance:

```
o
x
o
```

is defined with length = 3.

Definition at line 58 of file vline2d.hh.

8.30.2.4 typedef window<mln::dpoint2d> mln::window2d

Type alias for a window with arbitrary shape, defined on the 2D square grid with integer coordinates.

Definition at line 49 of file window2d.hh.

8.30.3 Function Documentation

8.30.3.1 const window2d & mln::win_c4p ( ) `[inline]`

4-connectivity window on the 2D grid, including the center.

```
- o -
o x o
- o -
```

Returns

A window2d.

Definition at line 105 of file window2d.hh.

References mln::window< D >::insert(), and mln::window< D >::size().

8.30.3.2 const window2d & mln::win_c8p ( ) `[inline]`

8-connectivity window on the 2D grid, including the center.

```
o o o
o x o
o o o
```

Returns

A window2d.

Definition at line 121 of file window2d.hh.

References mln::window< D >::insert(), and mln::window< D >::size().

8.31 3D windows

Predefined 3D windows.

Classes

- struct mln::win::cube3d

  Cube window defined on the 3D grid.

- struct mln::win::cuboid3d

  Cuboid defined on the 3-D square grid.

Typedefs

- typedef line< grid::cube, 0, def::coord > mln::win::sline3d

  Depth line window defined on the 3D cubic grid.

- typedef ball< grid::cube, def::coord > mln::win::sphere3d

  3D sphere window; precisely, ball-shaped window defined on the 3D cubic grid.

- typedef window< mln::dpoint3d > mln::window3d

  Type alias for a window with arbitrary shape, defined on the 3D square grid with integer coordinates.

Functions

- const window3d & mln::win_c4p_3d ()

  4-connectivity window on the 3D grid, including the center.

- const window3d & mln::win_c8p_3d ()

  8-connectivity window on the 3D grid, including the center.

8.31.1 Detailed Description

Predefined 3D windows.

8.31.2 Typedef Documentation

8.31.2.1 typedef line<grid::cube, 0, def::coord> mln::win::sline3d

Depth line window defined on the 3D cubic grid.

An sline3d is centered and symmetric; so its height and its width are 1 and its depth is odd.

For instance:

```
    . . .
   . o .
  . . .

    . . .
   . x .
  . . .

    . . .
   . o .
  . . .
```

is defined with length = 3.

Definition at line 68 of file sline3d.hh.

8.31.2.2 typedef ball<grid::cube, def::coord> mln::win::sphere3d

3D sphere window; precisely, ball-shaped window defined on the 3D cubic grid.

Definition at line 47 of file sphere3d.hh.

8.31.2.3 typedef window<mln::dpoint3d> mln::window3d

Type alias for a window with arbitrary shape, defined on the 3D square grid with integer coordinates.

Definition at line 48 of file window3d.hh.

8.31.3 Function Documentation

8.31.3.1 const window3d & mln::win_c4p_3d ( ) `[inline]`

4-connectivity window on the 3D grid, including the center.

```
    - - -
  - - -
- - -

    - o -
  o x o
- o -

    - - -
  - - -
- - -
```

Returns

A window3d.

Definition at line 119 of file window3d.hh.

References mln::window< D >::insert(), and mln::window< D >::size().

8.31.3.2 const window3d & mln::win_c8p_3d ( ) `[inline]`

8-connectivity window on the 3D grid, including the center.

```
    - - -
  - - -
- - -

    o o o
  o x o
o o o

    - - -
  - - -
- - -
```

Returns

A window3d.

Definition at line 135 of file window3d.hh.

References mln::window< D >::insert(), and mln::window< D >::size().

8.32 N-D windows

Predefined N-D windows.

Classes

- struct mln::win::ball< G, C >

  Generic ball window defined on a given grid.

- struct mln::win::line< M, i, C >

  Generic line window defined on a given grid in the given dimension.

8.32.1 Detailed Description

Predefined N-D windows.

8.33 Multiple windows

Generic multiple windows.

Classes

- class mln::win::multiple< W, F >

  Multiple window.

- class mln::win::multiple_size< n, W, F >

  Definition of a multiple-size window.

8.33.1 Detailed Description

Generic multiple windows.

8.34 v2w2v functions

All bijective functions.

All bijective functions.

8.35 v2w_w2v functions

All bijective function.

All bijective function.

8.36 vv2b functions

All functions mapping two values to a logical value.

All functions mapping two values to a logical value.

Chapter 9

Namespace Documentation

9.1 mln Namespace Reference

mln/convert/to_image.hh

Namespaces

- namespace accu

  Namespace of accumulators.

- namespace algebra

  Namespace of algebraic structure.

- namespace arith

  Namespace of arithmetic.

- namespace binarization

  Namespace of "point-wise" expression tools.

- namespace border

  Namespace of routines related to image virtual (outer) border.

- namespace canvas

  Namespace of canvas.

- namespace convert

  Namespace of conversion routines.

- namespace data

  Namespace of image processing routines related to pixel data.

- namespace debug

  Namespace of routines that help to debug.

- namespace def

Namespace for core definitions.

- namespace display

  Namespace of routines that help to display images.

- namespace doc

  The namespace mln::doc is only for documentation purpose.

- namespace draw

  Namespace of drawing routines.

- namespace estim

  Namespace of estimation materials.

- namespace extension

  Namespace of extension tools.

- namespace fun

  Namespace of functions.

- namespace geom

  Namespace of all things related to geometry.

- namespace graph

  Namespace of graph related routines.

- namespace grid

  Namespace of grids definitions.

- namespace histo

  Namespace of histograms.

- namespace impl

  Implementation namespace of mln namespace.

- namespace io

  Namespace of input/output handling.

- namespace labeling

  Namespace of labeling routines.

- namespace linear

  Namespace of linear image processing routines.

- namespace literal

  Namespace of literals.

- namespace logical

  Namespace of logic.

- namespace make

  Namespace of routines that help to make Milena's objects.

- namespace math

  Namespace of mathematical routines.

- namespace metal

  Namespace of meta-programming tools.

- namespace morpho

  Namespace of mathematical morphology routines.

- namespace norm

  Namespace of norms.

- namespace opt

  Namespace of optional routines.

- namespace pw

  Namespace of "point-wise" expression tools.

- namespace registration

  Namespace of "point-wise" expression tools.

- namespace select

  Select namespace (FIXME doc).

- namespace set

  Namespace of image processing routines related to pixel sets.

- namespace subsampling

  Namespace of "point-wise" expression tools.

- namespace tag

  Namespace of image processing routines related to tags.

- namespace test

  Namespace of image processing routines related to pixel tests.

- namespace topo

  Namespace of "point-wise" expression tools.

- namespace trace

  Namespace of routines related to the trace mechanism.

- namespace trait

  Namespace where traits are defined.

- namespace transform

  Namespace of transforms.

- namespace util

  Namespace of tools using for more complex algorithm.

- namespace value

  Namespace of materials related to pixel value types.

- namespace win

  Namespace of image processing routines related to win.

Classes

- struct Accumulator

  Base class for implementation of accumulators.

- class bkd_pixter1d

  Backward pixel iterator on a 1-D image with border.

- class bkd_pixter2d

  Backward pixel iterator on a 2-D image with border.

- class bkd_pixter3d

  Backward pixel iterator on a 3-D image with border.

- class box

  Generic box class: site set containing points of a regular grid.

- struct Box

  Base class for implementation classes of boxes.

- class box_runend_piter

  A generic backward iterator on points by lines.

- class box_runstart_piter

  A generic forward iterator on points by lines.

- struct Browsing

  Base class for implementation classes that are browsings.

- struct category< R(∗)(A) >

  Category declaration for a unary C function.

- class complex_image

  Image based on a complex.

- class complex_neighborhood_bkd_piter

  Backward iterator on complex neighborhood.

- class complex_neighborhood_fwd_piter

  Forward iterator on complex neighborhood.

- class complex_psite

  Point site associated to a mln::p_complex.

- class complex_window_bkd_piter

  Backward iterator on complex window.

- class complex_window_fwd_piter

  Forward iterator on complex window.

- struct decorated_image

  Image that can have additional features.

- struct Delta_Point_Site< void >

  Delta point site category flag type.

- struct dpoint

  Generic delta-point class.

- struct Dpoint

  Base class for implementation of delta-point classes.

- class dpoints_bkd_pixter

  A generic backward iterator on the pixels of a dpoint-based window or neighborhood.

- class dpoints_fwd_pixter

  A generic forward iterator on the pixels of a dpoint-based window or neighborhood.

- struct Edge

  edge category flag type.

- class edge_image

  Image based on graph edges.

- struct extended

  Makes an image become restricted by a point set.

- class extension_fun

  Extends the domain of an image with a function.

- class extension_ima

  Extends the domain of an image with an image.

- class extension_val

  Extends the domain of an image with a value.

- class faces_psite

  Point site associated to a mln::p_faces.

- struct flat_image

  Image with a single value.

- struct fun_image

  Image read through a function.

- struct Function

  Base class for implementation of function-objects.

- struct Function< void >

  Function category flag type.

- struct Function_n2v

  Base class for implementation of function-objects from Nil to value.

- struct Function_v2b

  Base class for implementation of function-objects from a value to a Boolean.

- struct Function_v2v

  Base class for implementation of function-objects from value to value.

- struct Function_vv2b

  Base class for implementation of function-objects from a couple of values to a Boolean.

- struct Function_vv2v

  Base class for implementation of function-objects from a couple of values to a value.

- class fwd_pixter1d

  Forward pixel iterator on a 1-D image with border.

- class fwd_pixter2d

  Forward pixel iterator on a 2-D image with border.

- class fwd_pixter3d

  Forward pixel iterator on a 3-D image with border.

- struct Gdpoint

  FIXME: Doc!

- struct Gdpoint< void >

  Delta point site category flag type.

- struct Gpoint

  Base class for implementation of point classes.

- struct Graph

  Base class for implementation of graph classes.

- struct graph_elt_mixed_neighborhood

Elementary neighborhood on graph class.

- class graph_elt_mixed_window

  Elementary window on graph class.

- struct graph_elt_neighborhood

  Elementary neighborhood on graph class.

- struct graph_elt_neighborhood_if

  Elementary neighborhood_if on graph class.

- class graph_elt_window

  Elementary window on graph class.

- class graph_elt_window_if

  Custom window on graph class.

- class graph_window_base
- class graph_window_if_piter

  Forward iterator on line graph window.

- class graph_window_piter

  Forward iterator on line graph window.

- struct hexa

  hexagonal image class.

- struct Image

  Base class for implementation of image classes.

- struct image1d

  Basic 1D image class.

- class image2d

  Basic 2D image class.

- struct image2d_h

  2d image based on an hexagonal mesh.

- struct image3d

  Basic 3D image class.

- struct image_if

  Image which domain is restricted by a function 'site -> Boolean'.

- struct interpolated

  Makes the underlying image being accessed with floating coordinates.

- struct Iterator

  Base class for implementation classes that are iterators.

- class labeled_image

  Morpher providing an improved interface for labeled image.

- class labeled_image_base

  Base class Morpher providing an improved interface for labeled image.

- struct lazy_image

  Image values are computed on the fly.

- struct Literal

  Base class for implementation classes of literals.

- struct Mesh

  Base class for implementation classes of meshes.

- struct Meta_Accumulator

  Base class for implementation of meta accumulators.

- struct Meta_Function

  Base class for implementation of meta functions.

- struct Meta_Function_v2v

  Base class for implementation of function-objects from value to value.

- struct Meta_Function_vv2v

  Base class for implementation of function-objects from value to value.

- class mixed_neighb

  Adapter class from window to neighborhood.

- class neighb

  Adapter class from window to neighborhood.

- struct Neighborhood

  Base class for implementation classes that are neighborhoods.

- struct Neighborhood< void >

  Neighborhood category flag type.

- struct Object

  Base class for almost every class defined in Milena.

- struct p2p_image

  FIXME: Doc!

- class p_array

  Multi-set of sites.

- class p_centered

Site set corresponding to a window centered on a site.

- class p_complex

  A complex psite set based on the N-faces of a complex of dimension `D` (a `D-complex`).

- class p_edges

  Site set mapping graph edges and image sites.

- struct p_faces

  A complex psite set based on a the N-faces of a complex of dimension D (a D-complex).

- class p_graph_piter

  Generic iterator on point sites of a mln::S.

- class p_if

  Site set restricted w.r.t.

- class p_image

  Site set based on an image of Booleans.

- class p_indexed_bkd_piter

  Backward iterator on sites of an indexed site set.

- class p_indexed_fwd_piter

  Forward iterator on sites of an indexed site set.

- class p_indexed_psite

  Psite class for indexed site sets such as p_array.

- class p_key

  Priority queue class.

- class p_line2d

  2D discrete line of points.

- class p_mutable_array_of

  p_mutable_array_of is a mutable array of site sets.

- class p_n_faces_bkd_piter

  Backward iterator on the n-faces sites of an mln::p_complex<D, G>.

- class p_n_faces_fwd_piter

  Forward iterator on the n-faces sites of an mln::p_complex<D, G>.

- class p_priority

  Priority queue.

- class p_queue

  Queue of sites (based on std::deque).

- class p_queue_fast

  Queue of sites class (based on p_array.

- class p_run

  Point set class in run.

- class p_set

  Mathematical set of sites (based on util::set).

- class p_set_of

  p_set_of is a set of site sets.

- class p_transformed

  Site set transformed through a function.

- struct p_transformed_piter

  Iterator on p_transformed<S,F>.

- class p_vaccess

  Site set in which sites are grouped by their associated value.

- class p_vertices

  Site set based mapping graph vertices to sites.

- struct pixel

  Generic pixel class.

- struct Pixel_Iterator

  Base class for the implementation of pixel iterator classes.

- class plain

  Prevents an image from sharing its data.

- struct point

  Generic point class.

- struct Point

  Base class for implementation of point classes.

- struct Point_Site

  Base class for implementation classes of the notion of "point site".

- struct Point_Site< void >

  Point site category flag type.

- struct Proxy

  Base class for implementation classes of the notion of "proxy".

- struct Proxy< void >

  Proxy category flag type.

- struct Pseudo_Site

  Base class for implementation classes of the notion of "pseudo site".

- struct Pseudo_Site< void >

  Pseudo_Site category flag type.

- struct Regular_Grid

  Base class for implementation classes of regular grids.

- class safe_image

  Makes an image accessible at undefined location.

- struct Site

  Base class for classes that are explicitly sites.

- struct Site< void >

  Site category flag type.

- struct Site_Iterator

  Base class for implementation of classes of iterator on points.

- struct Site_Proxy

  Base class for implementation classes of the notion of "site proxy".

- struct Site_Proxy< void >

  Site_Proxy category flag type.

- struct Site_Set

  Base class for implementation classes of site sets.

- struct Site_Set< void >

  Site_Set category flag type.

- struct slice_image

  2D image extracted from a slice of a 3D image.

- class sub_image

  Image having its domain restricted by a site set.

- struct sub_image_if

  Image having its domain restricted by a site set and a function.

- class thru_image

  Morph image values through a function.

- class thrubin_image

  Morphes values from two images through a binary function.

- struct tr_image

Transform an image by a given transformation.

- struct unproject_image

  Un-projects an image.

- struct Value

  Base class for implementation classes of values.

- struct Value_Iterator

  Base class for implementation of classes of iterator on values.

- struct Value_Set

  Base class for implementation classes of sets of values.

- struct Vertex

  Vertex category flag type.

- class vertex_image

  Image based on graph vertices.

- struct violent_cast_image

  Violently cast image values to a given type.

- struct w_window

  Generic w_window class.

- struct Weighted_Window

  Base class for implementation classes that are weighted_windows.

- class window

  Generic window class.

- struct Window

  Base class for implementation classes that are windows.

Typedefs

- typedef mln::complex_image< 1, mln::discrete_plane_1complex_geometry, bool > bin_1complex_image2d

  Type alias for a binary image based on a 1-complex, where 0-faces are located at discrete (integer) 2-dimensional points.

- typedef mln::complex_image< 2, mln::space_2complex_geometry, bool > bin_2complex_image3df

  Type alias for a binary image based on a 2-complex, where 0-faces are located at floating-point 3-dimensional points.

- typedef box< mln::point1d > box1d

  Type alias for a box defined on the 1D square grid with integer coordinates.

- typedef box< mln::point2d > box2d

  Type alias for a box defined on the 2D square grid with integer coordinates.

- typedef box< point2d_h > box2d_h

  FIXME.

- typedef box< point3d > box3d

  Type alias for a box defined on the 3D square grid with integer coordinates.

- typedef mln::geom::complex_geometry< 1, point2d > discrete_plane_1complex_geometry

  Type alias for the geometry of a 1-complex (e.g., a graph) located in a discrete 2-dimensional plane (with integer coordinates).

- typedef mln::geom::complex_geometry< 2, point2d > discrete_plane_2complex_geometry

  Type alias for the geometry of a 2-complex located in a discrete 2-dimensional plane (with integer coordinates).

- typedef dpoint< mln::grid::tick, def::coord > dpoint1d

  Type alias for a delta-point defined on the 1D square grid with integer coordinates.

- typedef dpoint< mln::grid::square, mln::def::coord > dpoint2d

  Type alias for a delta-point defined on the 2D square grid with integer coordinates.

- typedef dpoint< mln::grid::hexa, def::coord > dpoint2d_h

  Type alias for a delta-point defined on the 2D square grid with integer coordinates.

- typedef dpoint< mln::grid::cube, def::coord > dpoint3d

  Type alias for a delta-point defined on the 3D square grid with integer coordinates.

- typedef mln::complex_image< 2, mln::space_2complex_geometry, float > float_2complex_image3df

  Type alias for a floating-point image based on a 2-complex, where 0-faces are located at floating-point 3-dimensional points.

- typedef mln::complex_image< 1, mln::discrete_plane_1complex_geometry, mln::value::int_u8 > int_u8_1complex_image2d

  Type alias for an 8-bit gray-level image based on a 1-complex, where 0-faces are located at discrete (integer) 2-dimensional points.

- typedef mln::complex_image< 2, mln::discrete_plane_2complex_geometry, mln::value::int_u8 > int_u8_2complex_image2d

  Type alias for an 8-bit gray-level image based on a 2-complex, where 0-faces are located at discrete (integer) 2-dimensional points.

- typedef mln::complex_image< 2, mln::space_2complex_geometry, mln::value::int_u8 > int_u8_2complex_image3df

  Type alias for an 8-bit gray-level image based on a 2-complex, where 0-faces are located at floating-point 3-dimensional points.

- typedef neighb< window1d > neighb1d

Type alias for a neighborhood defined on the 1D square grid with integer coordinates.

- typedef neighb< window2d > neighb2d

  Type alias for a neighborhood defined on the 2D square grid with integer coordinates.

- typedef neighb< window3d > neighb3d

  Type alias for a neighborhood defined on the 3D square grid with integer coordinates.

- typedef p_run< point2d > p_run2d

  Type alias for a run of 2d points.

- typedef p_set_of< p_run2d > p_runs2d

  Type alias for a set of runs of 2d points.

- typedef point< grid::tick, def::coordf > point1df

  Type alias for a point defined on the 1D ruler with floating-point coordinates.

- typedef point< mln::grid::square, mln::def::coordf > point2df

  Type alias for a point defined on the 2D square grid with floating-point coordinates.

- typedef point< grid::cube, def::coordf > point3df

  Type alias for a point defined on the 3D square grid with floating-point coordinates.

- typedef mln::complex_image< 2, mln::space_2complex_geometry, mln::value::rgb8 > rgb8_-2complex_image3df

  Type alias for a (3x8-bit) RGB image based on a 2-complex, where 0-faces are located at floating-point 3-dimensional points.

- typedef mln::geom::complex_geometry< 2, point3df > space_2complex_geometry

  Type alias for the geometry of a 2-complex located in a 3-dimensional space (with floating-point coordinates).

- typedef mln::complex_image< 2, mln::space_2complex_geometry, unsigned > unsigned_-2complex_image3df

  Type alias for a gray-level image based on a 2-complex, where 0-faces are located at floating-point 3-dimensional points.

- typedef algebra::vec< 2u, double > vec2d_d

  2D vector with double coordinates.

- typedef algebra::vec< 2u, float > vec2d_f

  2D vector with float coordinates.

- typedef algebra::vec< 3u, double > vec3d_d

  3D vector with double coordinates.

- typedef algebra::vec< 3u, float > vec3d_f

  3D vector with float coordinates.

- typedef w_window< dpoint1d, float > w_window1d_float

Type alias for a w_window with arbitrary shape, defined on the 1D grid (with integer coordinates) and whose weights are floating values.

- typedef w_window< dpoint1d, int > w_window1d_int

  Type alias for a w_window with arbitrary shape, defined on the 1D grid (with integer coordinates) and whose weights are integers.

- typedef w_window< dpoint2d, float > w_window2d_float

  Type alias for a w_window with arbitrary shape, defined on the 2D square grid (with integer coordinates) and whose weights are floating values.

- typedef w_window< dpoint2d, int > w_window2d_int

  Type alias for a w_window with arbitrary shape, defined on the 2D square grid (with integer coordinates) and whose weights are integers.

- typedef w_window< dpoint3d, float > w_window3d_float

  Type alias for a w_window with arbitrary shape, defined on the 3D grid (with integer coordinates) and whose weights are floating values.

- typedef w_window< dpoint3d, int > w_window3d_int

  Type alias for a w_window with arbitrary shape, defined on the 3D grid (with integer coordinates) and whose weights are integers.

- typedef window< mln::dpoint1d > window1d

  Type alias for a window with arbitrary shape, defined on the 1D square grid with integer coordinates.

- typedef window< mln::dpoint2d > window2d

  Type alias for a window with arbitrary shape, defined on the 2D square grid with integer coordinates.

- typedef window< mln::dpoint3d > window3d

  Type alias for a window with arbitrary shape, defined on the 3D square grid with integer coordinates.

  - typedef point< grid::tick, def::coord > point1d

    Type alias for a point defined on the 1D ruler with integer coordinates.

  - typedef point< mln::grid::square, mln::def::coord > point2d

    Type alias for a point defined on the 2D square grid with integer coordinates.

  - typedef point< grid::hexa, def::coord > point2d_h

    Type alias for a point defined on the 2D hexagonal grid with integer coordinates.

  - typedef point< grid::cube, def::coord > point3d

    Type alias for a point defined on the 3D square grid with integer coordinates.

Functions

- template<typename I >
  I::psite a_point_of (const Image< I > &ima)

  Give a point of an image.

- template<typename I , typename F >
  p2p_image< I, F > apply_p2p (Image< I > &ima, const Function_v2v< F > &f)

  FIXME: Doc!

- template<typename I , typename F >
  p2p_image< const I, F > apply_p2p (const Image< I > &ima, const Function_v2v< F > &f)

  FIXME: Doc!

- const neighb3d & c18 ()

  18-connectivity neighborhood on the 3D grid.

- const neighb1d & c2 ()

  2-connectivity neighborhood on the 1D grid.

- const neighb3d & c26 ()

  26-connectivity neighborhood on the 3D grid.

- const neighb3d & c2_3d_sli ()

  depth 2-connectivity neighborhood on the 3D grid.

- const neighb2d & c2_col ()

  Vertical 2-connectivity neighborhood on the 2D grid.

- const neighb2d & c2_row ()

  Horizontal 2-connectivity neighborhood on the 2D grid.

- const neighb2d & c4 ()

  4-connectivity neighborhood on the 2D grid.

- const neighb3d & c4_3d ()

  4-connectivity neighborhood on the 3D grid.

- const neighb3d & c6 ()

  6-connectivity neighborhood on the 3D grid.

- const neighb2d & c8 ()

  8-connectivity neighborhood on the 2D grid.

- const neighb3d & c8_3d ()

  8-connectivity neighborhood on the 3D grid.

- template<typename T2 , typename T1 >
  fun::x2x::composed< T2, T1 > compose (T2 f, T1 g)

  Do a composition of two transformations.

- template<typename I >
  mln::trait::concrete< I >::ret duplicate (const Image< I > &model)

  Duplicate the image `model` with the values of the image `data`.

- template< typename I , typename F >
  extension_fun< const I, F > extend (const Image< I > &ima, const Function_v2v< F > &fun)

  Routines for domain extension with a function.

- template< typename I , typename J >
  extension_ima< const I, const J > extend (const Image< I > &ima, const Image< J > &ext)

  Routines for domain extension with an image.

- template< typename I >
  extension_val< const I > extend (const Image< I > &ima, const typename I::value &val)

  Routines for domain extension with a value.

- bool implies (bool lexpr, bool rexpr)

  Implication.

- template< typename I , typename J >
  void initialize (Image< I > &target, const Image< J > &model)
- template< typename P >
  box< P > larger_than (const box< P > a, const box< P > b)

  Return the minimum box including box `a` *and box* `b`*.*

- template< typename I , typename V , typename E >
  image2d< typename I::value > make_debug_graph_image (const I &input, const V &ima_v, const E &ima_e, const value::rgb8 &bg)

  Draw a graph.

- mln_gen_complex_neighborhood (complex_higher_dim_connected_n_face_neighborhood, complex_higher_dim_connected_n_face_window)

  Neighborhood centered on an n-face of complex returning the n-faces sharing an (n+1)-face with the center n-face.

- mln_gen_complex_neighborhood (complex_m_face_neighborhood, complex_m_face_window)

  Neighborhood centered on an n-face of complex returning the m-faces transitively adjacent to this center n-face.

- mln_gen_complex_neighborhood (complex_lower_neighborhood, complex_lower_window)

  Neighborhood centered on an n-face of complex returning its adjacent (n-1)-faces.

- mln_gen_complex_neighborhood (complex_higher_neighborhood, complex_higher_window)

  Neighborhood centered on an n-face of complex returning its adjacent (n+1)-faces.

- mln_gen_complex_neighborhood (complex_lower_higher_neighborhood, complex_lower_higher_-window)

  Neighborhood centered on an n-face of complex returning its adjacent (n-1)-faces and (n+1)-faces.

- mln_gen_complex_neighborhood (complex_lower_dim_connected_n_face_neighborhood, complex_lower_dim_connected_n_face_window)

  Neighborhood centered on an n-face of complex returning the n-faces sharing an (n-1)-face with the center n-face.

- mln_gen_complex_window (complex_lower_window, topo::adj_lower_face_fwd_iter, topo::adj_lower_face_bkd_iter)

  Window centered on an n-face of complex returning its adjacent (n-1)-faces.

- mln_gen_complex_window (complex_higher_window, topo::adj_higher_face_fwd_iter, topo::adj_higher_face_bkd_iter)

  Window centered on an n-face of complex returning its adjacent (n+1)-faces.

- mln_gen_complex_window (complex_lower_higher_window, topo::adj_lower_higher_face_fwd_iter, topo::adj_lower_higher_face_bkd_iter)

  Window centered on an n-face of complex returning its adjacent (n-1)-faces and (n+1)-faces.

- mln_gen_complex_window (complex_lower_dim_connected_n_face_window, topo::adj_lower_dim_connected_n_face_fwd_iter, topo::adj_lower_dim_connected_n_face_bkd_iter)

  Window centered on an n-face of complex returning the n-faces sharing an (n-1)-face with the center n-face.

- mln_gen_complex_window (complex_higher_dim_connected_n_face_window, topo::adj_higher_dim_connected_n_face_fwd_iter, topo::adj_higher_dim_connected_n_face_bkd_iter)

  Window centered on an n-face of complex returning the n-faces sharing an (n+1)-face with the center n-face.

- mln_gen_complex_window (complex_m_face_window, topo::adj_m_face_fwd_iter, topo::adj_m_face_bkd_iter)

  Window centered on an n-face of complex returning the m-faces transitively adjacent to this center n-face.

- mln_gen_complex_window_p (complex_lower_window_p, topo::adj_lower_face_fwd_iter, topo::adj_lower_face_bkd_iter)

  Window centered on an n-face of complex returning its adjacent (n-1)-faces as well as the center n-face.

- mln_gen_complex_window_p (complex_higher_window_p, topo::adj_higher_face_fwd_iter, topo::adj_higher_face_bkd_iter)

  Window centered on an n-face of complex returning its adjacent (n+1)-faces as well as the center n-face.

- mln_gen_complex_window_p (complex_lower_higher_window_p, topo::adj_lower_higher_face_fwd_iter, topo::adj_lower_higher_face_bkd_iter)

  Window centered on an n-face of complex returning its adjacent (n-1)-faces and (n+1)-faces as well as the center n-face.

- mln_gen_complex_window_p (complex_lower_dim_connected_n_face_window_p, topo::adj_lower_dim_connected_n_face_fwd_iter, topo::adj_lower_dim_connected_n_face_bkd_iter)

  Window centered on an n-face of complex returning the n-faces sharing an (n-1)-face with the center n-face, as well as this center n-face.

- mln_gen_complex_window_p (complex_higher_dim_connected_n_face_window_p, topo::adj_higher_dim_connected_n_face_fwd_iter, topo::adj_higher_dim_connected_n_face_bkd_iter)

  Window centered on an n-face of complex returning the n-faces sharing an (n+1)-face with the center n-face, as well as this center n-face.

- mln_gen_complex_window_p (complex_m_face_window_p, topo::adj_m_face_fwd_iter, topo::adj_m_face_bkd_iter)

  Window centered on an n-face of complex returning the m-faces transitively adjacent to this center n-face, as well as this center n-face.

- template< typename W1 , typename W2 >
  mln_regular (W1) operator-(const Window< W1 > &win1

  Set difference between a couple of windows `win1` *and* `win2`*.*

- template< typename O1 , typename O2 >
  mln_trait_op_geq (O1, O2) operator>

  General definition of the "greater than or equal to" operator.

- template< typename O1 , typename O2 >
  mln_trait_op_greater (O1, O2) operator>(const Object< O1 > &lhs

  General definition of the "greater than" operator.

- template< typename O1 , typename O2 >
  mln_trait_op_leq (O1, O2) operator<

  Default definition of the "less than or equal to" operator.

- template< typename O1 , typename O2 >
  mln_trait_op_neq (O1, O2) operator!

  General definition of the "not equal to" operator.

- template< typename P , typename S >
  P operator* (const Gpoint< P > &p, const value::scalar_< S > &s)

  Multiply a point `p` *by a scalar* `s`*.*

- template< typename S >
  S & operator++ (value::Scalar< S > &rhs)

  Pre-incrementation for any scalar type.

- template< typename P , typename D >
  P operator- (const Gpoint< P > &p, const Gdpoint< D > &dp)

  Substract a delta-point `dp` *to a grid point* `p`*.*

- template< typename N1 , typename N2 >
  neighb< typename N1::window::regular > operator- (const Neighborhood< N1 > &nbh1, const Neighborhood< N2 > &nbh2)

  Set difference between a couple of neighborhoods `nbh1` *and* `nbh2`*.*

- template< typename S >
  S & operator-- (value::Scalar< S > &rhs)

  Pre-decrementation for any scalar type.

- template< typename L , typename R >
  bool operator< (const Image< L > &lhs, const Image< R > &rhs)

  Point-wise test if the pixel values of `lhs` *are point-wise less than the pixel values of* `rhs`*.*

- template< typename I , typename G , typename W >
  std::ostream & operator<< (std::ostream &ostr, const complex_window_fwd_piter< I, G, W > &p)

  Print an mln::complex_window_fwd_piter.

- template<typename I , typename G , typename W >
  std::ostream & operator<< (std::ostream &ostr, const complex_window_bkd_piter< I, G, W > &p)

  Print an mln::complex_window_bkd_piter.

- template<typename I , typename G , typename N >
  std::ostream & operator<< (std::ostream &ostr, const complex_neighborhood_fwd_piter< I, G, N > &p)

  Print an mln::complex_neighborhood_fwd_piter.

- template<typename I , typename G , typename N >
  std::ostream & operator<< (std::ostream &ostr, const complex_neighborhood_bkd_piter< I, G, N > &p)

  Print an mln::complex_neighborhood_bkd_piter.

- template<unsigned N, unsigned D, typename P >
  bool operator<= (const p_faces< N, D, P > &lhs, const p_faces< N, D, P > &rhs)

  Inclusion of a mln::p_faces in another one.

- template<typename G , typename F >
  bool operator<= (const p_edges< G, F > &lhs, const p_edges< G, F > &rhs)

  Inclusion of a mln::p_edges in another one.

- template<typename L , typename R >
  bool operator<= (const Image< L > &lhs, const Image< R > &rhs)

  Point-wise test if the pixel values of `lhs` *are point-wise less than or equal to the pixel values of* `rhs`*.*

- template<unsigned D, typename G >
  bool operator<= (const p_complex< D, G > &lhs, const p_complex< D, G > &rhs)

  Inclusion of a mln::p_complex in another one.

- template<typename G , typename F >
  bool operator<= (const p_vertices< G, F > &lhs, const p_vertices< G, F > &rhs)

  Inclusion of a mln::p_vertices in another one.

- template<typename G , typename F >
  bool operator== (const p_edges< G, F > &lhs, const p_edges< G, F > &rhs)

  Comparison between two mln::p_edges's.

- template<typename L , typename R >
  bool operator== (const Image< L > &lhs, const Image< R > &rhs)

  Point-wise test if the pixel values of `lhs` *are equal to the pixel values of* `rhs`*.*

- template<unsigned D, typename G >
  bool operator== (const p_complex< D, G > &lhs, const p_complex< D, G > &rhs)

  Comparison between two mln::p_complex's.

- template<unsigned N, unsigned D, typename P >
  bool operator== (const p_faces< N, D, P > &lhs, const p_faces< N, D, P > &rhs)

  Comparison between two mln::p_faces's.

- template<typename G , typename F >
  bool operator== (const p_vertices< G, F > &lhs, const p_vertices< G, F > &rhs)

  Comparison between two mln::p_vertices's.

- template<typename I , typename F >
  image_if< I, F > operator| (Image< I > &ima, const Function_v2b< F > &f)

  ima | f creates an image_if with the image ima and the function f.

- template<typename V , typename G , typename P >
  edge_image< P, V, G > operator| (const fun::i2v::array< V > &edge_values, const p_edges< G, fun::i2v::array< P > > &pe)

  Construct a edge image from a fun::i2v::array and a p_edges.

- template<typename S , typename F >
  p_if< S, F > operator| (const Site_Set< S > &s, const Function_v2b< F > &f)

  Restrict a site set `s` to points that verify `f`.

- template<typename F , typename S >
  pw::image< F, S > operator| (const Function_v2v< F > &f, const Site_Set< S > &ps)

  Construct an image from a function and a site set.

- template<typename I , typename F >
  image_if< const I, F > operator| (const Image< I > &ima, const Function_v2b< F > &f)

  ima | f creates an image_if with the image ima and the function f.

- template<typename V , typename G , typename P >
  vertex_image< P, V, G > operator| (const fun::i2v::array< V > &vertex_values, const p_vertices< G, fun::i2v::array< P > > &pv)

  Construct a vertex image from a fun::i2v::array and a p_vertices.

- template<typename I >
  const internal::primary_type< I >::ret & primary (const Image< I > &input)

  FIXME: Doc!

- template<typename S , typename F >
  p_transformed< S, F > ptransform (const Site_Set< S > &s, const Function_v2v< F > &f)

  Transform a site set `s` through the function `f`.

- const window2d & win_c4p ()

  4-connectivity window on the 2D grid, including the center.

- const window3d & win_c4p_3d ()

  4-connectivity window on the 3D grid, including the center.

- const window2d & win_c8p ()

  8-connectivity window on the 2D grid, including the center.

- const window3d & win_c8p_3d ()

  8-connectivity window on the 3D grid, including the center.

- template< unsigned N, unsigned D, typename P >
  bool operator== (const faces_psite< N, D, P > &lhs, const faces_psite< N, D, P > &rhs)
  Comparison of two instances of mln::faces_psite.
- template< unsigned N, unsigned D, typename P >
  bool operator!= (const faces_psite< N, D, P > &lhs, const faces_psite< N, D, P > &rhs)
  Is lhs equal to rhs?
- template< unsigned N, unsigned D, typename P >
  bool operator< (const faces_psite< N, D, P > &lhs, const faces_psite< N, D, P > &rhs)
  Is lhs "less" than rhs?

- template< typename T >
  mln_exact (T)∗exact(T ∗ptr)
  Exact cast routine for mln objects.

- template< unsigned D, typename G >
  bool operator== (const complex_psite< D, G > &lhs, const complex_psite< D, G > &rhs)
  Comparison of two instances of mln::complex_psite.
- template< unsigned D, typename G >
  bool operator!= (const complex_psite< D, G > &lhs, const complex_psite< D, G > &rhs)
  Is lhs not equal to rhs?
- template< unsigned D, typename G >
  bool operator< (const complex_psite< D, G > &lhs, const complex_psite< D, G > &rhs)
  Is lhs "less" than rhs?

Variables

- const dpoint1d before = dpoint1d(-1)
  Definition of a shortcut for delta point in 1d.

- const dpoint2d up = dpoint2d(-1, 0)
  Definition of a shortcut for delta point in 2d.

- const dpoint3d sagittal_dec = dpoint3d(0, 0, -1)
  Definition of a shortcut for delta point in 3d.

9.1.1 Detailed Description

mln/convert/to_image.hh This implementation is not an usual heap, it allows to set an error rate so that some nodes may be "corrupted".

Generic class for hierarchical queues.

Merge with mln/topo/skeleton/is_simple_point.hh The fastest version give an approximation of the result.

The generic dual input tree algorithm for high quantized image.

The dual input tree algorithm specialized for low quantized image.

mln/linear/convolve_directional.hh

Read AVS header from a file.

Define a function which aborts a process in io module.

Forward declaration.

mln/core/def/all.hh

The namespace mln corresponds to the Milena (mini-Olena) project.

This accumulator uses an mln::util::pix (pixel) to update the reference level, area and volume information of the component.

The class mln/accu/volume is not a general-purpose accumulator; it is used to implement volume-based connected filters.

See also

mln::morpho::closing::volume
mln::morpho::opening::volume

The functor should provide the following methods:

- template <typename g>=""> void init(const Graph<G>& g) Will be called at the beginning.
- bool to_be_treated(unsigned id) Return whether this vertex has already been marked or if it may be a a component representative.
- void new_component_from_vertex(unsigned id) will be called for the first vertex encountered for each component.
- void process_vertex(unsigned id) Will be called for each vertex queued.
- bool to_be_queued(unsigned id) Return whether this vertex has already been marked or if it can be added to the current component.
- void added_to_queue(unsigned id) Will be called for every vertex encountered in each component, except the first one.
- void next_component() Will be called after all vertices from a component have been treated.
- void final() Will be called at the end;

Conversions to mln::Image.

FIXME: Re-write this description.

The contents of mln mimics the contents of the olena project but in a simplified way. Some classes have the same name in both projects and roughly have the same behavior.

Warning

The Milena project is independent from the Olena project; the user has to choose between both the project she wants to work with.

File that includes all core definitions.

The set of operators defined in this file is:

```
l += r  :  l = l + r, -> l&
l -= r  :  l = l - r, -> l&
l *= r  :  l = l * r, -> l&
l /= r  :  l = l / r, -> l&
l %= r  :  l = l % r, -> l&

+ r     :  -> r
- r     :  -> (0 - r)

l ++    :  t = l, ++l, -> t
l --    :  t = l, --l, -> t

++ r    :  r += 1, -> r&
-- r    :  r -= 1, -> r&

l != r  :  -> ! (l == r)

l >  r  :  -> (r < l)
l >= r  :  -> (r <= l)
l <= r  :  -> ! (r < l)   warning: re-define when partial ordering
```

As a consequence, the set of operators to be defined along with a client class is:

```
l + r
l - r
l * r
l / r

l == r

l < r
l <= r  in case of partial ordering
```

Convolution by a line-shaped (directional) kernel.

This implementation is based on P. Salembier algorithm using hierachical queues. This implies a low-quantized input image so that the number of queues is limited.

TODO: Think about how to extend f domain in a more generic way. The actual implementation doubles the size of the first dimension. It implies a boxed domain.

TODO: Use the less functor. The actual implementation is for max-tree.

TODO: During the canonization pass, we build the tree site set from the sorted site set of f, so that we compute twice f histogram (can be avoided).

This implementation is based on tarjan's union method, so that image quantization does not impact on the computation time.

TODO: Think about how to extend f domain in a more generic way. The actual implementation doubles the size of the first dimension. It implies a boxed domain.

TODO: Use the less functor. The actual implementation is for max-tree.

Do we want it to be exact?

Hierarchical queues are often used with connected operators (P. Salemebier's max tree algorithm relies on these queues). To be efficient, the hiererachy is a static array and each are preallocated using an histogram.

FIXME: consider hqueues as a site set ?

A "corrupted node" means that its correct order is not totally preserved for performance reasons. Of course, it will have an impact on the returned values. As a result, be ware of not using this data structure if the element order is relevant for to you.

A corruption threshold can be passed to the constructor. This threshold means that if nodes have a rank higher than this threshold they can be "corrupted" and therefore their rank can be reduced. Tuning this threshold may have an impact on the structure entropy thus on the returned values order. It may also have an impact on the performance.

More implementation details are available in: "The soft heap: an approximate priority queue with optimal error rate", Bernard Chazelle, JACM, 2000.

URL: `http://www.cs.princeton.edu/~chazelle/pubs/sheap.pdf`

9.1.2 Typedef Documentation

9.1.2.1 typedef mln::complex_image<1, mln::discrete_plane_1complex_geometry, bool> mln::bin_1complex_image2d

Type alias for a binary image based on a 1-complex, where 0-faces are located at discrete (integer) 2-dimensional points.

Definition at line 53 of file mln/core/alias/complex_image.hh.

9.1.2.2 typedef mln::complex_image<2, mln::space_2complex_geometry, bool> mln::bin_2complex_image3df

Type alias for a binary image based on a 2-complex, where 0-faces are located at floating-point 3-dimensional points.

Definition at line 85 of file mln/core/alias/complex_image.hh.

9.1.2.3 typedef box<mln::point1d> mln::box1d

Type alias for a box defined on the 1D square grid with integer coordinates.

See also

mln::win::rectangle1d.

Definition at line 47 of file core/alias/box1d.hh.

9.1.2.4 typedef box<mln::point2d> mln::box2d

Type alias for a box defined on the 2D square grid with integer coordinates.

See also

mln::win::rectangle2d.

Definition at line 45 of file core/alias/box2d.hh.

9.1.2.5 typedef box<point2d_h> mln::box2d_h

FIXME.

Definition at line 47 of file core/alias/box2d_h.hh.

9.1.2.6 typedef box<point3d> mln::box3d

Type alias for a box defined on the 3D square grid with integer coordinates.

See also

mln::win::rectangle3d.

Definition at line 45 of file core/alias/box3d.hh.

9.1.2.7 typedef mln::geom::complex_geometry<1, point2d> mln::discrete_plane_1complex_-geometry

Type alias for the geometry of a 1-complex (e.g., a graph) located in a discrete 2-dimensional plane (with integer coordinates).

Definition at line 45 of file core/alias/complex_geometry.hh.

9.1.2.8 typedef mln::geom::complex_geometry<2, point2d> mln::discrete_plane_2complex_-geometry

Type alias for the geometry of a 2-complex located in a discrete 2-dimensional plane (with integer coordinates).

Definition at line 50 of file core/alias/complex_geometry.hh.

9.1.2.9 typedef dpoint<mln::grid::tick, def::coord> mln::dpoint1d

Type alias for a delta-point defined on the 1D square grid with integer coordinates.

Definition at line 44 of file dpoint1d.hh.

9.1.2.10 typedef dpoint<mln::grid::square, mln::def::coord> mln::dpoint2d

Type alias for a delta-point defined on the 2D square grid with integer coordinates.

Definition at line 44 of file dpoint2d.hh.

9.1.2.11 typedef dpoint<mln::grid::hexa, def::coord> mln::dpoint2d_h

Type alias for a delta-point defined on the 2D square grid with integer coordinates.

Definition at line 45 of file core/alias/dpoint2d_h.hh.

9.1.2.12 typedef dpoint<mln::grid::cube, def::coord> mln::dpoint3d

Type alias for a delta-point defined on the 3D square grid with integer coordinates.

Definition at line 43 of file dpoint3d.hh.

9.1.2.13 typedef mln::complex_image<2, mln::space_2complex_geometry, float> mln::float_2complex_image3df

Type alias for a floating-point image based on a 2-complex, where 0-faces are located at floating-point 3-dimensional points.

Definition at line 106 of file mln/core/alias/complex_image.hh.

9.1.2.14 typedef mln::complex_image<1, mln::discrete_plane_1complex_geometry, mln::value::int_u8> mln::int_u8_1complex_image2d

Type alias for an 8-bit gray-level image based on a 1-complex, where 0-faces are located at discrete (integer) 2-dimensional points.

Definition at line 61 of file mln/core/alias/complex_image.hh.

9.1.2.15 typedef mln::complex_image<2, mln::discrete_plane_2complex_geometry, mln::value::int_u8> mln::int_u8_2complex_image2d

Type alias for an 8-bit gray-level image based on a 2-complex, where 0-faces are located at discrete (integer) 2-dimensional points.

Definition at line 74 of file mln/core/alias/complex_image.hh.

9.1.2.16 typedef mln::complex_image<2, mln::space_2complex_geometry, mln::value::int_u8> mln::int_u8_2complex_image3df

Type alias for an 8-bit gray-level image based on a 2-complex, where 0-faces are located at floating-point 3-dimensional points.

Definition at line 92 of file mln/core/alias/complex_image.hh.

9.1.2.17 typedef p_run<point2d> mln::p_run2d

Type alias for a run of 2d points.

Definition at line 42 of file p_run2d.hh.

9.1.2.18 typedef p_set_of<p_run2d> mln::p_runs2d

Type alias for a set of runs of 2d points.

Definition at line 42 of file p_runs2d.hh.

9.1.2.19 typedef point< grid::tick, def::coord > mln::point1d

Type alias for a point defined on the 1D ruler with integer coordinates.

Definition at line 45 of file point1d.hh.

9.1.2.20 typedef point<grid::tick, def::coordf> mln::point1df

Type alias for a point defined on the 1D ruler with floating-point coordinates.

Definition at line 49 of file point1d.hh.

9.1.2.21 typedef point< grid::square, def::coord > mln::point2d

Type alias for a point defined on the 2D square grid with integer coordinates.

Definition at line 45 of file point2d.hh.

9.1.2.22 typedef point< grid::hexa, def::coord > mln::point2d_h

Type alias for a point defined on the 2D hexagonal grid with integer coordinates.

Definition at line 43 of file core/alias/point2d_h.hh.

9.1.2.23 typedef point<mln::grid::square, mln::def::coordf> mln::point2df

Type alias for a point defined on the 2D square grid with floating-point coordinates.

Definition at line 49 of file point2d.hh.

9.1.2.24 typedef point< grid::cube, def::coord > mln::point3d

Type alias for a point defined on the 3D square grid with integer coordinates.

Definition at line 44 of file point3d.hh.

9.1.2.25 typedef point<grid::cube, def::coordf> mln::point3df

Type alias for a point defined on the 3D square grid with floating-point coordinates.

Definition at line 48 of file point3d.hh.

9.1.2.26 typedef mln::complex_image<2, mln::space_2complex_geometry, mln::value::rgb8> mln::rgb8_2complex_image3df

Type alias for a (3x8-bit) RGB image based on a 2-complex, where 0-faces are located at floating-point 3-dimensional points.

Definition at line 113 of file mln/core/alias/complex_image.hh.

9.1.2.27 typedef mln::geom::complex_geometry<2, point3df> mln::space_2complex_geometry

Type alias for the geometry of a 2-complex located in a 3-dimensional space (with floating-point coordinates).

Definition at line 54 of file core/alias/complex_geometry.hh.

9.1.2.28 typedef mln::complex_image<2, mln::space_2complex_geometry, unsigned> mln::unsigned_2complex_image3df

Type alias for a gray-level image based on a 2-complex, where 0-faces are located at floating-point 3-dimensional points.

Definition at line 99 of file mln/core/alias/complex_image.hh.

9.1.2.29 typedef algebra::vec<2u,double> mln::vec2d_d

2D vector with double coordinates.

Definition at line 43 of file vec2d.hh.

9.1.2.30 typedef algebra::vec<2u,float> mln::vec2d_f

2D vector with float coordinates.

Definition at line 40 of file vec2d.hh.

9.1.2.31 typedef algebra::vec<3u,double> mln::vec3d_d

3D vector with double coordinates.

Definition at line 43 of file vec3d.hh.

9.1.2.32 typedef algebra::vec<3u,float> mln::vec3d_f

3D vector with float coordinates.

Definition at line 40 of file vec3d.hh.

9.1.2.33 typedef w_window<dpoint1d, float> mln::w_window1d_float

Type alias for a w_window with arbitrary shape, defined on the 1D grid (with integer coordinates) and whose weights are floating values.

Definition at line 45 of file w_window1d_float.hh.

9.1.2.34 typedef w_window<dpoint1d, int> mln::w_window1d_int

Type alias for a w_window with arbitrary shape, defined on the 1D grid (with integer coordinates) and whose weights are integers.

Definition at line 45 of file core/alias/w_window1d_int.hh.

9.1.2.35 typedef w_window<dpoint2d, float> mln::w_window2d_float

Type alias for a w_window with arbitrary shape, defined on the 2D square grid (with integer coordinates) and whose weights are floating values.

Definition at line 45 of file w_window2d_float.hh.

9.1.2.36 typedef w_window<dpoint2d, int> mln::w_window2d_int

Type alias for a w_window with arbitrary shape, defined on the 2D square grid (with integer coordinates) and whose weights are integers.

Definition at line 45 of file core/alias/w_window2d_int.hh.

9.1.2.37 typedef w_window<dpoint3d, float> mln::w_window3d_float

Type alias for a w_window with arbitrary shape, defined on the 3D grid (with integer coordinates) and whose weights are floating values.

Definition at line 45 of file w_window3d_float.hh.

9.1.2.38 typedef w_window<dpoint3d, int> mln::w_window3d_int

Type alias for a w_window with arbitrary shape, defined on the 3D grid (with integer coordinates) and whose weights are integers.

Definition at line 45 of file core/alias/w_window3d_int.hh.

9.1.3 Function Documentation

9.1.3.1 template<typename I > I::psite mln::a_point_of (const Image< I > & *ima*) `[inline]`

Give a point of an image.

Definition at line 51 of file a_point_of.hh.

9.1.3.2 template<typename I , typename F > p2p_image< I, F > mln::apply_p2p (Image< I > & *ima*, const Function_v2v< F > & *f*) `[inline]`

FIXME: Doc!

Definition at line 242 of file p2p_image.hh.

Referenced by mln::debug::mosaic(), and mln::debug::slices_2d().

9.1.3.3 template<typename I , typename F > p2p_image< const I, F > mln::apply_p2p (const Image< I > & *ima*, const Function_v2v< F > & *f*) `[inline]`

FIXME: Doc!

Definition at line 256 of file p2p_image.hh.

9.1.3.4 template< typename T2 , typename T1 > fun::x2x::composed< T2, T1 > mln::compose (T2 *f*, T1 *g*) `[inline]`

Do a composition of two transformations.

Parameters

`[in]` ***f*** The second transformation.
`[in]` ***g*** The first transformation.

Returns

The composed transformation fog.

Definition at line 306 of file composed.hh.

References compose().

Referenced by compose(), and mln::geom::rotate().

9.1.3.5 template< typename I > mln::trait::concrete< I >::ret mln::duplicate (const Image< I > & *model*) `[inline]`

Duplicate the image `model` with the values of the image `data`.

Parameters

`[in]` ***model*** The image to be duplicated.

Returns

The duplicate.

Precondition

model.is_valid

Definition at line 56 of file core/routine/duplicate.hh.

References mln::data::fill(), and initialize().

Referenced by mln::registration::icp(), mln::plain< I >::operator I(), mln::geom::rotate(), mln::geom::impl::seeds2tiling(), and mln::labeling::superpose().

9.1.3.6 template< typename I , typename F > extension_fun< const I, F > mln::extend (const Image< I > & *ima*, const Function_v2v< F > & *fun*) `[inline]`

Routines for domain extension with a function.

Definition at line 140 of file extend.hh.

Referenced by mln::geom::translate().

9.1.3.7 template< typename I , typename J > extension_ima< const I, const J > mln::extend (const Image< I > & *ima*, const Image< J > & *ext*)

Routines for domain extension with an image.

Definition at line 162 of file extend.hh.

9.1.3.8 template< typename I > extension_val< const I > mln::extend (const Image< I > & *ima*, const typename I::value & *val*) [inline]

Routines for domain extension with a value.

Definition at line 175 of file extend.hh.

9.1.3.9 bool mln::implies (bool *lexpr*, bool *rexpr*) [inline]

Implication.

Definition at line 68 of file contract.hh.

Referenced by mln::p_line2d::is_valid().

9.1.3.10 template< typename I , typename J > void mln::initialize (Image< I > & *target*, const Image< J > & *model*) [inline]

Initialize the image `target` with data extracted from image `model`.

Parameters

[in,out] ***target*** The image to be initialized.

[in] ***model*** The image to provide data for the initialization.

Precondition

(not target.is_valid) and model.is_valid

Definition at line 56 of file initialize.hh.

Referenced by duplicate(), mln::histo::equalize(), mln::morpho::tree::filter::filter(), mln::linear::gaussian(), mln::linear::gaussian_1st_derivative(), mln::linear::gaussian_2nd_derivative(), mln::graph::labeling(), mln::io::magick::load(), mln::io::dicom::load(), make_debug_graph_-image(), mln::morpho::tree::filter::max(), mln::morpho::meyer_wst(), mln::morpho::tree::filter::min(), mln::arith::min(), mln::arith::minus(), mln::arith::plus(), mln::arith::revert(), mln::geom::rotate(), mln::data::impl::stretch(), mln::morpho::watershed::topological(), and mln::data::impl::generic::transform().

9.1.3.11 template< typename P > box< P > mln::larger_than (const box< P > *a*, const box< P > *b*) [inline]

Return the minimum box including box `a` and box `b`.

Definition at line 362 of file core/site_set/box.hh.

References mln::box< P >::pmax(), and mln::box< P >::pmin().

9.1.3.12 template< typename I , typename V , typename E > image2d<typename I ::value> mln::make_debug_graph_image (const I & *input*, const V & *ima_v*, const E & *ima_e*, const value::rgb8 & *bg*) [inline]

Draw a graph.

Definition at line 123 of file demos/graph/region_adjacency_graph.cc.

References mln::box< P >::crop_wrt(), mln::image2d< T >::domain(), mln::debug::draw_graph(), mln::data::fill(), mln::literal::green, initialize(), and mln::convert::to().

9.1.3.13 template<typename T > mln::mln_exact (T) [inline]

Exact cast routine for mln objects.

This set of routines can be used to downcast an object towards its exact type. The only argument, respectively `ptr` or `ref`, should be an mln::Object.

`The` parameter E is the exact type of the object.

Returns

The return follows the nature of the argument (either a pointer or a reference, const or not).

Definition at line 92 of file routine/exact.hh.

Referenced by mln::geom::rotate(), mln::Accumulator< E >::take_as_init(), mln::Accumulator< E >::take_n_times(), mln::convert::to(), and mln::geom::translate().

9.1.3.14 mln::mln_gen_complex_neighborhood (complex_higher_neighborhood , complex_higher_window)

Neighborhood centered on an n-face of complex returning its adjacent (n+1)-faces.

9.1.3.15 mln::mln_gen_complex_neighborhood (complex_lower_higher_neighborhood , complex_lower_higher_window)

Neighborhood centered on an n-face of complex returning its adjacent (n-1)-faces and (n+1)-faces.

9.1.3.16 mln::mln_gen_complex_neighborhood (complex_lower_dim_connected_-n_face_neighborhood , complex_lower_dim_connected_n_face_window)

Neighborhood centered on an n-face of complex returning the n-faces sharing an (n-1)-face with the center n-face.

9.1.3.17 mln::mln_gen_complex_neighborhood (complex_higher_dim_connected_-n_face_neighborhood , complex_higher_dim_connected_n_face_window)

Neighborhood centered on an n-face of complex returning the n-faces sharing an (n+1)-face with the center n-face.

9.1.3.18 mln::mln_gen_complex_neighborhood (complex_m_face_neighborhood , complex_m_face_window)

Neighborhood centered on an n-face of complex returning the m-faces transitively adjacent to this center n-face.

9.1.3.19 mln::mln_gen_complex_neighborhood (complex_lower_neighborhood , complex_lower_window)

Neighborhood centered on an n-face of complex returning its adjacent (n-1)-faces.

9.1.3.20 mln::mln_gen_complex_window (complex_lower_window , topo::adj_lower_face_fwd_iter , topo::adj_lower_face_bkd_iter)

Window centered on an n-face of complex returning its adjacent (n-1)-faces.

9.1.3.21 mln::mln_gen_complex_window (complex_higher_window , topo::adj_higher_face_fwd_iter , topo::adj_higher_face_bkd_iter)

Window centered on an n-face of complex returning its adjacent (n+1)-faces.

9.1.3.22 mln::mln_gen_complex_window (complex_lower_higher_window , topo::adj_lower_higher_face_fwd_iter , topo::adj_lower_higher_face_bkd_iter)

Window centered on an n-face of complex returning its adjacent (n-1)-faces and (n+1)-faces.

9.1.3.23 mln::mln_gen_complex_window (complex_lower_dim_connected_-n_face_window , topo::adj_lower_dim_connected_n_face_fwd_iter , topo::adj_lower_dim_connected_n_face_bkd_iter)

Window centered on an n-face of complex returning the n-faces sharing an (n-1)-face with the center n-face.

9.1.3.24 mln::mln_gen_complex_window (complex_higher_dim_connected_-n_face_window , topo::adj_higher_dim_connected_n_face_fwd_iter , topo::adj_higher_dim_connected_n_face_bkd_iter)

Window centered on an n-face of complex returning the n-faces sharing an (n+1)-face with the center n-face.

9.1.3.25 mln::mln_gen_complex_window (complex_m_face_window , topo::adj_m_face_fwd_iter , topo::adj_m_face_bkd_iter)

Window centered on an n-face of complex returning the m-faces transitively adjacent to this center n-face.

9.1.3.26 mln::mln_gen_complex_window_p (complex_lower_window_p , topo::adj_lower_face_fwd_iter , topo::adj_lower_face_bkd_iter)

Window centered on an n-face of complex returning its adjacent (n-1)-faces as well as the center n-face.

9.1.3.27 mln::mln_gen_complex_window_p (complex_higher_window_p , topo::adj_higher_face_fwd_iter , topo::adj_higher_face_bkd_iter)

Window centered on an n-face of complex returning its adjacent (n+1)-faces as well as the center n-face.

9.1.3.28 mln::mln_gen_complex_window_p (complex_lower_higher_window_p , topo::adj_lower_higher_face_fwd_iter , topo::adj_lower_higher_face_bkd_iter)

Window centered on an n-face of complex returning its adjacent (n-1)-faces and (n+1)-faces as well as the center n-face.

9.1.3.29 mln::mln_gen_complex_window_p (complex_higher_dim_connected_n_face_window_p , topo::adj_higher_dim_connected_n_face_fwd_iter , topo::adj_higher_dim_connected_n_face_bkd_iter)

Window centered on an n-face of complex returning the n-faces sharing an (n+1)-face with the center n-face, as well as this center n-face.

9.1.3.30 mln::mln_gen_complex_window_p (complex_lower_dim_connected_n_face_window_p , topo::adj_lower_dim_connected_n_face_fwd_iter , topo::adj_lower_dim_connected_n_face_bkd_iter)

Window centered on an n-face of complex returning the n-faces sharing an (n-1)-face with the center n-face, as well as this center n-face.

9.1.3.31 mln::mln_gen_complex_window_p (complex_m_face_window_p , topo::adj_m_face_fwd_iter , topo::adj_m_face_bkd_iter)

Window centered on an n-face of complex returning the m-faces transitively adjacent to this center n-face, as well as this center n-face.

9.1.3.32 template<typename W1 , typename W2 > mln::mln_regular (W1) const `[inline]`

Set difference between a couple of windows `win1` and `win2`.

Inter a window `win` with a delta-point `dp`.

It just calls mln::win::diff.

9.1.3.33 template<typename O1 , typename O2 > mln::mln_trait_op_geq (O1 , O2)

General definition of the "greater than or equal to" operator.

The "greater than or equal to" operator is here defined for every Milena objects. It relies on the definition of the "less than or equal to" operator. It returns "rhs <= lhs".

Warning

There shall not be any other definition of this operator in Milena when applying on a couple of mln::Object.

9.1.3.34 template<typename O1 , typename O2 > mln::mln_trait_op_greater (O1 , O2) const

General definition of the "greater than" operator.

The "greater than" operator is here defined for every milena objects. It relies on the definition of the "less than" operator. It returns "rhs < lhs".

Warning

There shall not be any other definition of this operator in Milena when applying on a couple of mln::Object.

9.1.3.35 template<typename O1 , typename O2 > mln::mln_trait_op_leq (O1 , O2)

Default definition of the "less than or equal to" operator.

A default version of the "less than or equal to" operator is defined for every Milena objects. It relies on the definition of the "less than" operator. It returns "not (rhs < lhs)".

Warning

In the case of partial ordering between objects, this operator has to be re-defined.

9.1.3.36 template<typename O1 , typename O2 > mln::mln_trait_op_neq (O1 , O2) [inline]

Initial value:

```
(const Object<O1>& lhs, const Object<O2>& rhs)
  {
    return ! (exact(lhs) == exact(rhs));
  }

  template <typename O1, typename O2>
  inline
  mln_trait_op_greater(O1, O2)
    operator>(const Object<O1>& lhs, const Object<O2>& rhs)
  {
    return exact(rhs) < exact(lhs);
  }

  template <typename O1
```

General definition of the "not equal to" operator.

The "not equal to" operator is here defined for every milena objects. It relies on the definition of the "equal to" operator. It returns "not (lhs == rhs)".

Warning

There shall not be any other definition of this operator in Milena when applying on a couple of mln::Object.

9.1.3.37 template<unsigned D, typename G > bool mln::operator!= (const complex_psite< D, G > & *lhs*, const complex_psite< D, G > & *rhs*)

Is *lhs* not equal to *rhs*?

Precondition

Arguments *lhs* and *rhs* must belong to the same mln::p_complex.

Definition at line 353 of file complex_psite.hh.

References mln::complex_psite< D, G >::face(), and mln::complex_psite< D, G >::site_set().

9.1.3.38 template< unsigned N, unsigned D, typename P > bool mln::operator!= (const faces_psite< N, D, P > & *lhs*, const faces_psite< N, D, P > & *rhs*)

Is *lhs* equal to *rhs*?

Precondition

Arguments *lhs* and *rhs* must belong to the same mln::complex.

Definition at line 336 of file faces_psite.hh.

References mln::faces_psite< N, D, P >::face(), and mln::faces_psite< N, D, P >::site_set().

9.1.3.39 template< typename P , typename S > P mln::operator* (const Gpoint< P > & *p*, const value::scalar_< S > & *s*) `[inline]`

Multiply a point `p` by a scalar `s`.

Definition at line 405 of file gpoint.hh.

9.1.3.40 template< typename S > S & mln::operator++ (value::Scalar< S > & *rhs*) `[inline]`

Pre-incrementation for any scalar type.

Definition at line 77 of file concept/scalar.hh.

References mln::literal::one.

9.1.3.41 template< typename N1 , typename N2 > N2 neighb< typename N1::window::regular > mln::operator- (const Neighborhood< N1 > & *nbh1*, const Neighborhood< N2 > & *nbh2*)

Set difference between a couple of neighborhoods `nbh1` and `nbh2`.

It just calls mln::win::diff.

Definition at line 155 of file win/diff.hh.

References mln::win::diff().

9.1.3.42 template< typename P , typename D > P mln::operator- (const Gpoint< P > & *p*, const Gdpoint< D > & *dp*) `[inline]`

Substract a delta-point `dp` to a grid point `p`.

Parameters

`[in]` ***p*** A grid point.

`[in]` ***dp*** A delta-point.

The type of `dp` has to compatible with the type of `p`.

Returns

A point (temporary object).

See also

mln::Gdpoint
mln::Gdpoint

Definition at line 395 of file gpoint.hh.

9.1.3.43 template<typename S > S & mln::operator-- (value::Scalar< S > & *rhs*) [inline]

Pre-decrementation for any scalar type.

Definition at line 85 of file concept/scalar.hh.

References mln::literal::one.

9.1.3.44 template<unsigned D, typename G > bool mln::operator< (const complex_psite< D, G > & *lhs*, const complex_psite< D, G > & *rhs*)

Is *lhs* “less” than *rhs*?

This comparison is required by algorithms sorting psites.

Precondition

Arguments *lhs* and *rhs* must belong to the same mln::p_complex.

Definition at line 362 of file complex_psite.hh.

9.1.3.45 template<unsigned N, unsigned D, typename P > bool mln::operator< (const faces_psite< N, D, P > & *lhs*, const faces_psite< N, D, P > & *rhs*)

Is *lhs* “less” than *rhs*?

This comparison is required by algorithms sorting psites.

Precondition

Arguments *lhs* and *rhs* must belong to the same mln::complex.

Definition at line 345 of file faces_psite.hh.

9.1.3.46 template<typename L , typename R > bool mln::operator< (const Image< L > & *lhs*, const Image< R > & *rhs*) [inline]

Point-wise test if the pixel values of `lhs` are point-wise less than the pixel values of `rhs`.

Parameters

`[in]` ***lhs*** A first image.
`[in]` ***rhs*** A second image.

Precondition

lhs.domain == rhs.domain

Definition at line 107 of file compare.hh.

References mln::test::predicate().

9.1.3.47 template<typename I , typename G , typename W > std::ostream & mln::operator<< (std::ostream & *ostr*, const complex_window_bkd_piter< I, G, W > & *p*) [inline]

Print an mln::complex_window_bkd_piter.

Definition at line 401 of file complex_window_piter.hh.

9.1.3.48 template<typename I , typename G , typename W > std::ostream & mln::operator<< (std::ostream & *ostr*, const complex_window_fwd_piter< I, G, W > & *p*) [inline]

Print an mln::complex_window_fwd_piter.

Definition at line 292 of file complex_window_piter.hh.

9.1.3.49 template<typename I , typename G , typename N > std::ostream & mln::operator<< (std::ostream & *ostr*, const complex_neighborhood_fwd_piter< I, G, N > & *p*) [inline]

Print an mln::complex_neighborhood_fwd_piter.

Definition at line 292 of file complex_neighborhood_piter.hh.

9.1.3.50 template<typename I , typename G , typename N > std::ostream & mln::operator<< (std::ostream & *ostr*, const complex_neighborhood_bkd_piter< I, G, N > & *p*) [inline]

Print an mln::complex_neighborhood_bkd_piter.

Definition at line 399 of file complex_neighborhood_piter.hh.

9.1.3.51 template<unsigned D, typename G > bool mln::operator<= (const p_complex< D, G > & *lhs*, const p_complex< D, G > & *rhs*)

Inclusion of a mln::p_complex in another one.

This inclusion relation is very strict for the moment, since our infrastrure for complexs is simple: a mln::p_complex is included in another one if their are equal.

Definition at line 330 of file p_complex.hh.

9.1.3.52 template<typename G , typename F > bool mln::operator<= (const p_edges< G, F > & *lhs*, const p_edges< G, F > & *rhs*)

Inclusion of a mln::p_edges in another one.

Definition at line 338 of file p_edges.hh.

9.1.3.53 template<typename L , typename R > bool mln::operator<= (const Image< L > & *lhs*, const Image< R > & *rhs*) [inline]

Point-wise test if the pixel values of `lhs` are point-wise less than or equal to the pixel values of `rhs`.

Parameters

[in] ***lhs*** A first image.

[in] ***rhs*** A second image.

Precondition

lhs.domain == rhs.domain

Definition at line 126 of file compare.hh.

References mln::test::predicate().

9.1.3.54 template< typename G , typename F > bool mln::operator<= (const p_vertices< G, F > & *lhs*, const p_vertices< G, F > & *rhs*)

Inclusion of a mln::p_vertices in another one.

This inclusion relation is very strict for the moment, since our infrastructure for graphs is simple: a mln::p_vertices is included in another one if their are equal.

Definition at line 399 of file p_vertices.hh.

9.1.3.55 template< unsigned N, unsigned D, typename P > bool mln::operator<= (const p_faces< N, D, P > & *lhs*, const p_faces< N, D, P > & *rhs*)

Inclusion of a mln::p_faces in another one.

This inclusion relation is very strict for the moment, since our infrastrure for complexs is simple: a mln::p_faces is included in another one if their are equal.

Definition at line 287 of file p_faces.hh.

9.1.3.56 template< unsigned N, unsigned D, typename P > bool mln::operator== (const p_faces< N, D, P > & *lhs*, const p_faces< N, D, P > & *rhs*)

Comparison between two mln::p_faces's.

Two mln::p_faces's are considered equal if they share the same complex.

Definition at line 278 of file p_faces.hh.

References mln::p_faces< N, D, P >::cplx().

9.1.3.57 template< unsigned N, unsigned D, typename P > bool mln::operator== (const faces_psite< N, D, P > & *lhs*, const faces_psite< N, D, P > & *rhs*)

Comparison of two instances of mln::faces_psite.

Is *lhs* equal to *rhs*?

Precondition

Arguments *lhs* and *rhs* must belong to the same mln::complex.

Definition at line 327 of file faces_psite.hh.

References mln::faces_psite< N, D, P >::face(), and mln::faces_psite< N, D, P >::site_set().

9.1.3.58 template<typename L , typename R > bool mln::operator== (const Image< L > & *lhs*, const Image< R > & *rhs*) [inline]

Point-wise test if the pixel values of `lhs` are equal to the pixel values of `rhs`.

Parameters

`[in]` ***lhs*** A first image.

`[in]` ***rhs*** A second image.

Precondition

lhs.domain == rhs.domain

Definition at line 86 of file compare.hh.

References mln::test::predicate().

9.1.3.59 template<unsigned D, typename G > bool mln::operator== (const p_complex< D, G > & *lhs*, const p_complex< D, G > & *rhs*)

Comparison between two mln::p_complex's.

Two mln::p_complex's are considered equal if they share the same complex.

Definition at line 321 of file p_complex.hh.

References mln::p_complex< D, G >::cplx().

9.1.3.60 template<unsigned D, typename G > bool mln::operator== (const complex_psite< D, G > & *lhs*, const complex_psite< D, G > & *rhs*)

Comparison of two instances of mln::complex_psite.

Is *lhs* equal to *rhs*?

Precondition

Arguments *lhs* and *rhs* must belong to the same mln::p_complex.

Definition at line 344 of file complex_psite.hh.

References mln::complex_psite< D, G >::face(), and mln::complex_psite< D, G >::site_set().

9.1.3.61 template<typename G , typename F > bool mln::operator== (const p_vertices< G, F > & *lhs*, const p_vertices< G, F > & *rhs*)

Comparison between two mln::p_vertices's.

Two mln::p_vertices's are considered equal if they share the same graph.

Definition at line 392 of file p_vertices.hh.

References mln::p_vertices< G, F >::graph().

9.1.3.62 template< typename G , typename F > bool mln::operator== (const p_edges< G, F > & *lhs*, const p_edges< G, F > & *rhs*)

Comparison between two mln::p_edges's.

Two mln::p_edges's are considered equal if they share the same graph.

Definition at line 331 of file p_edges.hh.

References mln::p_edges< G, F >::graph().

9.1.3.63 template< typename F , typename S > pw::image<F,S> mln::operator\| (const Function_v2v< F > & *f*, const Site_Set< S > & *ps*)

Construct an image from a function and a site set.

image = function | site_set.

Definition at line 138 of file pw/image.hh.

9.1.3.64 template< typename V , typename G , typename P > edge_image<P,V,G> mln::operator\| (const fun::i2v::array< V > & *edge_values*, const p_edges< G, fun::i2v::array< P > > & *pe*)

Construct a edge image from a fun::i2v::array and a p_edges.

image = fun::i2v::array | p_edges.

Definition at line 217 of file core/image/edge_image.hh.

9.1.3.65 template< typename S , typename F > p_if<S, F> mln::operator\| (const Site_Set< S > & *s*, const Function_v2b< F > & *f*)

Restrict a site set `s` to points that verify `f`.

Parameters

`[in]` ***s*** A site set.

`[in]` ***f*** A function from point to Boolean.

Returns

A subset of points.

Definition at line 147 of file p_if.hh.

9.1.3.66 template< typename V , typename G , typename P > vertex_image<P,V,G> mln::operator\| (const fun::i2v::array< V > & *vertex_values*, const p_vertices< G, fun::i2v::array< P > > & *pv*)

Construct a vertex image from a fun::i2v::array and a p_vertices.

image = fun::i2v::array | p_vertices.

Definition at line 215 of file core/image/vertex_image.hh.

9.1.3.67 template<typename I , typename F > image_if<I,F> mln::operator| (Image< I > & *ima*, const Function_v2b< F > & *f*)

ima | f creates an image_if with the image ima and the function f.

Definition at line 233 of file image_if.hh.

9.1.3.68 template<typename I , typename F > image_if<const I,F> mln::operator| (const Image< I > & *ima*, const Function_v2b< F > & *f*)

ima | f creates an image_if with the image ima and the function f.

Definition at line 242 of file image_if.hh.

9.1.3.69 template<typename I > const internal::primary_type< I >::ret & mln::primary (const Image< I > & *input*) [inline]

FIXME: Doc!

Definition at line 129 of file primary.hh.

Referenced by mln::border::resize().

9.1.3.70 template<typename S , typename F > p_transformed< S, F > mln::ptransform (const Site_Set< S > & *s*, const Function_v2v< F > & *f*) [inline]

Transform a site set `s` through the function `f`.

Parameters

[in] *s* A site set.

[in] *f* A function from site to site.

Returns

The transformed site set.

Definition at line 145 of file p_transformed.hh.

9.1.4 Variable Documentation

9.1.4.1 const dpoint1d mln::before = dpoint1d(-1)

Definition of a shortcut for delta point in 1d.

Definition at line 73 of file dpoint1d.hh.

9.1.4.2 const dpoint3d mln::sagittal_dec = dpoint3d(0, 0, -1)

Definition of a shortcut for delta point in 3d.

Definition at line 72 of file dpoint3d.hh.

9.1.4.3 const dpoint2d mln::up = dpoint2d(-1, 0)

Definition of a shortcut for delta point in 2d.

Definition at line 76 of file dpoint2d.hh.

9.2 mln::accu Namespace Reference

Namespace of accumulators.

Namespaces

- namespace image

  Namespace of accumulator image routines.

- namespace impl

  Implementation namespace of accumulator namespace.

- namespace logic

  Namespace of logical accumulators.

- namespace math

  Namespace of mathematic accumulators.

- namespace shape

  Namespace of shape accumulators.

- namespace stat

  Namespace of statistical accumulators.

Classes

- struct center

  Mass center accumulator.

- struct convolve

  Generic convolution accumulator class.

- struct count_adjacent_vertices

  Accumulator class counting the number of vertices adjacent to a set of mln::p_edges_psite (i.e., a set of edges).

- struct count_labels

  Count the number of different labels in an image.

- struct count_value

  Define an accumulator that counts the occurrence of a given value.

- struct histo

  Generic histogram class over a value set with type `V`*.*

- struct label_used

  References all the labels used.

- struct maj_h

  Compute the majority value.

- struct max_site

  Define an accumulator that computes the first site with the maximum value in an image.

- struct nil

  Define an accumulator that does nothing.

- struct p

  Generic p of accumulators.

- struct pair

  Generic pair of accumulators.

- struct rms

  Generic root mean square accumulator class.

- struct tuple

  Generic tuple of accumulators.

- struct val

  Generic val of accumulators.

Functions

- template<typename A , typename I >
  A::result compute (const Accumulator< A > &a, const Image< I > &input)

  Make an accumulator compute the pixels of the image `input`*.*

- template<typename Meta_Accu , unsigned Dir, typename I , typename O >
  void line (const Image< I > &input, const typename I::site &p_start, unsigned len, unsigned half_-length, Image< O > &output)
- template<typename A , typename I >
  mln_meta_accu_result (A, util::pix< I >) compute(const Meta_Accumulator< A > &a

  Make an accumulator compute the pixels of the image `input`*.*

- template<typename A , typename I >
  void take (const Image< I > &input, Accumulator< A > &a)

  Make an accumulator take the pixels of the image `input`*.*

9.2.1 Detailed Description

Namespace of accumulators.

9.2.2 Function Documentation

9.2.2.1 template<typename A , typename I > A::result mln::accu::compute (const Accumulator< A > & *a*, const Image< I > & *input*) `[inline]`

Make an accumulator compute the pixels of the image `input`.

Parameters

`[in]` ***input*** The input image.

`[in]` ***a*** An accumulator.

This routine runs:

a.take(make::pix(input, p)); on all pixels on the images.

Warning

This routine does not perform a.init().

Definition at line 130 of file accu/compute.hh.

9.2.2.2 template<typename Meta_Accu , unsigned Dir, typename I , typename O > void mln::accu::line (const Image< I > & *input*, const typename I::site & *p_start*, unsigned *len*, unsigned *half_length*, Image< O > & *output*)

Line an accumulator onto the pixel values of the image `input`.

Parameters

`[in]` ***input*** The input image.

`[in]` ***p_start*** The starting site of the line.

`[in]` ***len*** The line length.

`[in]` ***half_length*** The half length of the line.

`[in,out]` ***output*** The resulting image.

This routine runs:

tmp = `a`

tmp.init()

accu::take(`input`, tmp)

return tmp.to_result()

Definition at line 381 of file accu/line.hh.

9.2.2.3 template<typename A , typename I > mln::accu::mln_meta_accu_result (A , util::pix< I >) const [inline]

Make an accumulator compute the pixels of the image `input`.

Parameters

`[in]` ***input*** The input image.

`[in]` ***a*** A meta accumulator.

This routine runs:

a.take(make::pix(input, p)); on all pixels on the images.

Warning

This routine does not perform a.init().

9.2.2.4 template<typename A , typename I > void mln::accu::take (const Image< I > & *input*, Accumulator< A > & *a*) [inline]

Make an accumulator take the pixels of the image `input`.

Parameters

`[in]` ***input*** The input image.

`[in,out]` ***a*** The accumulator.

This routine runs:

for all p of `input`, `a.take`(pix(`input`, p))

Warning

This routine does not perform a.init().

Definition at line 87 of file take.hh.

9.3 mln::accu::image Namespace Reference

Namespace of accumulator image routines.

9.3.1 Detailed Description

Namespace of accumulator image routines.

9.4 mln::accu::impl Namespace Reference

Implementation namespace of accumulator namespace.

9.4.1 Detailed Description

Implementation namespace of accumulator namespace.

9.5 mln::accu::logic Namespace Reference

Namespace of logical accumulators.

Classes

- struct land
  "Logical-and" accumulator.
- struct land_basic
  "Logical-and" accumulator.
- struct lor
  "Logical-or" accumulator.
- struct lor_basic
  "Logical-or" accumulator class.

9.5.1 Detailed Description

Namespace of logical accumulators.

9.6 mln::accu::math Namespace Reference

Namespace of mathematic accumulators.

Classes

- struct count
  Generic counter accumulator.
- struct inf
  Generic inf accumulator class.
- struct sum
  Generic sum accumulator class.
- struct sup
  Generic sup accumulator class.

9.6.1 Detailed Description

Namespace of mathematic accumulators.

9.7 mln::accu::meta::logic Namespace Reference

Namespace of logical meta-accumulators.

Classes

- struct land

  Meta accumulator for land.

- struct land_basic

  Meta accumulator for land_basic.

- struct lor

  Meta accumulator for lor.

- struct lor_basic

  Meta accumulator for lor_basic.

9.7.1 Detailed Description

Namespace of logical meta-accumulators.

9.8 mln::accu::meta::math Namespace Reference

Namespace of mathematic meta-accumulators.

Classes

- struct count

  Meta accumulator for count.

- struct inf

  Meta accumulator for inf.

- struct sum

  Meta accumulator for sum.

- struct sup

  Meta accumulator for sup.

9.8.1 Detailed Description

Namespace of mathematic meta-accumulators.

9.9 mln::accu::meta::shape Namespace Reference

Namespace of shape meta-accumulators.

Classes

- struct bbox

  Meta accumulator for bbox.

- struct height

  Meta accumulator for height.

- struct volume

  Meta accumulator for volume.

9.9.1 Detailed Description

Namespace of shape meta-accumulators.

9.10 mln::accu::meta::stat Namespace Reference

Namespace of statistical meta-accumulators.

Classes

- struct max

  Meta accumulator for max.

- struct max_h

  Meta accumulator for max.

- struct mean

  Meta accumulator for mean.

- struct median_alt

  Meta accumulator for median_alt.

- struct median_h

  Meta accumulator for median_h.

- struct min

Meta accumulator for min.

- struct min_h

  Meta accumulator for min.

- struct rank

  Meta accumulator for rank.

- struct rank_high_quant

  Meta accumulator for rank_high_quant.

9.10.1 Detailed Description

Namespace of statistical meta-accumulators.

9.11 mln::accu::shape Namespace Reference

Namespace of shape accumulators.

Classes

- struct bbox

  Generic bounding box accumulator class.

- struct height

  Height accumulator.

- struct volume

  Volume accumulator class.

9.11.1 Detailed Description

Namespace of shape accumulators.

9.12 mln::accu::stat Namespace Reference

Namespace of statistical accumulators.

Classes

- struct deviation

  Generic standard deviation accumulator class.

- struct histo3d_rgb

Define a histogram as accumulator which returns an image3d.

- struct max

  Generic max accumulator class.

- struct max_h

  Generic max function based on histogram over a value set with type V.

- struct mean

  Generic mean accumulator class.

- struct median_alt

  Generic median_alt function based on histogram over a value set with type S.

- struct median_h

  Generic median function based on histogram over a value set with type V.

- struct min

  Generic min accumulator class.

- struct min_h

  Generic min function based on histogram over a value set with type V.

- struct min_max

  Generic min and max accumulator class.

- struct rank

  Generic rank accumulator class.

- struct rank< bool >

  rank accumulator class for Boolean.

- struct rank_high_quant

  Generic rank accumulator class.

- struct var

  Var accumulator class.

- struct variance

  Variance accumulator class.

Functions

- template<typename V >
  bool operator== (const histo3d_rgb< V > &histo1, const histo3d_rgb< V > &histo2)

  Check wethever an histogram is equal to an other one.

9.12.1 Detailed Description

Namespace of statistical accumulators.

9.12.2 Function Documentation

9.12.2.1 template< typename V > bool mln::accu::stat::operator== (const histo3d_rgb< V > & *histo1*, const histo3d_rgb< V > & *histo2*)

Check wethever an histogram is equal to an other one.

Parameters

`[in]` ***histo1*** the first histogram to compare with.

`[in]` ***histo2*** the second histogram.

The operator compares all the bins from the two histograms. Nobody uses this method unless unitary tests.

Definition at line 315 of file histo3d_rgb.hh.

References mln::image3d< T >::domain().

9.13 mln::algebra Namespace Reference

Namespace of algebraic structure.

Classes

- struct h_mat

  N-Dimensional matrix with homogeneous coordinates.

- class h_vec

  N-Dimensional vector with homogeneous coordinates.

Functions

- template<unsigned N, typename T >
  bool ldlt_decomp (mat< N, N, T > &A, vec< N, T > &rdiag)

  Perform LDL^T decomposition of a symmetric positive definite matrix.

- template<unsigned N, typename T >
  void ldlt_solve (const mat< N, N, T > &A, const vec< N, T > &rdiag, const vec< N, T > &B, vec< N, T > &x)

  Solve A x = B after mln::algebra::ldlt_decomp.

- template<unsigned n, typename T , typename U >
  mln::trait::value_< typename mln::trait::op::times< T, U >::ret >::sum operator* (const vec< n, T > &lhs, const vec< n, U > &rhs)

  Scalar product (dot product).

- template< typename T , typename U >
  vec< 3, typename mln::trait::op::times< T, U >::ret > vprod (const vec< 3, T > &lhs, const vec< 3, U > &rhs)

  Vectorial product (cross product).

9.13.1 Detailed Description

Namespace of algebraic structure.

9.13.2 Function Documentation

9.13.2.1 template< unsigned N, typename T > bool mln::algebra::ldlt_decomp (mat< N, N, T > & *A*, vec< N, T > & *rdiag*) [inline]

Perform LDL^T decomposition of a symmetric positive definite matrix.

Like Cholesky, but no square roots. Overwrites lower triangle of matrix.

From Trimesh's ldltdc routine.

Definition at line 79 of file misc.hh.

Referenced by mln::geom::mesh_curvature().

9.13.2.2 template< unsigned N, typename T > void mln::algebra::ldlt_solve (const mat< N, N, T > & *A*, const vec< N, T > & *rdiag*, const vec< N, T > & *B*, vec< N, T > & *x*) [inline]

Solve A x = B after mln::algebra::ldlt_decomp.

Definition at line 112 of file misc.hh.

Referenced by mln::geom::mesh_curvature().

9.13.2.3 template< unsigned n, typename T , typename U > mln::trait::value_< typename mln::trait::op::times< T, U >::ret >::sum mln::algebra::operator* (const vec< n, T > & *lhs*, const vec< n, U > & *rhs*) [inline]

Scalar product (dot product).

Definition at line 632 of file algebra/vec.hh.

References mln::literal::zero.

9.13.2.4 template< typename T , typename U > vec< 3, typename mln::trait::op::times< T, U >::ret > mln::algebra::vprod (const vec< 3, T > & *lhs*, const vec< 3, U > & *rhs*) [inline]

Vectorial product (cross product).

Definition at line 713 of file algebra/vec.hh.

References vprod().

Referenced by mln::geom::mesh_corner_point_area(), mln::geom::mesh_curvature(), mln::geom::mesh_-normal(), and vprod().

9.14 mln::arith Namespace Reference

Namespace of arithmetic.

Namespaces

- namespace impl

  Implementation namespace of arith namespace.

Functions

- template< typename I >
  mln::trait::concrete< I >::ret diff_abs (const Image< I > &lhs, const Image< I > &rhs)

  Point-wise absolute difference of images `lhs` and `rhs`.

- template< typename L , typename R , typename O >
  void div (const Image< L > &lhs, const Image< R > &rhs, Image< O > &output)

  Point-wise division of images `lhs` and `rhs`.

- template< typename I , typename V , typename O >
  void div_cst (const Image< I > &input, const V &val, Image< O > &output)

  Point-wise division of the value `val` to image `input`.

- template< typename L , typename R >
  void div_inplace (Image< L > &lhs, const Image< R > &rhs)

  Point-wise division of image `rhs` in image `lhs`.

- template< typename L , typename R >
  mln::trait::concrete< L >::ret min (const Image< L > &lhs, const Image< R > &rhs)

  Point-wise min of images `lhs` and `rhs`.

- template< typename L , typename R >
  void min_inplace (Image< L > &lhs, const Image< R > &rhs)

  Point-wise min of image `lhs` in image `rhs`.

- template< typename L , typename R >
  mln::trait::op::minus< L, R >::ret minus (const Image< L > &lhs, const Image< R > &rhs)

  Point-wise addition of images `lhs` and `rhs`.

- template< typename L , typename R , typename F >
  mln::trait::ch_value< L, typename F::result >::ret minus (const Image< L > &lhs, const Image< R > &rhs, const Function_v2v< F > &f)

  Point-wise addition of images `lhs` and `rhs`.

- template< typename V , typename L , typename R >
mln::trait::ch_value< L, V >::ret minus (const Image< L > &lhs, const Image< R > &rhs)

  Point-wise addition of images `lhs` *and* `rhs`*.*

- template< typename I , typename V >
mln::trait::op::minus< I, V >::ret minus_cst (const Image< I > &input, const V &val)

  Point-wise addition of the value `val` *to image* `input`*.*

- template< typename I , typename V , typename F >
mln::trait::ch_value< I, typename F::result >::ret minus_cst (const Image< I > &input, const V &val, const Function_v2v< F > &f)

  Point-wise addition of the value `val` *to image* `input`*.*

- template< typename I , typename V >
I & minus_cst_inplace (Image< I > &input, const V &val)

  Point-wise addition of the value `val` *to image* `input`*.*

- template< typename L , typename R >
void minus_inplace (Image< L > &lhs, const Image< R > &rhs)

  Point-wise addition of image `rhs` *in image* `lhs`*.*

- template< typename L , typename R , typename F >
mln::trait::ch_value< L, typename F::result >::ret plus (const Image< L > &lhs, const Image< R > &rhs, const Function_v2v< F > &f)

  Point-wise addition of images `lhs` *and* `rhs`*.*

- template< typename V , typename L , typename R >
mln::trait::ch_value< L, V >::ret plus (const Image< L > &lhs, const Image< R > &rhs)

  Point-wise addition of images `lhs` *and* `rhs`*.*

- template< typename L , typename R >
mln::trait::op::plus< L, R >::ret plus (const Image< L > &lhs, const Image< R > &rhs)

  Point-wise addition of images `lhs` *and* `rhs`*.*

- template< typename I , typename V >
mln::trait::op::plus< I, V >::ret plus_cst (const Image< I > &input, const V &val)

  Point-wise addition of the value `val` *to image* `input`*.*

- template< typename I , typename V , typename F >
mln::trait::ch_value< I, typename F::result >::ret plus_cst (const Image< I > &input, const V &val, const Function_v2v< F > &f)

  Point-wise addition of the value `val` *to image* `input`*.*

- template< typename W , typename I , typename V >
mln::trait::ch_value< I, W >::ret plus_cst (const Image< I > &input, const V &val)

  Point-wise addition of the value `val` *to image* `input`*.*

- template< typename I , typename V >
I & plus_cst_inplace (Image< I > &input, const V &val)

  Point-wise addition of the value `val` *to image* `input`*.*

- template< typename L , typename R >
  void plus_inplace (Image< L > &lhs, const Image< R > &rhs)

  Point-wise addition of image `rhs` in image `lhs`.

- template< typename I >
  mln::trait::concrete< I >::ret revert (const Image< I > &input)

  Point-wise reversion of image `input`.

- template< typename I >
  void revert_inplace (Image< I > &input)

  Point-wise in-place reversion of image `input`.

- template< typename L , typename R , typename O >
  void times (const Image< L > &lhs, const Image< R > &rhs, Image< O > &output)

  Point-wise addition of images `lhs` and `rhs`.

- template< typename I , typename V , typename O >
  void times_cst (const Image< I > &input, const V &val, Image< O > &output)

  Point-wise addition of the value `val` to image `input`.

- template< typename L , typename R >
  void times_inplace (Image< L > &lhs, const Image< R > &rhs)

  Point-wise addition of image `rhs` in image `lhs`.

9.14.1 Detailed Description

Namespace of arithmetic.

9.14.2 Function Documentation

9.14.2.1 template< typename I > mln::trait::concrete< I >::ret mln::arith::diff_abs (const Image< I > & *lhs*, const Image< I > & *rhs*) `[inline]`

Point-wise absolute difference of images `lhs` and `rhs`.

Parameters

`[in]` ***lhs*** First operand image.

`[in]` ***rhs*** Second operand image.

Returns

The result image.

Precondition

`lhs.domain` == `rhs.domain`

Definition at line 63 of file arith/diff_abs.hh.

References mln::data::transform().

9.14.2.2 template<typename L , typename R , typename O > void mln::arith::div (const Image< L > & *lhs*, const Image< R > & *rhs*, Image< O > & *output*) [inline]

Point-wise division of images `lhs` and `rhs`.

Parameters

`[in]` ***lhs*** First operand image.

`[in]` ***rhs*** Second operand image.

`[out]` ***output*** The result image.

Precondition

`output.domain` == `lhs.domain` == `rhs.domain`

Definition at line 227 of file arith/div.hh.

9.14.2.3 template<typename I , typename V , typename O > void mln::arith::div_cst (const Image< I > & *input*, const V & *val*, Image< O > & *output*) [inline]

Point-wise division of the value `val` to image `input`.

Parameters

`[in]` ***input*** The image.

`[in]` ***val*** The value.

`[out]` ***output*** The result image.

Precondition

`output.domain` == `input.domain`

Definition at line 242 of file arith/div.hh.

References div_cst().

Referenced by div_cst().

9.14.2.4 template<typename L , typename R > void mln::arith::div_inplace (Image< L > & *lhs*, const Image< R > & *rhs*) [inline]

Point-wise division of image `rhs` in image `lhs`.

Parameters

`[in]` ***lhs*** First operand image (subject to division).

`[in,out]` ***rhs*** Second operand image (to div `lhs`).

This addition performs:

for all p of rhs.domain

lhs(p) /= rhs(p)

Precondition

rhs.domain <= lhs.domain

Definition at line 255 of file arith/div.hh.

References div_inplace().

Referenced by div_inplace().

9.14.2.5 template< typename L , typename R > mln::trait::concrete< L >::ret mln::arith::min (const Image< L > & *lhs*, const Image< R > & *rhs*) [inline]

Point-wise min of images lhs and rhs.

Parameters

[in] ***lhs*** First operand image.

[in] ***rhs*** Second operand image.

Returns

The result image.

Precondition

lhs.domain == rhs.domain

Definition at line 112 of file arith/min.hh.

References mln::initialize().

9.14.2.6 template< typename L , typename R > void mln::arith::min_inplace (Image< L > & *lhs*, const Image< R > & *rhs*) [inline]

Point-wise min of image lhs in image rhs.

Parameters

[in,out] ***lhs*** First operand image.

[in] ***rhs*** Second operand image.

Precondition

rhs.domain == lhs.domain

Definition at line 128 of file arith/min.hh.

9.14.2.7 template< typename L , typename R > mln::trait::op::minus< L, R >::ret mln::arith::minus (const Image< L > & *lhs*, const Image< R > & *rhs*) [inline]

Point-wise addition of images lhs and rhs.

Parameters

[in] ***lhs*** First operand image.

[in] ***rhs*** Second operand image.

Returns

The result image.

Precondition

lhs.domain == rhs.domain

Definition at line 331 of file arith/minus.hh.

References mln::initialize().

9.14.2.8 template< typename L , typename R , typename F > mln::trait::ch_value< L, typename F::result >::ret mln::arith::minus (const Image< L > & *lhs*, const Image< R > & *rhs*, const Function_v2v< F > & *f*) [inline]

Point-wise addition of images lhs and rhs.

Parameters

[in] ***lhs*** First operand image.
[in] ***rhs*** Second operand image.
[in] ***f*** Function.

Returns

The result image.

Precondition

lhs.domain == rhs.domain

Definition at line 350 of file arith/minus.hh.

References mln::initialize().

9.14.2.9 template< typename V , typename L , typename R > mln::trait::ch_value< L, V >::ret mln::arith::minus (const Image< L > & *lhs*, const Image< R > & *rhs*) [inline]

Point-wise addition of images lhs and rhs.

Parameters

[in] ***lhs*** First operand image.
[in] ***rhs*** Second operand image.

Returns

The result image.

The free parameter V sets the destination value type.

Precondition

lhs.domain == rhs.domain

Definition at line 369 of file arith/minus.hh.

9.14.2.10 template<typename I , typename V > mln::trait::op::minus< I, V >::ret mln::arith::minus_cst (const Image< I > & *input*, const V & *val*) [inline]

Point-wise addition of the value `val` to image `input`.

Parameters

`[in]` ***input*** The image.
`[in]` ***val*** The value.

Returns

The result image.

Precondition

`input.is_valid`

Definition at line 387 of file arith/minus.hh.

9.14.2.11 template<typename I , typename V , typename F > mln::trait::ch_value< I, typename F::result >::ret mln::arith::minus_cst (const Image< I > & *input*, const V & *val*, const Function_v2v< F > & *f*) [inline]

Point-wise addition of the value `val` to image `input`.

Parameters

`[in]` ***input*** The image.
`[in]` ***val*** The value.
`[in]` ***f*** Function.

Returns

The result image.

Precondition

`input.is_valid`

Definition at line 405 of file arith/minus.hh.

9.14.2.12 template<typename I , typename V > I & mln::arith::minus_cst_inplace (Image< I > & *input*, const V & *val*) [inline]

Point-wise addition of the value `val` to image `input`.

Parameters

`[in,out]` ***input*** The image.
`[in]` ***val*** The value.

Precondition

`input.is_valid`

Definition at line 440 of file arith/minus.hh.

References minus_cst_inplace(), and minus_inplace().

Referenced by minus_cst_inplace().

9.14.2.13 template<typename L , typename R > void mln::arith::minus_inplace (Image< L > & *lhs*, const Image< R > & *rhs*) [inline]

Point-wise addition of image `rhs` in image `lhs`.

Parameters

`[in,out]` ***lhs*** First operand image (subject to addition).

`[in]` ***rhs*** Second operand image (to be added to `lhs`).

This addition performs:

for all p of rhs.domain

lhs(p) -= rhs(p)

Precondition

`rhs.domain` == `lhs.domain`

Definition at line 424 of file arith/minus.hh.

References minus_inplace().

Referenced by minus_cst_inplace(), and minus_inplace().

9.14.2.14 template<typename L , typename R , typename F > mln::trait::ch_value< L, typename F::result >::ret mln::arith::plus (const Image< L > & *lhs*, const Image< R > & *rhs*, const Function_v2v< F > & *f*) [inline]

Point-wise addition of images `lhs` and `rhs`.

Parameters

`[in]` ***lhs*** First operand image.

`[in]` ***rhs*** Second operand image.

`[in]` ***f*** Function.

Returns

The result image.

Precondition

`lhs.domain` == `rhs.domain`

Definition at line 367 of file arith/plus.hh.

References mln::initialize().

9.14.2.15 template<typename V , typename L , typename R > mln::trait::ch_value< L, V >::ret mln::arith::plus (const Image< L > & *lhs*, const Image< R > & *rhs*) [inline]

Point-wise addition of images `lhs` and `rhs`.

Parameters

[in] ***lhs*** First operand image.

[in] ***rhs*** Second operand image.

Returns

The result image.

The free parameter `V` sets the destination value type.

Precondition

`lhs.domain` == `rhs.domain`

Definition at line 386 of file arith/plus.hh.

9.14.2.16 template<typename L , typename R > mln::trait::op::plus< L, R >::ret mln::arith::plus (const Image< L > & *lhs*, const Image< R > & *rhs*) [inline]

Point-wise addition of images `lhs` and `rhs`.

Parameters

[in] ***lhs*** First operand image.

[in] ***rhs*** Second operand image.

Returns

The result image.

Precondition

`lhs.domain` == `rhs.domain`

Definition at line 348 of file arith/plus.hh.

References mln::initialize().

9.14.2.17 template<typename I , typename V > mln::trait::op::plus< I, V >::ret mln::arith::plus_cst (const Image< I > & *input*, const V & *val*) [inline]

Point-wise addition of the value `val` to image `input`.

Parameters

[in] ***input*** The image.

[in] ***val*** The value.

Returns

The result image.

Precondition

`input.is_valid`

Definition at line 404 of file arith/plus.hh.

Referenced by plus_cst().

9.14.2.18 template<typename I , typename V , typename F > mln::trait::ch_value< I, typename F::result >::ret mln::arith::plus_cst (const Image< I > & *input*, const V & *val*, const Function_v2v< F > & *f*) [inline]

Point-wise addition of the value `val` to image `input`.

Parameters

`[in]` ***input*** The image.

`[in]` ***val*** The value.

`[in]` ***f*** Function.

Returns

The result image.

Precondition

`input.is_valid`

Definition at line 422 of file arith/plus.hh.

9.14.2.19 template<typename W , typename I , typename V > mln::trait::ch_value< I, W >::ret mln::arith::plus_cst (const Image< I > & *input*, const V & *val*) [inline]

Point-wise addition of the value `val` to image `input`.

Parameters

`[in]` ***input*** The image.

`[in]` ***val*** The value.

Returns

The result image.

Precondition

`input.is_valid`

Definition at line 441 of file arith/plus.hh.

References plus_cst().

9.14.2.20 template<typename I , typename V > I & mln::arith::plus_cst_inplace (Image< I > & *input,* const V & *val*) [inline]

Point-wise addition of the value `val` to image `input`.

Parameters

`[in,out]` ***input*** The image.

`[in]` ***val*** The value.

Precondition

`input.is_valid`

Definition at line 475 of file arith/plus.hh.

References plus_cst_inplace(), and plus_inplace().

Referenced by plus_cst_inplace().

9.14.2.21 template<typename L , typename R > void mln::arith::plus_inplace (Image< L > & *lhs,* const Image< R > & *rhs*) [inline]

Point-wise addition of image `rhs` in image `lhs`.

Parameters

`[in,out]` ***lhs*** First operand image (subject to addition).

`[in]` ***rhs*** Second operand image (to be added to `lhs`).

This addition performs:

for all p of rhs.domain

lhs(p) += rhs(p)

Precondition

`rhs.domain` == `lhs.domain`

Definition at line 459 of file arith/plus.hh.

References plus_inplace().

Referenced by plus_cst_inplace(), and plus_inplace().

9.14.2.22 template<typename I > mln::trait::concrete< I >::ret mln::arith::revert (const Image< I > & *input*) [inline]

Point-wise reversion of image `input`.

Parameters

`[in]` ***input*** the input image.

Returns

The result image.

Precondition

`input.is_valid`

It performs:

for all p of input.domain

output(p) = min + (max - input(p))

Definition at line 158 of file revert.hh.

References mln::initialize().

9.14.2.23 template<typename I > void mln::arith::revert_inplace (Image< I > & *input*) [inline]

Point-wise in-place reversion of image `input`.

Parameters

`[in,out]` ***input*** The target image.

Precondition

`input.is_valid`

It performs:

for all p of input.domain

input(p) = min + (max - input(p))

Definition at line 174 of file revert.hh.

9.14.2.24 template<typename L , typename R , typename O > void mln::arith::times (const Image< L > & *lhs*, const Image< R > & *rhs*, Image< O > & *output*) [inline]

Point-wise addition of images `lhs` and `rhs`.

Parameters

`[in]` ***lhs*** First operand image.

`[in]` ***rhs*** Second operand image.

`[out]` ***output*** The result image.

Precondition

`output.domain` == `lhs.domain` == `rhs.domain`

Definition at line 226 of file arith/times.hh.

9.14.2.25 template<typename I , typename V , typename O > void mln::arith::times_cst (const Image< I > & *input*, const V & *val*, Image< O > & *output*) [inline]

Point-wise addition of the value `val` to image `input`.

Parameters

`[in]` ***input*** The image.
`[in]` ***val*** The value.
`[out]` ***output*** The result image.

Precondition

`output.domain == input.domain`

Definition at line 241 of file arith/times.hh.

References times_cst().

Referenced by times_cst().

9.14.2.26 template<typename L , typename R > void mln::arith::times_inplace (Image< L > & *lhs*, const Image< R > & *rhs*) `[inline]`

Point-wise addition of image `rhs` in image `lhs`.

Parameters

`[in]` ***lhs*** First operand image (subject to addition).
`[in,out]` ***rhs*** Second operand image (to be added to `lhs`).

This addition performs:

for all p of rhs.domain

lhs(p) *= rhs(p)

Precondition

`rhs.domain <= lhs.domain`

Definition at line 254 of file arith/times.hh.

References times_inplace().

Referenced by times_inplace().

9.15 mln::arith::impl Namespace Reference

Implementation namespace of arith namespace.

Namespaces

- namespace generic

    Generic implementation namespace of arith namespace.

9.15.1 Detailed Description

Implementation namespace of arith namespace.

9.16 mln::arith::impl::generic Namespace Reference

Generic implementation namespace of arith namespace.

9.16.1 Detailed Description

Generic implementation namespace of arith namespace.

9.17 mln::binarization Namespace Reference

Namespace of "point-wise" expression tools.

Functions

- template< typename I , typename F >
  mln::trait::ch_value< I, bool >::ret binarization (const Image< I > &input, const Function_v2b< F > &fun)

  Thresholds the values of `input` so that they can be stored in the `output` binary image.

- template< typename I >
  mln::trait::ch_value< I, bool >::ret threshold (const Image< I > &input, const typename I::value threshold)

  Thresholds the values of `input` so that they can be stored in the `output` binary image.

9.17.1 Detailed Description

Namespace of "point-wise" expression tools.

9.17.2 Function Documentation

9.17.2.1 template< typename I , typename F > mln::trait::ch_value< I, bool >::ret mln::binarization::binarization (const Image< I > & *input*, const Function_v2b< F > & *fun*) [inline]

Thresholds the values of `input` so that they can be stored in the `output` binary image.

Parameters

[in] ***input*** The input image.

[in] ***fun*** The thresholding function, from value(I) to bool.

for_all(p), output(p) = fun(p)

Definition at line 86 of file binarization.hh.

Referenced by threshold().

9.17.2.2 template< typename I > mln::trait::ch_value< I, bool >::ret mln::binarization::threshold (const Image< I > & *input*, const typename I::value *threshold*) [inline]

Thresholds the values of `input` so that they can be stored in the `output` binary image.

Parameters

`[in]` ***input*** The input image.

`[in]` ***threshold*** The threshold.

If input(p) is greater or equal than the threshold, the value in the output image in the same point will be TRUE, else FALSE.

Definition at line 61 of file binarization/threshold.hh.

References binarization().

9.18 mln::border Namespace Reference

Namespace of routines related to image virtual (outer) border.

Namespaces

- namespace impl

  Implementation namespace of border namespace.

Functions

- template< typename I >
  void adjust (const Image< I > &ima, unsigned min_thickness)
- template< typename I >
  void duplicate (const Image< I > &ima)
- template< typename I , typename J >
  void equalize (const Image< I > &ima1, const Image< J > &ima2, unsigned min_thickness)
- template< typename I >
  void fill (const Image< I > &ima, const typename I::value &v)
- template< typename I >
  unsigned find (const Image< I > &ima)
- template< typename I >
  unsigned get (const Image< I > &ima)
- template< typename I >
  void mirror (const Image< I > &ima)
- template< typename I >
  void resize (const Image< I > &ima, unsigned thickness)

  Facade.

9.18.1 Detailed Description

Namespace of routines related to image virtual (outer) border.

9.18.2 Function Documentation

9.18.2.1 template< typename I > void mln::border::adjust (const Image< I > & *ima*, unsigned *min_thickness*) `[inline]`

Adjust the virtual (outer) border of image `ima` so that its size is at least `min_thickness`.

Parameters

`[in,out]` ***ima*** The image whose border is to be adjusted.

`[in]` ***min_thickness*** The expected border minimum thickness.

Precondition

`ima` has to be initialized.

Warning

If the image border is already larger than `min_thickness`, this routine is a no-op.

Definition at line 62 of file border/adjust.hh.

References get(), and resize().

9.18.2.2 template< typename I > void mln::border::duplicate (const Image< I > & *ima*)

Assign the virtual (outer) border of image `ima` with the duplicate of the inner border of this image.

Parameters

`[in,out]` ***ima*** The image whose border is to be duplicated.

Precondition

`ima` has to be initialized.

Definition at line 252 of file border/duplicate.hh.

References get().

9.18.2.3 template< typename I , typename J > void mln::border::equalize (const Image< I > & *ima1*, const Image< J > & *ima2*, unsigned *min_thickness*) `[inline]`

Equalize the virtual (outer) border of images `ima1` and `ima2` so that their size is equal and is at least `min_thickness`.

Parameters

`[in,out]` ***ima1*** The first image whose border is to be equalizeed.

`[in,out]` ***ima2*** The second image whose border is to be equalizeed.

`[in]` ***min_thickness*** The expected border minimum thickness of both images.

Precondition

`ima1` has to be initialized.
`ima2` has to be initialized.

Warning

If both image borders already have the same thickness and if this thickness is larger than `min_-thickness`, this routine is a no-op.

Definition at line 112 of file border/equalize.hh.

References get().

9.18.2.4 template<typename I > void mln::border::fill (const Image< I > & *ima*, const typename I::value & *v*) [inline]

Fill the virtual (outer) border of image `ima` with the single value `v`.

Parameters

`[in,out]` ***ima*** The image whose border is to be filled.

`[in]` ***v*** The value to assign to all border pixels.

Precondition

`ima` has to be initialized.

Definition at line 201 of file border/fill.hh.

9.18.2.5 template<typename I > unsigned mln::border::find (const Image< I > & *ima*) [inline]

Find the virtual (outer) border thickness of image `ima`.

Parameters

`[in]` ***ima*** The image.

Returns

The border thickness (0 if there is no border).

Precondition

`ima` has to be initialized.

Definition at line 95 of file find.hh.

9.18.2.6 template<typename I > unsigned mln::border::get (const Image< I > & *ima*) [inline]

Get the virtual (outer) border thickness of image *ima*.

Parameters

`[in]` ***ima*** The image.

Returns

The border thickness (0 if there is no border).

Precondition

ima has to be initialized.

Definition at line 90 of file border/get.hh.

Referenced by adjust(), duplicate(), and equalize().

9.18.2.7 template<typename I > void mln::border::mirror (const Image< I > & *ima*) `[inline]`

Mirror the virtual (outer) border of image `ima` with the (inner) level contents of this image.

Parameters

`[in,out]` ***ima*** The image whose border is to be mirrored.

Precondition

`ima` has to be initialized.

Definition at line 211 of file border/mirror.hh.

9.18.2.8 template<typename I > void mln::border::resize (const Image< I > & *ima,* unsigned *thickness*) `[inline]`

Facade.

Resize the virtual (outer) border of image `ima` to exactly `thickness`.

Parameters

`[in,out]` ***ima*** The image whose border is to be resized.

`[in]` ***thickness*** The expected border thickness.

Precondition

`ima` has to be initialized.

Warning

If the image border already has the expected thickness, this routine is a no-op.

Definition at line 126 of file resize.hh.

References mln::primary(), and resize().

Referenced by adjust(), and resize().

9.19 mln::border::impl Namespace Reference

Implementation namespace of border namespace.

Namespaces

- namespace generic

  Generic implementation namespace of border namespace.

9.19.1 Detailed Description

Implementation namespace of border namespace.

9.20 mln::border::impl::generic Namespace Reference

Generic implementation namespace of border namespace.

9.20.1 Detailed Description

Generic implementation namespace of border namespace.

9.21 mln::canvas Namespace Reference

Namespace of canvas.

Namespaces

- namespace browsing

  Namespace of browsing canvas.

- namespace impl

  Implementation namespace of canvas namespace.

- namespace labeling

  Namespace of labeling canvas.

- namespace morpho

  Namespace of morphological canvas.

Classes

- struct chamfer

  Compute chamfer distance.

Functions

- template< typename I , typename N , typename W , typename D , typename F >
  mln::trait::ch_value< I, D >::ret distance_front (const Image< I > &input, const Neighborhood< N > &nbh, const Weighted_Window< W > &w_win, D max, F &functor)

  Canvas of discrete distance computation by thick front propagation.

- template< typename I , typename N , typename D , typename F >
  mln::trait::ch_value< I, D >::ret distance_geodesic (const Image< I > &input, const Neighborhood< N > &nbh, D max, F &functor)

  Discrete geodesic distance canvas.

9.21.1 Detailed Description

Namespace of canvas.

9.21.2 Function Documentation

9.21.2.1 template< typename I , typename N , typename W , typename D , typename F > mln::trait::ch_value< I, D >::ret mln::canvas::distance_front (const Image< I > & *input,* const Neighborhood< N > & *nbh,* const Weighted_Window< W > & *w_win,* D *max,* F & *functor*) `[inline]`

Canvas of discrete distance computation by thick front propagation.

Definition at line 397 of file canvas/distance_front.hh.

Referenced by mln::transform::influence_zone_front().

9.21.2.2 template< typename I , typename N , typename D , typename F > mln::trait::ch_value< I, D >::ret mln::canvas::distance_geodesic (const Image< I > & *input,* const Neighborhood< N > & *nbh,* D *max,* F & *functor*) `[inline]`

Discrete geodesic distance canvas.

Definition at line 321 of file canvas/distance_geodesic.hh.

Referenced by mln::transform::influence_zone_geodesic_saturated().

9.22 mln::canvas::browsing Namespace Reference

Namespace of browsing canvas.

Classes

- struct backdiagonal2d_t

  Browsing in a certain direction.

- struct breadth_first_search_t

Breadth-first search algorithm for graph, on vertices.

- struct depth_first_search_t

  Breadth-first search algorithm for graph, on vertices.

- struct diagonal2d_t

  Browsing in a certain direction.

- struct dir_struct_elt_incr_update_t

  Browsing in a certain direction with a segment.

- struct directional_t

  Browsing in a certain direction.

- struct fwd_t

  Canvas for forward browsing.

- struct hyper_directional_t

  Browsing in a certain direction.

- struct snake_fwd_t

  Browsing in a snake-way, forward.

- struct snake_generic_t

  Multidimentional Browsing in a given-way.

- struct snake_vert_t

  Browsing in a snake-way, forward.

9.22.1 Detailed Description

Namespace of browsing canvas.

9.23 mln::canvas::impl Namespace Reference

Implementation namespace of canvas namespace.

9.23.1 Detailed Description

Implementation namespace of canvas namespace.

9.24 mln::canvas::labeling Namespace Reference

Namespace of labeling canvas.

Namespaces

- namespace impl

  Implementation namespace of labeling canvas namespace.

Functions

- template< typename I , typename N , typename L , typename F >
  mln::trait::ch_value< I, L >::ret blobs (const Image< I > &input_, const Neighborhood< N > &nbh_, L &nlabels, F &functor)

  Canvas for connected component labeling of the binary objects of a binary image using a queue-based algorithm.

9.24.1 Detailed Description

Namespace of labeling canvas.

9.24.2 Function Documentation

9.24.2.1 template< typename I , typename N , typename L , typename F > mln::trait::ch_value< I, L >::ret mln::canvas::labeling::blobs (const Image< I > & *input_*, const Neighborhood< N > & *nbh_*, L & *nlabels*, F & *functor*) `[inline]`

Canvas for connected component labeling of the binary objects of a binary image using a queue-based algorithm.

Parameters

`[in]` ***input*** The input image.

`[in]` ***nbh*** The connexity of the objects.

`[out]` ***nlabels*** The Number of labels. Its value is set in the algorithms.

`[in,out]` ***functor*** A functor computing data while labeling.

Returns

The label image.

Precondition

The input image has to be binary (checked at compile-time).

A fast queue is used so that the algorithm is not recursive and can handle large binary objects (blobs).

Definition at line 167 of file canvas/labeling/blobs.hh.

9.25 mln::canvas::labeling::impl Namespace Reference

Implementation namespace of labeling canvas namespace.

9.25.1 Detailed Description

Implementation namespace of labeling canvas namespace.

9.26 mln::canvas::morpho Namespace Reference

Namespace of morphological canvas.

9.26.1 Detailed Description

Namespace of morphological canvas.

9.27 mln::convert Namespace Reference

Namespace of conversion routines.

Functions

- template< typename V >
  void from_to (const float &from, Value< V > &to)

  Conversion of a float `from` towards a value `to`.

- template< typename V >
  void from_to (const int &from, Value< V > &to)

  Conversion of a int `from` towards a value `to`.

- template< typename V >
  void from_to (const double &from, Value< V > &to)

  Conversion of a double `from` towards a value `to`.

- template< typename V >
  void from_to (const unsigned &from, Value< V > &to)

  Conversion of an unsigned `from` towards a value `to`.

- template< typename S >
  mln_image_from_grid (typename S::site::grid, bool) to_image(const Site_Set< S > &pset

  Convert a point set `pset` into a binary image.

- template< typename W >
  mln_image_from_grid (typename W::site::grid, bool) to_image(const Window< W > &win)

  Convert a window `win` into a binary image.

- template< typename W >
  mln_image_from_grid (typename W::site::grid, mln_weight(W)) to_image(const Weighted_-Window< W > &w_win)

  Convert a weighted window `w_win` into an image.

- template< typename N >
  mln_image_from_grid (typename N::site::grid, bool) to_image(const Neighborhood< N > &nbh)
  Convert a neighborhood `nbh` *into a binary image.*

- template< typename N >
  mln_window (N) to_window(const Neighborhood< N > &nbh)
  Convert a neighborhood `nbh` *into a window.*

- template< typename T , typename O >
  T to (const O &from)
  Conversion of the object `from` *towards an object with type* `T`.

- template< typename P >
  P::dpoint to_dpoint (const Point_Site< P > &p)
  Convert a point site `p` *into a delta-point.*

- template< typename I >
  pw::value_< I > to_fun (const Image< I > &ima)
  Convert an image into a function.

- template< typename T >
  image1d< unsigned > to_image (const histo::array< T > &h)
  Convert an histo `h` *into an image1d<unsigned>.*

- template< typename I >
  p_array< typename I::psite > to_p_array (const Image< I > &img)
  Convert an image `img` *into a p_array.*

- template< typename S >
  p_array< typename S::psite > to_p_array (const Site_Set< S > &pset)
  Convert a point set `pset` *into a p_array (point set vector).*

- template< typename W >
  p_array< typename W::psite > to_p_array (const Window< W > &win, const typename W::psite &p)
  Convert a window `win` *centered at point* `p` *into a p_array (point set vector).*

- template< typename N >
  p_set< typename N::psite > to_p_set (const Neighborhood< N > &nbh)
  Convert a neighborhood `nbh` *into a site set.*

- template< typename I >
  p_set< typename I::psite > to_p_set (const Image< I > &ima)
  Convert a binary image `ima` *into a site set.*

- template< typename P , typename C >
  p_set< P > to_p_set (const std::set< P, C > &s)
  Convert an std::set `s` *of sites into a site set.*

- template< typename S >
  p_set< typename S::psite > to_p_set (const Site_Set< S > &ps)

Convert any site set `ps` *into a 'mlnp_set' site set.*

- template< typename W >
  p_set< typename W::psite > to_p_set (const Window< W > &win)

  Convert a Window `win` *into a site set.*

- template< typename I >
  QImage to_qimage (const Image< I > &ima)

  Convert a Milena image to a Qimage.

- template< typename N >
  window< typename N::dpoint > to_upper_window (const Neighborhood< N > &nbh)

  Convert a neighborhood `nbh` *into an upper window.*

- template< typename W >
  window< typename W::dpsite > to_upper_window (const Window< W > &win)

  Convert a window `nbh` *into an upper window.*

- template< typename D , typename C >
  window< D > to_window (const std::set< D, C > &s)

  Convert an std::set `s` *of delta-sites into a window.*

- template< typename I >
  window< typename I::site::dpsite > to_window (const Image< I > &ima)

  Convert a binary image `ima` *into a window.*

- template< typename S >
  window< typename S::site::dpsite > to_window (const Site_Set< S > &pset)

  Convert a site set `pset` *into a window.*

Variables

- fun::C< R(∗)(A)> to_fun (R(∗f)(A))

  Convert a C unary function into an mln::fun::C.

9.27.1 Detailed Description

Namespace of conversion routines.

9.27.2 Function Documentation

9.27.2.1 template< typename V > void mln::convert::from_to (const float & *from*, Value< V > & *to*)

Conversion of a float `from` towards a value `to`.

9.27.2.2 template<typename V > void mln::convert::from_to (const int & *from*, Value< V > & *to*)

Conversion of a int `from` towards a value `to`.

9.27.2.3 template<typename V > void mln::convert::from_to (const double & *from*, Value< V > & *to*)

Conversion of a double `from` towards a value `to`.

9.27.2.4 template<typename V > void mln::convert::from_to (const unsigned & *from*, Value< V > & *to*)

Conversion of an unsigned `from` towards a value `to`.

9.27.2.5 template<typename S > mln::convert::mln_image_from_grid (typename S::site::grid , bool) const [inline]

Convert a point set `pset` into a binary image.

Width of the converted image will be pset.bbox + 2 $*$ `border`.

9.27.2.6 template<typename W > mln::convert::mln_image_from_grid (typename W::site::grid , bool) const

Convert a window `win` into a binary image.

9.27.2.7 template<typename W > mln::convert::mln_image_from_grid (typename W::site::grid , mln_weight(W)) const

Convert a weighted window `w_win` into an image.

9.27.2.8 template<typename N > mln::convert::mln_image_from_grid (typename N::site::grid , bool) const

Convert a neighborhood `nbh` into a binary image.

9.27.2.9 template<typename N > mln::convert::mln_window (N) const [inline]

Convert a neighborhood `nbh` into a window.

Definition at line 74 of file to_window.hh.

9.27.2.10 template<typename T , typename O > T mln::convert::to (const O & *from*) [inline]

Conversion of the object `from` towards an object with type `T`.

Definition at line 63 of file to.hh.

References mln::mln_exact().

Referenced by mln::make_debug_graph_image().

9.27.2.11 template<typename P > P::dpoint mln::convert::to_dpoint (const Point_Site< P > & *p*) [inline]

Convert a point site p into a delta-point.

Definition at line 52 of file to_dpoint.hh.

9.27.2.12 template<typename I > pw::value_<I> mln::convert::to_fun (const Image< I > & *ima*)

Convert an image into a function.

Definition at line 64 of file to_fun.hh.

9.27.2.13 template<typename T > image1d<unsigned> mln::convert::to_image (const histo::array< T > & *h*)

Convert an histo h into an image1d<unsigned>.

9.27.2.14 template<typename I > p_array< typename I::psite > mln::convert::to_p_array (const Image< I > & *img*) [inline]

Convert an image img into a p_array.

Definition at line 98 of file to_p_array.hh.

References mln::p_array< P >::append().

9.27.2.15 template<typename S > p_array< typename S::psite > mln::convert::to_p_array (const Site_Set< S > & *pset*) [inline]

Convert a point set pset into a p_array (point set vector).

Definition at line 68 of file to_p_array.hh.

References mln::p_array< P >::append().

9.27.2.16 template<typename W > p_array< typename W::psite > mln::convert::to_p_array (const Window< W > & *win*, const typename W::psite & *p*) [inline]

Convert a window win centered at point p into a p_array (point set vector).

Definition at line 82 of file to_p_array.hh.

References mln::p_array< P >::append(), and mln::p_array< P >::reserve().

9.27.2.17 template<typename N > p_set< typename N::psite > mln::convert::to_p_set (const Neighborhood< N > & *nbh*) [inline]

Convert a neighborhood nbh into a site set.

Definition at line 83 of file to_p_set.hh.

References mln::p_set< P >::insert().

9.27.2.18 template<typename I > p_set< typename I::psite > mln::convert::to_p_set (const Image< I > & *ima*) [inline]

Convert a binary image `ima` into a site set.

Definition at line 97 of file to_p_set.hh.

References mln::p_set< P >::insert().

9.27.2.19 template<typename P , typename C > p_set< P > mln::convert::to_p_set (const std::set< P, C > & *s*) [inline]

Convert an std::set `s` of sites into a site set.

C is the comparison functor.

Definition at line 130 of file to_p_set.hh.

References mln::p_set< P >::insert().

9.27.2.20 template<typename S > p_set< typename S::psite > mln::convert::to_p_set (const Site_Set< S > & *ps*) [inline]

Convert any site set `ps` into a 'mlnp_set' site set.

Definition at line 144 of file to_p_set.hh.

References mln::p_set< P >::insert().

9.27.2.21 template<typename W > p_set< typename W::psite > mln::convert::to_p_set (const Window< W > & *win*) [inline]

Convert a Window `win` into a site set.

Definition at line 117 of file to_p_set.hh.

References mln::p_set< P >::insert().

9.27.2.22 template<typename I > QImage mln::convert::to_qimage (const Image< I > & *ima*) [inline]

Convert a Milena image to a Qimage.

Definition at line 279 of file to_qimage.hh.

9.27.2.23 template<typename N > window< typename N::dpoint > mln::convert::to_upper_window (const Neighborhood< N > & *nbh*) [inline]

Convert a neighborhood `nbh` into an upper window.

Definition at line 82 of file to_upper_window.hh.

References mln::window< D >::insert().

9.27.2.24 template<typename W > window< typename W::dpsite > mln::convert::to_upper_window (const Window< W > & *win*) [inline]

Convert a window nbh into an upper window.

Definition at line 67 of file to_upper_window.hh.

References mln::window< D >::insert().

9.27.2.25 template<typename D , typename C > window< D > mln::convert::to_window (const std::set< D, C > & *s*) [inline]

Convert an std::set s of delta-sites into a window.

Definition at line 128 of file to_window.hh.

References mln::window< D >::insert().

9.27.2.26 template<typename I > window< typename I::site::dpsite > mln::convert::to_window (const Image< I > & *ima*) [inline]

Convert a binary image ima into a window.

Definition at line 94 of file to_window.hh.

References mln::window< D >::insert().

Referenced by to_window().

9.27.2.27 template<typename S > window< typename S::site::dpsite > mln::convert::to_window (const Site_Set< S > & *pset*) [inline]

Convert a site set pset into a window.

Definition at line 117 of file to_window.hh.

References to_window().

9.27.3 Variable Documentation

9.27.3.1 pw::value_< I > mln::convert::to_fun [inline]

Convert a C unary function into an mln::fun::C.

Definition at line 45 of file to_fun.hh.

9.28 mln::data Namespace Reference

Namespace of image processing routines related to pixel data.

Namespaces

- namespace approx

  Namespace of image processing routines related to pixel levels with approximation.

- namespace impl

  Implementation namespace of data namespace.

- namespace naive

  Namespace of image processing routines related to pixel levels with naive approach.

Functions

- template<typename I , typename O >
  void abs (const Image< I > &input, Image< O > &output)
- template<typename I >
  void abs_inplace (Image< I > &input)
- template<typename I , typename F >
  void apply (Image< I > &input, const Function_v2v< F > &f)
- template<typename A , typename I >
  A::result compute (const Accumulator< A > &a, const Image< I > &input)

  Compute an accumulator onto the pixel values of the image `input`.

- template<typename A , typename I >
  A::result compute (Accumulator< A > &a, const Image< I > &input)

  Compute an accumulator onto the pixel values of the image `input`.

- template<typename V , typename I >
  mln::trait::ch_value< I, V >::ret convert (const V &v, const Image< I > &input)

  Convert the image `input` *by changing the value type.*

- template<typename I , typename W , typename O >
  void fast_median (const Image< I > &input, const Window< W > &win, Image< O > &output)
- template<typename I , typename D >
  void fill (Image< I > &ima, const D &data)
- template<typename I , typename J >
  void fill_with_image (Image< I > &ima, const Image< J > &data)

  Fill the image `ima` *with the values of the image* `data`.

- template<typename I , typename W >
  mln::trait::concrete< I >::ret median (const Image< I > &input, const Window< W > &win)
- template<typename A , typename I >
  mln_meta_accu_result (A, typename I::value) compute(const Meta_Accumulator< A > &a

  Compute an accumulator onto the pixel values of the image `input`.

- template<typename I , typename J >
  void paste (const Image< I > &input, Image< J > &output)

  Paste the contents of image `input` *into the image* `output`.

- template<typename I , typename J >
  void paste_without_localization (const Image< I > &input, Image< J > &output)

  Paste the contents of image `input` *into the image* `output` *without taking into account the localization of sites.*

- template<typename I >
  void replace (Image< I > &input, const typename I::value &old_value, const typename I::value &new_value)
- template<typename I , typename V >
  mln::trait::ch_value< I, V >::ret saturate (const Image< I > &input, const V &min, const V &max)
- template<typename V , typename I >
  mln::trait::ch_value< I, V >::ret saturate (V v, const Image< I > &input)
- template<typename I >
  void saturate_inplace (Image< I > &input, const typename I::value &min, const typename I::value &max)
- template<typename I >
  util::array< unsigned > sort_offsets_increasing (const Image< I > &input)

  Sort pixel offsets of the image `input` *wrt increasing pixel values.*

- template<typename I >
  p_array< typename I::psite > sort_psites_decreasing (const Image< I > &input)
- template<typename I >
  p_array< typename I::psite > sort_psites_increasing (const Image< I > &input)
- template<typename V , typename I >
  mln::trait::ch_value< I, V >::ret stretch (const V &v, const Image< I > &input)
- template<typename I , typename O >
  void to_enc (const Image< I > &input, Image< O > &output)
- template<typename I1 , typename I2 , typename F >
  mln::trait::ch_value< I1, typename F::result >::ret transform (const Image< I1 > &input1, const Image< I2 > &input2, const Function_vv2v< F > &f)
- template<typename I , typename F >
  mln::trait::ch_value< I, typename F::result >::ret transform (const Image< I > &input, const Function_v2v< F > &f)
- template<typename I1 , typename I2 , typename F >
  void transform_inplace (Image< I1 > &ima, const Image< I2 > &aux, const Function_vv2v< F > &f)
- template<typename I , typename F >
  void transform_inplace (Image< I > &ima, const Function_v2v< F > &f)
- template<typename A , typename I >
  A::result update (Accumulator< A > &a, const Image< I > &input)
- template<typename V , typename I >
  mln::trait::ch_value< I, V >::ret wrap (const V &v, const Image< I > &input)

  Routine to wrap values such as 0 -> 0 and [1, lmax] maps to [1, Lmax] (using modulus).

  - template<typename I , typename V >
    void fill_with_value (Image< I > &ima, const V &val)

    Fill the whole image `ima` *with the single value* `v`*.*

9.28.1 Detailed Description

Namespace of image processing routines related to pixel data.

9.28.2 Function Documentation

9.28.2.1 template< typename I , typename O > void mln::data::abs (const Image< I > & *input*, Image< O > & *output*) `[inline]`

Apply the absolute value (abs) function to image pixel values.

Parameters

`[in]` ***input*** The input image.

`[out]` ***output*** The output image.

Definition at line 68 of file data/abs.hh.

References transform().

9.28.2.2 template< typename I > void mln::data::abs_inplace (Image< I > & *input*) `[inline]`

Apply the absolute value (abs) function to image pixel values.

Parameters

`[in,out]` ***input*** The input image.

Definition at line 80 of file data/abs.hh.

References apply().

9.28.2.3 template< typename I , typename F > void mln::data::apply (Image< I > & *input*, const Function_v2v< F > & *f*) `[inline]`

Apply a function-object to the image `input`.

Parameters

`[in,out]` ***input*** The input image.

`[in]` ***f*** The function-object.

This routine runs:

for all p of `input`, `input(p) = f( input(p) )`

This routine is equivalent to data::tranform(input, f, input) but it is faster since a single iterator is required.

Definition at line 95 of file apply.hh.

Referenced by abs_inplace(), and saturate_inplace().

9.28.2.4 template< typename A , typename I > A::result mln::data::compute (const Accumulator< A > & *a*, const Image< I > & *input*) `[inline]`

Compute an accumulator onto the pixel values of the image `input`.

Be ware that the given accumulator won't be modified and won't store any result.

Parameters

`[in]` ***a*** An accumulator.

`[in]` ***input*** The input image.

Returns

The accumulator result.

It fully relies on data::update.

Definition at line 93 of file data/compute.hh.

Referenced by mln::labeled_image< I >::labeled_image(), mln::estim::mean(), mln::estim::min_max(), and mln::estim::sum().

9.28.2.5 template<typename A , typename I > A::result mln::data::compute (Accumulator< A > & *a*, const Image< I > & *input*) `[inline]`

Compute an accumulator onto the pixel values of the image `input`.

Parameters

`[in,out]` ***a*** An accumulator.

`[in]` ***input*** The input image.

Returns

The accumulator result.

It fully relies on data::update.

Definition at line 104 of file data/compute.hh.

9.28.2.6 template<typename V , typename I > mln::trait::ch_value< I, V >::ret mln::data::convert (const V & *v*, const Image< I > & *input*) `[inline]`

Convert the image `input` by changing the value type.

Parameters

`[in]` ***v*** A value of the destination type.

`[in]` ***input*** The input image.

Definition at line 154 of file mln/data/convert.hh.

Referenced by mln::morpho::watershed::superpose(), and mln::debug::superpose().

9.28.2.7 template<typename I , typename W , typename O > void mln::data::fast_median (const Image< I > & *input*, const Window< W > & *win*, Image< O > & *output*) `[inline]`

Compute in `output` the median filter of image `input` by the window `win`.

Parameters

`[in]` ***input*** The image to be filtered.
`[in]` ***win*** The window.
`[in,out]` ***output*** The output image.

Precondition

`input` and `output` have to be initialized.

Definition at line 167 of file fast_median.hh.

9.28.2.8 template< typename I , typename D > void mln::data::fill (Image< I > & *ima*, const D & *data*) `[inline]`

Fill the whole image `ima` with the data provided by `aux`.

Parameters

`[in,out]` ***ima*** The image to be filled.
`[in]` ***data*** The auxiliary data to fill the image `ima`.

Precondition

`ima` has to be initialized.

Definition at line 138 of file data/fill.hh.

Referenced by mln::draw::box_plain(), mln::draw::dashed_line(), mln::topo::detach(), mln::util::display_branch(), mln::transform::distance_and_closest_point_geodesic(), mln::duplicate(), mln::make::edge_image(), mln::morpho::tree::filter::filter(), mln::transform::hough(), mln::registration::icp(), mln::accu::stat::histo3d_rgb< V >::init(), mln::graph::labeling(), mln::morpho::laplacian(), mln::make_debug_graph_image(), mln::morpho::tree::filter::max(), mln::geom::mesh_corner_point_area(), mln::geom::mesh_normal(), mln::morpho::meyer_wst(), mln::morpho::tree::filter::min(), mln::debug::mosaic(), mln::debug::slices_2d(), mln::morpho::watershed::superpose(), mln::debug::superpose(), mln::morpho::watershed::topological(), and mln::geom::translate().

9.28.2.9 template< typename I , typename J > void mln::data::fill_with_image (Image< I > & *ima*, const Image< J > & *data*) `[inline]`

Fill the image `ima` with the values of the image `data`.

Parameters

`[in,out]` ***ima*** The image to be filled.
`[in]` ***data*** The image.

Warning

The definition domain of `ima` has to be included in the one of `data`.

Precondition

`ima.domain` <= `data.domain`.

Definition at line 124 of file fill_with_image.hh.

9.28.2.10 template< typename I , typename V > void mln::data::fill_with_value (Image< I > & *ima*, const V & *val*) [inline]

Fill the whole image `ima` with the single value `v`.

Parameters

`[in,out]` ***ima*** The image to be filled.

`[in]` ***val*** The value to assign to all sites.

Precondition

`ima` has to be initialized.

Definition at line 130 of file fill_with_value.hh.

Referenced by mln::p_image< I >::clear().

9.28.2.11 template< typename I , typename W > mln::trait::concrete< I >::ret mln::data::median (const Image< I > & *input*, const Window< W > & *win*)

Compute in `output` the median filter of image `input` by the window `win`.

Parameters

`[in]` ***input*** The image to be filtered.

`[in]` ***win*** The window.

Precondition

`input` have to be initialized.

Definition at line 270 of file median.hh.

9.28.2.12 template< typename A , typename I > mln::data::mln_meta_accu_result (A , typename I::value) const [inline]

Compute an accumulator onto the pixel values of the image `input`.

Parameters

`[in]` ***a*** A meta-accumulator.

`[in]` ***input*** The input image.

Returns

The accumulator result.

9.28.2.13 template< typename I , typename J > void mln::data::paste (const Image< I > & *input*, Image< J > & *output*) [inline]

Paste the contents of image `input` into the image `output`.

Parameters

[in] ***input*** The input image providing pixels values.

[in,out] ***output*** The image in which values are assigned.

This routine runs:

for all p of `input`, `output(p) = input(p).`

Warning

The definition domain of `input` has to be included in the one of `output`; so using mln::safe_image does not make pasting outside the output domain work.

Precondition

`input.domain <= output.domain`

Definition at line 137 of file paste.hh.

Referenced by mln::make::image3d(), mln::draw::line(), mln::debug::mosaic(), mln::geom::rotate(), mln::debug::slices_2d(), and mln::labeling::superpose().

9.28.2.14 template<typename I , typename J > void mln::data::paste_without_localization (const Image< I > & *input*, Image< J > & *output*) [inline]

Paste the contents of image `input` into the image `output` without taking into account the localization of sites.

Parameters

[in] ***input*** The input image providing pixels values.

[in,out] ***output*** The image in which values are assigned.

Definition at line 349 of file paste_without_localization.hh.

9.28.2.15 template<typename I > void mln::data::replace (Image< I > & *input*, const typename I::value & *old_value*, const typename I::value & *new_value*)

Replace `old_value` by `new_value` in the image `input`

Parameters

[in] ***input*** The input image.

[in] ***old_value*** The value to be replaced...

[in] ***new_value*** ...by this one.

Definition at line 88 of file replace.hh.

9.28.2.16 template<typename V , typename I > mln::trait::ch_value< I, V >::ret mln::data::saturate (V *v*, const Image< I > & *input*) [inline]

Apply the saturate function to image pixel values.

Parameters

`[in]` ***v*** A value of the output type.

`[in]` ***input*** The input image.

The saturation is based on the min and max values of the output value type. This assumes that the range of values in the input image is larger than the one of the output image.

Definition at line 87 of file data/saturate.hh.

References transform().

9.28.2.17 template< typename I , typename V > mln::trait::ch_value< I, V >::ret mln::data::saturate (const Image< I > & *input*, const V & *min*, const V & *max*) `[inline]`

Apply the saturate function to image pixel values.

Parameters

`[in]` ***input*** The input image.

`[in]` ***min*** The minimum output value.

`[in]` ***max*** The maximum output value.

Definition at line 103 of file data/saturate.hh.

References transform().

9.28.2.18 template< typename I > void mln::data::saturate_inplace (Image< I > & *input*, const typename I::value & *min*, const typename I::value & *max*) `[inline]`

Apply the saturate function to image pixel values.

Parameters

`[in,out]` ***input*** The input image.

`[in]` ***min*** The minimum output value.

`[in]` ***max*** The maximum output value

Definition at line 119 of file data/saturate.hh.

References apply().

9.28.2.19 template< typename I > util::array< unsigned > mln::data::sort_offsets_increasing (const Image< I > & *input*) `[inline]`

Sort pixel offsets of the image `input` wrt increasing pixel values.

Definition at line 298 of file sort_offsets.hh.

9.28.2.20 template< typename I > p_array< typename I::psite > mln::data::sort_psites_-decreasing (const Image< I > & *input*) [inline]

Sort psites the image `input` through a function `f` to set the `output` image in decreasing way.

Parameters

`[in]` ***input*** The input image.

Precondition

`input.is_valid`

Definition at line 229 of file sort_psites.hh.

Referenced by mln::morpho::tree::min_tree().

9.28.2.21 template< typename I > p_array< typename I::psite > mln::data::sort_psites_-increasing (const Image< I > & *input*) [inline]

Sort psites the image `input` through a function `f` to set the `output` image in increasing way.

Parameters

`[in]` ***input*** The input image.

Precondition

`input.is_valid`

Definition at line 219 of file sort_psites.hh.

Referenced by mln::morpho::tree::max_tree().

9.28.2.22 template< typename V , typename I > mln::trait::ch_value< I, V >::ret mln::data::stretch (const V & *v*, const Image< I > & *input*) [inline]

Stretch the values of `input` so that they can be stored in `output`.

Parameters

`[in]` ***v*** A value to set the output value type.

`[in]` ***input*** The input image.

Returns

A stretch image with values of the same type as `v`.

Precondition

input.is_valid

Definition at line 128 of file stretch.hh.

References mln::data::impl::stretch().

9.28.2.23 template<typename I , typename O > void mln::data::to_enc (const Image< I > & *input,* Image< O > & *output*) `[inline]`

Set the `output` image with the encoding values of the image `input` pixels.

Parameters

`[in]` ***input*** The input image.

`[out]` ***output*** The result image.

Precondition

`output.domain` >= `input.domain`

Definition at line 60 of file data/to_enc.hh.

References transform().

9.28.2.24 template<typename I , typename F > mln::trait::ch_value< I, typename F::result >::ret mln::data::transform (const Image< I > & *input,* const Function_v2v< F > & *f*) `[inline]`

Transform the image `input` through a function `f`.

Parameters

`[in]` ***input*** The input image.

`[in]` ***f*** The function.

This routine runs:

for all p of `input`, `output(p)` = `f( input(p) )`.

Definition at line 202 of file data/transform.hh.

Referenced by abs(), mln::logical::and_not(), mln::labeling::colorize(), mln::arith::diff_abs(), mln::labeling::fill_holes(), mln::linear::mln_ch_convolve(), mln::linear::mln_ch_convolve_grad(), mln::labeling::pack(), mln::labeling::pack_inplace(), mln::labeling::relabel(), saturate(), mln::data::impl::stretch(), to_enc(), mln::labeling::wrap(), and wrap().

9.28.2.25 template<typename I1 , typename I2 , typename F > mln::trait::ch_value< I1, typename F::result >::ret mln::data::transform (const Image< I1 > & *input1,* const Image< I2 > & *input2,* const Function_vv2v< F > & *f*) `[inline]`

Transform two images `input1` `input2` through a function `f`.

Parameters

`[in]` ***input1*** The 1st input image.

`[in]` ***input2*** The 2nd input image.

`[in]` ***f*** The function.

This routine runs:

for all p of `input`, `output(p)` = `f( input1(p), input2(p) )`.

Definition at line 219 of file data/transform.hh.

9.28.2.26 template<typename I1 , typename I2 , typename F > void mln::data::transform_inplace (Image< I1 > & *ima*, const Image< I2 > & *aux*, const Function_vv2v< F > & *f*)

Transform inplace the image `ima` with the image `aux` through a function `f`.

Parameters

`[in]` ***ima*** The image to be transformed.

`[in]` ***aux*** The auxiliary image.

`[in]` ***f*** The function.

This routine runs:

for all p of `ima`, `ima(p) = f( ima(p), aux(p) )`.

Definition at line 502 of file transform_inplace.hh.

9.28.2.27 template<typename I , typename F > void mln::data::transform_inplace (Image< I > & *ima*, const Function_v2v< F > & *f*)

Transform inplace the image `ima` through a function `f`.

Parameters

`[in,out]` ***ima*** The image to be transformed.

`[in]` ***f*** The function.

This routine runs:

for all p of `ima`, `ima(p) = f( ima(p) )`.

Definition at line 490 of file transform_inplace.hh.

Referenced by mln::logical::and_inplace(), mln::logical::and_not_inplace(), mln::logical::not_inplace(), mln::logical::or_inplace(), mln::labeling::relabel_inplace(), and mln::logical::xor_inplace().

9.28.2.28 template<typename A , typename I > A::result mln::data::update (Accumulator< A > & *a*, const Image< I > & *input*) `[inline]`

Update an accumulator with the pixel values of the image `input`.

Parameters

`[in]` ***a*** The accumulator.

`[in]` ***input*** The input image.

Returns

The accumulator result.

Definition at line 191 of file update.hh.

9.28.2.29 template< typename V , typename I > mln::trait::ch_value< I, V >::ret mln::data::wrap (const V & *v*, const Image< I > & *input*)

Routine to wrap values such as 0 -> 0 and [1, lmax] maps to [1, Lmax] (using modulus).

Parameters

[in] ***v*** The target value type.
[in] ***input*** Input image.

Returns

An image with wrapped values.

Definition at line 65 of file data/wrap.hh.

References transform().

9.29 mln::data::approx Namespace Reference

Namespace of image processing routines related to pixel levels with approximation.

Namespaces

- namespace impl
  Implementation namespace of data::approx namespace.

Functions

- template< typename I >
  mln::trait::concrete< I >::ret median (const Image< I > &input, const win::rectangle2d &win)
- template< typename I >
  mln::trait::concrete< I >::ret median (const Image< I > &input, const win::octagon2d &win)
- template< typename I >
  mln::trait::concrete< I >::ret median (const Image< I > &input, const win::disk2d &win)

9.29.1 Detailed Description

Namespace of image processing routines related to pixel levels with approximation.

9.29.2 Function Documentation

9.29.2.1 template< typename I > mln::trait::concrete< I >::ret mln::data::approx::median (const Image< I > & *input*, const win::rectangle2d & *win*) [inline]

Compute in `output` an approximate of the median filter of image `input` by the 2D rectangle `win`.

Parameters

[in] ***input*** The image to be filtered.

[in] ***win*** The rectangle.

The approximation is based on a vertical median ran after an horizontal median.

Precondition

input and output have to be initialized.

Definition at line 112 of file approx/median.hh.

Referenced by median().

9.29.2.2 template< typename I > mln::trait::concrete< I >::ret mln::data::approx::median (const Image< I > & *input*, const win::octagon2d & *win*) [inline]

Compute in output an approximate of the median filter of image input by the 2D octagon win.

Parameters

[in] ***input*** The image to be filtered.

[in] ***win*** The octagon.

The approximation is based on a vertical median and an horizontal median an two diagonal median.

Precondition

input and output have to be initialized.

Definition at line 159 of file approx/median.hh.

References median().

9.29.2.3 template< typename I > mln::trait::concrete< I >::ret mln::data::approx::median (const Image< I > & *input*, const win::disk2d & *win*) [inline]

Compute in output an approximate of the median filter of image input by the 2D disk win.

Parameters

[in] ***input*** The image to be filtered.

[in] ***win*** The disk.

The approximation is based on a vertical median and an horizontal median an two diagonal median.

Precondition

input and output have to be initialized.

Definition at line 132 of file approx/median.hh.

References median().

9.30 mln::data::approx::impl Namespace Reference

Implementation namespace of data::approx namespace.

9.30.1 Detailed Description

Implementation namespace of data::approx namespace.

9.31 mln::data::impl Namespace Reference

Implementation namespace of data namespace.

Namespaces

- namespace generic

  Generic implementation namespace of data namespace.

Functions

- template< typename I , typename J >
  void paste_without_localization_fast (const Image< I > &input_, Image< J > &output_)

  Paste data to an image without using localization. Performs a point-wise copy.

- template< typename I , typename J >
  void paste_without_localization_fastest (const Image< I > &input_, Image< J > &output_)

  Paste data to an image without using localization. Performs a one-block memory copy.

- template< typename I , typename J >
  void paste_without_localization_lines (const Image< I > &input_, Image< J > &output_)

  Paste data to an image without using localization. Performs a line-per-line memory copy.

- template< typename V , typename I >
  mln::trait::ch_value< I, V >::ret stretch (const V &v, const Image< I > &input)

  Generic implementation of data::stretch.

- template< typename I , typename F >
  void transform_inplace_lowq (Image< I > &input_, const Function_v2v< F > &f_)

  Specialized implementation.

- template< typename A , typename I >
  A::result update_fastest (Accumulator< A > &a_, const Image< I > &input_)

  Fastest implementation of data::update.

9.31.1 Detailed Description

Implementation namespace of data namespace.

9.31.2 Function Documentation

9.31.2.1 template<typename I , typename J > void mln::data::impl::paste_without_-localization_fast (const Image< I > & *input_*, Image< J > & *output_*) [inline]

Paste data to an image without using localization. Performs a point-wise copy.

`input` and `output` must have both the following properties:

- mln::trait::image::value_alignment::with_grid
- mln::trait::image::value_storage::one_block
- mln::trait::image::value_access::direct
- mln::trait::image::ext_domain::some

They must also fulfill the following conditions:

- Same domain size.

Definition at line 220 of file paste_without_localization.hh.

9.31.2.2 template<typename I , typename J > void mln::data::impl::paste_without_-localization_fastest (const Image< I > & *input_*, Image< J > & *output_*) [inline]

Paste data to an image without using localization. Performs a one-block memory copy.

`input` and `output` must have both the following properties:

- mln::trait::image::value_alignment::with_grid
- mln::trait::image::value_storage::one_block
- mln::trait::image::value_access::direct
- mln::trait::image::ext_domain::some

They must also fulfill the following conditions:

- Same border size.
- Same domain size.
- Same value type.

Definition at line 142 of file paste_without_localization.hh.

9.31.2.3 template< typename I , typename J > void mln::data::impl::paste_without_localization_lines (const Image< I > & *input_*, Image< J > & *output_*) `[inline]`

Paste data to an image without using localization. Performs a line-per-line memory copy.

`input` and `output` must have both the following properties:

- mln::trait::image::value_alignment::with_grid
- mln::trait::image::value_storage::one_block
- mln::trait::image::value_access::direct
- mln::trait::image::ext_domain::some

They must also fulfill the following conditions:

- Same domain size.
- Same value type.

Definition at line 179 of file paste_without_localization.hh.

9.31.2.4 template< typename V , typename I > mln::trait::ch_value< I , V >::ret mln::data::impl::stretch (const V & *v*, const Image< I > & *input*) `[inline]`

Generic implementation of data::stretch.

Parameters

`[in]` ***v*** A value to set the output value type.

`[in]` ***input*** The input image.

Returns

A stretch image with values of the same type as `v`.

Definition at line 83 of file stretch.hh.

References mln::initialize(), mln::estim::min_max(), and mln::data::transform().

Referenced by mln::data::stretch().

9.31.2.5 template< typename I , typename F > void mln::data::impl::transform_inplace_lowq (Image< I > & *input_*, const Function_v2v< F > & *f_*)

Specialized implementation.

Definition at line 203 of file transform_inplace.hh.

9.31.2.6 template<typename A , typename I > A ::result mln::data::impl::update_fastest (Accumulator< A > & *a_*, const Image< I > & *input_*) [inline]

Fastest implementation of data::update.

Parameters

[in] ***a_*** The accumulator.

[in] ***input_*** The input image.

Returns

The accumulator result.

Definition at line 129 of file update.hh.

9.32 mln::data::impl::generic Namespace Reference

Generic implementation namespace of data namespace.

Functions

- template<typename I , typename J >
  void fill_with_image (Image< I > &ima_, const Image< J > &data_)

  Generic implementation.

- template<typename I , typename V >
  void fill_with_value (Image< I > &ima_, const V &val)

  Fill the whole image `ima` with the single value `v`.

- template<typename I , typename J >
  void paste (const Image< I > &input_, Image< J > &output_)

  Generic implementation of data::paste.

- template<typename I , typename F >
  mln::trait::ch_value< I, typename F::result >::ret transform (const Image< I > &input_, const Function_v2v< F > &f_)

  Generic implementation of data::transform.

- template<typename I1 , typename I2 , typename F >
  mln::trait::ch_value< I1, typename F::result >::ret transform (const Image< I1 > &input1_, const Image< I2 > &input2_, const Function_vv2v< F > &f_)

  Generic implementation of data::transform.

- template<typename I1 , typename I2 , typename F >
  void transform_inplace (Image< I1 > &ima_, const Image< I2 > &aux_, const Function_vv2v< F > &f_)

  Generic implementation of transform_inplace.

- template<typename I , typename F >
  void transform_inplace (Image< I > &ima_, const Function_v2v< F > &f_)

Generic implementation of transform_inplace.

- template< typename A , typename I >
  A::result update (Accumulator< A > &a_, const Image< I > &input_)

  Generic implementation of data::update.

9.32.1 Detailed Description

Generic implementation namespace of data namespace.

9.32.2 Function Documentation

9.32.2.1 template< typename I , typename J > void mln::data::impl::generic::fill_with_image (Image< I > & *ima_*, const Image< J > & *data_*)

Generic implementation.

Parameters

`[in,out]` ***ima_*** The image to be filled.

`[in]` ***data_*** The image.

Definition at line 100 of file fill_with_image.hh.

9.32.2.2 template< typename I , typename V > void mln::data::impl::generic::fill_with_value (Image< I > & *ima_*, const V & *val*)

Fill the whole image `ima` with the single value `v`.

Parameters

`[in,out]` ***ima_*** The image to be filled.

`[in]` ***val*** The value to assign to all sites.

Precondition

`ima` has to be initialized.

Definition at line 103 of file fill_with_value.hh.

9.32.2.3 template< typename I , typename J > void mln::data::impl::generic::paste (const Image< I > & *input_*, Image< J > & *output_*) `[inline]`

Generic implementation of data::paste.

Parameters

`[in]` ***input_*** The input image providing pixels values.

`[in,out]` ***output_*** The image in which values are assigned.

Definition at line 111 of file paste.hh.

9.32.2.4 template<typename I , typename F > mln::trait::ch_value< I , typename F ::result >::ret mln::data::impl::generic::transform (const Image< I > & *input_*, const Function_v2v< F > & *f_*)

Generic implementation of data::transform.

Parameters

`[in]` ***input_*** The input image.

`[in]` ***f_*** The function.

Definition at line 137 of file data/transform.hh.

References mln::initialize().

9.32.2.5 template<typename I1 , typename I2 , typename F > mln::trait::ch_value< I1 , typename F ::result >::ret mln::data::impl::generic::transform (const Image< I1 > & *input1_*, const Image< I2 > & *input2_*, const Function_vv2v< F > & *f_*)

Generic implementation of data::transform.

Parameters

`[in]` ***input1_*** The 1st input image.

`[in]` ***input2_*** The 2nd input image.

`[in]` ***f_*** The function.

Definition at line 166 of file data/transform.hh.

References mln::initialize().

9.32.2.6 template<typename I1 , typename I2 , typename F > void mln::data::impl::generic::transform_inplace (Image< I1 > & *ima_*, const Image< I2 > & *aux_*, const Function_vv2v< F > & *f_*)

Generic implementation of transform_inplace.

Parameters

`[in]` ***ima_*** The image to be transformed.

`[in]` ***aux_*** The auxiliary image.

`[in]` ***f_*** The function.

Definition at line 176 of file transform_inplace.hh.

9.32.2.7 template<typename I , typename F > void mln::data::impl::generic::transform_inplace (Image< I > & *ima_*, const Function_v2v< F > & *f_*)

Generic implementation of transform_inplace.

Parameters

`[in,out]` ***ima_*** The image to be transformed.

[in] *f_* The function.

Definition at line 149 of file transform_inplace.hh.

9.32.2.8 template<typename A , typename I > A ::result mln::data::impl::generic::update (Accumulator< A > & *a_*, const Image< I > & *input_*) [inline]

Generic implementation of data::update.

Parameters

[in] ***a_*** The accumulator.

[in] ***input_*** The input image.

Returns

The accumulator result.

Definition at line 100 of file update.hh.

9.33 mln::data::naive Namespace Reference

Namespace of image processing routines related to pixel levels with naive approach.

Namespaces

- namespace impl

  Implementation namespace of data::naive namespace.

Functions

- template<typename I , typename W , typename O >
  void median (const Image< I > &input, const Window< W > &win, Image< O > &output)

  Compute in `output` *the median filter of image* `input` *by the window* `win`*.*

9.33.1 Detailed Description

Namespace of image processing routines related to pixel levels with naive approach.

9.33.2 Function Documentation

9.33.2.1 template<typename I , typename W , typename O > void mln::data::naive::median (const Image< I > & *input*, const Window< W > & *win*, Image< O > & *output*) [inline]

Compute in `output` the median filter of image `input` by the window `win`.

Parameters

[in] ***input*** The image to be filtered.

[in] ***win*** The window.

[in,out] ***output*** The output image.

This is a NAIVE version for test / comparison purpose so do NOT use it.

Precondition

`input` and `output` have to be initialized.

See also

mln::data::median

Definition at line 99 of file naive/median.hh.

9.34 mln::data::naive::impl Namespace Reference

Implementation namespace of data::naive namespace.

9.34.1 Detailed Description

Implementation namespace of data::naive namespace.

9.35 mln::debug Namespace Reference

Namespace of routines that help to debug.

Namespaces

- namespace impl

  Implementation namespace of debug namespace.

Functions

- template<typename I , typename G , typename F >
  void draw_graph (Image< I > &ima, const p_vertices< G, F > &pv, typename I::value vcolor, typename I::value ecolor)

  Draw an image `ima` from a mln::p_vertices `pv`, with value `vcolor` for vertices, value `ecolor` for edges and 0 for the background.

- template<typename I , typename G , typename F , typename V , typename E >
  void draw_graph (Image< I > &ima, const p_vertices< G, F > &pv, const Function< V > &vcolor_f_, const Function< E > &ecolor_f_)

  Draw an image `ima` from a mln::p_vertices `pv`.

- template<typename I , typename G , typename F , typename V , typename E >
  void draw_graph (Image< I > &ima, const p_vertices< util::line_graph< G >, F > &pv, const Function< V > &vcolor_f_, const Function< E > &ecolor_f_)

  Draw an image `ima` *from a mln::p_vertices* `pv`*.*

- std::string filename (const std::string &filename, int id)

  Constructs and returns a formatted output file name.

- signed short format (signed char v)

  Format a signed char to print it properly, i.e., like an integer value.

- unsigned short format (unsigned char v)

  Format an unsigned char to print it properly, i.e., like an integer value.

- template<typename T >
  const T & format (const T &v)

  Default version for formatting a value is a no-op.

- char format (bool v)

  Format a Boolean to print it nicely: "|" for true and "-" for false.

- template<typename I >
  void iota (Image< I > &input, unsigned base_index)

- template<typename I >
  mln::trait::concrete< I >::ret mosaic (const util::array< I > &input, unsigned n_horizontal, const typename I::value &bg)

  Create a single image from an array of image.

- template<typename I >
  void println (const std::string &msg, const Image< I > &input)

  Print the message `msg` *and the image* `input` *on the standard output.*

- template<typename I >
  void println (const Image< I > &input)

  Print the image `input` *on the standard output.*

- template<typename I >
  void println_with_border (const Image< I > &input)

  Print the image `input` *on the standard output.*

- void put_word (image2d< char > &inout, const point2d &word_start, const std::string &word)

  Put the `word` *starting at location* `word_start` *in the image* `inout`*.*

- template<typename I >
  image2d< typename I::value > slices_2d (const Image< I > &input, unsigned n_horizontal, unsigned n_vertical, const typename I::value &bg)

  Create a 2D image of the slices of the 3D image `input`*.*

- template< typename I >
  image2d< typename I::value > slices_2d (const Image< I > &input, float ratio_hv, const typename I::value &bg)

  Create a 2D image of the slices of the 3D image `input`*.*

- template< typename I , typename J >
  mln::trait::ch_value< I, value::rgb8 >::ret superpose (const Image< I > &input, const Image< J > &object)
- template< typename I , typename J >
  mln::trait::ch_value< I, value::rgb8 >::ret superpose (const Image< I > &input_, const Image< J > &object_, const value::rgb8 &object_color)

  Superpose two images.

- template< typename I >
  void z_order (Image< I > &input)

9.35.1 Detailed Description

Namespace of routines that help to debug.

9.35.2 Function Documentation

9.35.2.1 template< typename I , typename G , typename F > void mln::debug::draw_graph (Image< I > & *ima*, const p_vertices< G, F > & *pv*, typename I::value *vcolor*, typename I::value *ecolor*) `[inline]`

Draw an image `ima` from a mln::p_vertices `pv`, with value `vcolor` for vertices, value `ecolor` for edges and 0 for the background.

Definition at line 142 of file draw_graph.hh.

References mln::p_vertices< G, F >::graph(), and mln::draw::line().

Referenced by mln::make_debug_graph_image().

9.35.2.2 template< typename I , typename G , typename F , typename V , typename E > void mln::debug::draw_graph (Image< I > & *ima*, const p_vertices< G, F > & *pv*, const Function< V > & *vcolor_f_*, const Function< E > & *ecolor_f_*) `[inline]`

Draw an image `ima` from a mln::p_vertices `pv`.

Colors for vertices are defined through `vcolor_f_`. Colors for edges are defined though `ecolor_f_`.

Definition at line 173 of file draw_graph.hh.

References mln::draw::box_plain(), mln::box< P >::crop_wrt(), mln::p_vertices< G, F >::graph(), and mln::draw::line().

9.35.2.3 template<typename I , typename G , typename F , typename V , typename E > void mln::debug::draw_graph (Image< I > & *ima*, const p_vertices< util::line_graph< G >, F > & *pv*, const Function< V > & *vcolor_f_*, const Function< E > & *ecolor_f_*) `[inline]`

Draw an image `ima` from a mln::p_vertices `pv`.

Colors for vertices are defined through `vcolor_f_`. Colors for edges are defined though `ecolor_f_`.

Definition at line 211 of file draw_graph.hh.

References mln::p_line2d::begin(), mln::p_line2d::end(), mln::p_vertices< G, F >::graph(), and mln::draw::line().

9.35.2.4 std::string mln::debug::filename (const std::string & *filename*, int *id* = `-1`) `[inline]`

Constructs and returns a formatted output file name.

The file name is formatted as follow:

'filename_prefix'_'id'_'filename'

Where:

- 'filename_prefix' can be set through the global variable debug::internal::filename_prefix.

'postfix_id' is autoincremented by default. Its value can be forced.

- 'filename' is the given filename

Definition at line 86 of file filename.hh.

9.35.2.5 signed short mln::debug::format (signed char *v*) `[inline]`

Format a signed char to print it properly, i.e., like an integer value.

Definition at line 78 of file format.hh.

9.35.2.6 unsigned short mln::debug::format (unsigned char *v*) `[inline]`

Format an unsigned char to print it properly, i.e., like an integer value.

Definition at line 85 of file format.hh.

9.35.2.7 template<typename T > const T & mln::debug::format (const T & *v*) `[inline]`

Default version for formatting a value is a no-op.

Definition at line 64 of file format.hh.

Referenced by mln::value::operator<<(), and mln::Gpoint< E >::operator<<().

9.35.2.8 char mln::debug::format (bool *v*) [inline]

Format a Boolean to print it nicely: "|" for true and "-" for false.

Definition at line 71 of file format.hh.

9.35.2.9 template<typename I > void mln::debug::iota (Image< I > & *input*, unsigned *base_index*) [inline]

Fill the image `input` with successive values.

Parameters

`[in,out]` ***input*** The image in which values are assigned.

Definition at line 88 of file debug/iota.hh.

References iota().

Referenced by iota().

9.35.2.10 template<typename I > mln::trait::concrete< I >::ret mln::debug::mosaic (const util::array< I > & *input*, unsigned *n_horizontal*, const typename I::value & *bg*) [inline]

Create a single image from an array of image.

The size of the output image is defined by:

width = n_horizontal * max(input[i].ncols()) height = (input.size() / n_horizontal) * max(input[i].nrows())

Returns

a single image where all the input images are displayed as a mosaic.

Definition at line 77 of file mosaic.hh.

References mln::apply_p2p(), mln::data::fill(), and mln::data::paste().

9.35.2.11 template<typename I > void mln::debug::println (const std::string & *msg*, const Image< I > & *input*)

Print the message `msg` and the image `input` on the standard output.

Definition at line 98 of file println.hh.

References println().

9.35.2.12 template<typename I > void mln::debug::println (const Image< I > & *input*) [inline]

Print the image `input` on the standard output.

Definition at line 87 of file println.hh.

References mln::geom::bbox().

Referenced by println().

9.35.2.13 template< typename I > void mln::debug::println_with_border (const Image< I > & *input*) [inline]

Print the image `input` on the standard output.

Definition at line 79 of file println_with_border.hh.

References mln::geom::bbox().

9.35.2.14 void mln::debug::put_word (image2d< char > & *inout,* const point2d & *word_start,* const std::string & *word*) [inline]

Put the `word` starting at location `word_start` in the image `inout`.

Definition at line 55 of file put_word.hh.

References mln::image2d< T >::has(), and mln::point< G, C >::last_coord().

9.35.2.15 template< typename I > image2d< typename I::value > mln::debug::slices_2d (const Image< I > & *input,* unsigned *n_horizontal,* unsigned *n_vertical,* const typename I::value & *bg*) [inline]

Create a 2D image of the slices of the 3D image `input`.

Definition at line 79 of file slices_2d.hh.

References mln::apply_p2p(), mln::data::fill(), and mln::data::paste().

Referenced by slices_2d().

9.35.2.16 template< typename I > image2d< typename I::value > mln::debug::slices_2d (const Image< I > & *input,* float *ratio_hv,* const typename I::value & *bg*)

Create a 2D image of the slices of the 3D image `input`.

Definition at line 162 of file slices_2d.hh.

References slices_2d().

9.35.2.17 template< typename I , typename J > mln::trait::ch_value< I, value::rgb8 >::ret mln::debug::superpose (const Image< I > & *input,* const Image< J > & *object*)

This is an overloaded member function, provided for convenience. It differs from the above function only in what argument(s) it accepts.

Definition at line 106 of file debug/superpose.hh.

References mln::literal::red, and superpose().

9.35.2.18 template< typename I , typename J > mln::trait::ch_value< I, value::rgb8 >::ret mln::debug::superpose (const Image< I > & *input_,* const Image< J > & *object_,* const value::rgb8 & *object_color*)

Superpose two images.

Parameters

[in] ***input_*** An image. Its value type must be convertible toward value::rgb8 thanks to a conversion operator or convert::from_to.

[in] ***object_*** A scalar or labeled image. Objects used for superposition. have their pixel values different from 0.

[in] ***object_color*** The color used to draw the objects in `object_`.

Precondition

`input_` and `object_` must have the same domain.

Returns

A color image.

Definition at line 79 of file debug/superpose.hh.

References mln::data::convert(), mln::data::fill(), and mln::literal::zero.

Referenced by superpose().

9.35.2.19 template<typename I > void mln::debug::z_order (Image< I > & *input*) `[inline]`

Fill the image `input` with Z-order (curve) values.

Parameters

[in,out] ***input*** The image in which values are assigned.

Reference: `http://en.wikipedia.org/wiki/Z-order_(curve)`

Definition at line 142 of file z_order.hh.

9.36 mln::debug::impl Namespace Reference

Implementation namespace of debug namespace.

9.36.1 Detailed Description

Implementation namespace of debug namespace.

9.37 mln::def Namespace Reference

Namespace for core definitions.

Typedefs

- typedef short coord

  Definition of the default coordinate type: 'short'.

- typedef float coordf

    Definition of the floating coordinate type.

Enumerations

- enum

    Definition of the number of bits of the low quantization threshold.

9.37.1 Detailed Description

Namespace for core definitions.

9.37.2 Typedef Documentation

9.37.2.1 typedef short mln::def::coord

Definition of the default coordinate type: 'short'.

Definition at line 43 of file coord.hh.

9.37.2.2 typedef float mln::def::coordf

Definition of the floating coordinate type.

Definition at line 41 of file coordf.hh.

9.37.3 Enumeration Type Documentation

9.37.3.1 anonymous enum

Definition of the number of bits of the low quantization threshold.

Definition at line 43 of file low_quant_nbits.hh.

9.38 mln::display Namespace Reference

Namespace of routines that help to display images.

Namespaces

- namespace impl

    Implementation namespace of display namespace.

9.38.1 Detailed Description

Namespace of routines that help to display images.

9.39 mln::display::impl Namespace Reference

Implementation namespace of display namespace.

Namespaces

- namespace generic

  Generic implementation namespace of display namespace.

9.39.1 Detailed Description

Implementation namespace of display namespace.

9.40 mln::display::impl::generic Namespace Reference

Generic implementation namespace of display namespace.

9.40.1 Detailed Description

Generic implementation namespace of display namespace.

9.41 mln::doc Namespace Reference

The namespace mln::doc is only for documentation purpose.

Classes

- struct Accumulator

  Documentation class for mln::Accumulator.

- struct Box

  Documentation class for mln::Box.

- struct Dpoint

  Documentation class for mln::Dpoint.

- struct Fastest_Image

  Documentation class for the concept of images that have the speed property set to "fastest".

- struct Generalized_Pixel

    Documentation class for mln::Generalized_Pixel.

- struct Image

    Documentation class for mln::Image.

- struct Iterator

    Documentation class for mln::Iterator.

- struct Neighborhood

    Documentation class for mln::Neighborhood.

- struct Object

    Documentation class for mln::Object.

- struct Pixel_Iterator

    Documentation class for mln::Iterator.

- struct Point_Site

    Documentation class for mln::Point_Site.

- struct Site_Iterator

    Documentation class for mln::Site_Iterator.

- struct Site_Set

    Documentation class for mln::Site_Set.

- struct Value_Iterator

    Documentation class for mln::Value_Iterator.

- struct Value_Set

    Documentation class for mln::Value_Set.

- struct Weighted_Window

    Documentation class for mln::Weighted_Window.

- struct Window

    Documentation class for mln::Window.

9.41.1 Detailed Description

The namespace mln::doc is only for documentation purpose. Since concepts are not yet part of the C++ Standard, they are not explicitly expressed in code. Their documentation is handled by their respective ghost class, located in this namespace.

Warning

The ghost classes located in mln::doc should not be used by the client.

9.42 mln::draw Namespace Reference

Namespace of drawing routines.

Functions

- template< typename I , typename B >
  void box (Image< I > &ima, const Box< B > &b, const typename I::value &v)
- template< typename I , typename B >
  void box_plain (Image< I > &ima, const Box< B > &b, const typename I::value &v)
- template< typename I >
  void dashed_line (Image< I > &ima, const typename I::psite &beg, const typename I::psite &end, const typename I::value &v)
- template< typename I >
  void line (Image< I > &ima, const typename I::psite &beg, const typename I::psite &end, const typename I::value &v)
- template< typename I >
  void plot (Image< I > &ima, const typename I::point &p, const typename I::value &v)
- template< typename I >
  void polygon (Image< I > &ima, const p_array< typename I::site > &par, const typename I::value &v, unsigned output_ratio)
- template< typename I , typename S >
  void site_set (Image< I > &ima, const Site_Set< S > &s, const typename I::value &v, unsigned output_ratio=1)

9.42.1 Detailed Description

Namespace of drawing routines.

9.42.2 Function Documentation

9.42.2.1 template< typename I , typename B > void mln::draw::box (Image< I > & *ima*, const Box< B > & *b*, const typename I::value & *v*) `[inline]`

Draw a box at value `v` in image `ima`

Parameters

`[in,out]` ***ima*** The image to be drawn.

`[in]` ***b*** the boxto draw.

`[in]` ***v*** The value to assign to all drawn pixels.

Precondition

`ima` has to be initialized.
`ima` has `beg`.
`ima` has `end`.

Definition at line 72 of file draw/box.hh.

References line().

9.42.2.2 template<typename I , typename B > void mln::draw::box_plain (Image< I > & *ima*, const Box< B > & *b*, const typename I::value & *v*) [inline]

Draw a plain box at value `v` in image `ima`

Parameters

`[in,out]` ***ima*** The image to be drawn.

`[in]` ***b*** the box to draw.

`[in]` ***v*** The value to assign to all drawn pixels.

Precondition

`ima` has to be initialized.
`ima` has `beg`.
`ima` has `end`.

Definition at line 71 of file box_plain.hh.

References mln::data::fill().

Referenced by mln::debug::draw_graph().

9.42.2.3 template<typename I > void mln::draw::dashed_line (Image< I > & *ima*, const typename I::psite & *beg*, const typename I::psite & *end*, const typename I::value & *v*) [inline]

Draw a dashed line at level `v` in image `ima` between the points `beg` and `end`.

Parameters

`[in,out]` ***ima*** The image to be drawn.

`[in]` ***beg*** The start point to drawn dashed_line.

`[in]` ***end*** The end point to drawn dashed_line.

`[in]` ***v*** The value to assign to all drawn pixels.

Precondition

`ima` has to be initialized.
`ima` has `beg`.
`ima` has `end`.

Definition at line 91 of file dashed_line.hh.

References mln::data::fill().

9.42.2.4 template<typename I > void mln::draw::line (Image< I > & *ima*, const typename I::psite & *beg*, const typename I::psite & *end*, const typename I::value & *v*) [inline]

Draw a line at level `v` in image `ima` between the points `beg` and `end`.

Parameters

`[in,out]` ***ima*** The image to be drawn.

[in] ***beg*** The start point to drawn line.

[in] ***end*** The end point to drawn line.

[in] ***v*** The value to assign to all drawn pixels.

Precondition

ima has to be initialized.
ima has beg.
ima has end.

Definition at line 72 of file draw/line.hh.

References mln::data::paste().

Referenced by box(), mln::debug::draw_graph(), and polygon().

9.42.2.5 template<typename I > void mln::draw::plot (Image< I > & *ima*, const typename I::point & *p*, const typename I::value & *v*)

Plot a point at level v in image ima

Parameters

[in,out] ***ima*** The image to be drawn.

[in] ***p*** The point to be plotted.

[in] ***v*** The value to assign to all drawn pixels.

Precondition

ima has to be initialized.
ima has p.

9.42.2.6 template<typename I > void mln::draw::polygon (Image< I > & *ima*, const p_array< typename I::site > & *par*, const typename I::value & *v*, unsigned *output_ratio*)

Draw a polygon at level v in image ima.

Parameters

[in,out] ***ima*** The image to be drawn.

[in] ***par*** The polygon site set.

[in] ***v*** The value to assign to all drawn pixels.

Precondition

ima has to be initialized.

Definition at line 70 of file polygon.hh.

References line().

9.42.2.7 template< typename I , typename S > void mln::draw::site_set (Image< I > & *ima*, const Site_Set< S > & *s*, const typename I::value & *v*, unsigned *output_ratio* = 1)

Draw a sites with value `v` in image `ima`

Parameters

`[in,out]` ***ima*** The image to be drawn.

`[in]` ***b*** the site set to draw.

`[in]` ***v*** The value to assign to all drawn pixels.

`[in]` ***output_ratio*** size ratio between output image and the image from which the bboxes were calculated.

Precondition

`s` is included in `ima` domain.

Definition at line 65 of file mln/draw/site_set.hh.

9.43 mln::estim Namespace Reference

Namespace of estimation materials.

Functions

- template< typename I >
  mln::value::props< typename I::value >::sum mean (const Image< I > &input)

  Compute the mean value of the pixels of image `input`.

- template< typename S , typename I , typename M >
  void mean (const Image< I > &input, M &result)

  Compute the mean value of the pixels of image `input`.

- template< typename I >
  void min_max (const Image< I > &input, typename I::value &min, typename I::value &max)

  Compute the min and max values of the pixels of image `input`.

- template< typename I >
  mln::value::props< typename I::value >::sum sum (const Image< I > &input)

  Compute the sum value of the pixels of image `input`.

- template< typename I , typename S >
  void sum (const Image< I > &input, S &result)

  Compute the sum value of the pixels of image `input`.

9.43.1 Detailed Description

Namespace of estimation materials.

9.43.2 Function Documentation

9.43.2.1 template< typename I > mln::value::props< typename I::value >::sum mln::estim::mean (const Image< I > & *input*) [inline]

Compute the mean value of the pixels of image `input`.

Parameters

`[in]` ***input*** The image.

Returns

The mean value.

Definition at line 68 of file estim/mean.hh.

References mln::data::compute().

9.43.2.2 template< typename S , typename I , typename M > void mln::estim::mean (const Image< I > & *input,* M & *result*) [inline]

Compute the mean value of the pixels of image `input`.

Parameters

`[in]` ***input*** The image.

`[out]` ***result*** The mean value.

The free parameter `S` is the type used to compute the summation.

Definition at line 76 of file estim/mean.hh.

References mln::data::compute().

9.43.2.3 template< typename I > void mln::estim::min_max (const Image< I > & *input,* typename I::value & *min,* typename I::value & *max*) [inline]

Compute the min and max values of the pixels of image `input`.

Parameters

`[in]` ***input*** The image.

`[out]` ***min*** The minimum pixel value of `input`.

`[out]` ***max*** The maximum pixel value of `input`.

Definition at line 61 of file estim/min_max.hh.

References mln::data::compute().

Referenced by mln::data::impl::stretch(), and mln::make::voronoi().

9.43.2.4 template< typename I > mln::value::props< typename I::value >::sum mln::estim::sum (const Image< I > & *input*) [inline]

Compute the sum value of the pixels of image `input`.

Parameters

`[in]` ***input*** The image.

Returns

The sum value.

Definition at line 67 of file estim/sum.hh.

References mln::data::compute().

9.43.2.5 template< typename I , typename S > void mln::estim::sum (const Image< I > & *input*, S & *result*) [inline]

Compute the sum value of the pixels of image `input`.

Parameters

`[in]` ***input*** The image.

`[out]` ***result*** The sum value.

Definition at line 75 of file estim/sum.hh.

References mln::data::compute().

9.44 mln::extension Namespace Reference

Namespace of extension tools.

Functions

- template< typename I , typename W >
  void adjust (const Image< I > &ima, const Window< W > &win)

  Adjust the domain extension of image `ima` with the size of the window `win`.

- template< typename I , typename W >
  void adjust (const Image< I > &ima, const Weighted_Window< W > &wwin)

  Adjust the domain extension of image `ima` with the size of the weighted window `wwin`.

- template< typename I >
  void adjust (const Image< I > &ima, unsigned delta)

  Adjust the domain extension of image `ima` with the size `delta`.

- template< typename I , typename N >
  void adjust (const Image< I > &ima, const Neighborhood< N > &nbh)

Adjust the domain extension of image `ima` with the size of the neighborhood `nbh`.

- template<typename I , typename W >
  void adjust_duplicate (const Image< I > &ima, const Window< W > &win)

  Adjust then duplicate.

- template<typename I , typename W >
  void adjust_fill (const Image< I > &ima, const Window< W > &win, const typename I::value &val)

  Adjust then fill.

- template<typename I >
  void duplicate (const Image< I > &ima)

  Assign the contents of the domain extension by duplicating the values of the inner boundary of image `ima`.

- template<typename I >
  void fill (const Image< I > &ima, const typename I::value &val)

9.44.1 Detailed Description

Namespace of extension tools.

9.44.2 Function Documentation

9.44.2.1 template<typename I , typename W > void mln::extension::adjust (const Image< I > & *ima*, const Window< W > & *win*)

Adjust the domain extension of image `ima` with the size of the window `win`.

Definition at line 89 of file extension/adjust.hh.

References mln::geom::delta().

Referenced by adjust(), adjust_duplicate(), and adjust_fill().

9.44.2.2 template<typename I , typename W > void mln::extension::adjust (const Image< I > & *ima*, const Weighted_Window< W > & *wwin*)

Adjust the domain extension of image `ima` with the size of the weighted window `wwin`.

Definition at line 97 of file extension/adjust.hh.

References adjust(), and mln::geom::delta().

9.44.2.3 template<typename I > void mln::extension::adjust (const Image< I > & *ima*, unsigned *delta*)

Adjust the domain extension of image `ima` with the size `delta`.

Definition at line 113 of file extension/adjust.hh.

References adjust().

9.44.2.4 template<typename I , typename N > void mln::extension::adjust (const Image< I > & *ima*, const Neighborhood< N > & *nbh*)

Adjust the domain extension of image `ima` with the size of the neighborhood `nbh`.

Definition at line 105 of file extension/adjust.hh.

References adjust(), and mln::geom::delta().

9.44.2.5 template<typename I , typename W > void mln::extension::adjust_duplicate (const Image< I > & *ima*, const Window< W > & *win*)

Adjust then duplicate.

Definition at line 70 of file adjust_duplicate.hh.

References adjust(), and duplicate().

9.44.2.6 template<typename I , typename W > void mln::extension::adjust_fill (const Image< I > & *ima*, const Window< W > & *win*, const typename I::value & *val*)

Adjust then fill.

Definition at line 72 of file adjust_fill.hh.

References adjust(), and fill().

9.44.2.7 template<typename I > void mln::extension::duplicate (const Image< I > & *ima*)

Assign the contents of the domain extension by duplicating the values of the inner boundary of image `ima`.

Definition at line 58 of file extension/duplicate.hh.

Referenced by adjust_duplicate().

9.44.2.8 template<typename I > void mln::extension::fill (const Image< I > & *ima*, const typename I::value & *val*)

Fill the domain extension of image `ima` with the single value `v`.

Parameters

`[in,out]` ***ima*** The image whose domain extension is to be filled.

`[in]` ***val*** The value to assign.

Precondition

`ima` has to be initialized.

Definition at line 173 of file extension/fill.hh.

Referenced by adjust_fill().

9.45 mln::fun Namespace Reference

Namespace of functions.

Namespaces

- namespace access

  Namespace for access functions.

- namespace i2v

  Namespace of integer-to-value functions.

- namespace n2v

  Namespace of functions from nil to value.

- namespace p2b

  Namespace of functions from point to boolean.

- namespace p2p

  Namespace of functions from grid point to grid point.

- namespace p2v

  Namespace of functions from point to value.

- namespace stat

  Namespace of statistical functions.

- namespace v2b

  Namespace of functions from value to logic value.

- namespace v2i

  Namespace of value-to-integer functions.

- namespace v2v

  Namespace of functions from value to value.

- namespace v2w2v

  Namespace of bijective functions.

- namespace v2w_w2v

  Namespace of functions from value to value.

- namespace vv2b

  Namespace of functions from value to value.

- namespace vv2v

  Namespace of functions from a couple of values to a value.

- namespace x2p

Namespace of functions from point to value.

- namespace x2v

  Namespace of functions from vector to value.

- namespace x2x

  Namespace of functions from vector to vector.

Classes

- struct from_accu

  Wrap an accumulator into a function.

9.45.1 Detailed Description

Namespace of functions. Forward declarations.

fun::i2v::array

Forward declaration.

9.46 mln::fun::access Namespace Reference

Namespace for access functions.

9.46.1 Detailed Description

Namespace for access functions.

9.47 mln::fun::i2v Namespace Reference

Namespace of integer-to-value functions.

Functions

- template<typename T >
  std::ostream & operator<< (std::ostream &ostr, const array< T > &a)

  Operator<<.

9.47.1 Detailed Description

Namespace of integer-to-value functions.

9.47.2 Function Documentation

9.47.2.1 template<typename T > std::ostream & mln::fun::i2v::operator<< (std::ostream & *ostr*, const array< T > & *a*)

Operator<<.

Definition at line 353 of file fun/i2v/array.hh.

9.48 mln::fun::n2v Namespace Reference

Namespace of functions from nil to value.

Classes

- struct white_gaussian

    Generate a White Gaussian Noise.

9.48.1 Detailed Description

Namespace of functions from nil to value.

9.49 mln::fun::p2b Namespace Reference

Namespace of functions from point to boolean.

Classes

- struct antilogy

    A p2b function always returning `false`.

- struct tautology

    A p2b function always returning `true`.

9.49.1 Detailed Description

Namespace of functions from point to boolean.

9.50 mln::fun::p2p Namespace Reference

Namespace of functions from grid point to grid point.

9.50.1 Detailed Description

Namespace of functions from grid point to grid point.

9.51 mln::fun::p2v Namespace Reference

Namespace of functions from point to value.

9.51.1 Detailed Description

Namespace of functions from point to value.

9.52 mln::fun::stat Namespace Reference

Namespace of statistical functions.

9.52.1 Detailed Description

Namespace of statistical functions.

9.53 mln::fun::v2b Namespace Reference

Namespace of functions from value to logic value.

Classes

- struct lnot

  Functor computing logical-not on a value.

- struct threshold

  Threshold function.

9.53.1 Detailed Description

Namespace of functions from value to logic value.

9.54 mln::fun::v2i Namespace Reference

Namespace of value-to-integer functions.

9.54.1 Detailed Description

Namespace of value-to-integer functions.

9.55 mln::fun::v2v Namespace Reference

Namespace of functions from value to value.

Classes

- class ch_function_value
  Wrap a function v2v and convert its result to another type.
- struct component
  Functor that accesses the i-th component of a value.
- struct l1_norm
  L1-norm.
- struct l2_norm
  L2-norm.
- struct linear
  Linear function. $f(v) = a * v + b$. `V` is the type of input values; `T` is the type used to compute the result; `R` is the result type.
- struct linfty_norm
  L-infty norm.
- struct rgb8_to_rgbn
  Convert a rgb8 value to a rgn, $n < 8$.

Variables

- f_hsi_to_rgb_3x8_t f_hsi_to_rgb_3x8
  Global variable.
- f_hsl_to_rgb_3x8_t f_hsl_to_rgb_3x8
  Global variables.
- f_rgb_to_hsi_f_t f_rgb_to_hsi_f
  Global variables.
- f_rgb_to_hsl_f_t f_rgb_to_hsl_f
  Global variables.

9.55.1 Detailed Description

Namespace of functions from value to value.

9.55.2 Variable Documentation

9.55.2.1 f_hsi_to_rgb_3x8_t mln::fun::v2v::f_hsi_to_rgb_3x8

Global variable.

Definition at line 74 of file hsi_to_rgb.hh.

9.55.2.2 f_hsl_to_rgb_3x8_t mln::fun::v2v::f_hsl_to_rgb_3x8

Global variables.

Definition at line 92 of file hsl_to_rgb.hh.

9.55.2.3 f_rgb_to_hsi_f_t mln::fun::v2v::f_rgb_to_hsi_f

Global variables.

Definition at line 66 of file rgb_to_hsi.hh.

9.55.2.4 f_rgb_to_hsl_f_t mln::fun::v2v::f_rgb_to_hsl_f

Global variables.

Definition at line 75 of file rgb_to_hsl.hh.

9.56 mln::fun::v2w2v Namespace Reference

Namespace of bijective functions.

Classes

- struct cos

  Cosinus bijective functor.

9.56.1 Detailed Description

Namespace of bijective functions.

9.57 mln::fun::v2w_w2v Namespace Reference

Namespace of functions from value to value.

Classes

- struct l1_norm

  L1-norm.

- struct l2_norm

  L2-norm.

- struct linfty_norm

  L-infty norm.

9.57.1 Detailed Description

Namespace of functions from value to value.

9.58 mln::fun::vv2b Namespace Reference

Namespace of functions from value to value.

Classes

- struct eq

  Functor computing equal between two values.

- struct ge

  Functor computing "greater or equal than" between two values.

- struct gt

  Functor computing "greater than" between two values.

- struct implies

  Functor computing logical-implies between two values.

- struct le

  Functor computing "lower or equal than" between two values.

- struct lt

  Functor computing "lower than" between two values.

9.58.1 Detailed Description

Namespace of functions from value to value.

9.59 mln::fun::vv2v Namespace Reference

Namespace of functions from a couple of values to a value.

Classes

- struct diff_abs

  A functor computing the diff_absimum of two values.
- struct land

  Functor computing logical-and between two values.
- struct land_not

  Functor computing logical and-not between two values.
- struct lor

  Functor computing logical-or between two values.
- struct lxor

  Functor computing logical-xor between two values.
- struct max

  A functor computing the maximum of two values.
- struct min

  A functor computing the minimum of two values.
- struct vec

  A functor computing the vecimum of two values.

9.59.1 Detailed Description

Namespace of functions from a couple of values to a value.

9.60 mln::fun::x2p Namespace Reference

Namespace of functions from point to value.

Classes

- struct closest_point

  FIXME: doxygen + concept checking.

9.60.1 Detailed Description

Namespace of functions from point to value.

9.61 mln::fun::x2v Namespace Reference

Namespace of functions from vector to value.

Classes

- struct bilinear

  Represent a bilinear interolation of values from an underlying image.

- struct trilinear

  Represent a trilinear interolation of values from an underlying image.

9.61.1 Detailed Description

Namespace of functions from vector to value.

9.62 mln::fun::x2x Namespace Reference

Namespace of functions from vector to vector.

Classes

- struct composed

  Represent a composition of two transformations.

- struct linear

  Represent a linear interolation of values from an underlying image.

- struct rotation

  Represent a rotation function.

- struct translation

  Translation function-object.

9.62.1 Detailed Description

Namespace of functions from vector to vector.

9.63 mln::geom Namespace Reference

Namespace of all things related to geometry.

Namespaces

- namespace impl

  Implementation namespace of geom namespace.

Classes

- class complex_geometry

  A functor returning the sites of the faces of a complex where the locations of each 0-face is stored.

Functions

- template< typename S >
  box< typename S::site > bbox (const Site_Set< S > &pset)

  Compute the precise bounding box of a point set `pset`.

- template< typename I >
  box< typename I::site > bbox (const Image< I > &ima)

  Compute the precise bounding box of a point set `pset`.

- template< typename W >
  box< typename W::psite > bbox (const Window< W > &win)

  Compute the precise bounding box of a window `win`.

- template< typename W >
  box< typename W::psite > bbox (const Weighted_Window< W > &win)

  Compute the precise bounding box of a weighted window `win`.

- template< typename I , typename W >
  mln::trait::ch_value< I, unsigned >::ret chamfer (const Image< I > &input_, const W &w_win_, unsigned max=mln_max(unsigned))

  Apply chamfer algorithm to a binary image.

- template< typename W >
  unsigned delta (const Window< W > &win)

  Compute the delta of a window `win`.

- template< typename W >
  unsigned delta (const Weighted_Window< W > &wwin)

  Compute the delta of a weighted window `wwin`.

- template< typename N >
  unsigned delta (const Neighborhood< N > &nbh)

  Compute the delta of a neighborhood `nbh`.

- template< typename I >
  mln::trait::concrete< I >::ret horizontal_symmetry (const Image< I > &input)

  Perfoms a horizontal symmetry.

- template< typename I >
  I::site::coord max_col (const Image< I > &ima)
  Give the maximum column of an image.
- template< typename B >
  B::site::coord max_col (const Box< B > &b)
  Give the maximum col of an box 2d or 3d.
- template< typename I >
  I::site::coord max_ind (const Image< I > &ima)
  Give the maximum ind of an image.
- template< typename I >
  I::site::coord max_row (const Image< I > &ima)
  Give the maximum row of an image.
- template< typename B >
  B::site::coord max_row (const Box< B > &b)
  Give the maximum row of an box 2d or 3d.
- template< typename I >
  I::site::coord max_sli (const Image< I > &ima)
  Give the maximum sli of an image.
- std::pair< complex_image< 2, mln::space_2complex_geometry, algebra::vec< 3, float > >, complex_image< 2, mln::space_2complex_geometry, float > > mesh_corner_point_area (const p_complex< 2, space_2complex_geometry > &mesh)
  Compute the area "belonging" to normals at vertices.
- std::pair< complex_image< 2, mln::space_2complex_geometry, float >, complex_image< 2, mln::space_2complex_geometry, float > > mesh_curvature (const p_complex< 2, space_2complex_geometry > &mesh)
  Compute the principal curvatures of a surface at vertices.
- complex_image< 2, mln::space_2complex_geometry, algebra::vec< 3, float > > mesh_normal (const p_complex< 2, space_2complex_geometry > &mesh)
  Compute normals at vertices.
- template< typename I >
  I::site::coord min_col (const Image< I > &ima)
  Give the minimum column of an image.
- template< typename B >
  B::site::coord min_col (const Box< B > &b)
  Give the minimum column of an box 2d or 3d.
- template< typename I >
  I::site::coord min_ind (const Image< I > &ima)
  Give the minimum ind of an image.

- template< typename I >
  I::site::coord min_row (const Image< I > &ima)
  Give the minimum row of an image.
- template< typename B >
  B::site::coord min_row (const Box< B > &b)
  Give the minimum row of an box 2d or 3d.
- template< typename I >
  I::site::coord min_sli (const Image< I > &ima)
  Give the minimum sli of an image.
- template< typename I >
  unsigned ncols (const Image< I > &ima)
  Give the number of columns of an image.
- template< typename B >
  unsigned ncols (const Box< B > &b)
  Give the number of cols of a box 2d or 3d.
- template< typename I >
  unsigned ninds (const Image< I > &ima)
  Give the number of inds of an image.
- template< typename I >
  unsigned nrows (const Image< I > &ima)
  Give the number of rows of an image.
- template< typename B >
  unsigned nrows (const Box< B > &b)
  Give the number of rows of a box 2d or 3d.
- template< typename I >
  unsigned nsites (const Image< I > &input)
  Compute the number of sites of the image `input`.
- template< typename I >
  unsigned nslis (const Image< I > &ima)
  Give the number of slices of an image.
- template< typename S >
  void pmin_pmax (const Site_Set< S > &s, typename S::site &pmin, typename S::site &pmax)
  Compute the minimum and maximum points, `pmin` and `max`, of point set `s`.
- template< typename S >
  std::pair< typename S::site, typename S::site > pmin_pmax (const Site_Set< S > &s)
  Compute the minimum and maximum points of point set `s`.
- template< typename I >
  std::pair< typename I::site, typename I::site > pmin_pmax (const Site_Iterator< I > &p)
  Compute the minimum and maximum points when browsing with iterator `p`.

- template< typename I >
  void pmin_pmax (const Site_Iterator< I > &p, typename I::site &pmin, typename I::site &pmax)

  Compute the minimum and maximum points, `pmin` and `max`, when browsing with iterator `p`.

- template< typename I , typename Ext >
  mln::trait::concrete< I >::ret rotate (const Image< I > &input, double angle, const Ext &extension)
- template< typename B >
  B rotate (const Box< B > &box, double angle)

  This is an overloaded member function, provided for convenience. It differs from the above function only in what argument(s) it accepts. The rotation center `ref` is set to box.pcenter().

- template< typename I , typename Ext , typename S >
  mln::trait::concrete< I >::ret rotate (const Image< I > &input, double angle, const Ext &extension, const Site_Set< S > &output_domain)

  Perform a rotation from the center of an image.

- template< typename I >
  mln::trait::concrete< I >::ret rotate (const Image< I > &input, double angle)

  This is an overloaded member function, provided for convenience. It differs from the above function only in what argument(s) it accepts. Use literal::zero as default value for the extension.

- template< typename B >
  B rotate (const Box< B > &box_, double angle, const typename B::site &ref)

  Rotate a box.

- template< typename I , typename N >
  mln::trait::concrete< I >::ret seeds2tiling (const Image< I > &ima_, const Neighborhood< N > &nbh)

  Take a labeled image `ima_` with seeds and extend them until creating tiles.

- template< typename I , typename V , typename Ext , typename S >
  mln::trait::concrete< I >::ret translate (const Image< I > &input, const algebra::vec< I::site::dim, V > &ref, const Ext &extension, const Site_Set< S > &output_domain)

  Perform a translation from the center of an image.

- template< typename I , typename V >
  mln::trait::concrete< I >::ret translate (const Image< I > &input, const algebra::vec< I::site::dim, V > &ref)

  This is an overloaded member function, provided for convenience. It differs from the above function only in what argument(s) it accepts. Use literal::zero as default value for the extension.

- template< typename I , typename V , typename Ext >
  mln::trait::concrete< I >::ret translate (const Image< I > &input, const algebra::vec< I::site::dim, V > &ref, const Ext &extension)
- template< typename I >
  mln::trait::concrete< I >::ret vertical_symmetry (const Image< I > &input)

  Perfoms a vertical symmetry.

  - template< typename I , typename N >
    I seeds2tiling_roundness (Image< I > &ima_, const w_window2d_int &w_win, unsigned max, const Neighborhood< N > &nbh_)

Take a labeled image `ima_` *with seeds and extend them until creating tiles rounder than the primary version.*

9.63.1 Detailed Description

Namespace of all things related to geometry. Namespace of essential things related to geometry.

9.63.2 Function Documentation

9.63.2.1 template< typename S > box< typename S::site > mln::geom::bbox (const Site_Set< S > & *pset*) `[inline]`

Compute the precise bounding box of a point set `pset`.

Definition at line 122 of file geom/bbox.hh.

Referenced by bbox(), mln::transform::distance_and_closest_point_geodesic(), mln::registration::icp(), max_col(), max_row(), max_sli(), min_col(), min_row(), min_sli(), mln::debug::println(), mln::debug::println_with_border(), and rotate().

9.63.2.2 template< typename I > box< typename I::site > mln::geom::bbox (const Image< I > & *ima*)

Compute the precise bounding box of a point set `pset`.

Definition at line 133 of file geom/bbox.hh.

References bbox().

9.63.2.3 template< typename W > box< typename W::psite > mln::geom::bbox (const Window< W > & *win*)

Compute the precise bounding box of a window `win`.

Definition at line 143 of file geom/bbox.hh.

References mln::literal::origin.

9.63.2.4 template< typename W > box< typename W::psite > mln::geom::bbox (const Weighted_Window< W > & *win*)

Compute the precise bounding box of a weighted window `win`.

Definition at line 156 of file geom/bbox.hh.

References bbox().

9.63.2.5 template< typename I , typename W > mln::trait::ch_value< I, unsigned >::ret mln::geom::chamfer (const Image< I > & *input_*, const W & *w_win_*, unsigned *max* = *`mln_max(unsigned)`*)

Apply chamfer algorithm to a binary image.

Definition at line 113 of file geom/chamfer.hh.

9.63.2.6 template< typename W > unsigned mln::geom::delta (const Window< W > & *win*)

Compute the delta of a window `win`.

Definition at line 96 of file delta.hh.

Referenced by mln::extension::adjust(), and delta().

9.63.2.7 template< typename W > unsigned mln::geom::delta (const Weighted_Window< W > & *wwin*)

Compute the delta of a weighted window `wwin`.

Definition at line 105 of file delta.hh.

References delta().

9.63.2.8 template< typename N > unsigned mln::geom::delta (const Neighborhood< N > & *nbh*)

Compute the delta of a neighborhood `nbh`.

Definition at line 112 of file delta.hh.

References delta().

9.63.2.9 template< typename I > mln::trait::concrete< I >::ret mln::geom::horizontal_symmetry (const Image< I > & *input*)

Perfoms a horizontal symmetry.

Definition at line 172 of file horizontal_symmetry.hh.

9.63.2.10 template< typename I > I::site::coord mln::geom::max_col (const Image< I > & *ima*) `[inline]`

Give the maximum column of an image.

Definition at line 56 of file max_col.hh.

References bbox().

Referenced by mln::io::magick::load(), and ncols().

9.63.2.11 template< typename B > B::site::coord mln::geom::max_col (const Box< B > & *b*) `[inline]`

Give the maximum col of an box 2d or 3d.

Definition at line 67 of file max_col.hh.

9.63.2.12 template<typename I > I::site::coord mln::geom::max_ind (const Image< I > & *ima*) [inline]

Give the maximum ind of an image.

Definition at line 51 of file max_ind.hh.

Referenced by ninds().

9.63.2.13 template<typename I > I::site::coord mln::geom::max_row (const Image< I > & *ima*) [inline]

Give the maximum row of an image.

Definition at line 57 of file max_row.hh.

References bbox().

Referenced by mln::io::magick::load(), and nrows().

9.63.2.14 template<typename B > B::site::coord mln::geom::max_row (const Box< B > & *b*) [inline]

Give the maximum row of an box 2d or 3d.

Definition at line 68 of file max_row.hh.

9.63.2.15 template<typename I > I::site::coord mln::geom::max_sli (const Image< I > & *ima*) [inline]

Give the maximum sli of an image.

Definition at line 53 of file max_sli.hh.

References bbox().

Referenced by nslis().

9.63.2.16 std::pair< complex_image< 2, mln::space_2complex_geometry, algebra::vec<3, float> >, complex_image< 2, mln::space_2complex_geometry, float > > mln::geom::mesh_corner_point_area (const p_complex< 2, space_2complex_geometry > & *mesh*) [inline]

Compute the area “belonging” to normals at vertices.

Inspired from the method Trimesh::need_pointareas of the Trimesh library.

See also

http://www.cs.princeton.edu/gfx/proj/trimesh2/

From the documentation of Trimesh:

“Compute the area "belonging" to each vertex or each corner of a triangle (defined as Voronoi area restricted to the 1-ring of a vertex, or to the triangle).”

Definition at line 249 of file misc.hh.

References mln::data::fill(), mln::norm::sqr_l2(), mln::algebra::vprod(), and mln::literal::zero.

Referenced by mesh_curvature().

9.63.2.17 std::pair< complex_image< 2, mln::space_2complex_geometry, float >, complex_image< 2, mln::space_2complex_geometry, float > > mln::geom::mesh_curvature (const p_complex< 2, space_2complex_geometry > & *mesh*) `[inline]`

Compute the principal curvatures of a surface at vertices.

These princpal curvatures are names kappa_1 and kappa_2 in

Sylvie Philipp-Foliguet, Michel Jordan Laurent Najman and Jean Cousty. Artwork 3D Model Database Indexing and Classification.

Parameters

`[in]` ***mesh*** The surface (triangle mesh) on which the curvature is to be computed.

Definition at line 486 of file misc.hh.

References mln::algebra::ldlt_decomp(), mln::algebra::ldlt_solve(), mesh_corner_point_area(), mesh_-normal(), mln::algebra::vprod(), and mln::literal::zero.

9.63.2.18 complex_image< 2, mln::space_2complex_geometry, algebra::vec<3, float> > mln::geom::mesh_normal (const p_complex< 2, space_2complex_geometry > & *mesh*) `[inline]`

Compute normals at vertices.

Inspired from the method Trimesh::need_normals of the Trimesh library.

See also

http://www.cs.princeton.edu/gfx/proj/trimesh2/

For simplicity purpose, and contrary to Trimesh, this routine only compute normals from a mesh, not from a cloud of points.

Definition at line 161 of file misc.hh.

References mln::data::fill(), mln::norm::sqr_l2(), mln::algebra::vprod(), and mln::literal::zero.

Referenced by mesh_curvature().

9.63.2.19 template<typename I > I::site::coord mln::geom::min_col (const Image< I > & *ima*) `[inline]`

Give the minimum column of an image.

Definition at line 57 of file min_col.hh.

References bbox().

Referenced by mln::transform::hough(), mln::io::magick::load(), and ncols().

9.63.2.20 template<typename B > B::site::coord mln::geom::min_col (const Box< B > & *b*) [inline]

Give the minimum column of an box 2d or 3d.

Definition at line 68 of file min_col.hh.

9.63.2.21 template<typename I > I::site::coord mln::geom::min_ind (const Image< I > & *ima*) [inline]

Give the minimum ind of an image.

Definition at line 51 of file min_ind.hh.

Referenced by ninds().

9.63.2.22 template<typename I > I::site::coord mln::geom::min_row (const Image< I > & *ima*) [inline]

Give the minimum row of an image.

Definition at line 60 of file min_row.hh.

References bbox().

Referenced by mln::transform::hough(), mln::io::magick::load(), and nrows().

9.63.2.23 template<typename B > B::site::coord mln::geom::min_row (const Box< B > & *b*) [inline]

Give the minimum row of an box 2d or 3d.

Definition at line 71 of file min_row.hh.

9.63.2.24 template<typename I > I::site::coord mln::geom::min_sli (const Image< I > & *ima*) [inline]

Give the minimum sli of an image.

Definition at line 53 of file min_sli.hh.

References bbox().

Referenced by nslis().

9.63.2.25 template<typename I > unsigned mln::geom::ncols (const Image< I > & *ima*) [inline]

Give the number of columns of an image.

Definition at line 57 of file ncols.hh.

References max_col(), and min_col().

Referenced by mln::labeling::impl::compute_fastest(), mln::subsampling::gaussian_subsampling(), mln::transform::hough(), ncols(), mln::io::magick::save(), and mln::subsampling::subsampling().

9.63.2.26 template< typename B > unsigned mln::geom::ncols (const Box< B > & *b*)

Give the number of cols of a box 2d or 3d.

Definition at line 67 of file ncols.hh.

References max_col(), min_col(), and ncols().

9.63.2.27 template< typename I > unsigned mln::geom::ninds (const Image< I > & *ima*) [inline]

Give the number of inds of an image.

Definition at line 52 of file ninds.hh.

References max_ind(), and min_ind().

9.63.2.28 template< typename I > unsigned mln::geom::nrows (const Image< I > & *ima*) [inline]

Give the number of rows of an image.

Definition at line 57 of file nrows.hh.

References max_row(), and min_row().

Referenced by mln::subsampling::gaussian_subsampling(), mln::transform::hough(), nrows(), mln::io::magick::save(), and mln::subsampling::subsampling().

9.63.2.29 template< typename B > unsigned mln::geom::nrows (const Box< B > & *b*)

Give the number of rows of a box 2d or 3d.

Definition at line 66 of file nrows.hh.

References max_row(), min_row(), and nrows().

9.63.2.30 template< typename I > unsigned mln::geom::nsites (const Image< I > & *input*) [inline]

Compute the number of sites of the image `input`.

Definition at line 52 of file nsites.hh.

Referenced by pmin_pmax().

9.63.2.31 template< typename I > unsigned mln::geom::nslis (const Image< I > & *ima*) [inline]

Give the number of slices of an image.

Definition at line 53 of file nslis.hh.

References max_sli(), and min_sli().

9.63.2.32 template<typename S > std::pair< typename S::site, typename S::site > mln::geom::pmin_pmax (const Site_Set< S > & *s*) [inline]

Compute the minimum and maximum points of point set `s`.

Definition at line 157 of file pmin_pmax.hh.

References nsites().

Referenced by pmin_pmax().

9.63.2.33 template<typename S > void mln::geom::pmin_pmax (const Site_Set< S > & *s*, typename S::site & *pmin*, typename S::site & *pmax*) [inline]

Compute the minimum and maximum points, `pmin` and `max`, of point set `s`.

Definition at line 148 of file pmin_pmax.hh.

References nsites().

9.63.2.34 template<typename I > std::pair< typename I::site, typename I::site > mln::geom::pmin_pmax (const Site_Iterator< I > & *p*) [inline]

Compute the minimum and maximum points when browsing with iterator `p`.

Definition at line 106 of file pmin_pmax.hh.

References pmin_pmax().

9.63.2.35 template<typename I > void mln::geom::pmin_pmax (const Site_Iterator< I > & *p*, typename I::site & *pmin*, typename I::site & *pmax*) [inline]

Compute the minimum and maximum points, `pmin` and `max`, when browsing with iterator `p`.

Definition at line 84 of file pmin_pmax.hh.

9.63.2.36 template<typename I > mln::trait::concrete< I >::ret mln::geom::rotate (const Image< I > & *input*, double *angle*)

This is an overloaded member function, provided for convenience. It differs from the above function only in what argument(s) it accepts. Use literal::zero as default value for the extension.

Definition at line 197 of file rotate.hh.

References rotate(), and mln::literal::zero.

9.63.2.37 template<typename I , typename Ext > mln::trait::concrete< I >::ret mln::geom::rotate (const Image< I > & *input*, double *angle*, const Ext & *extension*)

This is an overloaded member function, provided for convenience. It differs from the above function only in what argument(s) it accepts.

Definition at line 185 of file rotate.hh.

References rotate().

9.63.2.38 template< typename B > B mln::geom::rotate (const Box< B > & *box*, double *angle*)

This is an overloaded member function, provided for convenience. It differs from the above function only in what argument(s) it accepts. The rotation center `ref` is set to box.pcenter().

Definition at line 252 of file rotate.hh.

References rotate().

9.63.2.39 template< typename I , typename Ext , typename S > mln::trait::concrete< I >::ret mln::geom::rotate (const Image< I > & *input*, double *angle*, const Ext & *extension*, const Site_Set< S > & *output_domain*)

Perform a rotation from the center of an image.

Parameters

- `[in]` ***input*** An image.
- `[in]` ***angle*** An angle in degrees.
- `[in]` ***extension*** Function, image or value which will be used as extension. This extension allows to map values to sites which where not part of the domain before the rotation.
- `[in]` ***output_domain*** The domain of the output image. An invalid domain, causes the routine to use a domain large enough to display the whole original image.

Returns

An image with the same domain as `input`.

Definition at line 123 of file rotate.hh.

References bbox(), mln::compose(), mln::duplicate(), mln::initialize(), mln::mln_exact(), mln::literal::origin, and mln::data::paste().

Referenced by rotate().

9.63.2.40 template< typename B > B mln::geom::rotate (const Box< B > & *box_*, double *angle*, const typename B::site & *ref*)

Rotate a box.

FIXME: the return type may be too generic and may lead to invalid covariance.

Definition at line 205 of file rotate.hh.

References mln::compose(), mln::literal::origin, and mln::accu::shape::bbox< P >::to_result().

9.63.2.41 template< typename I , typename N > mln::trait::concrete< I >::ret mln::geom::seeds2tiling (const Image< I > & *ima_*, const Neighborhood< N > & *nbh*) `[inline]`

Take a labeled image `ima_` with seeds and extend them until creating tiles.

Parameters

- `[in,out]` ***ima_*** The labeled image with seed.

[in] ***nbh*** The neighborhood to use on this algorithm.

Returns

A tiled image.

Precondition

ima_ has to be initialized.

Definition at line 136 of file seeds2tiling.hh.

References mln::geom::impl::seeds2tiling().

9.63.2.42 template<typename I , typename N > I mln::geom::seeds2tiling_roundness (Image< I > & *ima_*, const w_window2d_int & *w_win*, unsigned *max*, const Neighborhood< N > & *nbh_*) [inline]

Take a labeled image ima_ with seeds and extend them until creating tiles rounder than the primary version.

Parameters

[in,out] ***ima_*** The labeled image with seed.

[in] ***w_win*** The weight window using by geom::chamfer to compute distance.

[in] ***max*** Unsigned using by geom::chamfer to compute the distance.

[in] ***nbh_*** The neighborhood to use on this algorithm.

Precondition

ima_ has to be initialized.

Definition at line 128 of file seeds2tiling_roundness.hh.

9.63.2.43 template<typename I , typename V > mln::trait::concrete< I >::ret mln::geom::translate (const Image< I > & *input*, const algebra::vec< I::site::dim, V > & *ref*)

This is an overloaded member function, provided for convenience. It differs from the above function only in what argument(s) it accepts. Use literal::zero as default value for the extension.

Definition at line 146 of file translate.hh.

References translate(), and mln::literal::zero.

9.63.2.44 template<typename I , typename V , typename Ext , typename S > mln::trait::concrete< I >::ret mln::geom::translate (const Image< I > & *input*, const algebra::vec< I::site::dim, V > & *ref*, const Ext & *extension*, const Site_Set< S > & *output_domain*)

Perform a translation from the center of an image.

Parameters

[in] ***input*** An image.

[in] ***ref*** The translation vector.

[in] ***extension*** Function, image or value which will be used as extension. This extension allows to map values to sites which where not part of the domain before the translation.

[in] ***output_domain*** The domain of the output image. An invalid domain, causes the routine to use the translated input_ domain.

Returns

An image with the same domain as `input`.

Definition at line 99 of file translate.hh.

References mln::extend(), mln::data::fill(), and mln::mln_exact().

Referenced by translate().

9.63.2.45 template< typename I , typename V , typename Ext > mln::trait::concrete< I >::ret mln::geom::translate (const Image< I > & *input,* const algebra::vec< I::site::dim, V > & *ref,* const Ext & *extension*)

This is an overloaded member function, provided for convenience. It differs from the above function only in what argument(s) it accepts.

Definition at line 132 of file translate.hh.

References translate().

9.63.2.46 template< typename I > mln::trait::concrete< I >::ret mln::geom::vertical_symmetry (const Image< I > & *input*)

Perfoms a vertical symmetry.

Definition at line 174 of file vertical_symmetry.hh.

9.64 mln::geom::impl Namespace Reference

Implementation namespace of geom namespace.

Functions

- template< typename I , typename N >
  mln::trait::concrete< I >::ret seeds2tiling (const Image< I > &ima_, const Neighborhood< N > &nbh_)

  Generic implementation of geom::seed2tiling.

9.64.1 Detailed Description

Implementation namespace of geom namespace.

9.64.2 Function Documentation

9.64.2.1 template< typename I , typename N > mln::trait::concrete< I >::ret mln::geom::impl::seeds2tiling (const Image< I > & *ima_*, const Neighborhood< N > & *nbh_*) `[inline]`

Generic implementation of geom::seed2tiling.

Parameters

`[in,out]` ***ima_*** The labeled image with seed.

`[in]` ***nbh_*** The neighborhood to use on this algorithm.

Definition at line 77 of file seeds2tiling.hh.

References mln::duplicate(), mln::p_queue< P >::front(), mln::p_queue< P >::pop(), and mln::p_queue< P >::push().

Referenced by mln::geom::seeds2tiling().

9.65 mln::graph Namespace Reference

Namespace of graph related routines.

Functions

- template< typename G , typename F >
  F::result compute (const Graph< G > &g_, F &functor)

  Base routine to compute attributes on a graph.

- template< typename I , typename N , typename L >
  mln::trait::ch_value< I, L >::ret labeling (const Image< I > &graph_image_, const Neighborhood< N > &nbh_, L &nlabels)

  Label graph components.

- template< typename I , typename M >
  graph_elt_neighborhood_if< mln_graph(I), typename I::domain_t, M > to_neighb (const Image< I > &graph_image_, const Image< M > &graph_mask_image_)

  Make a custom graph neighborhood from a mask image.

- template< typename I , typename M >
  graph_elt_window_if< mln_graph(I), typename I::domain_t, M > to_win (const Image< I > &graph_image_, const Image< M > &graph_mask_image_)

  Make a custom graph window from a mask image.

9.65.1 Detailed Description

Namespace of graph related routines.

9.65.2 Function Documentation

9.65.2.1 template< typename G , typename F > F::result mln::graph::compute (const Graph< G > & *g_*, F & *functor*)

Base routine to compute attributes on a graph.

Parameters

[in] ***g_*** A graph.

[in] ***functor*** A functor implementing the right interface.

Returns

The computed data.

See also

canvas::browsing::depth_first_search

Definition at line 63 of file graph/compute.hh.

9.65.2.2 template< typename I , typename N , typename L > mln::trait::ch_value< I, L >::ret mln::graph::labeling (const Image< I > & *graph_image_*, const Neighborhood< N > & *nbh_*, L & *nlabels*)

Label graph components.

Vertex with id 0, usuallly used to represent the background component, will be labeled with an id different from 0. Therefore, the labeling starts from 1.

Parameters

[in] ***graph_image_*** A graph image (

See also

vertex_image, edge_image).

Parameters

[in] ***nbh_*** A graph neighborhood.

[in,out] ***nlabels*** The number of labels found.

Returns

a Graph image of labels.

Definition at line 72 of file labeling.hh.

References mln::labeling::blobs(), mln::data::fill(), and mln::initialize().

9.65.2.3 template< typename I , typename M > graph_elt_neighborhood_if< mln_graph(I), typename I::domain_t, M > mln::graph::to_neighb (const Image< I > & *graph_image_*, const Image< M > & *graph_mask_image_*)

Make a custom graph neighborhood from a mask image.

Parameters

[in] ***graph_image_*** A graph image (

See also

vertex_image and edge_image).

Parameters

[in] ***graph_mask_image_*** A graph image of bool used as a mask.

Returns

A masked neighborhood on graph.

Definition at line 57 of file to_neighb.hh.

9.65.2.4 template< typename I , typename M > graph_elt_window_if< mln_graph(I), typename I::domain_t, M > mln::graph::to_win (const Image< I > & *graph_image_*, const Image< M > & *graph_mask_image_*)

Make a custom graph window from a mask image.

Parameters

[in] ***graph_image_*** A graph image (

See also

vertex_image and edge_image).

Parameters

[in] ***graph_mask_image_*** A graph image of bool used as a mask.

Returns

A masked window on graph.

Definition at line 57 of file to_win.hh.

9.66 mln::grid Namespace Reference

Namespace of grids definitions.

9.66.1 Detailed Description

Namespace of grids definitions. Compute the image::space trait from a point type.

9.67 mln::histo Namespace Reference

Namespace of histograms.

Namespaces

- namespace impl

  Implementation namespace of histo namespace.

Classes

- struct array

  Generic histogram class over a value set with type `T`.

Functions

- template<typename I >
  histo::array< typename I::value > compute (const Image< I > &input)

  Compute the histogram of image `input`.

- template<typename I >
  mln::trait::concrete< I >::ret equalize (const Image< I > &input)

  Equalizes the histogram of image `input`.

9.67.1 Detailed Description

Namespace of histograms.

9.67.2 Function Documentation

9.67.2.1 template<typename I > histo::array< typename I::value > mln::histo::compute (const Image< I > & *input*) [inline]

Compute the histogram of image `input`.

Definition at line 79 of file histo/compute.hh.

Referenced by equalize().

9.67.2.2 template<typename I > mln::trait::concrete< I >::ret mln::histo::equalize (const Image< I > & *input*)

Equalizes the histogram of image `input`.

Author

J. Fabrizio, R. Levillain

Definition at line 55 of file histo/equalize.hh.

References compute(), and mln::initialize().

9.68 mln::histo::impl Namespace Reference

Implementation namespace of histo namespace.

Namespaces

- namespace generic

  Generic implementation namespace of histo namespace.

9.68.1 Detailed Description

Implementation namespace of histo namespace.

9.69 mln::histo::impl::generic Namespace Reference

Generic implementation namespace of histo namespace.

9.69.1 Detailed Description

Generic implementation namespace of histo namespace.

9.70 mln::impl Namespace Reference

Implementation namespace of mln namespace.

9.70.1 Detailed Description

Implementation namespace of mln namespace.

9.71 mln::io Namespace Reference

Namespace of input/output handling.

Namespaces

- namespace cloud

  Namespace of cloud input/output handling.

- namespace dicom

  Namespace of DICOM input/output handling.

- namespace dump

Namespace of dump input/output handling.

- namespace fits

  Namespace of fits input/output handling.

- namespace fld

  Namespace of pgm input/output handling.

- namespace magick

  Namespace of magick input/output handling.

- namespace off

  Namespace of off input/output handling.

- namespace pbm

  Namespace of pbm input/output handling.

- namespace pbms

  Namespace of pbms input/output handling.

- namespace pfm

  Namespace of pfm input/output handling.

- namespace pgm

  Namespace of pgm input/output handling.

- namespace pgms

  Namespace of pgms input/output handling.

- namespace plot

  Namespace of plot input/output handling.

- namespace pnm

  Namespace of pnm input/output handling.

- namespace pnms

  Namespace of pnms input/output handling.

- namespace ppm

  Namespace of ppm input/output handling.

- namespace ppms

  Namespace of ppms input/output handling.

- namespace raw

  Namespace of raw input/output handling.

- namespace tiff

  Namespace of tiff input/output handling.

- namespace txt

  Namespace of txt input/output handling.

9.71.1 Detailed Description

Namespace of input/output handling.

9.72 mln::io::cloud Namespace Reference

Namespace of cloud input/output handling.

Functions

- template< typename P >
  void load (p_array< P > &arr, const std::string &filename)

  Load a cloud of points.

- template< typename P >
  void save (const p_array< P > &arr, const std::string &filename)

  Load a cloud of points.

9.72.1 Detailed Description

Namespace of cloud input/output handling.

9.72.2 Function Documentation

9.72.2.1 template< typename P > void mln::io::cloud::load (p_array< P > & *arr*, const std::string & *filename*)

Load a cloud of points.

Parameters

`[in,out]` ***arr*** the site set where to load the data.

`[in]` ***filename*** file to load.

Definition at line 88 of file cloud/load.hh.

9.72.2.2 template< typename P > void mln::io::cloud::save (const p_array< P > & *arr*, const std::string & *filename*)

Load a cloud of points.

Parameters

[in] ***arr*** the cloud of points to save.

[in] ***filename*** the destination.

Definition at line 83 of file cloud/save.hh.

9.73 mln::io::dicom Namespace Reference

Namespace of DICOM input/output handling.

Classes

- struct dicom_header

  Store dicom file header.

Functions

- dicom_header get_header (const std::string &filename)

  Retrieve header in a dicom file.

- template<typename I >
  void load (Image< I > &ima, const std::string &filename)

9.73.1 Detailed Description

Namespace of DICOM input/output handling.

9.73.2 Function Documentation

9.73.2.1 dicom_header mln::io::dicom::get_header (const std::string & *filename*)

Retrieve header in a dicom file.

Definition at line 76 of file dicom/get_header.hh.

References mln::util::array< T >::append().

9.73.2.2 template<typename I > void mln::io::dicom::load (Image< I > & *ima*, const std::string & *filename*) `[inline]`

Load a DICOM file in a Milena image.

Parameters

[out] ***ima*** A reference to the image which will receive data.

[in] ***filename*** The source.

Common compilation flags to link to gdcm if this file is used:

-lgdcmCommon -lgdcmDICT -lgdcmDSED -lgdcmIOD -lgdcmMSFF -lgdcmexpat -lgdcmjpeg12 -lgdcmjpeg16 -lgdcmjpeg8 -lgdcmopenjpeg -lgdcmuuid -lgdcmzlib

Definition at line 96 of file dicom/load.hh.

References mln::initialize().

9.74 mln::io::dump Namespace Reference

Namespace of dump input/output handling.

Classes

- struct dump_header

  Store dump file header.

Functions

- dump_header get_header (const std::string &filename)

  Retrieve header in a dump file.

- template< typename I >
  void load (Image< I > &ima_, const std::string &filename)

  Load a Milena image by dumped into a file.

- template< typename I >
  void save (const Image< I > &ima_, const std::string &filename)

  Save a Milena image by dumping its data to a file.

9.74.1 Detailed Description

Namespace of dump input/output handling.

9.74.2 Function Documentation

9.74.2.1 dump_header mln::io::dump::get_header (const std::string & *filename*)

Retrieve header in a dump file.

Definition at line 68 of file dump/get_header.hh.

References mln::util::array< T >::resize().

9.74.2.2 template<typename I > void mln::io::dump::load (Image< I > & *ima_*, const std::string & *filename*)

Load a Milena image by dumped into a file.

Parameters

`[in,out]` ***ima_*** The image to load.

`[in]` ***filename*** the destination.

Definition at line 171 of file dump/load.hh.

9.74.2.3 template<typename I > void mln::io::dump::save (const Image< I > & *ima_*, const std::string & *filename*)

Save a Milena image by dumping its data to a file.

Parameters

`[in]` ***ima_*** The image to save.

`[in]` ***filename*** the destination.

Definition at line 131 of file dump/save.hh.

9.75 mln::io::fits Namespace Reference

Namespace of fits input/output handling.

Functions

- void load (image2d< float > &ima, const std::string &filename)

  Load a fits image in a Milena image.

- image2d< float > load (const std::string &filename)

  Load a fits image in a image2d<float>.

9.75.1 Detailed Description

Namespace of fits input/output handling.

9.75.2 Function Documentation

9.75.2.1 void mln::io::fits::load (image2d< float > & *ima*, const std::string & *filename*) `[inline]`

Load a fits image in a Milena image.

Parameters

`[out]` ***ima*** A reference to the image2d<float> which will receive data.

`[in]` ***filename*** The source.

Definition at line 132 of file fits/load.hh.

9.75.2.2 image2d< float > mln::io::fits::load (const std::string & *filename*) `[inline]`

Load a fits image in a image2d<float>.

Parameters

`[in]` ***filename*** The image source.

Returns

An image2d<float> which contains loaded data.

Definition at line 85 of file fits/load.hh.

9.76 mln::io::fld Namespace Reference

Namespace of pgm input/output handling.

Classes

- struct fld_header

  Define the header structure of an AVS field data file.

Functions

- template<typename I >
  void load (Image< I > &ima_, const char *filename)

  Load an image from an AVS field file.

- fld_header read_header (std::istream &ins)

  Read the header form an AVS field file.

- void write_header (std::ostream &file, const fld_header &h)

  Write the AVS header in a file.

9.76.1 Detailed Description

Namespace of pgm input/output handling.

9.76.2 Function Documentation

9.76.2.1 template< typename I > void mln::io::fld::load (Image< I > & *ima_*, const char * *filename*) [inline]

Load an image from an AVS field file.

Parameters

[in,out] ***ima_*** The image to load.

[in] ***filename*** The path to the AVS file.

Definition at line 198 of file fld/load.hh.

References mln::box< P >::pmax(), mln::box< P >::pmin(), and read_header().

9.76.2.2 fld_header mln::io::fld::read_header (std::istream & *ins*) [inline]

Read the header form an AVS field file.

Parameters

ins The file to read.

Returns

The header.

Definition at line 73 of file fld/load_header.hh.

Referenced by load().

9.76.2.3 void mln::io::fld::write_header (std::ostream & *file*, const fld_header & *h*) [inline]

Write the AVS header in a file.

Parameters

file The file to write.

h The AVS header.

Definition at line 58 of file write_header.hh.

9.77 mln::io::magick Namespace Reference

Namespace of magick input/output handling.

Functions

- template< typename I >
  void load (Image< I > &ima, const std::string &filename)

Load data from a file into a Milena image using Magick++.

- template<typename I , typename J >
  void save (const Image< I > &ima, const Image< J > &opacity_mask, const std::string &filename)

  Save a Milena image into a file using Magick++.

- template<typename I >
  void save (const Image< I > &ima, const std::string &filename)

  Save a Milena image into a file using Magick++.

9.77.1 Detailed Description

Namespace of magick input/output handling.

9.77.2 Function Documentation

9.77.2.1 template<typename I > void mln::io::magick::load (Image< I > & *ima*, const std::string & *filename*) [inline]

Load data from a file into a Milena image using Magick++.

Parameters

[out] ***ima*** The image data are loaded into.

[in] ***filename*** The name of the input file.

Definition at line 139 of file magick/load.hh.

References mln::initialize(), mln::geom::max_col(), mln::geom::max_row(), mln::geom::min_col(), and mln::geom::min_row().

9.77.2.2 template<typename I , typename J > void mln::io::magick::save (const Image< I > & *ima*, const Image< J > & *opacity_mask*, const std::string & *filename*)

Save a Milena image into a file using Magick++.

Parameters

[in] ***ima*** The image to save.

[in] ***opacity_mask*** Mask used to set pixel opacity_mask in output image. Output format must support this feature to be taken into account.

[in] ***filename*** The name of the output file.

Definition at line 228 of file magick/save.hh.

References mln::geom::ncols(), and mln::geom::nrows().

9.77.2.3 template<typename I > void mln::io::magick::save (const Image< I > & *ima*, const std::string & *filename*) `[inline]`

Save a Milena image into a file using Magick++.

This is an overloaded member function, provided for convenience. It differs from the above function only in what argument(s) it accepts.

Parameters

`[in]` ***ima*** The image to save.

`[in]` ***filename*** The name of the output file.

Definition at line 288 of file magick/save.hh.

9.78 mln::io::off Namespace Reference

Namespace of off input/output handling.

Functions

- void load (bin_2complex_image3df &ima, const std::string &filename)

  Load a (binary) OFF image into a complex image.

- void save (const bin_2complex_image3df &ima, const std::string &filename)

  Save a (binary) OFF image into a complex image.

- template<typename I >
  void save_bin_alt (const I &ima, const std::string &filename)

  FIXME: Similar to mln::io::off::save(const bin_2complex_image3df&, const std::string&), but does not save faces whose value is 'false'.

9.78.1 Detailed Description

Namespace of off input/output handling.

9.78.2 Function Documentation

9.78.2.1 void mln::io::off::load (bin_2complex_image3df & *ima*, const std::string & *filename*)

Load a (binary) OFF image into a complex image.

Load a 3x8-bit RGB (color) OFF image into a complex image.

Load a floating-point OFF image into a complex image.

Parameters

`[out]` ***ima*** A reference to the image to construct.

`[in]` ***filename*** The name of the file to load.

The image is said binary since data only represent the existence of faces.

Parameters

[out] ***ima*** A reference to the image to construct.

[in] ***filename*** The name of the file to load.

Read floating-point data is attached to 2-faces only; 1-faces and 0-faces are set to 0.0f.

Definition at line 195 of file off/load.hh.

9.78.2.2 void mln::io::off::save (const bin_2complex_image3df & *ima*, const std::string & *filename*)

Save a (binary) OFF image into a complex image.

Save a 3x8-bit RGB (color) OFF image into a complex image.

Save a floating-point value grey-level OFF image into a complex image.

Save an 8-bit grey-level OFF image into a complex image.

Parameters

[in] ***ima*** The image to save.

[in] ***filename*** The name of the file where to save the image.

The image is said binary since data represent only the existence of faces.

Parameters

[in] ***ima*** The image to save.

[in] ***filename*** The name of the file where to save the image.

Only data is attached to 2-faces is saved; the OFF file cannot store data attached to faces of other dimensions.

Definition at line 189 of file off/save.hh.

9.78.2.3 template<typename I > void mln::io::off::save_bin_alt (const I & *ima*, const std::string & *filename*)

FIXME: Similar to mln::io::off::save(const bin_2complex_image3df&, const std::string&), but does not save faces whose value is 'false'.

Definition at line 59 of file save_bin_alt.hh.

9.79 mln::io::pbm Namespace Reference

Namespace of pbm input/output handling.

Namespaces

- namespace impl

  Namespace of pbm implementation details.

Functions

- void load (image2d< bool > &ima, const std::string &filename)

  Load a pbm image in a Milena image.

- image2d< bool > load (const std::string &filename)

  Load a pbm image in a image2d<float>.

- template<typename I >
  void save (const Image< I > &ima, const std::string &filename)

9.79.1 Detailed Description

Namespace of pbm input/output handling.

9.79.2 Function Documentation

9.79.2.1 void mln::io::pbm::load (image2d< bool > & *ima*, const std::string & *filename*) `[inline]`

Load a pbm image in a Milena image.

Parameters

`[out]` ***ima*** A reference to the image2d<bool> which will receive data.

`[in]` ***filename*** The source.

Definition at line 156 of file pbm/load.hh.

9.79.2.2 image2d< bool > mln::io::pbm::load (const std::string & *filename*) `[inline]`

Load a pbm image in a image2d<float>.

Parameters

`[in]` ***filename*** The image source.

Returns

An image2d<float> which contains loaded data.

Definition at line 128 of file pbm/load.hh.

9.79.2.3 template< typename I > void mln::io::pbm::save (const Image< I > & *ima*, const std::string & *filename*) [inline]

Save a Milena image as a pbm image.

Parameters

[in] ***ima*** The image to save.

[in,out] ***filename*** the destination.

Definition at line 118 of file pbm/save.hh.

9.80 mln::io::pbm::impl Namespace Reference

Namespace of pbm implementation details.

9.80.1 Detailed Description

Namespace of pbm implementation details.

9.81 mln::io::pbms Namespace Reference

Namespace of pbms input/output handling.

Namespaces

- namespace impl

  Namespace of pbms implementation details.

Functions

- void load (image3d< bool > &ima, const util::array< std::string > &filenames)

  Load pbms images as slices of a 3D Milena image.

9.81.1 Detailed Description

Namespace of pbms input/output handling.

9.81.2 Function Documentation

9.81.2.1 void mln::io::pbms::load (image3d< bool > & *ima*, const util::array< std::string > & *filenames*) [inline]

Load pbms images as slices of a 3D Milena image.

Parameters

`[out]` ***ima*** A reference to the 3D image which will receive data.

`[in]` ***filenames*** The list of 2D images to load..

Definition at line 65 of file pbms/load.hh.

9.82 mln::io::pbms::impl Namespace Reference

Namespace of pbms implementation details.

9.82.1 Detailed Description

Namespace of pbms implementation details.

9.83 mln::io::pfm Namespace Reference

Namespace of pfm input/output handling.

Namespaces

- namespace impl

  Implementation namespace of pfm namespace.

Functions

- void load (image2d< float > &ima, const std::string &filename)

  Load a pfm image in a Milena image.

- image2d< float > load (const std::string &filename)

  Load a pfm image in a image2d<float>.

- template<typename I >
  void save (const Image< I > &ima, const std::string &filename)

  Save a Milena image as a pfm image.

9.83.1 Detailed Description

Namespace of pfm input/output handling.

9.83.2 Function Documentation

9.83.2.1 void mln::io::pfm::load (image2d< float > & *ima*, const std::string & *filename*) [inline]

Load a pfm image in a Milena image.

Parameters

[out] ***ima*** A reference to the image2d<float> which will receive data.

[in] ***filename*** The source.

Definition at line 162 of file pfm/load.hh.

9.83.2.2 image2d< float > mln::io::pfm::load (const std::string & *filename*) [inline]

Load a pfm image in a image2d<float>.

Parameters

[in] ***filename*** The image source.

Returns

An image2d<float> which contains loaded data.

Definition at line 138 of file pfm/load.hh.

9.83.2.3 template<typename I > void mln::io::pfm::save (const Image< I > & *ima*, const std::string & *filename*) [inline]

Save a Milena image as a pfm image.

Parameters

[in] ***ima*** The image to save.

[in,out] ***filename*** the destination.

Definition at line 101 of file pfm/save.hh.

9.84 mln::io::pfm::impl Namespace Reference

Implementation namespace of pfm namespace.

9.84.1 Detailed Description

Implementation namespace of pfm namespace.

9.85 mln::io::pgm Namespace Reference

Namespace of pgm input/output handling.

Functions

- template< typename I >
  void load (Image< I > &ima, const std::string &filename)
  Load a pgm image in a Milena image.
- template< typename V >
  image2d< V > load (const std::string &filename)
  Load a pgm image in a Milena image.
- template< typename I >
  void save (const Image< I > &ima, const std::string &filename)

9.85.1 Detailed Description

Namespace of pgm input/output handling.

9.85.2 Function Documentation

9.85.2.1 template< typename I > void mln::io::pgm::load (Image< I > & *ima*, const std::string & *filename*) `[inline]`

Load a pgm image in a Milena image.

Parameters

`[out]` ***ima*** A reference to the image which will receive data.
`[in]` ***filename*** The source.

Definition at line 87 of file pgm/load.hh.

9.85.2.2 template< typename V > image2d< V > mln::io::pgm::load (const std::string & *filename*) `[inline]`

Load a pgm image in a Milena image.

To use this routine, you should specialize the template whith the value type of the image loaded. (ex : load<value::int_u8>("..."))

Parameters

`[in]` ***filename*** The image source.

Returns

An image2d which contains loaded data.

Definition at line 77 of file pgm/load.hh.

9.85.2.3 template< typename I > void mln::io::pgm::save (const Image< I > & *ima*, const std::string & *filename*) `[inline]`

Save a Milena image as a pgm image.

Parameters

`[in]` ***ima*** The image to save.

`[in,out]` ***filename*** the destination.

Definition at line 77 of file pgm/save.hh.

9.86 mln::io::pgms Namespace Reference

Namespace of pgms input/output handling.

Functions

- template< typename V >
  void load (image3d< V > &ima, const util::array< std::string > &filenames)

  Load pgm images as slices of a 3D Milena image.

9.86.1 Detailed Description

Namespace of pgms input/output handling.

9.86.2 Function Documentation

9.86.2.1 template< typename V > void mln::io::pgms::load (image3d< V > & *ima*, const util::array< std::string > & *filenames*) `[inline]`

Load pgm images as slices of a 3D Milena image.

Parameters

`[out]` ***ima*** A reference to the 3D image which will receive data.

`[in]` ***filenames*** The list of 2D images to load..

Definition at line 69 of file pgms/load.hh.

9.87 mln::io::plot Namespace Reference

Namespace of plot input/output handling.

Functions

- template<typename I >
  void load (util::array< I > &arr, const std::string &filename)
- template<typename T >
  void save (const histo::array< T > &arr, const std::string &filename)
- template<typename T >
  void save (const util::array< T > &arr, const std::string &filename, int start_value=0)

  Save a Milena array in a plot file.
- template<typename I >
  void save (const image1d< I > &ima, const std::string &filename)

  Save a Milena 1D image in a plot file.

9.87.1 Detailed Description

Namespace of plot input/output handling.

9.87.2 Function Documentation

9.87.2.1 template<typename I > void mln::io::plot::load (util::array< I > & *arr*, const std::string & *filename*) `[inline]`

Load a Milena 1D image from a plot file.

Parameters

`[in]` ***ima*** A reference to the image to load.

`[out]` ***filename*** The output file.

`[in]` ***start_value*** The start index value of the plot (optional).

Load a Milena array from a plot file.

Parameters

`[in]` ***arr*** A reference to the array to load.

`[out]` ***filename*** The output file.

Definition at line 93 of file plot/load.hh.

References mln::util::array< T >::append(), and mln::util::array< T >::clear().

9.87.2.2 template<typename T > void mln::io::plot::save (const histo::array< T > & *arr*, const std::string & *filename*) `[inline]`

This is an overloaded member function, provided for convenience. It differs from the above function only in what argument(s) it accepts.

Definition at line 103 of file plot/save.hh.

9.87.2.3 template< typename T > void mln::io::plot::save (const util::array< T > & *arr*, const std::string & *filename*, int *start_value* = 0) [inline]

Save a Milena array in a plot file.

Parameters

[in] ***arr*** A reference to the array to save.

[out] ***filename*** The output file.

[in] ***start_value*** The start index value of the plot (optional).

Definition at line 89 of file plot/save.hh.

References mln::util::array< T >::nelements().

9.87.2.4 template< typename I > void mln::io::plot::save (const image1d< I > & *ima*, const std::string & *filename*)

Save a Milena 1D image in a plot file.

Parameters

[in] ***ima*** A reference to the image to save.

[out] ***filename*** The output file.

9.88 mln::io::pnm Namespace Reference

Namespace of pnm input/output handling.

Namespaces

- namespace impl

  Namespace of pnm's implementation details.

Functions

- template< typename V >
  image2d< V > load (char type_, const std::string &filename)

  main function : load pnm format

- template< typename I >
  void load (char type_, Image< I > &ima_, const std::string &filename)

  An other way to load pnm files : the destination is an argument to check if the type match the file to load.

- template< typename I >
  void load_ascii_builtin (std::ifstream &file, I &ima)

  load_ascii for builtin value types.

- template<typename I >
  void load_ascii_value (std::ifstream &file, I &ima)

  load_ascii for Milena value types.

- template<typename I >
  void load_raw_2d (std::ifstream &file, I &ima)

  load_raw_2d.

- template<typename V >
  unsigned int max_component (const V &)

  Give the maximum value which can be stored as a component value type V.

- template<typename I >
  void save (char type, const Image< I > &ima_, const std::string &filename)

9.88.1 Detailed Description

Namespace of pnm input/output handling.

9.88.2 Function Documentation

9.88.2.1 template<typename V > image2d<V> mln::io::pnm::load (char *type_*, const std::string & *filename*) `[inline]`

main function : load pnm format

Definition at line 210 of file pnm/load.hh.

References load_raw_2d(), and max_component().

9.88.2.2 template<typename I > void mln::io::pnm::load (char *type_*, Image< I > & *ima_*, const std::string & *filename*) `[inline]`

An other way to load pnm files : the destination is an argument to check if the type match the file to load.

Definition at line 257 of file pnm/load.hh.

References mln::make::box2d(), load_raw_2d(), and max_component().

9.88.2.3 template<typename I > void mln::io::pnm::load_ascii_builtin (std::ifstream & *file*, I & *ima*) `[inline]`

load_ascii for builtin value types.

Definition at line 178 of file pnm/load.hh.

9.88.2.4 template<typename I > void mln::io::pnm::load_ascii_value (std::ifstream & *file*, I & *ima*) `[inline]`

load_ascii for Milena value types.

Definition at line 164 of file pnm/load.hh.

9.88.2.5 template<typename I > void mln::io::pnm::load_raw_2d (std::ifstream & *file*, I & *ima*) `[inline]`

load_raw_2d.

for all pnm 8/16 bits formats

Definition at line 198 of file pnm/load.hh.

Referenced by load().

9.88.2.6 template<typename V > unsigned int mln::io::pnm::max_component (const V &) `[inline]`

Give the maximum value which can be stored as a component value type V.

Definition at line 56 of file max_component.hh.

Referenced by load().

9.88.2.7 template<typename I > void mln::io::pnm::save (char *type*, const Image< I > & *ima_*, const std::string & *filename*) `[inline]`

Save a Milena image as a pnm image.

Parameters

`[in]` ***type*** The type of the image to save (can be PPM, PGM, PBM).

`[in]` ***ima_*** The image to save.

`[in,out]` ***filename*** the destination.

Definition at line 185 of file pnm/save.hh.

9.89 mln::io::pnm::impl Namespace Reference

Namespace of pnm's implementation details.

9.89.1 Detailed Description

Namespace of pnm's implementation details.

9.90 mln::io::pnms Namespace Reference

Namespace of pnms input/output handling.

Functions

- template<typename V >
  void load (char type, image3d< V > &ima, const util::array< std::string > &filenames)

Load pnm images as slices of a 3D Milena image.

- void load (char type, image3d< bool > &ima, const util::array< std::string > &filenames)

9.90.1 Detailed Description

Namespace of pnms input/output handling.

9.90.2 Function Documentation

9.90.2.1 template<typename V > void mln::io::pnms::load (char *type*, image3d< V > & *ima*, const util::array< std::string > & *filenames*) `[inline]`

Load pnm images as slices of a 3D Milena image.

Parameters

`[in]` ***type*** The type of the pnm files.

`[out]` ***ima*** A reference to the 3D image which will receive data.

`[in]` ***filenames*** The list of 2D images to load..

Definition at line 79 of file pnms/load.hh.

References mln::make::image3d(), mln::util::array< T >::is_empty(), and mln::util::array< T >::nelements().

Referenced by load().

9.90.2.2 void mln::io::pnms::load (char *type*, image3d< bool > & *ima*, const util::array< std::string > & *filenames*) `[inline]`

This is an overloaded member function, provided for convenience. It differs from the above function only in what argument(s) it accepts.

Definition at line 102 of file pnms/load.hh.

References mln::make::image3d(), mln::util::array< T >::is_empty(), load(), and mln::util::array< T >::nelements().

9.91 mln::io::ppm Namespace Reference

Namespace of ppm input/output handling.

Functions

- template<typename I >
  void load (Image< I > &ima, const std::string &filename)

  Load a ppm image in a Milena image.

- template<typename V >
  image2d< V > load (const std::string &filename)

  Load a ppm image in a Milena image.

- template<typename I >
  void save (const Image< I > &ima, const std::string &filename)

9.91.1 Detailed Description

Namespace of ppm input/output handling.

9.91.2 Function Documentation

9.91.2.1 template<typename I > void mln::io::ppm::load (Image< I > & *ima*, const std::string & *filename*) [inline]

Load a ppm image in a Milena image.

Parameters

[out] ***ima*** A reference to the image which will receive data.

[in] ***filename*** The source.

Definition at line 89 of file ppm/load.hh.

9.91.2.2 template<typename V > image2d< V > mln::io::ppm::load (const std::string & *filename*) [inline]

Load a ppm image in a Milena image.

To use this routine, you should specialize the template whith the value type of the image loaded. (ex : load<value::int_u8>("..."))

Parameters

[in] ***filename*** The image source.

Returns

An image2d which contains loaded data.

Definition at line 79 of file ppm/load.hh.

9.91.2.3 template<typename I > void mln::io::ppm::save (const Image< I > & *ima*, const std::string & *filename*) [inline]

Save a Milena image as a ppm image.

Parameters

[in] ***ima*** The image to save.

[in,out] ***filename*** the destination.

Definition at line 65 of file ppm/save.hh.

Referenced by mln::registration::icp().

9.92 mln::io::ppms Namespace Reference

Namespace of ppms input/output handling.

Functions

- template< typename V >
  void load (image3d< V > &ima, const util::array< std::string > &filenames)

  Load ppm images as slices of a 3D Milena image.

9.92.1 Detailed Description

Namespace of ppms input/output handling.

9.92.2 Function Documentation

9.92.2.1 template< typename V > void mln::io::ppms::load (image3d< V > & *ima*, const util::array< std::string > & *filenames*) [inline]

Load ppm images as slices of a 3D Milena image.

Parameters

[out] ***ima*** A reference to the 3D image which will receive data.

[in] ***filenames*** The list of 2D images to load..

Definition at line 67 of file ppms/load.hh.

9.93 mln::io::raw Namespace Reference

Namespace of raw input/output handling.

Classes

- struct raw_header

  Store raw file header.

Functions

- raw_header get_header (const std::string &filename)

    Retrieve header in a raw file.

- template< typename I >
  void load (Image< I > &ima_, const std::string &filename)

    Load an image saved as a raw data file.

- template< typename I >
  void save (const Image< I > &ima_, const std::string &filename)

    Save a Milena image as a raw data file.

9.93.1 Detailed Description

Namespace of raw input/output handling.

9.93.2 Function Documentation

9.93.2.1 raw_header mln::io::raw::get_header (const std::string & *filename*)

Retrieve header in a raw file.

Definition at line 68 of file raw/get_header.hh.

References mln::util::array< T >::resize().

9.93.2.2 template< typename I > void mln::io::raw::load (Image< I > & *ima_*, const std::string & *filename*)

Load an image saved as a raw data file.

Parameters

`[in,out]` ***ima_*** The image to load.

`[in]` ***filename*** the destination.

This routine try to read two input files: 'filename' and 'filename.info'. 'filename' is the raw data. 'filename.info' store various information about the image.

Definition at line 184 of file raw/load.hh.

9.93.2.3 template< typename I > void mln::io::raw::save (const Image< I > & *ima_*, const std::string & *filename*)

Save a Milena image as a raw data file.

Parameters

`[in]` ***ima_*** The image to save.

`[in]` ***filename*** the destination.

This routine produce two output files: 'filename' and 'filename.info'. 'filename' is the raw data. 'filename.info' store various information about the image.

Definition at line 135 of file raw/save.hh.

9.94 mln::io::tiff Namespace Reference

Namespace of tiff input/output handling.

Functions

- template< typename I >
  void load (Image< I > &ima_, const std::string &filename)

  Load a TIFF image to a Milena image.

9.94.1 Detailed Description

Namespace of tiff input/output handling.

9.94.2 Function Documentation

9.94.2.1 template<typename I > void mln::io::tiff::load (Image< I > & *ima_*, const std::string & *filename*) [inline]

Load a TIFF image to a Milena image.

Definition at line 323 of file tiff/load.hh.

9.95 mln::io::txt Namespace Reference

Namespace of txt input/output handling.

Functions

- void save (const image2d< char > &ima, const std::string &filename)

  Save an image as txt file.

9.95.1 Detailed Description

Namespace of txt input/output handling.

9.95.2 Function Documentation

9.95.2.1 void mln::io::txt::save (const image2d< char > & *ima*, const std::string & *filename*) [inline]

Save an image as txt file.

Parameters

[in] ***ima*** The image to save. Must be an image of char.

[in] ***filename*** the destination.

Definition at line 63 of file txt/save.hh.

References mln::image2d< T >::domain().

9.96 mln::labeling Namespace Reference

Namespace of labeling routines.

Namespaces

- namespace impl

  Implementation namespace of labeling namespace.

Functions

- template<typename I , typename N , typename L >
  mln::trait::ch_value< I, L >::ret background (const Image< I > &input, const Neighborhood< N > &nbh, L &nlabels)
- template<typename I , typename N , typename L >
  mln::trait::ch_value< I, L >::ret blobs (const Image< I > &input, const Neighborhood< N > &nbh, L &nlabels)

  Connected component labeling of the binary objects of a binary image.
- template<typename I , typename N , typename L , typename A >
  util::couple< mln::trait::ch_value< I, L >::ret, util::couple< util::array< typename A::result >, util::array< A > > > blobs_and_compute (const Image< I > &input, const Neighborhood< N > &nbh, L &nlabels, const Accumulator< A > &accu)
- template<typename V , typename L >
  mln::trait::ch_value< L, V >::ret colorize (const V &value, const Image< L > &labeled_image, const typename L::value &nlabels)

  Create a new color image from a labeled image and fill each component with a random color.
- template<typename V , typename L >
  mln::trait::ch_value< L, V >::ret colorize (const V &value, const Image< L > &labeled_image)
- template<typename L >
  mln::trait::ch_value< L, mln::value::rgb8 >::ret colorize (const Image< L > &input, const typename L::value &nlabels)

- template<typename A , typename I , typename L >
util::array< mln_meta_accu_result(A, typename I::value)> compute (const Meta_Accumulator< A > &a, const Image< I > &input, const Image< L > &label, const typename L::value &nlabels)

  Compute an accumulator onto the pixel values of the image `input`.

- template<typename A , typename L >
util::array< typename A::result > compute (const Accumulator< A > &a, const Image< L > &label, const typename L::value &nlabels)

  Compute an accumulator onto the pixel sites of each component domain of `label`.

- template<typename A , typename L >
util::array< mln_meta_accu_result(A, typename L::psite)> compute (const Meta_Accumulator< A > &a, const Image< L > &label, const typename L::value &nlabels)

  Compute an accumulator onto the pixel sites of each component domain of `label`.

- template<typename A , typename I , typename L >
util::array< typename A::result > compute (util::array< A > &a, const Image< I > &input, const Image< L > &label, const typename L::value &nlabels)

  Compute an accumulator onto the pixel values of the image `input`.

- template<typename A , typename I , typename L >
util::array< typename A::result > compute (const Accumulator< A > &a, const Image< I > &input, const Image< L > &label, const typename L::value &nlabels)

  Compute an accumulator onto the pixel values of the image `input`.

- template<typename A , typename I , typename L >
mln::trait::ch_value< L, typename A::result >::ret compute_image (const util::array< typename A::result > &a, const Image< I > &input, const Image< L > &labels, const typename L::value &nlabels)

  Compute an accumulator onto the pixel values of the image `input`.

- template<typename A , typename I , typename L >
mln::trait::ch_value< L, typename A::result >::ret compute_image (const Accumulator< A > &accu, const Image< I > &input, const Image< L > &labels, const typename L::value &nlabels)

  Compute an accumulator onto the pixel values of the image `input`.

- template<typename A , typename I , typename L >
mln::trait::ch_value< L, typename mln::internal::meta_accu_ret_result_helper< A, typename I::value >::result >::ret compute_image (const Meta_Accumulator< A > &accu, const Image< I > &input, const Image< L > &labels, const typename L::value &nlabels)

  Compute an accumulator onto the pixel values of the image `input`.

- template<typename I , typename N , typename L >
mln::trait::concrete< I >::ret fill_holes (const Image< I > &input, const Neighborhood< N > &nbh, L &nlabels)

  Filling holes of a single object in a binary image.

- template<typename I , typename N , typename L >
mln::trait::ch_value< I, L >::ret flat_zones (const Image< I > &input, const Neighborhood< N > &nbh, L &nlabels)

  Connected component labeling of the flat zones of an image.

- template<typename I , typename N , typename L >
mln::trait::ch_value< I, L >::ret foreground (const Image< I > &input, const Neighborhood< N > &nbh, L &nlabels)
- template<typename I >
mln::trait::concrete< I >::ret pack (const Image< I > &label, typename I::value &new_nlabels, fun::i2v::array< typename I::value > &repack_fun)

  Relabel a labeled image in order to have a contiguous labeling.
- template<typename I >
mln::trait::concrete< I >::ret pack (const Image< I > &label, typename I::value &new_nlabels)
- template<typename I >
void pack_inplace (Image< I > &label, typename I::value &new_nlabels)
- template<typename I >
void pack_inplace (Image< I > &label, typename I::value &new_nlabels, fun::i2v::array< typename I::value > &repack_fun)

  Relabel inplace a labeled image in order to have a contiguous labeling.
- template<typename I , typename N , typename L >
mln::trait::ch_value< I, L >::ret regional_maxima (const Image< I > &input, const Neighborhood< N > &nbh, L &nlabels)
- template<typename I , typename N , typename L >
mln::trait::ch_value< I, L >::ret regional_minima (const Image< I > &input, const Neighborhood< N > &nbh, L &nlabels)
- template<typename I , typename F >
mln::trait::concrete< I >::ret relabel (const Image< I > &label, const typename I::value &nlabels, typename I::value &new_nlabels, const Function_v2b< F > &fv2b)

  Remove components and relabel a labeled image.
- template<typename I , typename F >
mln::trait::concrete< I >::ret relabel (const Image< I > &label, const typename I::value &nlabels, const Function_v2v< F > &fv2v)

  Remove components and relabel a labeled image.
- template<typename I , typename F >
void relabel_inplace (Image< I > &label, const typename I::value &nlabels, const Function_v2v< F > &fv2v)

  Remove components and relabel a labeled image inplace.
- template<typename I , typename F >
void relabel_inplace (Image< I > &label, const typename I::value &nlabels, const Function_v2b< F > &fv2b)

  Remove components and relabel a labeled image inplace.
- template<typename I , typename J >
mln::trait::concrete< I >::ret superpose (const Image< I > &lhs, const typename I::value &lhs_nlabels, const Image< J > &rhs, const typename J::value &rhs_nlabels, typename I::value &new_nlabels)

  Superpose two labeled image.

- template<typename I , typename N , typename L >
  mln::trait::ch_value< I, L >::ret value (const Image< I > &input, const typename I::value &val, const Neighborhood< N > &nbh, L &nlabels)

  Connected component labeling of the image sites at a given value.

- template<typename I , typename N , typename L , typename A >
  util::couple< mln::trait::ch_value< I, L >::ret, util::couple< util::array< typename A::result >, util::array< A > > > value_and_compute (const Image< I > &input, const typename I::value &val, const Neighborhood< N > &nbh, L &nlabels, const Accumulator< A > &accu)

  Connected component labeling of the image sites at a given value.

- template<typename V , typename I >
  mln::trait::ch_value< I, V >::ret wrap (const V &value_type, const Image< I > &input)

  Wrap labels such as 0 -> 0 and [1, lmax] maps to [1, Lmax] (using modulus).

- template<typename I >
  mln::trait::ch_value< I, mln::value::label_8 >::ret wrap (const Image< I > &input)

  Wrap labels such as 0 -> 0 and [1, lmax] maps to [1, Lmax] (using modulus).

9.96.1 Detailed Description

Namespace of labeling routines.

9.96.2 Function Documentation

9.96.2.1 template<typename I , typename N , typename L > mln::trait::ch_value< I, L >::ret mln::labeling::background (const Image< I > & *input*, const Neighborhood< N > & *nbh*, L & *nlabels*) `[inline]`

Connected component labeling of the background part in a binary image.

Parameters

`[in]` ***input*** The input image.

`[in]` ***nbh*** The connexity of the background.

`[out]` ***nlabels*** The number of labels.

Returns

The label image.

Precondition

The input image has to be binary (checked at compile-time).

This routine actually calls mln::labeling::value with the value set to `false`.

See also

mln::labeling::value

Definition at line 69 of file background.hh.

References value().

Referenced by fill_holes().

9.96.2.2 template<typename I , typename N , typename L > mln::trait::ch_value< I, L >::ret mln::labeling::blobs (const Image< I > & *input*, const Neighborhood< N > & *nbh*, L & *nlabels*) `[inline]`

Connected component labeling of the binary objects of a binary image.

Parameters

`[in]` ***input*** The input image.

`[in]` ***nbh*** The connexity of the objects.

`[out]` ***nlabels*** The Number of labels. Its value is set in the algorithms.

Returns

The label image.

Precondition

The input image has to be binary (checked at compile-time).

A fast queue is used so that the algorithm is not recursive and can handle large binary objects (blobs).

Definition at line 102 of file labeling/blobs.hh.

Referenced by blobs_and_compute(), and mln::graph::labeling().

9.96.2.3 template<typename I , typename N , typename L , typename A > util::couple< mln::trait::ch_value< I, L >::ret, util::couple< util::array< typename A::result >, util::array< A > > > mln::labeling::blobs_and_compute (const Image< I > & *input*, const Neighborhood< N > & *nbh*, L & *nlabels*, const Accumulator< A > & *accu*)

Label an image and compute given accumulators.

Parameters

`[in]` ***input*** A binary image.

`[in]` ***nbh*** A neighborhood used for labeling.

`[in,out]` ***nlabels*** The number of labels found.

`[in]` ***accu*** An accumulator to be computed while labeling.

Returns

The labeled image, computed attributes for each regions and an array of the accumulators used to compute the attributes.

Definition at line 160 of file blobs_and_compute.hh.

References blobs(), and mln::make::couple().

9.96.2.4 template<typename V , typename L > mln::trait::ch_value< L, V >::ret mln::labeling::colorize (const V & *value,* const Image< L > & *labeled_image,* const typename L::value & *nlabels*) [inline]

Create a new color image from a labeled image and fill each component with a random color.

litera::black is used for component 0, e.g. the background. Min and max values for RGB values can be set through the global variables mln::labeling::colorize_::min_value and mln::labeling::colorize_::max_value.

Parameters

[in] ***value*** value type used in the returned image.

[in] ***labeled_image*** A labeled image (

See also

labeling::blobs).

Parameters

[in] ***nlabels*** Number of labels.

Definition at line 190 of file colorize.hh.

References mln::literal::black, and mln::data::transform().

Referenced by colorize().

9.96.2.5 template<typename V , typename L > mln::trait::ch_value< L, V >::ret mln::labeling::colorize (const V & *value,* const Image< L > & *labeled_image*) [inline]

This is an overloaded member function, provided for convenience. It differs from the above function only in what argument(s) it accepts.

Definition at line 228 of file colorize.hh.

References colorize(), and compute().

9.96.2.6 template<typename L > mln::trait::ch_value< L, mln::value::rgb8 >::ret mln::labeling::colorize (const Image< L > & *input,* const typename L::value & *nlabels*) [inline]

This is an overloaded member function, provided for convenience. It differs from the above function only in what argument(s) it accepts.

Definition at line 247 of file colorize.hh.

References colorize().

9.96.2.7 template<typename A , typename I , typename L > util::array< mln_meta_accu_result(A, typename I::value)> mln::labeling::compute (const Meta_Accumulator< A > & *a,* const Image< I > & *input,* const Image< L > & *label,* const typename L::value & *nlabels*) [inline]

Compute an accumulator onto the pixel values of the image `input`.

for each component of the image `label`.

Parameters

[in] ***a*** A meta-accumulator.

[in] ***input*** The input image.

[in] ***label*** The labeled image.

[in] ***nlabels*** The number of labels in `label`.

Returns

A util::array of accumulator result (one result per label).

Definition at line 734 of file labeling/compute.hh.

References compute().

9.96.2.8 template<typename A , typename L > util::array< typename A::result > mln::labeling::compute (const Accumulator< A > & *a*, const Image< L > & *label*, const typename L::value & *nlabels*) `[inline]`

Compute an accumulator onto the pixel sites of each component domain of `label`.

Parameters

[in] ***a*** An accumulator.

[in] ***label*** The labeled image.

[in] ***nlabels*** The number of labels in `label`.

Returns

A util::array of accumulator result (one result per label).

Definition at line 771 of file labeling/compute.hh.

9.96.2.9 template<typename A , typename L > util::array< mln_meta_accu_result(A, typename L::psite)> mln::labeling::compute (const Meta_Accumulator< A > & *a*, const Image< L > & *label*, const typename L::value & *nlabels*) `[inline]`

Compute an accumulator onto the pixel sites of each component domain of `label`.

Parameters

[in] ***a*** A meta-accumulator.

[in] ***label*** The labeled image.

[in] ***nlabels*** The number of labels in `label`.

Returns

A util::array of accumulator result (one result per label).

Definition at line 792 of file labeling/compute.hh.

References compute().

9.96.2.10 template<typename A , typename I , typename L > util::array< typename A::result > mln::labeling::compute (util::array< A > & *a*, const Image< I > & *input*, const Image< L > & *label*, const typename L::value & *nlabels*) `[inline]`

Compute an accumulator onto the pixel values of the image `input`.

for each component of the image `label`.

Parameters

`[in]` ***a*** An array of accumulator.

`[in]` ***input*** The input image.

`[in]` ***label*** The labeled image.

`[in]` ***nlabels*** The number of labels in `label`.

Returns

A util::array of accumulator result (one result per label).

Definition at line 696 of file labeling/compute.hh.

9.96.2.11 template<typename A , typename I , typename L > util::array< typename A::result > mln::labeling::compute (const Accumulator< A > & *a*, const Image< I > & *input*, const Image< L > & *label*, const typename L::value & *nlabels*) `[inline]`

Compute an accumulator onto the pixel values of the image `input`.

for each component of the image `label`.

Parameters

`[in]` ***a*** An accumulator.

`[in]` ***input*** The input image.

`[in]` ***label*** The labeled image.

`[in]` ***nlabels*** The number of labels in `label`.

Returns

A util::array of accumulator result (one result per label).

Definition at line 715 of file labeling/compute.hh.

Referenced by colorize(), compute(), compute_image(), fill_holes(), mln::make::p_edges_with_mass_-centers(), mln::make::p_vertices_with_mass_centers(), pack(), and pack_inplace().

9.96.2.12 template<typename A , typename I , typename L > mln::trait::ch_value< L , typename A ::result >::ret mln::labeling::compute_image (const util::array< typename A::result > & *a*, const Image< I > & *input*, const Image< L > & *labels*, const typename L::value & *nlabels*)

Compute an accumulator onto the pixel values of the image `input`.

for each component of the image `label`.

Parameters

[in] ***a*** The mln::p_array of accumulator result.

[in] ***input*** The input image (values).

[in] ***labels*** The label image.

[in] ***nlabels*** The count of labels.

Returns

The image where labels are replaced by the result of the accumulator.

Referenced by compute_image().

9.96.2.13 template< typename A , typename I , typename L > mln::trait::ch_value< L, typename A::result >::ret mln::labeling::compute_image (const Accumulator< A > & *accu*, const Image< I > & *input*, const Image< L > & *labels*, const typename L::value & *nlabels*) `[inline]`

Compute an accumulator onto the pixel values of the image `input`.

for each component of the image `label`.

Parameters

[in] ***accu*** The accumulator.

[in] ***input*** The input image (values).

[in] ***labels*** The label image.

[in] ***nlabels*** The count of labels.

Returns

The image where labels are replaced by the result of the accumulator.

Definition at line 161 of file compute_image.hh.

References compute(), and compute_image().

9.96.2.14 template< typename A , typename I , typename L > mln::trait::ch_value< L, typename mln::internal::meta_accu_ret_result_helper< A, typename I::value >::result >::ret mln::labeling::compute_image (const Meta_Accumulator< A > & *accu*, const Image< I > & *input*, const Image< L > & *labels*, const typename L::value & *nlabels*) `[inline]`

Compute an accumulator onto the pixel values of the image `input`.

for each component of the image `label`.

Parameters

[in] ***accu*** The meta-accumulator.

[in] ***input*** The input image (values).

[in] ***labels*** The label image.

[in] ***nlabels*** The count of labels.

Returns

The image where labels are replaced by the result of the accumulator.

Definition at line 181 of file compute_image.hh.

References compute(), and compute_image().

9.96.2.15 template< typename I , typename N , typename L > mln::trait::concrete< I >::ret mln::labeling::fill_holes (const Image< I > & *input*, const Neighborhood< N > & *nbh*, L & *nlabels*) `[inline]`

Filling holes of a single object in a binary image.

Parameters

`[in]` ***input*** The input image.

`[in]` ***nbh*** The connexity of the background.

`[out]` ***nlabels*** The number of labels.

Returns

The binary image with a simple object without holes.

Precondition

The input image has to be binary (checked at compile-time).

This routine actually calls mln::labeling::background

See also

mln::labeling::background

Definition at line 73 of file fill_holes.hh.

References background(), compute(), mln::util::array< T >::nelements(), and mln::data::transform().

9.96.2.16 template< typename I , typename N , typename L > mln::trait::ch_value< I, L >::ret mln::labeling::flat_zones (const Image< I > & *input*, const Neighborhood< N > & *nbh*, L & *nlabels*)

Connected component labeling of the flat zones of an image.

Parameters

`[in]` ***input*** The input image.

`[in]` ***nbh*** The connexity of the flat zones.

`[out]` ***nlabels*** The number of labels.

Returns

The label image.

Definition at line 124 of file flat_zones.hh.

9.96.2.17 template<typename I , typename N , typename L > mln::trait::ch_value< I, L >::ret mln::labeling::foreground (const Image< I > & *input*, const Neighborhood< N > & *nbh*, L & *nlabels*) [inline]

Connected component labeling of the object part in a binary image.

Parameters

[in] ***input*** The input image.

[in] ***nbh*** The connexity of the foreground.

[out] ***nlabels*** The number of labels.

Returns

The label image.

Precondition

The input image has to be binary (checked at compile-time).

This routine actually calls mln::labeling::value with the value set to `true`.

See also

mln::labeling::value

Definition at line 69 of file foreground.hh.

References value().

9.96.2.18 template<typename I > mln::trait::concrete< I >::ret mln::labeling::pack (const Image< I > & *label*, typename I::value & *new_nlabels*, fun::i2v::array< typename I::value > & *repack_fun*)

Relabel a labeled image in order to have a contiguous labeling.

Parameters

[in] ***label*** The labeled image.

[out] ***new_nlabels*** The number of labels after relabeling.

[out] ***repack_fun*** The function used to repack the labels.

Returns

The relabeled image.

Definition at line 124 of file pack.hh.

References compute(), mln::make::relabelfun(), and mln::data::transform().

Referenced by pack().

9.96.2.19 template<typename I > mln::trait::concrete< I >::ret mln::labeling::pack (const Image< I > & *label*, typename I::value & *new_nlabels*)

This is an overloaded member function, provided for convenience. It differs from the above function only in what argument(s) it accepts.

Definition at line 115 of file pack.hh.

References pack().

9.96.2.20 template<typename I > void mln::labeling::pack_inplace (Image< I > & *label*, typename I::value & *new_nlabels*)

This is an overloaded member function, provided for convenience. It differs from the above function only in what argument(s) it accepts.

Definition at line 148 of file pack.hh.

References pack_inplace().

9.96.2.21 template<typename I > void mln::labeling::pack_inplace (Image< I > & *label*, typename I::value & *new_nlabels*, fun::i2v::array< typename I::value > & *repack_fun*)

Relabel inplace a labeled image in order to have a contiguous labeling.

Parameters

`[in]` ***label*** The labeled image.

`[out]` ***new_nlabels*** The number of labels after relabeling.

`[out]` ***repack_fun*** The function used to repack the labels.

Definition at line 157 of file pack.hh.

References compute(), mln::make::relabelfun(), and mln::data::transform().

Referenced by pack_inplace().

9.96.2.22 template<typename I , typename N , typename L > mln::trait::ch_value< I, L >::ret mln::labeling::regional_maxima (const Image< I > & *input*, const Neighborhood< N > & *nbh*, L & *nlabels*)

Connected component labeling of the regional maxima of an image.

Parameters

`[in]` ***input*** The input image.

`[in]` ***nbh*** The connexity of the regional maxima.

`[out]` ***nlabels*** The number of labeled regions.

Returns

The label image.

Definition at line 130 of file regional_maxima.hh.

9.96.2.23 template<typename I , typename N , typename L > mln::trait::ch_value< I, L >::ret mln::labeling::regional_minima (const Image< I > & *input*, const Neighborhood< N > & *nbh*, L & *nlabels*)

Connected component labeling of the regional minima of an image.

Parameters

`[in]` ***input*** The input image.

`[in]` ***nbh*** The connexity of the regional minima.

`[out]` ***nlabels*** The number of labeled regions.

Returns

The label image.

Definition at line 140 of file regional_minima.hh.

Referenced by mln::morpho::meyer_wst().

9.96.2.24 template<typename I , typename F > mln::trait::concrete< I >::ret mln::labeling::relabel (const Image< I > & *label*, const typename I::value & *nlabels*, typename I::value & *new_nlabels*, const Function_v2b< F > & *fv2b*) `[inline]`

Remove components and relabel a labeled image.

Parameters

`[in]` ***label*** the labeled image.

`[in]` ***nlabels*** the number of labels in `label`.

`[out]` ***new_nlabels*** the number of labels after relabeling.

`[in]` ***fv2b*** function returning whether a label must be replaced by the background.

Returns

the relabeled image.

Definition at line 200 of file relabel.hh.

References mln::make::relabelfun().

Referenced by superpose().

9.96.2.25 template<typename I , typename F > mln::trait::concrete< I >::ret mln::labeling::relabel (const Image< I > & *label*, const typename I::value & *nlabels*, const Function_v2v< F > & *fv2v*) `[inline]`

Remove components and relabel a labeled image.

Parameters

`[in]` ***label*** the labeled image.

`[in]` ***nlabels*** the number of labels in `label`.

[in] ***fv2v*** function returning the new component id for each pixel value.

Returns

the relabeled image.

Definition at line 179 of file relabel.hh.

References mln::data::transform().

9.96.2.26 template<typename I , typename F > void mln::labeling::relabel_inplace (Image< I > & *label*, const typename I::value & *nlabels*, const Function_v2v< F > & *fv2v*) [inline]

Remove components and relabel a labeled image inplace.

Parameters

[in,out] ***label*** the labeled image.

[in] ***nlabels*** the number of labels in `label`.

[in] ***fv2v*** function returning the new component id for each pixel value.

Definition at line 221 of file relabel.hh.

References mln::data::transform_inplace().

9.96.2.27 template<typename I , typename F > void mln::labeling::relabel_inplace (Image< I > & *label*, const typename I::value & *nlabels*, const Function_v2b< F > & *fv2b*) [inline]

Remove components and relabel a labeled image inplace.

Parameters

[in,out] ***label*** the labeled image.

[in] ***nlabels*** the number of labels in `label`.

[in] ***fv2b*** function returning whether a label must be replaced by the background.

Definition at line 240 of file relabel.hh.

References mln::make::relabelfun().

Referenced by mln::labeled_image_base< I, E >::relabel().

9.96.2.28 template<typename I , typename J > mln::trait::concrete< I >::ret mln::labeling::superpose (const Image< I > & *lhs*, const typename I::value & *lhs_nlabels*, const Image< J > & *rhs*, const typename J::value & *rhs_nlabels*, typename I::value & *new_nlabels*)

Superpose two labeled image.

Labels in `lhs` are preserved in the output. Labels of `rhs` are renumbered from the last label value of `lhs`. It avoids duplicate label values in several components.

Parameters

[in] ***lhs*** A labeled image.

[in] ***lhs_nlabels*** The number of labels in lhs.

[in] ***rhs*** A labeled image.

[in] ***rhs_nlabels*** The number of labels in rhs.

[out] ***new_nlabels*** The number of labels in the output image.

Returns

An image with all the components of rhs and lhs.

Precondition

rhs and lhs must have the same domain.
The value type of rhs must be convertible towards lhs's.

Definition at line 83 of file labeling/superpose.hh.

References mln::duplicate(), mln::value::equiv(), mln::data::paste(), relabel(), and mln::literal::zero.

9.96.2.29 template<typename I , typename N , typename L > mln::trait::ch_value< I, L >::ret mln::labeling::value (const Image< I > & *input*, const typename I::value & *val*, const Neighborhood< N > & *nbh*, L & *nlabels*)

Connected component labeling of the image sites at a given value.

Parameters

[in] ***input*** The input image.

[in] ***val*** The value to consider.

[in] ***nbh*** The connectivity of components.

[out] ***nlabels*** The number of labels.

Returns

The label image.

Definition at line 149 of file labeling/value.hh.

Referenced by background(), and foreground().

9.96.2.30 template<typename I , typename N , typename L , typename A > util::couple< mln::trait::ch_value< I, L >::ret, util::couple< util::array< typename A::result >, util::array< A > > > mln::labeling::value_and_compute (const Image< I > & *input*, const typename I::value & *val*, const Neighborhood< N > & *nbh*, L & *nlabels*, const Accumulator< A > & *accu*)

Connected component labeling of the image sites at a given value.

Parameters

[in] ***input*** The input image.

[in] ***val*** The value to consider.

[in] ***nbh*** The connectivity of components.

[out] ***nlabels*** The number of labels.

Returns

The label image.

Definition at line 212 of file value_and_compute.hh.

References mln::make::couple().

9.96.2.31 template< typename V , typename I > mln::trait::ch_value< I, V >::ret mln::labeling::wrap (const V & *value_type,* const Image< I > & *input*) [inline]

Wrap labels such as 0 -> 0 and [1, lmax] maps to [1, Lmax] (using modulus).

Parameters

[in] ***value_type*** The type used to wrap the label type.

[in] ***input*** The label image.

Returns

A new image with values wrapped with type V.

Definition at line 75 of file labeling/wrap.hh.

References mln::data::transform().

Referenced by wrap().

9.96.2.32 template< typename I > mln::trait::ch_value< I, mln::value::label_8 >::ret mln::labeling::wrap (const Image< I > & *input*) [inline]

Wrap labels such as 0 -> 0 and [1, lmax] maps to [1, Lmax] (using modulus).

Use label_8 as label type.

Parameters

[in] ***input*** The label image.

Returns

A new image with values wrapped with type label_8.

Definition at line 93 of file labeling/wrap.hh.

References wrap().

9.97 mln::labeling::impl Namespace Reference

Implementation namespace of labeling namespace.

Namespaces

- namespace generic

  Generic implementation namespace of labeling namespace.

Functions

- template<typename A , typename I , typename L >
  util::array< typename A::result > compute_fastest (const Accumulator< A > &a_, const Image< I > &input_, const Image< L > &label_, const typename L::value &nlabels)

  Fastest implementation of labeling::compute.

- template<typename A , typename I , typename L >
  util::array< typename A::result > compute_fastest (util::array< A > &accus, const Image< I > &input_, const Image< L > &label_, const typename L::value &nlabels)

  Fastest implementation of labeling::compute.

9.97.1 Detailed Description

Implementation namespace of labeling namespace.

9.97.2 Function Documentation

9.97.2.1 template<typename A , typename I , typename L > util::array<typename A ::result> mln::labeling::impl::compute_fastest (const Accumulator< A > & *a_*, const Image< I > & *input_*, const Image< L > & *label_*, const typename L::value & *nlabels*) `[inline]`

Fastest implementation of labeling::compute.

Parameters

`[in]` ***a_*** An accumulator.

`[in]` ***input_*** The input image.

`[in]` ***label_*** The labeled image.

`[in]` ***nlabels*** The number of labels in `label`.

Returns

A util::array of accumulator result (one result per label).

Definition at line 373 of file labeling/compute.hh.

References mln::geom::ncols().

9.97.2.2 template< typename A , typename I , typename L > util::array< typename A ::result> mln::labeling::impl::compute_fastest (util::array< A > & *accus*, const Image< I > & *input_*, const Image< L > & *label_*, const typename L::value & *nlabels*) [inline]

Fastest implementation of labeling::compute.

Parameters

[in] ***accus*** An array of accumulators.

[in] ***input_*** The input image.

[in] ***label_*** The labeled image.

[in] ***nlabels*** The number of labels in `label`.

Returns

A util::array of accumulator result (one result per label).

Definition at line 427 of file labeling/compute.hh.

References mln::geom::ncols(), mln::util::array< T >::resize(), and mln::util::array< T >::size().

9.98 mln::labeling::impl::generic Namespace Reference

Generic implementation namespace of labeling namespace.

Functions

- template<typename A , typename L >
  util::array< typename A::result > compute (const Accumulator< A > &a_, const Image< L > &label_, const typename L::value &nlabels)

  Generic implementation of labeling::compute.

- template<typename A , typename L >
  util::array< typename A::result > compute (util::array< A > &accus, const Image< L > &label_, const typename L::value &nlabels)

  Generic implementation of labeling::compute.

- template<typename A , typename I , typename L >
  util::array< typename A::result > compute (util::array< A > &accus, const Image< I > &input_, const Image< L > &label_, const typename L::value &nlabels)

  Generic implementation of labeling::compute.

- template<typename A , typename I , typename L >
  util::array< typename A::result > compute (const Accumulator< A > &a_, const Image< I > &input_, const Image< L > &label_, const typename L::value &nlabels)

  Generic implementation of labeling::compute.

9.98.1 Detailed Description

Generic implementation namespace of labeling namespace.

9.98.2 Function Documentation

9.98.2.1 template<typename A , typename L > util::array<typename A ::result> mln::labeling::impl::generic::compute (const Accumulator< A > & *a_*, const Image< L > & *label_*, const typename L::value & *nlabels*) `[inline]`

Generic implementation of labeling::compute.

Parameters

`[in]` ***a_*** An accumulator.

`[in]` ***label_*** The labeled image.

`[in]` ***nlabels*** The number of labels in `label`.

Returns

A util::array of accumulator result (one result per label).

Definition at line 204 of file labeling/compute.hh.

9.98.2.2 template<typename A , typename L > util::array<typename A ::result> mln::labeling::impl::generic::compute (util::array< A > & *accus*, const Image< L > & *label_*, const typename L::value & *nlabels*) `[inline]`

Generic implementation of labeling::compute.

Parameters

`[in]` ***accus_*** An array of accumulators. If the size is set to nlabels + 1, the accumulators are considered as initialized. Otherwise, the size is adjusted.

`[in]` ***label_*** The labeled image.

`[in]` ***nlabels*** The number of labels in `label`.

Returns

A util::array of accumulator result (one result per label).

Definition at line 241 of file labeling/compute.hh.

References mln::util::array< T >::resize(), and mln::util::array< T >::size().

9.98.2.3 template<typename A , typename I , typename L > util::array<typename A ::result> mln::labeling::impl::generic::compute (util::array< A > & *accus*, const Image< I > & *input_*, const Image< L > & *label_*, const typename L::value & *nlabels*) `[inline]`

Generic implementation of labeling::compute.

Parameters

`[in]` ***accus*** An array of accumulators.

`[in]` ***input_*** The input image.

`[in]` ***label_*** The labeled image.

`[in]` ***nlabels*** The number of labels in `label`.

Returns

A util::array of accumulator result (one result per label).

Definition at line 321 of file labeling/compute.hh.

References mln::util::array< T >::resize(), and mln::util::array< T >::size().

9.98.2.4 template<typename A , typename I , typename L > util::array<typename A ::result> mln::labeling::impl::generic::compute (const Accumulator< A > & *a_*, const Image< I > & *input_*, const Image< L > & *label_*, const typename L::value & *nlabels*) `[inline]`

Generic implementation of labeling::compute.

Parameters

`[in]` ***a_*** An accumulator.

`[in]` ***input_*** The input image.

`[in]` ***label_*** The labeled image.

`[in]` ***nlabels*** The number of labels in `label`.

Returns

A util::array of accumulator result (one result per label).

Definition at line 283 of file labeling/compute.hh.

9.99 mln::linear Namespace Reference

Namespace of linear image processing routines.

Namespaces

- namespace impl

  Namespace of linear image processing routines implementation details.

- namespace local

  Specializations of local linear routines.

Functions

- template<typename I >
  mln::trait::concrete< I >::ret gaussian (const Image< I > &input, float sigma)

  Gaussian filter of an image `input`*.*

- template<typename I >
  mln::trait::concrete< I >::ret gaussian (const Image< I > &input, float sigma, int dir)
- template<typename I >
  mln::trait::concrete< I >::ret gaussian_1st_derivative (const Image< I > &input, float sigma)
- template<typename I >
  mln::trait::concrete< I >::ret gaussian_1st_derivative (const Image< I > &input, float sigma, int dir)
- template<typename I >
  mln::trait::concrete< I >::ret gaussian_2nd_derivative (const Image< I > &input, float sigma, int dir)
- template<typename I , typename W , unsigned Sh, unsigned Sv>
  mln_ch_convolve (I, W) convolve_2x1d(const Image< I > &input
- template<typename I , typename W >
  mln_ch_convolve (I, W) convolve(const Image< I > &input
- template<typename I , typename W , unsigned S>
  mln_ch_convolve (I, W) convolve_directional(const Image< I > &input
- template<typename I >
  mln_ch_convolve_grad (I, int) sobel_2d(const Image< I > &input)

  Compute the vertical component of the 2D Sobel gradient.

  - template<typename I >
    mln_ch_convolve (I, int) sobel_2d_h(const Image< I > &input)

    Sobel_2d gradient components.

9.99.1 Detailed Description

Namespace of linear image processing routines.

9.99.2 Function Documentation

9.99.2.1 template< typename I > mln::trait::concrete< I >::ret mln::linear::gaussian (const Image< I > & *input*, float *sigma*) [inline]

Gaussian filter of an image `input`.

Precondition

output.domain = input.domain

Apply an approximated gaussian filter of `sigma` on `input`. This filter is applied in all the input image direction.

Precondition

input.is_valid

Definition at line 750 of file gaussian.hh.

References mln::initialize().

Referenced by mln::subsampling::gaussian_subsampling().

9.99.2.2 template< typename I > mln::trait::concrete< I >::ret mln::linear::gaussian (const Image< I > & *input*, float *sigma*, int *dir*) `[inline]`

Apply an approximated gaussian filter of `sigma` on `input`. on a specific direction `dir` if `dir` = 0, the filter is applied on the first image dimension. if `dir` = 1, the filter is applied on the second image dimension. And so on...

Precondition

input.is_valid
dir < dimension(input)

Definition at line 653 of file gaussian.hh.

References mln::initialize().

9.99.2.3 template< typename I > mln::trait::concrete< I >::ret mln::linear::gaussian_1st_derivative (const Image< I > & *input*, float *sigma*) `[inline]`

Apply an approximated first derivative gaussian filter of `sigma` on `input` This filter is applied in all the input image direction.

Precondition

input.is_valid

Definition at line 779 of file gaussian.hh.

References mln::initialize().

9.99.2.4 template< typename I > mln::trait::concrete< I >::ret mln::linear::gaussian_1st_derivative (const Image< I > & *input*, float *sigma*, int *dir*) `[inline]`

Apply an approximated first derivative gaussian filter of `sigma` on `input`. on a specific direction `dir` if `dir` = 0, the filter is applied on the first image dimension. if `dir` = 1, the filter is applied on the second image dimension. And so on...

Precondition

input.is_valid
dir < dimension(input)

Definition at line 685 of file gaussian.hh.

References mln::initialize().

9.99.2.5 template< typename I > mln::trait::concrete< I >::ret mln::linear::gaussian_2nd_derivative (const Image< I > & *input*, float *sigma*, int *dir*) `[inline]`

Apply an approximated second derivative gaussian filter of `sigma` on `input`. on a specific direction `dir` if `dir` = 0, the filter is applied on the first image dimension. if `dir` = 1, the filter is applied on the second image dimension. And so on...

Precondition

input.is_valid
dir < dimension(input)

Definition at line 718 of file gaussian.hh.

References mln::initialize().

9.99.2.6 template<typename I > mln::linear::mln_ch_convolve (I, int) const [inline]

Sobel_2d gradient components.

Compute the L1 norm of the 2D Sobel gradient.

Compute the vertical component of the 2D Sobel gradient.

Compute the horizontal component of the 2D Sobel gradient.

Definition at line 142 of file sobel_2d.hh.

References mln_ch_convolve(), mln_ch_convolve_grad(), and mln::data::transform().

9.99.2.7 template<typename I , typename W , unsigned Sh, unsigned Sv> mln::linear::mln_ch_convolve (I, W) const

Convolution of an image `input` by two weighted line-shapes windows.

Warning

The weighted window is used as-is, considering that its symmetrization is handled by the client.

Precondition

input.is_valid

9.99.2.8 template<typename I , typename W > mln::linear::mln_ch_convolve (I, W) const

Convolution of an image `input` by the weighted window `w_win`.

Warning

Computation of `output(p)` is performed with the value type of `output`.
The weighted window is used as-is, considering that its symmetrization is handled by the client.

Precondition

input.is_valid

Referenced by mln_ch_convolve(), and mln_ch_convolve_grad().

9.99.2.9 template<typename I , typename W , unsigned S> mln::linear::mln_ch_convolve (I, W) const [inline]

Convolution of an image `input` by a line-shaped (directional) weighted window defined by the array of `weights`.

Warning

Computation of `output(p)` is performed with the value type of `output`.
The weighted window is used as-is, considering that its symmetrization is handled by the client.

Precondition

input.is_valid

9.99.2.10 template<typename I > mln::linear::mln_ch_convolve_grad (I , int) const

Compute the vertical component of the 2D Sobel gradient.

Definition at line 124 of file sobel_2d.hh.

References mln_ch_convolve(), and mln::data::transform().

Referenced by mln_ch_convolve().

9.100 mln::linear::impl Namespace Reference

Namespace of linear image processing routines implementation details.

9.100.1 Detailed Description

Namespace of linear image processing routines implementation details.

9.101 mln::linear::local Namespace Reference

Specializations of local linear routines.

Namespaces

- namespace impl
  Namespace of local linear routines implementation details.

Functions

- template<typename I , typename P , typename W , typename R >
  void convolve (const Image< I > &input, const Site< P > &p, const Weighted_Window< W > &w_win, R &result)
- template<typename P , typename W , typename R >
  void convolve (const Generalized_Pixel< P > &p, const Weighted_Window< W > &w_win, R &result)

9.101.1 Detailed Description

Specializations of local linear routines.

9.101.2 Function Documentation

9.101.2.1 template<typename I , typename P , typename W , typename R > void mln::linear::local::convolve (const Image< I > & *input*, const Site< P > & *p*, const Weighted_Window< W > & *w_win*, R & *result*) `[inline]`

Local convolution of image `input` at point `p` by the weighted window `w_win`.

Warning

Computation of the `result` is performed with the type `R`.
The weighted window is used as-is, considering that its symmetrization is handled by the client.

Definition at line 149 of file linear/local/convolve.hh.

Referenced by convolve().

9.101.2.2 template<typename P , typename W , typename R > void mln::linear::local::convolve (const Generalized_Pixel< P > & *p*, const Weighted_Window< W > & *w_win*, R & *result*) `[inline]`

Local convolution around (generalized) pixel `by` the weighted window `w_win`.

Warning

Computation of the `result` is performed with the type `R`.
The weighted window is used as-is, considering that its symmetrization is handled by the client.

Definition at line 161 of file linear/local/convolve.hh.

References convolve().

9.102 mln::linear::local::impl Namespace Reference

Namespace of local linear routines implementation details.

9.102.1 Detailed Description

Namespace of local linear routines implementation details.

9.103 mln::literal Namespace Reference

Namespace of literals.

Classes

- struct black_t

  Type of literal black.

- struct blue_t

  Type of literal blue.

- struct brown_t

  Type of literal brown.

- struct cyan_t

  Type of literal cyan.

- struct green_t

  Type of literal green.

- struct identity_t

  Type of literal identity.

- struct light_gray_t

  Type of literal grays.

- struct lime_t

  Type of literal lime.

- struct magenta_t

  Type of literal magenta.

- struct max_t

  Type of literal max.

- struct min_t

  Type of literal min.

- struct olive_t

  Type of literal olive.

- struct one_t

  Type of literal one.

- struct orange_t

  Type of literal orange.

- struct origin_t

  Type of literal origin.

- struct pink_t

  Type of literal pink.

- struct purple_t

  Type of literal purple.

- struct red_t

  Type of literal red.

- struct teal_t

  Type of literal teal.

- struct violet_t

  Type of literal violet.

- struct white_t

  Type of literal white.

- struct yellow_t

  Type of literal yellow.

- struct zero_t

  Type of literal zero.

Variables

- const black_t & black = black_t()

  Literal black.

- const blue_t & blue = blue_t()

  Literal blue.

- const brown_t & brown = brown_t()

  Literal brown.

- const cyan_t & cyan = cyan_t()

  Literal cyan.

- const dark_gray_t & dark_gray = dark_gray_t()

  Literal dark gray.

- const green_t & green = green_t()

  Literal green.

- const identity_t & identity = identity_t()

  Literal identity.

- const light_gray_t & light_gray = light_gray_t()

  Literal light gray.

- const lime_t & lime = lime_t()

  Literal lime.

- const magenta_t & magenta = magenta_t()

  Literal magenta.

- const max_t & max = max_t()
  Literal max.
- const medium_gray_t & medium_gray = medium_gray_t()
  Literal medium_gray.
- const min_t & min = min_t()
  Literal min.
- const olive_t & olive = olive_t()
  Literal olive.
- const one_t & one = one_t()
  Literal one.
- const orange_t & orange = orange_t()
  Literal orange.
- const origin_t & origin = origin_t()
  Literal origin.
- const pink_t & pink = pink_t()
  Literal pink.
- const purple_t & purple = purple_t()
  Literal purple.
- const red_t & red = red_t()
  Literal red.
- const teal_t & teal = teal_t()
  Literal teal.
- const violet_t & violet = violet_t()
  Literal violet.
- const white_t & white = white_t()
  Literal white.
- const yellow_t & yellow = yellow_t()
  Literal yellow.
- const zero_t & zero = zero_t()
  Literal zero.

9.103.1 Detailed Description

Namespace of literals.

9.103.2 Variable Documentation

9.103.2.1 const black_t & mln::literal::black = black_t()

Literal black.

Definition at line 60 of file black.hh.

Referenced by mln::labeling::colorize(), and mln::registration::icp().

9.103.2.2 const blue_t & mln::literal::blue = blue_t()

Literal blue.

Definition at line 162 of file colors.hh.

9.103.2.3 const brown_t & mln::literal::brown = brown_t()

Literal brown.

Definition at line 164 of file colors.hh.

9.103.2.4 const cyan_t & mln::literal::cyan = cyan_t()

Literal cyan.

Definition at line 178 of file colors.hh.

9.103.2.5 const dark_gray_t & mln::literal::dark_gray = dark_gray_t()

Literal dark gray.

Definition at line 70 of file grays.hh.

9.103.2.6 const green_t & mln::literal::green = green_t()

Literal green.

Definition at line 160 of file colors.hh.

Referenced by mln::registration::icp(), and mln::make_debug_graph_image().

9.103.2.7 const identity_t & mln::literal::identity = identity_t()

Literal identity.

Definition at line 54 of file identity.hh.

9.103.2.8 const light_gray_t & mln::literal::light_gray = light_gray_t()

Literal light gray.

Definition at line 66 of file grays.hh.

9.103.2.9 const lime_t & mln::literal::lime = lime_t()

Literal lime.

Definition at line 166 of file colors.hh.

9.103.2.10 const magenta_t & mln::literal::magenta = magenta_t()

Literal magenta.

Definition at line 180 of file colors.hh.

9.103.2.11 const max_t & mln::literal::max = max_t()

Literal max.

Definition at line 66 of file literal/max.hh.

9.103.2.12 const medium_gray_t & mln::literal::medium_gray = medium_gray_t()

Literal medium_gray.

Definition at line 68 of file grays.hh.

9.103.2.13 const min_t & mln::literal::min = min_t()

Literal min.

Definition at line 66 of file literal/min.hh.

9.103.2.14 const olive_t & mln::literal::olive = olive_t()

Literal olive.

Definition at line 184 of file colors.hh.

9.103.2.15 const one_t & mln::literal::one = one_t()

Literal one.

Definition at line 69 of file one.hh.

Referenced by mln::algebra::h_vec< d, C >::h_vec(), mln::operator++(), and mln::operator--().

9.103.2.16 const orange_t & mln::literal::orange = orange_t()

Literal orange.

Definition at line 168 of file colors.hh.

9.103.2.17 const origin_t & mln::literal::origin = origin_t()

Literal origin.

Definition at line 55 of file origin.hh.

Referenced by mln::win::ball< G, C >::ball(), mln::geom::bbox(), mln::box< P >::box(), mln::geom::rotate(), and mln::make::w_window().

9.103.2.18 const pink_t & mln::literal::pink = pink_t()

Literal pink.

Definition at line 170 of file colors.hh.

9.103.2.19 const purple_t & mln::literal::purple = purple_t()

Literal purple.

Definition at line 172 of file colors.hh.

9.103.2.20 const red_t & mln::literal::red = red_t()

Literal red.

Definition at line 158 of file colors.hh.

Referenced by mln::morpho::watershed::superpose(), and mln::debug::superpose().

9.103.2.21 const teal_t & mln::literal::teal = teal_t()

Literal teal.

Definition at line 174 of file colors.hh.

9.103.2.22 const violet_t & mln::literal::violet = violet_t()

Literal violet.

Definition at line 176 of file colors.hh.

9.103.2.23 const white_t & mln::literal::white = white_t()

Literal white.

Definition at line 60 of file white.hh.

Referenced by mln::registration::icp().

9.103.2.24 const yellow_t & mln::literal::yellow = yellow_t()

Literal yellow.

Definition at line 182 of file colors.hh.

9.103.2.25 const zero_t & mln::literal::zero = zero_t()

Literal zero.

Definition at line 69 of file zero.hh.

Referenced by mln::transform::influence_zone_geodesic_saturated(), mln::accu::shape::volume< I >::init(), mln::accu::stat::variance< T, S, R >::init(), mln::morpho::attribute::sum< I, S >::init(), mln::accu::math::sum< T, S >::init(), mln::accu::rms< T, V >::init(), mln::accu::stat::histo3d_rgb< V >::init(), mln::accu::convolve< T1, T2, R >::init(), mln::accu::center< P, V >::init(), mln::window< D >::is_centered(), mln::accu::stat::variance< T, S, R >::mean(), mln::accu::stat::var< T >::mean(), mln::geom::mesh_corner_point_area(), mln::geom::mesh_curvature(), mln::geom::mesh_normal(), mln::morpho::meyer_wst(), mln::algebra::operator*(), mln::test::positive(), mln::make::relabelfun(), mln::geom::rotate(), mln::accu::shape::volume< I >::set_value(), mln::morpho::watershed::superpose(), mln::labeling::superpose(), mln::debug::superpose(), mln::accu::stat::var< T >::to_result(), mln::geom::translate(), and mln::make::w_window_directional().

9.104 mln::logical Namespace Reference

Namespace of logic.

Namespaces

- namespace impl

  Implementation namespace of logical namespace.

Functions

- template<typename L , typename R >
  void and_inplace (Image< L > &lhs, const Image< R > &rhs)
- template<typename L , typename R >
  mln::trait::ch_value< L, typename mln::fun::vv2v::land_not< typename L::value, typename R::value >::result >::ret and_not (const Image< L > &lhs, const Image< R > &rhs)
- template<typename L , typename R >
  void and_not_inplace (Image< L > &lhs, const Image< R > &rhs)
- template<typename I >
  void not_inplace (Image< I > &input)
- template<typename L , typename R >
  void or_inplace (Image< L > &lhs, const Image< R > &rhs)
- template<typename L , typename R >
  void xor_inplace (Image< L > &lhs, const Image< R > &rhs)

9.104.1 Detailed Description

Namespace of logic.

9.104.2 Function Documentation

9.104.2.1 template<typename L , typename R > void mln::logical::and_inplace (Image< L > & *lhs*, const Image< R > & *rhs*) `[inline]`

Point-wise in-place "logical and" of image `rhs` in image `lhs`.

Parameters

`[in,out]` ***lhs*** First operand image.

`[in]` ***rhs*** Second operand image.

It performs:

for all p of rhs.domain

lhs(p) = lhs(p) and rhs(p)

Precondition

`rhs.domain` >= `lhs.domain`

Definition at line 91 of file logical/and.hh.

References mln::data::transform_inplace().

9.104.2.2 template<typename L , typename R > mln::trait::ch_value< L, typename mln::fun::vv2v::land_not< typename L::value, typename R::value >::result >::ret mln::logical::and_not (const Image< L > & *lhs*, const Image< R > & *rhs*) `[inline]`

Point-wise "logical and-not" between images `lhs` and `rhs`.

Parameters

`[in]` ***lhs*** First operand image.

`[in]` ***rhs*** Second operand image.

Returns

The result image.

Precondition

`lhs.domain` == `rhs.domain`

Definition at line 76 of file and_not.hh.

References mln::data::transform().

9.104.2.3 template<typename L , typename R > void mln::logical::and_not_inplace (Image< L > & *lhs*, const Image< R > & *rhs*) `[inline]`

Point-wise in-place "logical and-not" of image `rhs` in image `lhs`.

Parameters

`[in,out]` ***lhs*** First operand image.
`[in]` ***rhs*** Second operand image.

It performs:

for all p of rhs.domain

lhs(p) = lhs(p) and not rhs(p)

Precondition

`rhs.domain` >= `lhs.domain`

Definition at line 91 of file and_not.hh.

References mln::data::transform_inplace().

9.104.2.4 template<typename I > void mln::logical::not_inplace (Image< I > & *input*) `[inline]`

Point-wise in-place "logical not" of image `input`.

Parameters

`[in,out]` ***input*** The target image.

It performs:

for all p of input.domain

input(p) = not input(p)

Precondition

`input.is_valid`

Definition at line 88 of file logical/not.hh.

References mln::data::transform_inplace().

9.104.2.5 template<typename L , typename R > void mln::logical::or_inplace (Image< L > & *lhs,* const Image< R > & *rhs*) `[inline]`

Point-wise in-place "logical or" of image `rhs` in image `lhs`.

Parameters

`[in,out]` ***lhs*** First operand image.
`[in]` ***rhs*** Second operand image.

It performs:

for all p of rhs.domain

lhs(p) = lhs(p) or rhs(p)

Precondition

`rhs.domain >= lhs.domain`

Definition at line 91 of file logical/or.hh.

References mln::data::transform_inplace().

9.104.2.6 template<typename L , typename R > void mln::logical::xor_inplace (Image< L > & *lhs*, const Image< R > & *rhs*) [inline]

Point-wise in-place "logical xor" of image `rhs` in image `lhs`.

Parameters

`[in,out]` ***lhs*** First operand image.

`[in]` ***rhs*** Second operand image.

It performs:

for all p of rhs.domain

lhs(p) = lhs(p) xor rhs(p)

Precondition

`rhs.domain >= lhs.domain`

Definition at line 91 of file logical/xor.hh.

References mln::data::transform_inplace().

9.105 mln::logical::impl Namespace Reference

Implementation namespace of logical namespace.

Namespaces

- namespace generic

  Generic implementation namespace of logical namespace.

9.105.1 Detailed Description

Implementation namespace of logical namespace.

9.106 mln::logical::impl::generic Namespace Reference

Generic implementation namespace of logical namespace.

9.106.1 Detailed Description

Generic implementation namespace of logical namespace.

9.107 mln::make Namespace Reference

Namespace of routines that help to make Milena's objects.

Functions

- template<unsigned D, typename G , typename V >
  p_set< complex_psite< D, G > > attachment (const complex_psite< D, G > &f, const complex_-image< D, G, V > &ima)

  Compute the attachment of the cell corresponding to the facet f to the image ima.

- mln::box1d box1d (def::coord min_ind, def::coord max_ind)

  Create an mln::box1d.

- mln::box1d box1d (unsigned ninds)

  Create an mln::box1d.

- mln::box2d box2d (unsigned nrows, unsigned ncols)

  Create an mln::box2d.

- mln::box2d box2d (def::coord min_row, def::coord min_col, def::coord max_row, def::coord max_-col)

  Create an mln::box2d.

- mln::box2d_h box2d_h (def::coord min_row, def::coord min_col, def::coord max_row, def::coord max_col)

  Create an mln::box2d_h.

- mln::box2d_h box2d_h (unsigned nrows, unsigned ncols)

  Create an mln::box2d_h.

- mln::box3d box3d (unsigned nslis, unsigned nrows, unsigned ncols)

  Create an mln::box3d.

- mln::box3d box3d (def::coord min_sli, def::coord min_row, def::coord min_col, def::coord max_sli, def::coord max_row, def::coord max_col)

  Create an mln::box3d.

- template<unsigned D, typename G >
  p_set< complex_psite< D, G > > cell (const complex_psite< D, G > &f)

  Compute the set of faces of the cell corresponding to the facet f.

- template<typename T , typename U >
  util::couple< T, U > couple (const T &val1, const T &val2)

  Construct an mln::util::couple on-the-fly.

- template<unsigned D, typename G , typename V >
p_set< complex_psite< D, G > > detachment (const complex_psite< D, G > &f, const complex_-image< D, G, V > &ima)

  Compute the detachment of the cell corresponding to the facet f to the image ima.

- mln::dpoint2d_h dpoint2d_h (def::coord row, def::coord col)

  Create an mln::dpoint2d_h.

- template<typename G , typename P >
p_edges< G, pw::cst_< P > > dummy_p_edges (const Graph< G > &g_, const P &dummy_site)

  Create a p_edges which associate a graph element to a constant site.

- template<typename G >
p_edges< G > dummy_p_edges (const Graph< G > &g)

  Create a p_edges which associate a graph element to a constant site.

- template<typename G , typename P >
p_vertices< G, pw::cst_< P > > dummy_p_vertices (const Graph< G > &g_, const P &dummy_-site)

  Create a p_vertices which associate a graph element to a constant site.

- template<typename G >
p_vertices< G > dummy_p_vertices (const Graph< G > &g)

  Create a p_vertices which associate a graph element to a constant site.

- template<typename V , typename G >
mln::edge_image< void, V, G > edge_image (const Graph< G > &g, const fun::i2v::array< V > &fv)

  Construct an edge image.

- template<typename FV , typename G >
mln::edge_image< void, typename FV::result, G > edge_image (const Graph< G > &g, const Function_v2v< FV > &fv)

  Construct an edge image.

- template<typename FP , typename FV , typename G >
mln::edge_image< typename FP::result, typename FV::result, G > edge_image (const Graph< G > &g_, const Function_v2v< FP > &fp, const Function_v2v< FV > &fv)

  Construct an edge image.

- template<typename P , typename V , typename G , typename FP , typename FV >
mln::edge_image< typename FP::result, typename FV::result, G > edge_image (const mln::vertex_-image< P, V, G > &v_ima_, const p_edges< G, FP > pe, const Function_vv2v< FV > &fv_)

  Construct an edge image.

- template<typename P , typename V , typename G , typename FV >
mln::edge_image< void, typename FV::result, G > edge_image (const mln::vertex_image< P, V, G > &v_ima_, const Function_vv2v< FV > &fv_)

  Construct an edge image.

- template<typename P , typename V , typename G , typename F >
  mln::edge_image< void, bool, G > edge_image (const mln::vertex_image< P, V, G > &v_ima_, const Function_v2b< F > &fv_)

  Construct an edge image.

- template<typename T , unsigned N>
  algebra::h_mat< mlc_sqrt_int(N), T > h_mat (const T(&tab)[N])

  Create an mln::algebra::mat<n,n,T>.

- template<typename V , unsigned L>
  mln::image1d< V > image (V(&values)[L])

  Create an image1d from an 1D array of values.

- template<typename V , unsigned R, unsigned C>
  mln::image2d< V > image (V(&values)[R][C])

  Create an image2d from an 2D array of values.

- template<typename V , unsigned S, unsigned R, unsigned C>
  mln::image3d< V > image (V(&values)[S][R][C])

  Create an image3d from an 3D array of values.

- template<typename V , unsigned S>
  mln::image2d< V > image2d (V(&values)[S])

  Create an image2d from an 2D array of values.

- template<typename I >
  mln::image3d< typename I::value > image3d (const Image< I > &ima)

  Create an image3d from a 2D image.

- template<typename I >
  mln::image3d< typename I::value > image3d (const util::array< I > &ima)

  Create an image3d from an array of 2D images.

- template<typename I , typename N >
  util::graph influence_zone_adjacency_graph (const Image< I > &iz_, const Neighborhood< N > &nbh, const typename I::value &nlabels)

  Create a graph from an influence zone image.

- template<unsigned n, unsigned m, typename T >
  algebra::mat< n, m, T > mat (const T(&tab)[n *m])

  Create an mln::algebra::mat<n,m,T>.

- template<typename T >
  util::ord_pair< T > ord_pair (const T &val1, const T &val2)

  Construct an mln::util::ord_pair on-the-fly.

- template<typename W , typename G >
  p_edges< G, fun::i2v::array< util::site_pair< typename W::site > > > p_edges_with_mass_centers (const Image< W > &wst_, const Graph< G > &g_)

  Construct a p_edges from a watershed image and a region adjacency graph (RAG).

- template<typename W , typename G >
  p_vertices< G, fun::i2v::array< typename W::site > > p_vertices_with_mass_centers (const Image< W > &wst_, const Graph< G > &g_)

  Construct a p_vertices from a watershed image and a region adjacency graph (RAG).

- template<typename I >
  mln::util::pix< I > pix (const Image< I > &ima, const typename I::psite &p)

  Create an mln::util::pix from an image `ima` *and a psite* `p`*.*

- template<typename I >
  mln::pixel< I > pixel (Image< I > &ima, const typename I::psite &p)

  Create a mln::pixel from a mutable image `ima` *and a point* `p`*.*

- template<typename I >
  mln::pixel< const I > pixel (const Image< I > &ima, const typename I::psite &p)

  Create a mln::pixel from a constant image `ima` *and a point* `p`*.*

- mln::point2d_h point2d_h (def::coord row, def::coord col)

  Create an mln::point2d_h.

- template<typename I , typename N >
  util::couple< util::graph, typename mln::trait::concrete< I >::ret > rag_and_labeled_wsl (const Image< I > &wshd_, const Neighborhood< N > &nbh_, const typename I::value &nbasins)

  Create a region adjacency graph and a label image of the watershed line from a watershed image.

- template<typename I , typename N >
  util::graph region_adjacency_graph (const Image< I > &wshd_, const Neighborhood< N > &nbh, const typename I::value &nbasins)

  Create a region adjacency graph from a watershed image.

- template<typename V , typename F >
  fun::i2v::array< V > relabelfun (const Function_v2b< F > &fv2b, const V &nlabels, V &new_nlabels)

  Create a i2v function from a v2b function.

- template<typename V , typename F >
  fun::i2v::array< V > relabelfun (const Function_v2v< F > &fv2v, const V &nlabels, V &new_nlabels)

  Create a i2v function from a v2v function.

- template<typename T >
  algebra::vec< 1, T > vec (const T &v_0)

  Create an mln::algebra::vec<n,T>.

- template<typename T >
  algebra::vec< 4, T > vec (const T &v_0, const T &v_1, const T &v_2, const T &v_3)

  Create an mln::algebra::vec<4,T>.

- template<typename T >
  algebra::vec< 3, T > vec (const T &v_0, const T &v_1, const T &v_2)

  Create an mln::algebra::vec<3,T>.

- template<typename T >
  algebra::vec< 2, T > vec (const T &v_0, const T &v_1)

  Create an mln::algebra::vec<2,T>.

- template<typename G , typename FV >
  mln::vertex_image< void, typename FV::result, G > vertex_image (const Graph< G > &g, const Function_v2v< FV > &fv)

  Construct a vertex image.

- template<typename FP , typename FV , typename G >
  mln::vertex_image< typename FP::result, typename FV::result, G > vertex_image (const Graph< G > &g_, const Function_v2v< FP > &fp, const Function_v2v< FV > &fv)

  Construct a vertex image.

- template<typename I , typename N >
  p_vertices< util::graph, fun::i2v::array< typename I::site > > voronoi (Image< I > &ima_, Image< I > &orig_, const Neighborhood< N > &nbh)

  Apply the Voronoi algorithm on `ima_` with the original image `orig_` for node computing with neighborhood `nbh`.

- template<typename W , typename F >
  mln::w_window< typename W::dpsite, typename F::result > w_window (const Window< W > &win, const Function_v2v< F > &wei)

  Create a mln::w_window from a window and a weight function.

- template<typename W , unsigned M>
  mln::w_window< mln::dpoint1d, W > w_window1d (W(&weights)[M])

  Create a 1D mln::w_window from an array of weights.

- template<unsigned M>
  mln::w_window1d_int w_window1d_int (int(&weights)[M])

  Create a mln::w_window1d_int.

- template<typename W , unsigned S>
  mln::w_window< mln::dpoint2d, W > w_window2d (W(&weights)[S])

  Create a 2D mln::w_window from an array of weights.

- template<unsigned M>
  mln::w_window2d_int w_window2d_int (int(&weights)[M])

  Create a mln::w_window2d_int.

- template<typename W , unsigned M>
  mln::w_window< mln::dpoint3d, W > w_window3d (W(&weights)[M])

  Create a 3D mln::w_window from an array of weights.

- template<unsigned M>
  mln::w_window3d_int w_window3d_int (int(&weights)[M])

  Create a mln::w_window3d_int.

- template<typename D , typename W , unsigned L>
  mln::w_window< D, W > w_window_directional (const Gdpoint< D > &dp, W(&weights)[L])
  Create a directional centered weighted window.

9.107.1 Detailed Description

Namespace of routines that help to make Milena's objects.

9.107.2 Function Documentation

9.107.2.1 template<unsigned D, typename G , typename V > p_set< complex_psite< D, G > > mln::make::attachment (const complex_psite< D, G > & *f*, const complex_image< D, G, V > & *ima*) `[inline]`

Compute the attachment of the cell corresponding to the facet *f* to the image *ima*.

Precondition

f is a facet (it does not belong to any face of higher dimension).
ima is an image of Boolean values.

Returns

a set of faces containing the attachment.

We do not use the fomal definition of the attachment here (see couprie.08.pami). We use the following (equivalent) definition: an N-face F in CELL is in the attachment of CELL to IMA if it is adjacent to at least an (N-1)-face or an (N+1)-face that does not belong to CELL.

Definition at line 68 of file attachment.hh.

References cell(), and mln::topo::is_facet().

Referenced by mln::topo::is_simple_cell< I >::operator()().

9.107.2.2 mln::box1d mln::make::box1d (def::coord *min_ind*, def::coord *max_ind*) `[inline]`

Create an mln::box1d.

This is an overloaded member function, provided for convenience. It differs from the above function only in what argument(s) it accepts.

Parameters

`[in]` ***min_ind*** Minimum index.
`[in]` ***max_ind*** Maximum index.

Precondition

`max_ind` >= `min_ind`.

Returns

A 1D box.

Definition at line 79 of file make/box1d.hh.

References box1d().

9.107.2.3 mln::box1d mln::make::box1d (unsigned *ninds*) [inline]

Create an mln::box1d.

Parameters

[in] ***ninds*** Number of indices.

Precondition

ninds != 0 and ncols != 0.

Returns

A 1D box.

Definition at line 70 of file make/box1d.hh.

Referenced by box1d(), and mln::image1d< T >::image1d().

9.107.2.4 mln::box2d mln::make::box2d (unsigned *nrows*, unsigned *ncols*) [inline]

Create an mln::box2d.

Parameters

[in] ***nrows*** Number of rows.

[in] ***ncols*** Number of columns.

Precondition

nrows != 0 and ncols != 0.

Returns

A 2D box.

Definition at line 78 of file make/box2d.hh.

Referenced by mln::image2d< T >::image2d(), and mln::io::pnm::load().

9.107.2.5 mln::box2d mln::make::box2d (def::coord *min_row*, def::coord *min_col*, def::coord *max_row*, def::coord *max_col*) [inline]

Create an mln::box2d.

This is an overloaded member function, provided for convenience. It differs from the above function only in what argument(s) it accepts.

Parameters

[in] ***min_row*** Index of the top most row.

[in] ***min_col*** Index of the left most column.

[in] ***max_row*** Index of the botton most row.

[in] ***max_col*** Index of the right most column.

Precondition

max_row >= min_row and max_col >= min_col.

Returns

A 2D box.

Definition at line 88 of file make/box2d.hh.

9.107.2.6 mln::box2d_h mln::make::box2d_h (def::coord *min_row*, def::coord *min_col*, def::coord *max_row*, def::coord *max_col*) [inline]

Create an mln::box2d_h.

This is an overloaded member function, provided for convenience. It differs from the above function only in what argument(s) it accepts.

Parameters

[in] ***min_row*** Index of the top most row.

[in] ***min_col*** Index of the left most column.

[in] ***max_row*** Index of the botton most row.

[in] ***max_col*** Index of the right most column.

Precondition

max_row >= min_row and max_col >= min_col.

Returns

A 2D_H box.

Definition at line 85 of file make/box2d_h.hh.

References point2d_h().

9.107.2.7 mln::box2d_h mln::make::box2d_h (unsigned *nrows*, unsigned *ncols*) [inline]

Create an mln::box2d_h.

Parameters

[in] ***nrows*** Number of rows.

[in] ***ncols*** Number of columns.

Precondition

nrows != 0 and ncols != 0.

Returns

A 2D_H box.

Definition at line 75 of file make/box2d_h.hh.

References point2d_h().

9.107.2.8 mln::box3d mln::make::box3d (unsigned *nslis*, unsigned *nrows*, unsigned *ncols*) `[inline]`

Create an mln::box3d.

Parameters

`[in]` ***nslis*** Number of slices.

`[in]` ***nrows*** Number of rows.

`[in]` ***ncols*** Number of columns.

Precondition

`ninds` != 0 and `ncols` != 0 and `nslis` != 0.

Returns

A 3D box.

Definition at line 80 of file make/box3d.hh.

Referenced by image3d(), and mln::image3d< T >::image3d().

9.107.2.9 mln::box3d mln::make::box3d (def::coord *min_sli*, def::coord *min_row*, def::coord *min_col*, def::coord *max_sli*, def::coord *max_row*, def::coord *max_col*) `[inline]`

Create an mln::box3d.

This is an overloaded member function, provided for convenience. It differs from the above function only in what argument(s) it accepts.

Parameters

`[in]` ***min_sli*** Index of the lowest slice.

`[in]` ***min_row*** Index of the top most row.

`[in]` ***min_col*** Index of the left most column.

`[in]` ***max_sli*** Index of the highest slice.

`[in]` ***max_row*** Index of the botton most row.

`[in]` ***max_col*** Index of the right most column.

Precondition

`max_sli` >= `min_sli`.
`max_row` >= `min_row`.
`max_col` >= `min_col`.

Returns

A 3D box.

Definition at line 92 of file make/box3d.hh.

9.107.2.10 template<unsigned D, typename G > p_set< complex_psite< D, G > > mln::make::cell (const complex_psite< D, G > & *f*) [inline]

Compute the set of faces of the cell corresponding to the facet *f*.

Precondition

f is a facet (it does not belong to any face of higher dimension).

Returns

An mln::p_set of sites (faces) containing the attachment.

Definition at line 63 of file cell.hh.

References mln::topo::is_facet(), and mln::complex_psite< D, G >::n().

Referenced by attachment(), and detachment().

9.107.2.11 template<typename T , typename U > util::couple<T,U> mln::make::couple (const T & *val1*, const T & *val2*)

Construct an mln::util::couple on-the-fly.

Referenced by mln::labeling::blobs_and_compute(), mln::transform::distance_and_closest_point_-geodesic(), mln::transform::distance_and_influence_zone_geodesic(), and mln::labeling::value_and_-compute().

9.107.2.12 template<unsigned D, typename G , typename V > p_set< complex_psite< D, G > > mln::make::detachment (const complex_psite< D, G > & *f*, const complex_image< D, G, V > & *ima*) [inline]

Compute the detachment of the cell corresponding to the facet *f* to the image *ima*.

Precondition

f is a facet (it does not belong to any face of higher dimension).
ima is an image of Boolean values.

Returns

a set of faces containing the detachment.

We do not use the fomal definition of the detachment here (see couprie.08.pami). We use the following (equivalent) definition: an N-face F in CELL is not in the detachment of CELL from IMA if it is adjacent to at least an (N-1)-face or an (N+1)-face that does not belong to CELL.

Definition at line 68 of file detachment.hh.

References cell(), and mln::topo::is_facet().

Referenced by mln::topo::detach().

9.107.2.13 mln::dpoint2d_h mln::make::dpoint2d_h (def::coord *row*, def::coord *col*) [inline]

Create an mln::dpoint2d_h.

Parameters

[in] ***row*** Row coordinate.

[in] ***col*** Column coordinate.

Returns

A 2D dpoint.

Definition at line 55 of file make/dpoint2d_h.hh.

9.107.2.14 template<typename G , typename P > p_edges< G, pw::cst_< P > > mln::make::dummy_p_edges (const Graph< G > & *g_*, const P & *dummy_site*)

Create a p_edges which associate a graph element to a constant site.

Parameters

[in] ***g_*** A graph.

[in] ***dummy_site*** The dummy site mapped to graph edges.

Returns

A p_edges.

Definition at line 77 of file dummy_p_edges.hh.

9.107.2.15 template<typename G > p_edges< G > mln::make::dummy_p_edges (const Graph< G > & *g*)

Create a p_edges which associate a graph element to a constant site.

`0` (int) is used as dummy site.

Parameters

[in] ***g*** A graph.

Returns

A p_edges.

Definition at line 93 of file dummy_p_edges.hh.

9.107.2.16 template<typename G , typename P > p_vertices< G, pw::cst_< P > > mln::make::dummy_p_vertices (const Graph< G > & *g_*, const P & *dummy_site*)

Create a p_vertices which associate a graph element to a constant site.

Parameters

[in] ***g_*** A graph.

[in] ***dummy_site*** The dummy site mapped to graph vertices.

Returns

A p_vertices.

Definition at line 77 of file dummy_p_vertices.hh.

9.107.2.17 template<typename G > p_vertices< G > mln::make::dummy_p_vertices (const Graph< G > & *g*)

Create a p_vertices which associate a graph element to a constant site.

`0` (int) is used as dummy site.

Parameters

`[in]` ***g*** A graph.

Returns

A p_vertices.

Definition at line 93 of file dummy_p_vertices.hh.

9.107.2.18 template<typename V , typename G > mln::edge_image< void, V, G > mln::make::edge_image (const Graph< G > & *g*, const fun::i2v::array< V > & *fv*) `[inline]`

Construct an edge image.

Parameters

`[in]` ***g*** A graph.

`[in]` ***fv*** A function mapping edge ids to values.

Returns

an edge image.

Definition at line 141 of file make/edge_image.hh.

9.107.2.19 template<typename FV , typename G > mln::edge_image< void, typename FV::result, G > mln::make::edge_image (const Graph< G > & *g*, const Function_v2v< FV > & *fv*)

Construct an edge image.

Parameters

`[in]` ***g*** A graph.

`[in]` ***fv*** A function mapping edge ids to values.

Returns

an edge image.

Definition at line 155 of file make/edge_image.hh.

9.107.2.20 template< typename FP , typename FV , typename G > mln::edge_image< typename FP::result, typename FV::result, G > mln::make::edge_image (const Graph< G > & *g_*, const Function_v2v< FP > & *fp*, const Function_v2v< FV > & *fv*) `[inline]`

Construct an edge image.

Parameters

`[in]` ***g_*** A graph.
`[in]` ***fp*** A function mapping edge ids to sites.
`[in]` ***fv*** A function mapping edge ids to values.

Returns

an edge image.

Definition at line 179 of file make/edge_image.hh.

9.107.2.21 template< typename P , typename V , typename G , typename FP , typename FV > mln::edge_image< typename FP::result, typename FV::result, G > mln::make::edge_image (const mln::vertex_image< P, V, G > & *v_ima_*, const p_edges< G, FP > *pe*, const Function_vv2v< FV > & *fv_*) `[inline]`

Construct an edge image.

Parameters

`[in]` ***v_ima_*** A vertex image.
`[in]` ***pe*** A p_edges mapping graph elements to sites.
`[in]` ***fv_*** A function mapping two vertex ids to a value. The result is associated to the corresponding edge.

Returns

an edge image.

Definition at line 199 of file make/edge_image.hh.

9.107.2.22 template< typename P , typename V , typename G , typename FV > mln::edge_image< void, typename FV::result, G > mln::make::edge_image (const mln::vertex_image< P, V, G > & *v_ima_*, const Function_vv2v< FV > & *fv_*) `[inline]`

Construct an edge image.

Parameters

`[in]` ***v_ima_*** A vertex image.
`[in]` ***fv_*** A function mapping two vertices' values to a value. The result is associated to the corresponding edge.

Returns

an edge image without localization information mapped to graph elements.

Definition at line 225 of file make/edge_image.hh.

9.107.2.23 template<typename P , typename V , typename G , typename F > mln::edge_image< void, bool, G > mln::make::edge_image (const mln::vertex_image< P, V, G > & *v_ima_*, const Function_v2b< F > & *fv_*) [inline]

Construct an edge image.

Parameters

[in] ***v_ima_*** A vertex image.

[in] ***fv_*** A predicate on a vertex's value. The (Boolean) result is associated to the edges adjacent to the vertex.

Returns

an edge image without localization information mapped to graph elements.

Definition at line 250 of file make/edge_image.hh.

References mln::data::fill().

9.107.2.24 template<typename T , unsigned N> algebra::h_mat< mlc_sqrt_int(N), T > mln::make::h_mat (const T(&) *tab[N]*) [inline]

Create an mln::algebra::mat<n,n,T>.

Definition at line 60 of file make/h_mat.hh.

Referenced by mln::fun::x2x::rotation< n, C >::rotation().

9.107.2.25 template<typename V , unsigned L> mln::image1d< V > mln::make::image (V(&) *values[L]*)

Create an image1d from an 1D array of values.

Parameters

[in] ***values*** 1D array.

Returns

A 1D image.

Definition at line 85 of file make/image.hh.

9.107.2.26 template<typename V , unsigned R, unsigned C> mln::image2d< V > mln::make::image (V(&) *values[R][C]*)

Create an image2d from an 2D array of values.

Parameters

[in] ***values*** 2D array.

Returns

A 2D image.

Definition at line 97 of file make/image.hh.

References mln::opt::at().

9.107.2.27 template<typename V , unsigned S, unsigned R, unsigned C> mln::image3d< V > mln::make::image (V(&) *values[S][R][C]*)

Create an image3d from an 3D array of values.

Parameters

`[in]` ***values*** 3D array.

Returns

A 3D image.

Definition at line 112 of file make/image.hh.

References mln::opt::at().

9.107.2.28 template<typename V , unsigned S> mln::image2d< V > mln::make::image2d (V(&) *values[S]*)

Create an image2d from an 2D array of values.

Parameters

`[in]` ***values*** 2D array.

Returns

A 2D image.

Definition at line 61 of file make/image2d.hh.

9.107.2.29 template<typename I > mln::image3d< typename I::value > mln::make::image3d (const Image< I > & *ima*) `[inline]`

Create an image3d from a 2D image.

Definition at line 92 of file make/image3d.hh.

References box3d(), and mln::data::paste().

9.107.2.30 template<typename I > mln::image3d< typename I::value > mln::make::image3d (const util::array< I > & *ima*) `[inline]`

Create an image3d from an array of 2D images.

Definition at line 70 of file make/image3d.hh.

References box3d(), mln::util::array< T >::is_empty(), mln::util::array< T >::nelements(), mln::data::paste(), mln::box< P >::pmax(), and mln::box< P >::pmin().

Referenced by mln::io::pnms::load().

9.107.2.31 template< typename I , typename N > util::graph mln::make::influence_zone_-adjacency_graph (const Image< I > & *iz_*, const Neighborhood< N > & *nbh*, const typename I::value & *nlabels*) [inline]

Create a graph from an influence zone image.

Parameters

[in] ***iz*** influence zone image.

[in] ***nbh*** A neighborhood.

[in] ***nlabels*** number of influence zone in iz.

Returns

util::graph Graph based on the adjacency of the influence zones.

Definition at line 175 of file influence_zone_adjacency_graph.hh.

9.107.2.32 template< unsigned n, unsigned m, typename T > algebra::mat< n, m, T > mln::make::mat (const T(&) *tab[n *m]*) [inline]

Create an mln::algebra::mat<n,m,T>.

Parameters

[in] ***tab*** Array of values.

Precondition

The array dimension has to be n * m.

Definition at line 61 of file make/mat.hh.

9.107.2.33 template< typename T > util::ord_pair< T > mln::make::ord_pair (const T & *val1*, const T & *val2*) [inline]

Construct an mln::util::ord_pair on-the-fly.

Definition at line 277 of file ord_pair.hh.

9.107.2.34 template< typename W , typename G > p_edges< G, fun::i2v::array< util::site_pair< typename W::site > > > mln::make::p_edges_with_mass_centers (const Image< W > & *wst_*, const Graph< G > & *g_*) [inline]

Construct a p_edges from a watershed image and a region adjacency graph (RAG).

Map each graph edge to a pair of mass centers of two adjacent regions.

Parameters

wst_ A watershed image.

g_ A region adjacency graph.

Returns

A p_edges.

See also

edge_image, p_edges, make::region_adjacency_graph

Definition at line 81 of file p_edges_with_mass_centers.hh.

References mln::labeling::compute().

9.107.2.35 template<typename W , typename G > p_vertices< G, fun::i2v::array< typename W::site > > mln::make::p_vertices_with_mass_centers (const Image< W > & *wst_*, const Graph< G > & *g_*) `[inline]`

Construct a p_vertices from a watershed image and a region adjacency graph (RAG).

Map each graph vertex to the mass center of its corresponding region.

Parameters

*wst_* A watershed image.
*g_* A region adjacency graph.

Returns

A p_vertices.

See also

edge_image, vertex_image, p_vertices, p_edges, make::region_adjacency_graph

Definition at line 77 of file p_vertices_with_mass_centers.hh.

References mln::labeling::compute().

9.107.2.36 template<typename I > mln::util::pix< I > mln::make::pix (const Image< I > & *ima*, const typename I::psite & *p*) `[inline]`

Create an mln::util::pix from an image `ima` and a psite `p`.

Parameters

`[in]` ***ima*** The input image.
`[in]` ***p*** The point site.

Returns

An mln::util::pix.

Definition at line 58 of file make/pix.hh.

9.107.2.37 template<typename I > mln::pixel< I > mln::make::pixel (Image< I > & *ima*, const typename I::psite & *p*) `[inline]`

Create a mln::pixel from a mutable image `ima` and a point `p`.

Definition at line 63 of file make/pixel.hh.

9.107.2.38 template< typename I > mln::pixel< const I > mln::make::pixel (const Image< I > & *ima*, const typename I::psite & *p*) [inline]

Create a mln::pixel from a constant image `ima` and a point `p`.

Definition at line 55 of file make/pixel.hh.

9.107.2.39 mln::point2d_h mln::make::point2d_h (def::coord *row*, def::coord *col*) [inline]

Create an mln::point2d_h.

Parameters

`[in]` ***row*** Row coordinate.

`[in]` ***col*** Column coordinate.

Returns

A 2D point.

Definition at line 55 of file make/point2d_h.hh.

Referenced by box2d_h().

9.107.2.40 template< typename I , typename N > util::couple< util::graph, typename mln::trait::concrete< I >::ret > mln::make::rag_and_labeled_wsl (const Image< I > & *wshd_*, const Neighborhood< N > & *nbh_*, const typename I::value & *nbasins*) [inline]

Create a region adjacency graph and a label image of the watershed line from a watershed image.

Parameters

`[in]` ***wshd_*** Watershed image.

`[in]` ***nbh_*** Neighborhood

`[in]` ***nbasins*** Number of influence zone in `wshd`.

Returns

A couple. First element is the graph, second element is an image with a labeled watershed line.

```
        |-----------------|         |-----------------|
        | 1 1 1 0 2 2 0 3 |                       | . . . 1 . . 2 . |
        | 1 1 0 2 2 2 0 3 |                       | . . 1 . . . 2 . |
        | 1 0 4 0 2 0 3 3 |         ---->         | . 1 . 3 . 4 . . |
        | 0 4 4 4 0 5 0 3 |                       | 1 . . . 5 . 6 . |
        |-----------------|                       |-----------------|

Watershed image       Labeled watershed line
 (watershed line labeled with 0)


|
|
|
v
```

```
1 -- 2 - 3
 \  /   /
  4 -- 5

  Region Adjacency graph (RAG)
```

Definition at line 229 of file rag_and_labeled_wsl.hh.

9.107.2.41 template<typename I , typename N > util::graph mln::make::region_adjacency_graph (const Image< I > & *wshd_*, const Neighborhood< N > & *nbh*, const typename I::value & *nbasins*) [inline]

Create a region adjacency graph from a watershed image.

Parameters

[in] ***wshd_*** watershed image.

[in] ***nbh*** A neighborhood.

[in] ***nbasins*** number of influence zone in `wshd`.

Returns

util::graph Graph based on the adjacency of the influence zones.

Definition at line 179 of file region_adjacency_graph.hh.

9.107.2.42 template<typename V , typename F > fun::i2v::array< V > mln::make::relabelfun (const Function_v2b< F > & *fv2b*, const V & *nlabels*, V & *new_nlabels*) [inline]

Create a i2v function from a v2b function.

This function can be used to relabel a labeled image.

Parameters

[in] ***fv2b*** A v2b function.

[in] ***nlabels*** The number of labels.

[in] ***new_nlabels*** The number of labels after relabeling.

Returns

a i2v function.

See also

mln::labeling::relabel

Definition at line 83 of file relabelfun.hh.

References mln::literal::zero.

Referenced by mln::labeling::pack(), mln::labeling::pack_inplace(), mln::labeling::relabel(), mln::labeled_image_base< I, E >::relabel(), and mln::labeling::relabel_inplace().

9.107.2.43 template< typename V , typename F > fun::i2v::array< V > mln::make::relabelfun (const Function_v2v< F > & *fv2v*, const V & *nlabels*, V & *new_nlabels*) [inline]

Create a i2v function from a v2v function.

This function can be used to relabel a labeled image.

Parameters

[in] ***fv2v*** A v2v function. This function maps an id to an already existing one.
[in] ***nlabels*** The number of labels.
[in] ***new_nlabels*** The number of labels after relabeling.

Returns

a i2v function.

See also

mln::labeling::relabel

Definition at line 106 of file relabelfun.hh.

References mln::literal::zero.

9.107.2.44 template< typename T > algebra::vec< 1, T > mln::make::vec (const T & *v_0*) [inline]

Create an mln::algebra::vec<n,T>.

Parameters

[in] ***v_0*** First coordinate.

Returns

A 1D vector.

Definition at line 91 of file make/vec.hh.

9.107.2.45 template< typename T > algebra::vec< 4, T > mln::make::vec (const T & *v_0*, const T & *v_1*, const T & *v_2*, const T & *v_3*) [inline]

Create an mln::algebra::vec<4,T>.

Parameters

[in] ***v_0*** First coordinate.
[in] ***v_1*** Second coordinate.
[in] ***v_2*** Third coordinate.
[in] ***v_3*** Fourth coordinate.

Returns

A 4D vector.

Definition at line 121 of file make/vec.hh.

9.107.2.46 template<typename T > algebra::vec< 3, T > mln::make::vec (const T & *v_0*, const T & *v_1*, const T & *v_2*) [inline]

Create an mln::algebra::vec<3,T>.

Parameters

[in] ***v_0*** First coordinate.

[in] ***v_1*** Second coordinate.

[in] ***v_2*** Third coordinate.

Returns

A 3D vector.

Definition at line 110 of file make/vec.hh.

9.107.2.47 template<typename T > algebra::vec< 2, T > mln::make::vec (const T & *v_0*, const T & *v_1*) [inline]

Create an mln::algebra::vec<2,T>.

Parameters

[in] ***v_0*** First coordinate.

[in] ***v_1*** Second coordinate.

Returns

A 2D vector.

Definition at line 100 of file make/vec.hh.

9.107.2.48 template<typename G , typename FV > mln::vertex_image< void, typename FV::result, G > mln::make::vertex_image (const Graph< G > & *g*, const Function_v2v< FV > & *fv*)

Construct a vertex image.

Parameters

[in] ***g*** A graph.

[in] ***fv*** A function mapping vertex ids to values.

Returns

A vertex image.

Definition at line 77 of file make/vertex_image.hh.

9.107.2.49 template<typename FP , typename FV , typename G > mln::vertex_image< typename FP::result, typename FV::result, G > mln::make::vertex_image (const Graph< G > & *g_*, const Function_v2v< FP > & *fp*, const Function_v2v< FV > & *fv*)

Construct a vertex image.

Parameters

`[in]` ***g_*** A graph.
`[in]` ***fp*** A function mapping vertex ids to sites.
`[in]` ***fv*** A function mapping vertex ids to values.

Returns

A vertex image.

Definition at line 92 of file make/vertex_image.hh.

9.107.2.50 template<typename I , typename N > p_vertices< util::graph, fun::i2v::array< typename I::site > > mln::make::voronoi (Image< I > & *ima_*, Image< I > & *orig_*, const Neighborhood< N > & *nbh*) `[inline]`

Apply the Voronoi algorithm on `ima_` with the original image `orig_` for node computing with neighborhood `nbh`.

Parameters

`[in]` ***ima_*** The labeling image.
`[in]` ***orig_*** The original image.
`[in]` ***nbh*** The neighborhood for computing algorithm.

Returns

The computed graph.

Definition at line 68 of file voronoi.hh.

References mln::util::graph::add_edge(), mln::util::graph::add_vertex(), and mln::estim::min_max().

9.107.2.51 template<typename W , typename F > mln::w_window< typename W::dpsite, typename F::result > mln::make::w_window (const Window< W > & *win*, const Function_v2v< F > & *wei*) `[inline]`

Create a mln::w_window from a window and a weight function.

Parameters

`[in]` ***win*** A simple window.
`[in]` ***wei*** A weight function.

Returns

A weighted window.

Definition at line 63 of file make/w_window.hh.

References mln::w_window< D, W >::insert(), and mln::literal::origin.

9.107.2.52 template<typename W , unsigned M> mln::w_window< mln::dpoint1d, W > mln::make::w_window1d (W(&) *weights[M]*) [inline]

Create a 1D mln::w_window from an array of weights.

Parameters

[in] ***weights*** Array.

Precondition

The array size, M, has to be a square of an odd integer.

Returns

A 1D weighted window.

Definition at line 63 of file w_window1d.hh.

References mln::w_window< D, W >::insert().

Referenced by w_window1d_int().

9.107.2.53 template<unsigned M> mln::w_window1d_int mln::make::w_window1d_int (int(&) *weights[M]*) [inline]

Create a mln::w_window1d_int.

Parameters

[in] ***weights*** Array of integers.

Precondition

The array size, M, has to be a square of an odd integer.

Returns

A 1D int-weighted window.

Definition at line 61 of file make/w_window1d_int.hh.

References w_window1d().

9.107.2.54 template<typename W , unsigned S> mln::w_window< mln::dpoint2d, W > mln::make::w_window2d (W(&) *weights[S]*) [inline]

Create a 2D mln::w_window from an array of weights.

Parameters

[in] ***weights*** Array.

Precondition

The array size, S, has to be a square of an odd integer.

Returns

A 2D weighted window.

Definition at line 62 of file w_window2d.hh.

Referenced by w_window2d_int().

9.107.2.55 template<unsigned M> mln::w_window2d_int mln::make::w_window2d_int (int(&) *weights[M]*) [inline]

Create a mln::w_window2d_int.

Parameters

[in] ***weights*** Array of integers.

Precondition

The array size, M, has to be a square of an odd integer.

Returns

A 2D int-weighted window.

Definition at line 61 of file make/w_window2d_int.hh.

References w_window2d().

9.107.2.56 template<typename W , unsigned M> mln::w_window< mln::dpoint3d, W > mln::make::w_window3d (W(&) *weights[M]*) [inline]

Create a 3D mln::w_window from an array of weights.

Parameters

[in] ***weights*** Array.

Precondition

The array size, M, has to be a cube of an odd integer.

Returns

A 3D weighted window.

Definition at line 64 of file w_window3d.hh.

References mln::w_window< D, W >::insert().

Referenced by w_window3d_int().

9.107.2.57 template<unsigned M> mln::w_window3d_int mln::make::w_window3d_int (int(&) *weights[M]*) [inline]

Create a mln::w_window3d_int.

Parameters

[in] ***weights*** Array of integers.

Precondition

The array size, M, has to be a cube of an odd integer.

Returns

A 3D int-weighted window.

Definition at line 61 of file make/w_window3d_int.hh.

References w_window3d().

9.107.2.58 template<typename D , typename W , unsigned L> mln::w_window< D, W > mln::make::w_window_directional (const Gdpoint< D > & *dp*, W(&) *weights[L]*) [inline]

Create a directional centered weighted window.

Parameters

[in] ***dp*** A delta-point to set the orientation.

[in] ***weights*** An array of weights.

Returns

A weighted window.

The window length L has to be odd.

Definition at line 61 of file w_window_directional.hh.

References mln::w_window< D, W >::insert(), and mln::literal::zero.

9.108 mln::math Namespace Reference

Namespace of mathematical routines.

Functions

- template<typename T >
  T abs (const T &v)
  Generic version.
- template<unsigned n>
  value::int_u< n > abs (const value::int_u< n > &v)
  Specialization for mln::value::int_u.
  - int abs (int v)
    Specializations for existing overloads of std::abs.

9.108.1 Detailed Description

Namespace of mathematical routines.

9.108.2 Function Documentation

9.108.2.1 template<typename T > T mln::math::abs (const T & *v*) [inline]

Generic version.

Definition at line 74 of file math/abs.hh.

Referenced by abs(), and mln::morpho::line_gradient().

9.108.2.2 int mln::math::abs (int *v*) [inline]

Specializations for existing overloads of std::abs.

Reference: ISO/IEC 14882:2003 C++ standard, section 26.5 (C Library, [lib.c.math]).

Definition at line 79 of file math/abs.hh.

References abs().

9.108.2.3 template<unsigned n> value::int_u< n > mln::math::abs (const value::int_u< n > & *v*) [inline]

Specialization for mln::value::int_u.

Definition at line 88 of file math/abs.hh.

9.109 mln::metal Namespace Reference

Namespace of meta-programming tools.

Namespaces

- namespace impl

  Implementation namespace of metal namespace.

- namespace math

  Namespace of static mathematical functions.

Classes

- struct ands

  Ands type.

- struct converts_to

"converts-to" check.

- struct equal

  Definition of a static 'equal' test.

- struct goes_to

  "goes-to" check.

- struct is

  "is" check.

- struct is_a

  "is_a" check.

- struct is_not

  "is_not" check.

- struct is_not_a

  "is_not_a" static Boolean expression.

9.109.1 Detailed Description

Namespace of meta-programming tools.

9.110 mln::metal::impl Namespace Reference

Implementation namespace of metal namespace.

9.110.1 Detailed Description

Implementation namespace of metal namespace.

9.111 mln::metal::math Namespace Reference

Namespace of static mathematical functions.

Namespaces

- namespace impl

  Implementation namespace of metal::math namespace.

9.111.1 Detailed Description

Namespace of static mathematical functions.

9.112 mln::metal::math::impl Namespace Reference

Implementation namespace of metal::math namespace.

9.112.1 Detailed Description

Implementation namespace of metal::math namespace.

9.113 mln::morpho Namespace Reference

Namespace of mathematical morphology routines.

Namespaces

- namespace approx

  Namespace of approximate mathematical morphology routines.

- namespace attribute

  Namespace of attributes used in mathematical morphology.

- namespace elementary

  Namespace of image processing routines of elementary mathematical morphology.

- namespace impl

  Namespace of mathematical morphology routines implementations.

- namespace reconstruction

  Namespace of morphological reconstruction routines.

- namespace tree

  Namespace of morphological tree-related routines.

- namespace watershed

  Namespace of morphological watershed routines.

Functions

- template< typename I >
  mln::trait::concrete< I >::ret complementation (const Image< I > &input)
- template< typename I >
  void complementation_inplace (Image< I > &input)
- template< typename I , typename W >
  mln::trait::concrete< I >::ret contrast (const Image< I > &input, const Window< W > &win)
- template< typename I , typename W >
  mln::trait::concrete< I >::ret dilation (const Image< I > &input, const Window< W > &win)

  Morphological dilation.

- template<typename I , typename W >
mln::trait::concrete< I >::ret erosion (const Image< I > &input, const Window< W > &win)

  Morphological erosion.

- template<typename Op , typename I , typename W >
mln::trait::concrete< I >::ret general (const Op &op, const Image< I > &input, const Window< W > &win)

  Morphological general routine.

- template<typename I , typename W >
mln::trait::concrete< I >::ret gradient (const Image< I > &input, const Window< W > &win)

  Morphological gradient.

- template<typename I , typename W >
mln::trait::concrete< I >::ret gradient_external (const Image< I > &input, const Window< W > &win)

  Morphological external gradient.

- template<typename I , typename W >
mln::trait::concrete< I >::ret gradient_internal (const Image< I > &input, const Window< W > &win)

  Morphological internal gradient.

- template<typename I , typename Wh , typename Wm >
mln::trait::concrete< I >::ret hit_or_miss (const Image< I > &input, const Window< Wh > &win_hit, const Window< Wm > &win_miss)

  Morphological hit-or-miss.

- template<typename I , typename Wh , typename Wm >
mln::trait::concrete< I >::ret hit_or_miss_background_closing (const Image< I > &input, const Window< Wh > &win_hit, const Window< Wm > &win_miss)

  Morphological hit-or-miss closing of the background.

- template<typename I , typename Wh , typename Wm >
mln::trait::concrete< I >::ret hit_or_miss_background_opening (const Image< I > &input, const Window< Wh > &win_hit, const Window< Wm > &win_miss)

  Morphological hit-or-miss opening of the background.

- template<typename I , typename Wh , typename Wm >
mln::trait::concrete< I >::ret hit_or_miss_closing (const Image< I > &input, const Window< Wh > &win_hit, const Window< Wm > &win_miss)

  Morphological hit-or-miss closing.

- template<typename I , typename Wh , typename Wm >
mln::trait::concrete< I >::ret hit_or_miss_opening (const Image< I > &input, const Window< Wh > &win_hit, const Window< Wm > &win_miss)

  Morphological hit-or-miss opening.

- template<typename I , typename W , typename O >
void laplacian (const Image< I > &input, const Window< W > &win, Image< O > &output)

- template< typename V >
  edge_image< util::site_pair< point2d >, V, util::graph > line_gradient (const mln::image2d< V > &ima)

  Create a line graph image representing the gradient norm of a mln::image2d.

- template< typename L , typename I , typename N >
  mln::trait::ch_value< I, L >::ret meyer_wst (const Image< I > &input, const Neighborhood< N > &nbh, L &nbasins)

  Meyer's Watershed Transform (WST) algorithm.

- template< typename L , typename I , typename N >
  mln::trait::ch_value< I, L >::ret meyer_wst (const Image< I > &input, const Neighborhood< N > &nbh)

  Meyer's Watershed Transform (WST) algorithm, with no count of basins.

- template< typename I , typename J >
  mln::trait::concrete< I >::ret min (const Image< I > &lhs, const Image< J > &rhs)
- template< typename I , typename J >
  void min_inplace (Image< I > &lhs, const Image< J > &rhs)
- template< typename I , typename J >
  mln::trait::concrete< I >::ret minus (const Image< I > &lhs, const Image< J > &rhs)
- template< typename I , typename J >
  mln::trait::concrete< I >::ret plus (const Image< I > &lhs, const Image< J > &rhs)
- template< typename I , typename W >
  mln::trait::concrete< I >::ret rank_filter (const Image< I > &input, const Window< W > &win, unsigned k)

  Morphological rank_filter.

- template< typename I , typename Wfg , typename Wbg >
  mln::trait::concrete< I >::ret thick_miss (const Image< I > &input, const Window< Wfg > &win_fg, const Window< Wbg > &win_bg)
- template< typename I , typename Wfg , typename Wbg >
  mln::trait::concrete< I >::ret thickening (const Image< I > &input, const Window< Wfg > &win_fg, const Window< Wbg > &win_bg)
- template< typename I , typename Wfg , typename Wbg >
  mln::trait::concrete< I >::ret thin_fit (const Image< I > &input, const Window< Wfg > &win_fg, const Window< Wbg > &win_bg)
- template< typename I , typename Wfg , typename Wbg >
  mln::trait::concrete< I >::ret thinning (const Image< I > &input, const Window< Wfg > &win_fg, const Window< Wbg > &win_bg)

  Morphological thinning.

- template< typename I , typename W >
  mln::trait::concrete< I >::ret top_hat_black (const Image< I > &input, const Window< W > &win)

  Morphological black top-hat (for background / dark objects).

- template< typename I , typename W >
  mln::trait::concrete< I >::ret top_hat_self_complementary (const Image< I > &input, const Window< W > &win)

  Morphological self-complementary top-hat.

- template<typename I , typename W >
  mln::trait::concrete< I >::ret top_hat_white (const Image< I > &input, const Window< W > &win)

  Morphological white top-hat (for object / light objects).

9.113.1 Detailed Description

Namespace of mathematical morphology routines.

9.113.2 Function Documentation

9.113.2.1 template<typename I > mln::trait::concrete< I >::ret mln::morpho::complementation (const Image< I > & *input*) [inline]

Morphological complementation: either a logical "not" (if morpho on sets) or an arithmetical complementation (if morpho on functions).

Definition at line 116 of file complementation.hh.

Referenced by hit_or_miss_background_closing(), hit_or_miss_background_opening(), hit_or_miss_closing(), and thinning().

9.113.2.2 template<typename I > void mln::morpho::complementation_inplace (Image< I > & *input*) [inline]

Morphological complementation, inplace version: either a logical "not" (if morpho on sets) or an arithmetical complementation (if morpho on functions).

Definition at line 130 of file complementation.hh.

9.113.2.3 template<typename I , typename W > mln::trait::concrete< I >::ret mln::morpho::contrast (const Image< I > & *input*, const Window< W > & *win*) [inline]

Morphological contrast operator (based on top-hats).

This operator is Id + wth_B - bth_B.

Definition at line 57 of file contrast.hh.

References plus(), top_hat_black(), and top_hat_white().

9.113.2.4 template<typename I , typename W > mln::trait::concrete< I >::ret mln::morpho::dilation (const Image< I > & *input*, const Window< W > & *win*) [inline]

Morphological dilation.

Definition at line 162 of file dilation.hh.

References general().

Referenced by gradient(), gradient_external(), hit_or_miss_background_opening(), hit_or_miss_opening(), laplacian(), mln::morpho::opening::approx::structural(), and mln::morpho::closing::approx::structural().

9.113.2.5 template<typename I , typename W > mln::trait::concrete< I >::ret mln::morpho::erosion (const Image< I > & *input*, const Window< W > & *win*) [inline]

Morphological erosion.

Definition at line 163 of file erosion.hh.

References general().

Referenced by gradient(), gradient_internal(), laplacian(), mln::morpho::opening::approx::structural(), and mln::morpho::closing::approx::structural().

9.113.2.6 template<typename Op , typename I , typename W > mln::trait::concrete< I >::ret mln::morpho::general (const Op & *op*, const Image< I > & *input*, const Window< W > & *win*) [inline]

Morphological general routine.

Definition at line 168 of file general.hh.

Referenced by dilation(), and erosion().

9.113.2.7 template<typename I , typename W > mln::trait::concrete< I >::ret mln::morpho::gradient (const Image< I > & *input*, const Window< W > & *win*) [inline]

Morphological gradient.

This operator is d_B - e_B.

Definition at line 76 of file gradient.hh.

References dilation(), erosion(), minus(), and mln::test::positive().

9.113.2.8 template<typename I , typename W > mln::trait::concrete< I >::ret mln::morpho::gradient_external (const Image< I > & *input*, const Window< W > & *win*) [inline]

Morphological external gradient.

This operator is d_B - Id.

Definition at line 110 of file gradient.hh.

References dilation(), minus(), and mln::test::positive().

9.113.2.9 template<typename I , typename W > mln::trait::concrete< I >::ret mln::morpho::gradient_internal (const Image< I > & *input*, const Window< W > & *win*) [inline]

Morphological internal gradient.

This operator is Id - e_B.

Definition at line 93 of file gradient.hh.

References erosion(), minus(), and mln::test::positive().

9.113.2.10 template<typename I , typename Wh , typename Wm > mln::trait::concrete< I >::ret mln::morpho::hit_or_miss (const Image< I > & *input*, const Window< Wh > & *win_hit*, const Window< Wm > & *win_miss*) `[inline]`

Morphological hit-or-miss.

This operator is HMT_(Bh,Bm) = e_Bh /\ (e_Bm o C).

Definition at line 276 of file hit_or_miss.hh.

Referenced by thickening(), and thinning().

9.113.2.11 template<typename I , typename Wh , typename Wm > mln::trait::concrete< I >::ret mln::morpho::hit_or_miss_background_closing (const Image< I > & *input*, const Window< Wh > & *win_hit*, const Window< Wm > & *win_miss*) `[inline]`

Morphological hit-or-miss closing of the background.

This operator is C o HMTopeBG o C.

Definition at line 357 of file hit_or_miss.hh.

References complementation(), hit_or_miss_background_opening(), and hit_or_miss_closing().

9.113.2.12 template<typename I , typename Wh , typename Wm > mln::trait::concrete< I >::ret mln::morpho::hit_or_miss_background_opening (const Image< I > & *input*, const Window< Wh > & *win_hit*, const Window< Wm > & *win_miss*) `[inline]`

Morphological hit-or-miss opening of the background.

This operator is HMTopeBG = HMTope_(Bm,Bh) o C = d_(-Bm) o HMT_(Bh,Bm).

Definition at line 314 of file hit_or_miss.hh.

References complementation(), dilation(), hit_or_miss_opening(), and mln::win::sym().

Referenced by hit_or_miss_background_closing(), and thick_miss().

9.113.2.13 template<typename I , typename Wh , typename Wm > mln::trait::concrete< I >::ret mln::morpho::hit_or_miss_closing (const Image< I > & *input*, const Window< Wh > & *win_hit*, const Window< Wm > & *win_miss*) `[inline]`

Morphological hit-or-miss closing.

This operator is C o HMTope o C.

Definition at line 337 of file hit_or_miss.hh.

References complementation(), and hit_or_miss_opening().

Referenced by hit_or_miss_background_closing().

9.113.2.14 template<typename I , typename Wh , typename Wm > mln::trait::concrete< I >::ret mln::morpho::hit_or_miss_opening (const Image< I > & *input*, const Window< Wh > & *win_hit*, const Window< Wm > & *win_miss*) `[inline]`

Morphological hit-or-miss opening.

This operator is HMTope_(Bh,Bm) = d_(-Bh) o HMT_(Bh,Bm).

Definition at line 294 of file hit_or_miss.hh.

References dilation(), and mln::win::sym().

Referenced by hit_or_miss_background_opening(), hit_or_miss_closing(), and thin_fit().

9.113.2.15 template<typename I , typename W , typename O > void mln::morpho::laplacian (const Image< I > & *input*, const Window< W > & *win*, Image< O > & *output*) `[inline]`

Morphological laplacian.

This operator is (d_B - Id) - (Id - e_B).

Definition at line 63 of file laplacian.hh.

References dilation(), erosion(), mln::data::fill(), and minus().

9.113.2.16 template<typename V > edge_image< util::site_pair< point2d >, V, util::graph > mln::morpho::line_gradient (const mln::image2d< V > & *ima*)

Create a line graph image representing the gradient norm of a mln::image2d.

Definition at line 70 of file line_gradient.hh.

References mln::math::abs(), mln::image2d< T >::domain(), mln::box< P >::has(), mln::window< D >::insert(), and mln::Box< E >::nsites().

9.113.2.17 template<typename L , typename I , typename N > mln::trait::ch_value< I, L >::ret mln::morpho::meyer_wst (const Image< I > & *input*, const Neighborhood< N > & *nbh*, L & *nbasins*)

Meyer's Watershed Transform (WST) algorithm.

Parameters

`[in]` ***input*** The input image.
`[in]` ***nbh*** The connexity of markers.
`[out]` ***nbasins*** The number of basins.

- `L` is the type of labels, used to number the watershed itself (with the minimal value), and the basins.
- `I` is the exact type of the input image.
- `N` is the exact type of the neighborhood used to express *input's* connexity.

Definition at line 108 of file meyer_wst.hh.

References mln::data::fill(), mln::p_priority< P, Q >::front(), mln::initialize(), mln::p_priority< P, Q >::pop(), mln::p_priority< P, Q >::push(), mln::labeling::regional_minima(), and mln::literal::zero.

9.113.2.18 template<typename L , typename I , typename N > mln::trait::ch_value< I, L >::ret mln::morpho::meyer_wst (const Image< I > & *input*, const Neighborhood< N > & *nbh*)

Meyer's Watershed Transform (WST) algorithm, with no count of basins.

Parameters

`[in]` ***input*** The input image.

`[in]` ***nbh*** The connexity of markers.

- `L` is the type of labels, used to number the watershed itself (with the minimal value), and the basins.
- `I` is the exact type of the input image.
- `N` is the exact type of the neighborhood used to express *input's* connexity.

Note that the first parameter, `L`, is not automatically valued from the type of the actual argument during implicit instantiation: you have to explicitly pass this parameter at call sites.

Definition at line 202 of file meyer_wst.hh.

9.113.2.19 template<typename I , typename J > mln::trait::concrete< I >::ret mln::morpho::min (const Image< I > & *lhs*, const Image< J > & *rhs*) `[inline]`

Morphological min: either a logical "and" (if morpho on sets) or an arithmetical min (if morpho on functions).

Definition at line 112 of file morpho/min.hh.

9.113.2.20 template<typename I , typename J > void mln::morpho::min_inplace (Image< I > & *lhs*, const Image< J > & *rhs*) `[inline]`

Morphological min, inplace version: either a logical "and" (if morpho on sets) or an arithmetical min (if morpho on functions).

Definition at line 125 of file morpho/min.hh.

9.113.2.21 template<typename I , typename J > mln::trait::concrete< I >::ret mln::morpho::minus (const Image< I > & *lhs*, const Image< J > & *rhs*) `[inline]`

Morphological minus: either a logical "and not" (if morpho on sets) or an arithmetical minus (if morpho on functions).

Definition at line 87 of file morpho/minus.hh.

Referenced by gradient(), gradient_external(), gradient_internal(), laplacian(), thin_fit(), thinning(), top_-hat_black(), mln::morpho::elementary::top_hat_black(), top_hat_self_complementary(), top_hat_white(), and mln::morpho::elementary::top_hat_white().

9.113.2.22 template< typename I , typename J > mln::trait::concrete< I >::ret mln::morpho::plus (const Image< I > & *lhs*, const Image< J > & *rhs*) [inline]

Morphological plus: either a "logical or" (if morpho on sets) or an "arithmetical plus" (if morpho on functions).

Definition at line 86 of file morpho/plus.hh.

Referenced by contrast(), thick_miss(), and thickening().

9.113.2.23 template< typename I , typename W > mln::trait::concrete< I >::ret mln::morpho::rank_filter (const Image< I > & *input*, const Window< W > & *win*, unsigned *k*) [inline]

Morphological rank_filter.

Definition at line 213 of file rank_filter.hh.

9.113.2.24 template< typename I , typename Wfg , typename Wbg > mln::trait::concrete< I >::ret mln::morpho::thick_miss (const Image< I > & *input*, const Window< Wfg > & *win_fg*, const Window< Wbg > & *win_bg*) [inline]

Morphological thick-miss.

This operator is THICK_B = Id + HMTopeBG_B, where B = (Bfg, Bbg).

Definition at line 59 of file thick_miss.hh.

References hit_or_miss_background_opening(), and plus().

9.113.2.25 template< typename I , typename Wfg , typename Wbg > mln::trait::concrete< I >::ret mln::morpho::thickening (const Image< I > & *input*, const Window< Wfg > & *win_fg*, const Window< Wbg > & *win_bg*) [inline]

Morphological thickening.

This operator is THICK_B = Id + HMT_B, where B = (Bfg, Bbg).

Definition at line 88 of file thickening.hh.

References hit_or_miss(), and plus().

Referenced by thinning().

9.113.2.26 template< typename I , typename Wfg , typename Wbg > mln::trait::concrete< I >::ret mln::morpho::thin_fit (const Image< I > & *input*, const Window< Wfg > & *win_fg*, const Window< Wbg > & *win_bg*) [inline]

Morphological thin-fit.

This operator is THIN_B = Id - HMTope_B where B = (Bfg, Bbg).

Definition at line 87 of file thin_fit.hh.

References hit_or_miss_opening(), and minus().

9.113.2.27 template<typename I , typename Wfg , typename Wbg > mln::trait::concrete< I >::ret mln::morpho::thinning (const Image< I > & *input,* const Window< Wfg > & *win_fg,* const Window< Wbg > & *win_bg*) [inline]

Morphological thinning.

This operator is THIN_B = Id - HMT_B, where B = (Bfg, Bbg).

Definition at line 90 of file thinning.hh.

References complementation(), hit_or_miss(), minus(), and thickening().

9.113.2.28 template<typename I , typename W > mln::trait::concrete< I >::ret mln::morpho::top_hat_black (const Image< I > & *input,* const Window< W > & *win*) [inline]

Morphological black top-hat (for background / dark objects).

This operator is clo_B - Id.

Definition at line 102 of file top_hat.hh.

References minus(), and mln::test::positive().

Referenced by contrast().

9.113.2.29 template<typename I , typename W > mln::trait::concrete< I >::ret mln::morpho::top_hat_self_complementary (const Image< I > & *input,* const Window< W > & *win*) [inline]

Morphological self-complementary top-hat.

This operator is

= top_hat_white + top_hat_black

= (input - opening) + (closing - input)

= closing - opening.

Definition at line 121 of file top_hat.hh.

References minus(), and mln::test::positive().

9.113.2.30 template<typename I , typename W > mln::trait::concrete< I >::ret mln::morpho::top_hat_white (const Image< I > & *input,* const Window< W > & *win*) [inline]

Morphological white top-hat (for object / light objects).

This operator is Id - ope_B.

Definition at line 83 of file top_hat.hh.

References minus(), and mln::test::positive().

Referenced by contrast().

9.114 mln::morpho::approx Namespace Reference

Namespace of approximate mathematical morphology routines.

9.114.1 Detailed Description

Namespace of approximate mathematical morphology routines.

9.115 mln::morpho::attribute Namespace Reference

Namespace of attributes used in mathematical morphology.

Classes

- class card
  Cardinality accumulator class.
- struct count_adjacent_vertices
  Count_Adjacent_Vertices accumulator class.
- struct height
  Height accumulator class.
- struct sharpness
  Sharpness accumulator class.
- class sum
  Suminality accumulator class.
- struct volume
  Volume accumulator class.

9.115.1 Detailed Description

Namespace of attributes used in mathematical morphology.

9.116 mln::morpho::closing::approx Namespace Reference

Namespace of approximate mathematical morphology closing routines.

Functions

- template<typename I , typename W >
  mln::trait::concrete< I >::ret structural (const Image< I > &input, const Window< W > &win)
  Approximate of morphological structural closing.

9.116.1 Detailed Description

Namespace of approximate mathematical morphology closing routines.

9.116.2 Function Documentation

9.116.2.1 template<typename I , typename W > mln::trait::concrete< I >::ret mln::morpho::closing::approx::structural (const Image< I > & *input*, const Window< W > & *win*) `[inline]`

Approximate of morphological structural closing.

This operator is e_{-B} o d_B.

Definition at line 65 of file closing/approx/structural.hh.

References mln::morpho::dilation(), mln::morpho::erosion(), and mln::win::sym().

9.117 mln::morpho::elementary Namespace Reference

Namespace of image processing routines of elementary mathematical morphology.

Functions

- template<typename I , typename N >
  mln::trait::concrete< I >::ret closing (const Image< I > &input, const Neighborhood< N > &nbh)

  Morphological elementary closing.

- template<typename I , typename N >
  mln_trait_op_minus_twice (typename mln::trait::concrete< I >::ret) laplacian(const Image< I > &input

  Morphological elementary laplacian.

- template<typename I , typename N >
  mln::trait::concrete< I >::ret opening (const Image< I > &input, const Neighborhood< N > &nbh)

  Morphological elementary opening.

- template<typename I , typename N >
  mln::trait::concrete< I >::ret top_hat_black (const Image< I > &input, const Neighborhood< N > &nbh)

  Morphological elementary black top-hat (for background / dark objects).

- template<typename I , typename N >
  mln::trait::concrete< I >::ret top_hat_white (const Image< I > &input, const Neighborhood< N > &nbh)

  Morphological elementary white top-hat (for object / light objects).

9.117.1 Detailed Description

Namespace of image processing routines of elementary mathematical morphology.

9.117.2 Function Documentation

9.117.2.1 template< typename I , typename N > mln::trait::concrete< I >::ret mln::morpho::elementary::closing (const Image< I > & *input*, const Neighborhood< N > & *nbh*) `[inline]`

Morphological elementary closing.

This operator is e o d.

Definition at line 58 of file closing.hh.

Referenced by top_hat_black().

9.117.2.2 template< typename I , typename N > mln::morpho::elementary::mln_-trait_op_minus_twice (typename mln::trait::concrete< I >::ret) const `[inline]`

Morphological elementary laplacian.

This operator is (d - id) - (id - e).

9.117.2.3 template< typename I , typename N > mln::trait::concrete< I >::ret mln::morpho::elementary::opening (const Image< I > & *input*, const Neighborhood< N > & *nbh*) `[inline]`

Morphological elementary opening.

This operator is d o e.

Definition at line 58 of file opening.hh.

Referenced by top_hat_white().

9.117.2.4 template< typename I , typename N > mln::trait::concrete< I >::ret mln::morpho::elementary::top_hat_black (const Image< I > & *input*, const Neighborhood< N > & *nbh*) `[inline]`

Morphological elementary black top-hat (for background / dark objects).

This operator is clo - Id.

Definition at line 105 of file elementary/top_hat.hh.

References closing(), mln::morpho::minus(), and mln::test::positive().

9.117.2.5 template< typename I , typename N > mln::trait::concrete< I >::ret mln::morpho::elementary::top_hat_white (const Image< I > & *input*, const Neighborhood< N > & *nbh*) `[inline]`

Morphological elementary white top-hat (for object / light objects).

This operator is Id - ope.

Definition at line 85 of file elementary/top_hat.hh.

References mln::morpho::minus(), opening(), and mln::test::positive().

9.118 mln::morpho::impl Namespace Reference

Namespace of mathematical morphology routines implementations.

Namespaces

- namespace generic

  Namespace of mathematical morphology routines generic implementations.

9.118.1 Detailed Description

Namespace of mathematical morphology routines implementations.

9.119 mln::morpho::impl::generic Namespace Reference

Namespace of mathematical morphology routines generic implementations.

9.119.1 Detailed Description

Namespace of mathematical morphology routines generic implementations.

9.120 mln::morpho::opening::approx Namespace Reference

Namespace of approximate mathematical morphology opening routines.

Functions

- template< typename I , typename W >
  mln::trait::concrete< I >::ret structural (const Image< I > &input, const Window< W > &win)

  Approximate of morphological structural opening.

9.120.1 Detailed Description

Namespace of approximate mathematical morphology opening routines.

9.120.2 Function Documentation

9.120.2.1 template< typename I , typename W > mln::trait::concrete< I >::ret mln::morpho::opening::approx::structural (const Image< I > & *input*, const Window< W > & *win*) `[inline]`

Approximate of morphological structural opening.

This operator is d_{-B} o e_B.

Definition at line 64 of file opening/approx/structural.hh.

References mln::morpho::dilation(), mln::morpho::erosion(), and mln::win::sym().

9.121 mln::morpho::reconstruction Namespace Reference

Namespace of morphological reconstruction routines.

Namespaces

- namespace by_dilation

  Namespace of morphological reconstruction by dilation routines.

- namespace by_erosion

  Namespace of morphological reconstruction by erosion routines.

9.121.1 Detailed Description

Namespace of morphological reconstruction routines.

9.122 mln::morpho::reconstruction::by_dilation Namespace Reference

Namespace of morphological reconstruction by dilation routines.

9.122.1 Detailed Description

Namespace of morphological reconstruction by dilation routines.

9.123 mln::morpho::reconstruction::by_erosion Namespace Reference

Namespace of morphological reconstruction by erosion routines.

9.123.1 Detailed Description

Namespace of morphological reconstruction by erosion routines.

9.124 mln::morpho::tree Namespace Reference

Namespace of morphological tree-related routines.

Namespaces

- namespace filter

  Namespace for attribute filtering.

Functions

- template< typename A , typename T >
  mln::trait::ch_value< typename T::function, typename A::result >::ret compute_attribute_image (const Accumulator< A > &a, const T &t, mln::trait::ch_value< typename T::function, A >::ret ∗accu_image=0)

  Compute an attribute image using tree with a parent relationship between sites.

- template< typename A , typename T , typename V >
  mln::trait::ch_value< typename T::function, typename A::result >::ret compute_attribute_image_from (const Accumulator< A > &a, const T &t, const Image< V > &values, mln::trait::ch_value< typename T::function, A >::ret ∗accu_image=0)

  The same as compute_attribute_image but uses the values stored by `values` image instead.

- template< typename I , typename N , typename S >
  mln::trait::ch_value< I, typename I::psite >::ret compute_parent (const Image< I > &f, const Neighborhood< N > &nbh, const Site_Set< S > &s)

  Compute a tree with a parent relationship between sites.

- template< typename I , typename N >
  data< I, p_array< typename I::psite > > dual_input_max_tree (const Image< I > &f, const Image< I > &m, const Neighborhood< N > &nbh)

  Compute the dual input max tree using mask-based connectivity.

- template< typename I , typename N >
  data< I, p_array< typename I::psite > > max_tree (const Image< I > &f, const Neighborhood< N > &nbh)

  Compute a canonized max-tree.

- template< typename I , typename N >
  data< I, p_array< typename I::psite > > min_tree (const Image< I > &f, const Neighborhood< N > &nbh)

  Compute a canonized min-tree.

- template< typename T , typename A , typename P , typename W >
  void propagate_if (const T &tree, Image< A > &a_, const way_of_propagation< W > &prop_, const Function_v2b< P > &pred_, const typename A::value &v)
- template< typename T , typename A , typename P >
  void propagate_if (const T &tree, Image< A > &a_, const desc_propagation &prop_, const Function_v2b< P > &pred_)
- template< typename T , typename A , typename W >
  void propagate_if_value (const T &tree, Image< A > &a_, const way_of_propagation< W > &prop, const typename A::value &v)
- template< typename T , typename A , typename W >
  void propagate_if_value (const T &tree, Image< A > &a_, const way_of_propagation< W > &prop_, const typename A::value &v, const typename A::value &v_prop)
- template< typename T , typename A >
  void propagate_node_to_ancestors (typename A::psite n, const T &t, Image< A > &a_, const typename A::value &v)
- template< typename T , typename A >
  void propagate_node_to_ancestors (typename A::psite n, const T &t, Image< A > &a_)
- template< typename T , typename A >
  void propagate_node_to_descendants (typename A::psite n, const T &t, Image< A > &a_, const typename A::value &v, unsigned *nb_leaves=0)
- template< typename T , typename A >
  void propagate_node_to_descendants (typename A::psite &n, const T &t, Image< A > &a_, unsigned *nb_leaves=0)
- template< typename T , typename F >
  void propagate_representative (const T &t, Image< F > &f_)

  Propagate the representative node's value to non-representative points of the component.

9.124.1 Detailed Description

Namespace of morphological tree-related routines.

9.124.2 Function Documentation

9.124.2.1 template< typename A , typename T > mln::trait::ch_value< typename T::function, typename A::result >::ret mln::morpho::tree::compute_attribute_image (const Accumulator< A > & *a*, const T & *t*, mln::trait::ch_value< typename T::function, A >::ret * *accu_image* = *0*) `[inline]`

Compute an attribute image using tree with a parent relationship between sites.

In the attribute image, the resulting value at a node is the 'sum' of its sub-components value + the attribute value at this node.

Warning: `s` translates the ordering related to the "natural" childhood relationship. The parenthood is thus inverted w.r.t. to `s`.

It is very convenient since all processing upon the parent tree are performed following `s` (in the default "forward" way).

FIXME: Put it more clearly...

The parent result image verifies:

- p is root iff parent(p) == p
- p is a node iff either p is root or f(parent(p)) != f(p).

Parameters

`[in]` ***a*** Attribute.

`[in]` ***t*** Component tree.

`[out]` ***accu_image*** Optional argument used to store image of attribute accumulator.

Returns

The attribute image.

Definition at line 216 of file compute_attribute_image.hh.

Referenced by compute_attribute_image_from().

9.124.2.2 template< typename A , typename T , typename V > mln::trait::ch_value< typename T::function, typename A::result >::ret mln::morpho::tree::compute_attribute_image_-from (const Accumulator< A > & *a*, const T & *t*, const Image< V > & *values*, mln::trait::ch_value< typename T::function, A >::ret * *accu_image* = 0) `[inline]`

The same as compute_attribute_image but uses the values stored by `values` image instead.

Parameters

`[in]` ***a*** Attribute.

`[in]` ***t*** Component tree.

`[in]` ***values*** Value image.

`[out]` ***accu_image*** Optional argument used to store image.

Returns

Definition at line 233 of file compute_attribute_image.hh.

References compute_attribute_image().

9.124.2.3 template< typename I , typename N , typename S > mln::trait::ch_value< I, typename I::psite >::ret mln::morpho::tree::compute_parent (const Image< I > & *f*, const Neighborhood< N > & *nbh*, const Site_Set< S > & *s*) `[inline]`

Compute a tree with a parent relationship between sites.

Warning: `s` translates the ordering related to the "natural" childhood relationship. The parenthood is thus inverted w.r.t. to `s`.

It is very convenient since most processing routines upon the parent tree are performed following `s` (in the default "forward" way). Indeed that is the way to propagate information from parents to children.

The parent result image verifies:

- p is root iff parent(p) == p

- p is a node iff either p is root or f(parent(p)) != f(p).

The choice "s means childhood" is consistent with labeling in binary images. In that particular case, while browsing the image in forward scan (video), we expect to find first a tree root (a first point, representative of a component) and then the other component points. Please note that it leads to increasing values of labels in the "natural" video scan.

Since mathematical morphology on functions is related to morphology on sets, we clearly want to keep the equivalence between "component labeling" and "component filtering" using trees.

FIXME: Put it more clearly... Insert pictures!

A binary image:

- | | - -
- | | - |
- - - - -
- - | | -

where '|' means true and '-' means false.

Its labeling:

0 1 1 0 0

0 1 1 0 2

0 0 0 0 0

0 0 3 3 0

The corresponding forest:

x o . x x

x . . x o

x x x x x

x x o . x

where 'x' means "no data", 'o' is a tree root (representative point for a component), and '.' is a tree regular (non-root) point (in a component by not its representative point).

The forest, with the parent relationship looks like:

o < .

^ r

. . o

o < .

Definition at line 286 of file compute_parent.hh.

9.124.2.4 template< typename I , typename N > morpho::tree::data< I, p_array< typename I::psite > > mln::morpho::tree::dual_input_max_tree (const Image< I > & *f*, const Image< I > & *m*, const Neighborhood< N > & *nbh*) `[inline]`

Compute the dual input max tree using mask-based connectivity.

Parameters

[in] ***f*** The original image.

[in] ***m*** The connectivity mask.

[in] ***nbh*** The neighborhood of the mask.

Returns

The computed tree.

Definition at line 109 of file dual_input_tree.hh.

9.124.2.5 template<typename I , typename N > data< I, p_array< typename I::psite > > mln::morpho::tree::max_tree (const Image< I > & *f*, const Neighborhood< N > & *nbh*) [inline]

Compute a canonized max-tree.

Parameters

[in] ***f*** The input image.

[in] ***nbh*** The neighborhood.

Returns

The corresponding max-tree structure.

Definition at line 100 of file component_tree.hh.

References mln::data::sort_psites_increasing().

9.124.2.6 template<typename I , typename N > data< I, p_array< typename I::psite > > mln::morpho::tree::min_tree (const Image< I > & *f*, const Neighborhood< N > & *nbh*) [inline]

Compute a canonized min-tree.

Parameters

[in] ***f*** The input image.

[in] ***nbh*** The neighborhood.

Returns

The corresponding min-tree structure.

Definition at line 77 of file component_tree.hh.

References mln::data::sort_psites_decreasing().

9.124.2.7 template<typename T , typename A , typename P , typename W > void mln::morpho::tree::propagate_if (const T & *tree*, Image< A > & *a_*, const way_of_propagation< W > & *prop_*, const Function_v2b< P > & *pred_*, const typename A::value & *v*) `[inline]`

Propagate nodes checking the predicate `pred` in the way defined by `way_of_propagation`.

Parameters

tree Component tree used for propagation.

a_ Attributed image where values are propagated.

prop_ Propagate node in acsendant or descendant way.

pred_ Predicate that node must check to be propagated.

v Value to be propagated. (By default `v` is the value at the node being propagated).

Definition at line 293 of file propagate_if.hh.

Referenced by propagate_if(), propagate_if_value(), and mln::morpho::tree::filter::subtractive().

9.124.2.8 template<typename T , typename A , typename P > void mln::morpho::tree::propagate_if (const T & *tree*, Image< A > & *a_*, const desc_propagation & *prop_*, const Function_v2b< P > & *pred_*) `[inline]`

This is an overloaded member function, provided for convenience. It differs from the above function only in what argument(s) it accepts.

Definition at line 310 of file propagate_if.hh.

References propagate_if().

9.124.2.9 template<typename T , typename A , typename W > void mln::morpho::tree::propagate_if_value (const T & *tree*, Image< A > & *a_*, const way_of_propagation< W > & *prop*, const typename A::value & *v*) `[inline]`

This is an overloaded member function, provided for convenience. It differs from the above function only in what argument(s) it accepts.

Definition at line 278 of file propagate_if.hh.

References propagate_if().

9.124.2.10 template<typename T , typename A , typename W > void mln::morpho::tree::propagate_if_value (const T & *tree*, Image< A > & *a_*, const way_of_propagation< W > & *prop_*, const typename A::value & *v*, const typename A::value & *v_prop*) `[inline]`

Propagate nodes having the value v in the way defined by `way_of_propagation`.

Parameters

tree Component tree used for propagation.

a_ Attributed image where values are propagated.

prop_ Propagate node in acsendant or descendant way.

v Value that node must have to be propagated.

v_prop Value to propagate (By default it is the value at the node being propagated).

Definition at line 262 of file propagate_if.hh.

References propagate_if().

9.124.2.11 template<typename T , typename A > void mln::morpho::tree::propagate_node_to_-ancestors (typename A::psite *n*, const T & *t*, Image< A > & *a_*, const typename A::value & *v*)

Propagate a value `v` from a node `n` to its ancestors.

Parameters

`[in]` ***n*** Node to propagate.

`[in]` ***t*** Component tree used for propagation.

`[in]` ***a_*** Attribute image where values are propagated.

`[in]` ***v*** Value to propagate.

Definition at line 170 of file propagate_node.hh.

Referenced by propagate_node_to_ancestors().

9.124.2.12 template<typename T , typename A > void mln::morpho::tree::propagate_-node_to_ancestors (typename A::psite *n*, const T & *t*, Image< A > & *a_*) `[inline]`

Propagate the node's value to its ancestors.

Parameters

`[in]` ***n*** Node to propagate.

`[in]` ***t*** Component tree used for propagation.

`[in,out]` ***a_*** Attribute image where values are propagated.

Definition at line 197 of file propagate_node.hh.

References propagate_node_to_ancestors().

9.124.2.13 template<typename T , typename A > void mln::morpho::tree::propagate_node_to_-descendants (typename A::psite *n*, const T & *t*, Image< A > & *a_*, const typename A::value & *v*, unsigned ∗ *nb_leaves* = `0`) `[inline]`

Propagate a value `v` from a node `n` to its descendants.

Parameters

`[in]` ***n*** Node to propagate.

`[in]` ***t*** Component tree used for propagation.

`[in]` ***a_*** Attribute image where values are propagated.

[in] *v* Value to propagate.

[out] *nb_leaves* Optional. Store the number of leaves in the component.

Definition at line 120 of file propagate_node.hh.

9.124.2.14 template<typename T , typename A > void mln::morpho::tree::propagate_node_to_-descendants (typename A::psite & *n*, const T & *t*, Image< A > & *a_*, unsigned * *nb_leaves* = *0*) [inline]

Propagate the node's value to its descendants.

Parameters

[in] *n* Node to propagate.

[in] *t* Component tree used for propagation.

[in] *a_* Attribute image where values are propagated.

[out] *nb_leaves* Optional. Store the number of leaves in the component.

9.124.2.15 template<typename T , typename F > void mln::morpho::tree::propagate_-representative (const T & *t*, Image< F > & *f_*) [inline]

Propagate the representative node's value to non-representative points of the component.

Parameters

t Component tree.

*f_* Value image.

Definition at line 65 of file propagate_representative.hh.

9.125 mln::morpho::tree::filter Namespace Reference

Namespace for attribute filtering.

Functions

- template<typename T , typename F , typename P >
  void direct (const T &tree, Image< F > &f_, const Function_v2b< P > &pred_)

  Direct non-pruning strategy.

- template<typename T , typename F , typename P >
  void filter (const T &tree, Image< F > &f_, const Function_v2b< P > &pred_, const typename F::value &v)

  Filter the image `f_` with a given value.

- template<typename T , typename F , typename P >
  void max (const T &tree, Image< F > &f_, const Function_v2b< P > &pred_)

Max pruning strategy.

- template<typename T , typename F , typename P >
  void min (const T &tree, Image< F > &f_, const Function_v2b< P > &pred_)

  Min pruning strategy.

- template<typename T , typename F , typename P >
  void subtractive (const T &tree, Image< F > &f_, const Function_v2b< P > &pred_)

  Subtractive pruning strategy.

9.125.1 Detailed Description

Namespace for attribute filtering.

9.125.2 Function Documentation

9.125.2.1 template<typename T , typename F , typename P > void mln::morpho::tree::filter::direct (const T & *tree,* Image< F > & *f_,* const Function_v2b< P > & *pred_*) `[inline]`

Direct non-pruning strategy.

A node is removed if it does not verify the predicate. The sub-components remain intact.

Parameters

`[in]` ***tree*** Component tree.

`[out]` ***f_*** Image to filter.

`[in]` ***pred_*** Filtering criterion.

Definition at line 73 of file direct.hh.

9.125.2.2 template<typename T , typename F , typename P > void mln::morpho::tree::filter::filter (const T & *tree,* Image< F > & *f_,* const Function_v2b< P > & *pred_,* const typename F::value & *v*) `[inline]`

Filter the image `f_` with a given value.

The sub-components of nodes that does not match the predicate `pred_` are filled with the given value `v`.

Parameters

tree Component tree.

f_ Image function.

pred_ Predicate.

v Value to propagate.

Definition at line 73 of file morpho/tree/filter/filter.hh.

References mln::data::fill(), and mln::initialize().

9.125.2.3 template<typename T , typename F , typename P > void mln::morpho::tree::filter::max (const T & *tree*, Image< F > & *f_*, const Function_v2b< P > & *pred_*) `[inline]`

Max pruning strategy.

A node is removed iif all of its children are removed or if it does not verify the predicate `pred_`.

Parameters

`[in]` ***tree*** Component tree.

`[out]` ***f_*** Image to filter.

`[in]` ***pred_*** Filtering criterion.

Definition at line 74 of file morpho/tree/filter/max.hh.

References mln::data::fill(), and mln::initialize().

9.125.2.4 template<typename T , typename F , typename P > void mln::morpho::tree::filter::min (const T & *tree*, Image< F > & *f_*, const Function_v2b< P > & *pred_*) `[inline]`

Min pruning strategy.

A node is removed iif its parent is removed or if it does not verify the predicate `pred_`.

Parameters

`[in]` ***tree*** Component tree.

`[out]` ***f_*** Image to filter.

`[in]` ***pred_*** Filtering criterion.

Definition at line 75 of file morpho/tree/filter/min.hh.

References mln::data::fill(), and mln::initialize().

9.125.2.5 template<typename T , typename F , typename P > void mln::morpho::tree::filter::subtractive (const T & *tree*, Image< F > & *f_*, const Function_v2b< P > & *pred_*) `[inline]`

Subtractive pruning strategy.

The node is removed if it does not verify the predicate. The sub-components values are set to the value of the removed component.

Parameters

`[in]` ***tree*** Component tree.

`[out]` ***f_*** Image to filter.

`[in]` ***pred_*** Filtering criterion.

Definition at line 77 of file subtractive.hh.

References mln::morpho::tree::propagate_if().

9.126 mln::morpho::watershed Namespace Reference

Namespace of morphological watershed routines.

Namespaces

- namespace watershed

  Namespace of morphological watershed routines implementations.

Functions

- template<typename L , typename I , typename N >
  mln::trait::ch_value< I, L >::ret flooding (const Image< I > &input, const Neighborhood< N > &nbh, L &n_basins)

  Meyer's Watershed Transform (WST) algorithm.

- template<typename L , typename I , typename N >
  mln::trait::ch_value< I, L >::ret flooding (const Image< I > &input, const Neighborhood< N > &nbh)

  Meyer's Watershed Transform (WST) algorithm, with no count of basins.

- template<typename I , typename J >
  mln::trait::ch_value< I, value::rgb8 >::ret superpose (const Image< I > &input, const Image< J > &ws_ima)

  Convert an image to a rgb8 image and draw the watershed lines.

- template<typename I , typename J >
  mln::trait::ch_value< I, value::rgb8 >::ret superpose (const Image< I > &input_, const Image< J > &ws_ima_, const value::rgb8 &wsl_color)

  Convert an image to a rgb8 image and draw the watershed lines.

- template<class T >
  T::image_t topological (T &tree)

  Compute a toological watershed transform from tree.

9.126.1 Detailed Description

Namespace of morphological watershed routines.

9.126.2 Function Documentation

9.126.2.1 template<typename L , typename I , typename N > mln::trait::ch_value< I, L >::ret mln::morpho::watershed::flooding (const Image< I > & *input*, const Neighborhood< N > & *nbh*, L & *n_basins*) `[inline]`

Meyer's Watershed Transform (WST) algorithm.

Parameters

`[in]` ***input*** The input image.
`[in]` ***nbh*** The connexity of markers.
`[out]` ***n_basins*** The number of basins.

- `L` is the type of labels, used to number the watershed itself (with the minimal value), and the basins.
- `I` is the exact type of the input image.
- `N` is the exact type of the neighborhood used to express *input's* connexity.

Definition at line 381 of file flooding.hh.

9.126.2.2 template<typename L , typename I , typename N > mln::trait::ch_value< I, L >::ret mln::morpho::watershed::flooding (const Image< I > & *input*, const Neighborhood< N > & *nbh*)

Meyer's Watershed Transform (WST) algorithm, with no count of basins.

Parameters

`[in]` ***input*** The input image.
`[in]` ***nbh*** The connexity of markers.

- `L` is the type of labels, used to number the watershed itself (with the minimal value), and the basins.
- `I` is the exact type of the input image.
- `N` is the exact type of the neighborhood used to express *input's* connexity.

Note that the first parameter, `L`, is not automatically valued from the type of the actual argument during implicit instantiation: you have to explicitly pass this parameter at call sites.

Definition at line 396 of file flooding.hh.

9.126.2.3 template<typename I , typename J > mln::trait::ch_value< I, value::rgb8 >::ret mln::morpho::watershed::superpose (const Image< I > & *input*, const Image< J > & *ws_ima*) `[inline]`

Convert an image to a rgb8 image and draw the watershed lines.

Definition at line 109 of file morpho/watershed/superpose.hh.

References mln::literal::red, and superpose().

9.126.2.4 template<typename I , typename J > mln::trait::ch_value< I, value::rgb8 >::ret mln::morpho::watershed::superpose (const Image< I > & *input_*, const Image< J > & *ws_ima_*, const value::rgb8 & *wsl_color*) `[inline]`

Convert an image to a rgb8 image and draw the watershed lines.

Definition at line 85 of file morpho/watershed/superpose.hh.

References mln::data::convert(), mln::data::fill(), and mln::literal::zero.

Referenced by superpose().

9.126.2.5 template< class T > T::image_t mln::morpho::watershed::topological (T & *tree*)

Compute a toological watershed transform from *tree*.

Definition at line 675 of file topological.hh.

References mln::data::fill(), mln::p_priority< P, Q >::front(), mln::initialize(), mln::p_priority< P, Q >::pop(), mln::p_priority< P, Q >::push(), and topological().

Referenced by topological().

9.127 mln::morpho::watershed::watershed Namespace Reference

Namespace of morphological watershed routines implementations.

Namespaces

- namespace generic

  Namespace of morphological watershed routines generic implementations.

9.127.1 Detailed Description

Namespace of morphological watershed routines implementations.

9.128 mln::morpho::watershed::watershed::generic Namespace Reference

Namespace of morphological watershed routines generic implementations.

9.128.1 Detailed Description

Namespace of morphological watershed routines generic implementations.

9.129 mln::norm Namespace Reference

Namespace of norms.

Namespaces

- namespace impl

  Implementation namespace of norm namespace.

Functions

- template< unsigned n, typename C >
  mln::trait::value_< typename mln::trait::op::times< C, C >::ret >::sum l2 (const C(&vec)[n])
  L2-norm of a vector vec.
- template< unsigned n, typename C >
  mln::trait::value_< typename mln::trait::op::times< C, C >::ret >::sum l1 (const C(&vec)[n])
  L1-norm of a vector vec.
- template< unsigned n, typename C >
  mln::trait::value_< typename mln::trait::op::times< C, C >::ret >::sum l1_distance (const C(&vec1)[n], const C(&vec2)[n])
  L1-norm distance between vectors vec1 and vec2.
- template< unsigned n, typename C >
  mln::trait::value_< typename mln::trait::op::times< C, C >::ret >::sum sqr_l2 (const C(&vec)[n])
  Squared L2-norm of a vector vec.
- template< unsigned n, typename C >
  mln::trait::value_< typename mln::trait::op::times< C, C >::ret >::sum l2_distance (const C(&vec1)[n], const C(&vec2)[n])
  L2-norm distance between vectors vec1 and `vec2`.
- template< unsigned n, typename C >
  C linfty (const C(&vec)[n])
  L-infinity-norm of a vector vec.
- template< unsigned n, typename C >
  C linfty_distance (const C(&vec1)[n], const C(&vec2)[n])
  L-infinity-norm distance between vectors vec1 and vec2.

9.129.1 Detailed Description

Namespace of norms.

9.129.2 Function Documentation

9.129.2.1 template< unsigned n, typename C > mln::trait::value_< typename mln::trait::op::times< C, C >::ret >::sum mln::norm::l1 (const C(&) *vec[n]*) `[inline]`

L1-norm of a vector *vec*.

Definition at line 108 of file l1.hh.

9.129.2.2 template< unsigned n, typename C > mln::trait::value_< typename mln::trait::op::times< C, C >::ret >::sum mln::norm::l1_distance (const C(&) *vec1[n]*, const C(&) *vec2[n]*) [inline]

L1-norm distance between vectors *vec1* and *vec2*.

Definition at line 124 of file l1.hh.

9.129.2.3 template< unsigned n, typename C > mln::trait::value_< typename mln::trait::op::times< C, C >::ret >::sum mln::norm::l2 (const C(&) *vec[n]*) [inline]

L2-norm of a vector *vec*.

Definition at line 139 of file l2.hh.

9.129.2.4 template< unsigned n, typename C > mln::trait::value_< typename mln::trait::op::times< C, C >::ret >::sum mln::norm::l2_distance (const C(&) *vec1[n]*, const C(&) *vec2[n]*) [inline]

L2-norm distance between vectors *vec1* and `vec2`.

Definition at line 173 of file l2.hh.

9.129.2.5 template< unsigned n, typename C > C mln::norm::linfty (const C(&) *vec[n]*) [inline]

L-infinity-norm of a vector *vec*.

Definition at line 113 of file linfty.hh.

9.129.2.6 template< unsigned n, typename C > C mln::norm::linfty_distance (const C(&) *vec1[n]*, const C(&) *vec2[n]*) [inline]

L-infinity-norm distance between vectors *vec1* and *vec2*.

Definition at line 127 of file linfty.hh.

9.129.2.7 template< unsigned n, typename C > mln::trait::value_< typename mln::trait::op::times< C, C >::ret >::sum mln::norm::sqr_l2 (const C(&) *vec[n]*) [inline]

Squared L2-norm of a vector *vec*.

Definition at line 156 of file l2.hh.

Referenced by mln::geom::mesh_corner_point_area(), and mln::geom::mesh_normal().

9.130 mln::norm::impl Namespace Reference

Implementation namespace of norm namespace.

9.130.1 Detailed Description

Implementation namespace of norm namespace.

9.131 mln::opt Namespace Reference

Namespace of optional routines.

Namespaces

- namespace impl

  Implementation namespace of opt namespace.

Functions

- template< typename I >
  I::rvalue at (const Image< I > &ima, def::coord ind)

  One dimension Read-only access to the `ima` value located at (`ind`).

- template< typename I >
  I::lvalue at (Image< I > &ima, def::coord ind)

  Read-write access to the `ima` value located at (`ind`).

- template< typename I >
  I::lvalue at (Image< I > &ima, def::coord row, def::coord col)

  Read-write access to the `ima` value located at (`row, col`).

- template< typename I >
  I::rvalue at (const Image< I > &ima, def::coord sli, def::coord row, def::coord col)

  Three dimensions Read-only access to the `ima` value located at (`sli, row, col`).

- template< typename I >
  I::rvalue at (const Image< I > &ima, def::coord row, def::coord col)

  Two dimensions Read-only access to the `ima` value located at (`row, col`).

- template< typename I >
  I::lvalue at (Image< I > &ima, def::coord sli, def::coord row, def::coord col)

  Read-write access to the `ima` value located at (`sli, row, col`).

9.131.1 Detailed Description

Namespace of optional routines.

9.131.2 Function Documentation

9.131.2.1 template< typename I > I::rvalue mln::opt::at (const Image< I > & *ima*, def::coord *ind*) [inline]

One dimension Read-only access to the `ima` value located at (`ind`).

Definition at line 151 of file at.hh.

Referenced by mln::transform::hough(), and mln::make::image().

9.131.2.2 template< typename I > I::lvalue mln::opt::at (Image< I > & *ima*, def::coord *ind*)

Read-write access to the `ima` value located at (`ind`).

Definition at line 160 of file at.hh.

9.131.2.3 template< typename I > I::lvalue mln::opt::at (Image< I > & *ima*, def::coord *row*, def::coord *col*)

Read-write access to the `ima` value located at (`row`, `col`).

Definition at line 245 of file at.hh.

9.131.2.4 template< typename I > I::rvalue mln::opt::at (const Image< I > & *ima*, def::coord *sli*, def::coord *row*, def::coord *col*) [inline]

Three dimensions Read-only access to the `ima` value located at (`sli`, `row`, `col`).

Definition at line 320 of file at.hh.

9.131.2.5 template< typename I > I::rvalue mln::opt::at (const Image< I > & *ima*, def::coord *row*, def::coord *col*) [inline]

Two dimensions Read-only access to the `ima` value located at (`row`, `col`).

Definition at line 236 of file at.hh.

9.131.2.6 template< typename I > I::lvalue mln::opt::at (Image< I > & *ima*, def::coord *sli*, def::coord *row*, def::coord *col*)

Read-write access to the `ima` value located at (`sli`, `row`, `col`).

Definition at line 330 of file at.hh.

9.132 mln::opt::impl Namespace Reference

Implementation namespace of opt namespace.

9.132.1 Detailed Description

Implementation namespace of opt namespace. Three dimensions.

Two dimensions.

One dimension.

9.133 mln::pw Namespace Reference

Namespace of "point-wise" expression tools.

Classes

- class image

  A generic point-wise image implementation.

9.133.1 Detailed Description

Namespace of "point-wise" expression tools.

9.134 mln::registration Namespace Reference

Namespace of "point-wise" expression tools.

Classes

- class closest_point_basic

  Closest point functor based on map distance.

- class closest_point_with_map

  Closest point functor based on map distance.

Functions

- template< typename P , typename F >
  algebra::quat get_rot (const p_array< P > &P_, const vec3d_f &mu_P, const vec3d_f &mu_Yk, const F &closest_point, const algebra::quat &qR, const vec3d_f &qT)

  FIXME: work only for 3d images.

- template< typename P , typename F >
  std::pair< algebra::quat, mln_vec(P)> icp (const p_array< P > &P_, const p_array< P > &X, const F &closest_point, const algebra::quat &initial_rot, const mln_vec(P)&initial_translation)

  Base version of the ICP algorithm. It is called in other variants.

- template<typename P , typename F >
  composed< translation< P::dim, float >, rotation< P::dim, float > > icp (const p_array< P > &P_, const p_array< P > &X, const F &closest_point)
- template<typename P >
  composed< translation< P::dim, float >, rotation< P::dim, float > > registration1 (const box< P > &domain, const p_array< P > &P_, const p_array< P > &X)

  Call ICP once and return the resulting transformation.
- template<typename P >
  composed< translation< P::dim, float >, rotation< P::dim, float > > registration2 (const box< P > &domain, const p_array< P > &P_, const p_array< P > &X)

  Call ICP 10 times.
- template<typename P >
  composed< translation< P::dim, float >, rotation< P::dim, float > > registration3 (const box< P > &domain, const p_array< P > &P_, const p_array< P > &X)

  Call ICP 10 times.

9.134.1 Detailed Description

Namespace of "point-wise" expression tools.

9.134.2 Function Documentation

9.134.2.1 template<typename P , typename F > algebra::quat mln::registration::get_rot (const p_array< P > & *P_*, const vec3d_f & *mu_P*, const vec3d_f & *mu_Yk*, const F & *closest_point*, const algebra::quat & *qR*, const vec3d_f & *qT*)

FIXME: work only for 3d images.

Definition at line 527 of file icp.hh.

References mln::p_array< P >::nsites().

9.134.2.2 template<typename P , typename F > std::pair< algebra::quat, mln_vec(P)> mln::registration::icp (const p_array< P > & *P_*, const p_array< P > & *X*, const F & *closest_point*, const algebra::quat & *initial_rot*, const mln_vec(P)& *initial_translation*) `[inline]`

Base version of the ICP algorithm. It is called in other variants.

Register point in `c` using a function of closest points `closest_point`. This overload allows to specify initial transformations.

Parameters

`[in]` ***P_*** The cloud of points.

`[in]` ***X*** the reference surface.

`[in]` ***closest_point*** The function of closest points.

`[in]` ***initial_rot*** An initial rotation.

[in] ***initial_translation*** An initial translation.

Returns

the rigid transformation which may be use later to create a registered image.

WARNING: the function `closest_point` *MUST* take float/double vector as arguments. Otherwise the resulting transformation may be wrong due to the truncation of the vector coordinate values.

Precondition

`P_` and `X` must not be empty.

Reference article: "A Method for Registration of 3-D Shapes", Paul J. Besl and Neil D. McKay, IEEE, 2, February 1992.

Definition at line 612 of file icp.hh.

References mln::geom::bbox(), mln::literal::black, mln::set::compute(), mln::duplicate(), mln::box< P >::enlarge(), mln::data::fill(), mln::literal::green, mln::io::ppm::save(), and mln::literal::white.

9.134.2.3 template<typename P , typename F > composed< translation<P::dim,float>,rotation<P::dim,float> > mln::registration::icp (const p_array< P > & *P_*, const p_array< P > & *X*, const F & *closest_point*)

Register point in `c` using a function of closest points `closest_point`.

Parameters

[in] ***P_*** The cloud of points.

[in] ***X*** the reference surface.

[in] ***closest_point*** The function of closest points.

Returns

the rigid transformation which may be use later to create a registered image.

9.134.2.4 template<typename P > composed< translation< P::dim, float >, rotation< P::dim, float > > mln::registration::registration1 (const box< P > & *domain*, const p_array< P > & *P_*, const p_array< P > & *X*) [inline]

Call ICP once and return the resulting transformation.

Definition at line 325 of file registration.hh.

9.134.2.5 template<typename P > composed< translation< P::dim, float >, rotation< P::dim, float > > mln::registration::registration2 (const box< P > & *domain*, const p_array< P > & *P_*, const p_array< P > & *X*) [inline]

Call ICP 10 times.

Do the first call to ICP with all sites then work on a subset of which size is decreasing. For each call, a distance criterion is computed on a subset. Sites part of the subset which are too far or too close are removed. Removed sites are *NOT* reused later in the subset.

Definition at line 345 of file registration.hh.

9.134.2.6 template<typename P > composed< translation< P::dim, float >, rotation< P::dim, float > > mln::registration::registration3 (const box< P > & *domain*, const p_array< P > & *P_*, const p_array< P > & *X*) [inline]

Call ICP 10 times.

Do the first call to ICP with all sites then work on a subset. For each call, a distance criterion is computed on a subset. A new subset is computed from the whole set of points according to this distance. It will be used in the next call. Removed Sites ∗MAY∗ be reintegrated.

Definition at line 365 of file registration.hh.

9.135 mln::select Namespace Reference

Select namespace (FIXME doc).

Classes

- struct p_of

  Structure p_of.

9.135.1 Detailed Description

Select namespace (FIXME doc).

9.136 mln::set Namespace Reference

Namespace of image processing routines related to pixel sets.

Functions

- template<typename S >
  unsigned card (const Site_Set< S > &s)

  Compute the cardinality of the site set s.

- template<typename A , typename S >
  A::result compute (const Accumulator< A > &a, const Site_Set< S > &s)

  Compute an accumulator onto a site set.

- template<typename A , typename I >
  A::result compute_with_weights (const Accumulator< A > &a, const Image< I > &w)

  Compute an accumulator on a site set described by an image.

- template<typename S >
  S::site get (const Site_Set< S > &s, size_t index)

  FIXME.

- template< typename S >
  bool has (const Site_Set< S > &s, const typename S::site &e)
  FIXME.
- template< typename A , typename I >
  mln_meta_accu_result (A, typename I::site) compute_with_weights(const Meta_Accumulator< A > &a
  Compute an accumulator on a site set described by an image.
- template< typename A , typename S >
  mln_meta_accu_result (A, typename S::site) compute(const Meta_Accumulator< A > &a
  Compute an accumulator onto a site set.

9.136.1 Detailed Description

Namespace of image processing routines related to pixel sets.

9.136.2 Function Documentation

9.136.2.1 template< typename S > unsigned mln::set::card (const Site_Set< S > & *s*) `[inline]`

Compute the cardinality of the site set `s`.

Definition at line 134 of file set/card.hh.

9.136.2.2 template< typename A , typename S > A::result mln::set::compute (const Accumulator< A > & *a*, const Site_Set< S > & *s*) `[inline]`

Compute an accumulator onto a site set.

Parameters

`[in]` ***a*** An accumulator.

`[in]` ***s*** A site set.

Returns

The accumulator result.

Definition at line 112 of file set/compute.hh.

Referenced by mln::registration::icp().

9.136.2.3 template< typename A , typename I > A::result mln::set::compute_with_weights (const Accumulator< A > & *a*, const Image< I > & *w*) `[inline]`

Compute an accumulator on a site set described by an image.

Parameters

`[in]` ***a*** An accumulator.

`[in]` ***w*** An image of weights (a site -> a weight).

Returns

The accumulator result.

Definition at line 217 of file compute_with_weights.hh.

9.136.2.4 template<typename S > S::site mln::set::get (const Site_Set< S > & *s*, size_t *index*)

FIXME.

Definition at line 56 of file set/get.hh.

9.136.2.5 template<typename S > bool mln::set::has (const Site_Set< S > & *s*, const typename S::site & *e*)

FIXME.

Definition at line 56 of file set/has.hh.

9.136.2.6 template<typename A , typename I > mln::set::mln_meta_accu_result (A , typename I::site) const [inline]

Compute an accumulator on a site set described by an image.

Parameters

`[in]` ***a*** A meta-accumulator.

`[in]` ***w*** An image of weights (a site -> a weight).

Returns

The accumulator result.

9.136.2.7 template<typename A , typename S > mln::set::mln_meta_accu_result (A , typename S::site) const

Compute an accumulator onto a site set.

Parameters

`[in]` ***a*** A meta-accumulator.

`[in]` ***s*** A site set.

9.137 mln::subsampling Namespace Reference

Namespace of "point-wise" expression tools.

Functions

- template< typename I >
  mln::trait::concrete< I >::ret antialiased (const Image< I > &input, unsigned factor, const typename I::domain_t &output_domain, unsigned border_thickness)

  Antialiased subsampling.

- template< typename I >
  mln::trait::concrete< I >::ret antialiased (const Image< I > &input, unsigned factor)
- template< typename I >
  mln::trait::concrete< I >::ret gaussian_subsampling (const Image< I > &input, float sigma, const typename I::dpsite &first_p, const typename I::site::coord &gap)

  Gaussian subsampling FIXME : doxy.

- template< typename I >
  mln::trait::concrete< I >::ret subsampling (const Image< I > &input, const typename I::site::delta &first_p, const typename I::site::coord &gap)

  Subsampling FIXME : doxy.

9.137.1 Detailed Description

Namespace of "point-wise" expression tools.

9.137.2 Function Documentation

9.137.2.1 template< typename I > mln::trait::concrete< I >::ret mln::subsampling::antialiased (const Image< I > & *input*, unsigned *factor*, const typename I::domain_t & *output_domain*, unsigned *border_thickness*) `[inline]`

Antialiased subsampling.

Parameters

`[in]` ***input*** A gray-level image.

`[in]` ***factor*** Subsampling ratio. Must be divisible by 2 or 3.

`[in]` ***output_domain*** Force output domain.

`[in]` ***border_thickness*** Force output border thickness.

Definition at line 418 of file antialiased.hh.

Referenced by antialiased().

9.137.2.2 template< typename I > mln::trait::concrete< I >::ret mln::subsampling::antialiased (const Image< I > & *input*, unsigned *factor*) `[inline]`

This is an overloaded member function, provided for convenience. It differs from the above function only in what argument(s) it accepts.

Definition at line 443 of file antialiased.hh.

References antialiased().

9.137.2.3 template< typename I > mln::trait::concrete< I >::ret mln::subsampling::gaussian_-subsampling (const Image< I > & *input*, float *sigma*, const typename I::dpsite & *first_p*, const typename I::site::coord & *gap*) `[inline]`

Gaussian subsampling FIXME : doxy.

Definition at line 62 of file gaussian_subsampling.hh.

References mln::linear::gaussian(), mln::geom::ncols(), and mln::geom::nrows().

9.137.2.4 template< typename I > mln::trait::concrete< I >::ret mln::subsampling::subsampling (const Image< I > & *input*, const typename I::site::delta & *first_p*, const typename I::site::coord & *gap*) `[inline]`

Subsampling FIXME : doxy.

Definition at line 91 of file subsampling.hh.

References mln::geom::ncols(), and mln::geom::nrows().

9.138 mln::tag Namespace Reference

Namespace of image processing routines related to tags.

9.138.1 Detailed Description

Namespace of image processing routines related to tags.

9.139 mln::test Namespace Reference

Namespace of image processing routines related to pixel tests.

Namespaces

- namespace impl

  Implementation namespace of test namespace.

Functions

- template< typename I >
  bool positive (const Image< I > &input)

  Test if an image only contains positive values.

- template< typename S , typename F >
  bool predicate (const Site_Set< S > &pset, const Function_v2b< F > &f)

  Test if all points of `pset` verify the predicate `f`.

- template<typename I , typename J , typename F >
  bool predicate (const Image< I > &lhs, const Image< J > &rhs, const Function_vv2b< F > &f)

  Test if all pixel values of `lhs` *and* `rhs` *verify the predicate* `f`.

- template<typename I , typename F >
  bool predicate (const Image< I > &ima, const Function_v2b< F > &f)

  Test if all pixel values of `ima` *verify the predicate* `f`.

9.139.1 Detailed Description

Namespace of image processing routines related to pixel tests.

9.139.2 Function Documentation

9.139.2.1 template<typename I > bool mln::test::positive (const Image< I > & *input*) [inline]

Test if an image only contains positive values.

Definition at line 54 of file positive.hh.

References predicate(), and mln::literal::zero.

Referenced by mln::morpho::gradient(), mln::morpho::gradient_external(), mln::morpho::gradient_internal(), mln::morpho::top_hat_black(), mln::morpho::elementary::top_hat_black(), mln::morpho::top_hat_self_complementary(), mln::morpho::top_hat_white(), and mln::morpho::elementary::top_hat_white().

9.139.2.2 template<typename S , typename F > bool mln::test::predicate (const Site_Set< S > & *pset*, const Function_v2b< F > & *f*) [inline]

Test if all points of `pset` verify the predicate `f`.

Parameters

[in] ***pset*** The point set.

[in] ***f*** The predicate.

Definition at line 242 of file predicate.hh.

9.139.2.3 template<typename I , typename J , typename F > bool mln::test::predicate (const Image< I > & *lhs*, const Image< J > & *rhs*, const Function_vv2b< F > & *f*) [inline]

Test if all pixel values of `lhs` and `rhs` verify the predicate `f`.

Parameters

[in] ***lhs*** The image.

[in] ***rhs*** The image.

`[in]` ***f*** The predicate.

Definition at line 222 of file predicate.hh.

9.139.2.4 template<typename I , typename F > bool mln::test::predicate (const Image< I > & *ima*, const Function_v2b< F > & *f*) `[inline]`

Test if all pixel values of `ima` verify the predicate `f`.

Parameters

`[in]` ***ima*** The image.

`[in]` ***f*** The predicate.

Definition at line 207 of file predicate.hh.

Referenced by mln::operator<(), mln::operator<=(), mln::operator==(), and positive().

9.140 mln::test::impl Namespace Reference

Implementation namespace of test namespace.

9.140.1 Detailed Description

Implementation namespace of test namespace.

9.141 mln::topo Namespace Reference

Namespace of "point-wise" expression tools.

Classes

- class adj_higher_dim_connected_n_face_bkd_iter

  Backward iterator on all the n-faces sharing an adjacent (n+1)-face with a (reference) n-face of an mln::complex<D>.

- class adj_higher_dim_connected_n_face_fwd_iter

  Forward iterator on all the n-faces sharing an adjacent (n+1)-face with a (reference) n-face of an mln::complex<D>.

- class adj_higher_face_bkd_iter

  Backward iterator on all the adjacent (n+1)-faces of the n-face of an mln::complex<D>.

- class adj_higher_face_fwd_iter

  Forward iterator on all the adjacent (n+1)-faces of the n-face of an mln::complex<D>.

- class adj_lower_dim_connected_n_face_bkd_iter

Backward iterator on all the n-faces sharing an adjacent (n-1)-face with a (reference) n-face of an mln::complex<D>.

- class adj_lower_dim_connected_n_face_fwd_iter

  Forward iterator on all the n-faces sharing an adjacent (n-1)-face with a (reference) n-face of an mln::complex<D>.

- class adj_lower_face_bkd_iter

  Backward iterator on all the adjacent (n-1)-faces of the n-face of an mln::complex<D>.

- class adj_lower_face_fwd_iter

  Forward iterator on all the adjacent (n-1)-faces of the n-face of an mln::complex<D>.

- class adj_lower_higher_face_bkd_iter

  Forward iterator on all the adjacent (n-1)-faces and (n+1)-faces of the n-face of an mln::complex<D>.

- class adj_lower_higher_face_fwd_iter

  Forward iterator on all the adjacent (n-1)-faces and (n+1)-faces of the n-face of an mln::complex<D>.

- class adj_m_face_bkd_iter

  Backward iterator on all the m-faces transitively adjacent to a (reference) n-face in a complex.

- class adj_m_face_fwd_iter

  Forward iterator on all the m-faces transitively adjacent to a (reference) n-face in a complex.

- class algebraic_face

  Algebraic face handle in a complex; the face dimension is dynamic.

- class algebraic_n_face

  Algebraic `N-face` handle in a complex.

- class center_only_iter

  Iterator on all the adjacent (n-1)-faces of the n-face of an mln::complex<D>.

- class centered_bkd_iter_adapter

  Forward complex relative iterator adapters adding the central (reference) point to the set of iterated faces.

- class centered_fwd_iter_adapter

  Backward complex relative iterator adapters adding the central (reference) point to the set of iterated faces.

- class complex

  General complex of dimension `D`.

- class face

  Face handle in a complex; the face dimension is dynamic.

- class face_bkd_iter

  Backward iterator on all the faces of an mln::complex<D>.

- class face_fwd_iter

Forward iterator on all the faces of an mln::complex<D>.

- struct is_n_face

  A functor testing wheter a mln::complex_psite is an N *-face.*

- struct is_simple_2d_t

  Test if a point is simple or not.

- class is_simple_cell

  A predicate for the simplicity of a point based on the collapse property of the attachment.

- class n_face

  `N-face` *handle in a complex.*

- class n_face_bkd_iter

  Backward iterator on all the faces of an mln::complex<D>.

- class n_face_fwd_iter

  Forward iterator on all the faces of an mln::complex<D>.

- class n_faces_set

  Set of face handles of dimension `N`*.*

- class static_n_face_bkd_iter

  Backward iterator on all the `N-faces` *of a mln::complex<D>.*

- class static_n_face_fwd_iter

  Forward iterator on all the `N-faces` *of a mln::complex<D>.*

Functions

- template<unsigned D, typename G >
  void detach (const complex_psite< D, G > &f, complex_image< D, G, bool > &ima)

  Detach the cell corresponding to f from ima.

- template<unsigned D, typename G >
  bool is_facet (const complex_psite< D, G > &f)

  Is f a facet, i.e., a face not "included in" (adjacent to) a face of higher dimension?

- template<unsigned D>
  algebraic_face< D > make_algebraic_face (const face< D > &f, bool sign)

  Create an algebraic face handle of a `D-complex`*.*

- template<unsigned D>
  std::ostream & operator<< (std::ostream &ostr, const face< D > &f)

  Print an mln::topo::face.

- template<unsigned N, unsigned D>
  std::ostream & operator<< (std::ostream &ostr, const n_face< N, D > &f)

Print an mln::topo::n_face.

- template<unsigned D>
  std::ostream & operator<< (std::ostream &ostr, const complex< D > &c)
  Pretty print a complex.

- template<unsigned D>
  std::ostream & operator<< (std::ostream &ostr, const algebraic_face< D > &f)
  Print an mln::topo::algebraic_face.

- template<unsigned N, unsigned D>
  std::ostream & operator<< (std::ostream &ostr, const algebraic_n_face< N, D > &f)
  Print an mln::topo::algebraic_n_face.

- template<unsigned D>
  bool operator== (const complex< D > &lhs, const complex< D > &rhs)
  Compare two complexes for equality.

  - template<unsigned D>
    algebraic_face< D > operator- (const face< D > &f)
    Inversion operators.

  - template<unsigned D>
    bool operator== (const algebraic_face< D > &lhs, const algebraic_face< D > &rhs)
    Comparison of two instances of mln::topo::algebraic_face.
  - template<unsigned D>
    bool operator!= (const algebraic_face< D > &lhs, const algebraic_face< D > &rhs)
    Is lhs different from rhs?
  - template<unsigned D>
    bool operator< (const algebraic_face< D > &lhs, const algebraic_face< D > &rhs)
    Is lhs "less" than rhs?

  - template<unsigned N, unsigned D>
    algebraic_n_face< N, D > operator- (const n_face< N, D > &f)
    Inversion operators.

  - template<unsigned N, unsigned D>
    bool operator== (const algebraic_n_face< N, D > &lhs, const algebraic_n_face< N, D > &rhs)
    Comparison of two instances of mln::topo::algebraic_n_face.
  - template<unsigned N, unsigned D>
    bool operator!= (const algebraic_n_face< N, D > &lhs, const algebraic_n_face< N, D > &rhs)
    Is lhs different from rhs?
  - template<unsigned N, unsigned D>
    bool operator< (const algebraic_n_face< N, D > &lhs, const algebraic_n_face< N, D > &rhs)

Is lhs "less" than rhs?

- template<unsigned D>
algebraic_n_face< 1, D > edge (const n_face< 0, D > &f1, const n_face< 0, D > &f2)

  Helpers.

- template<unsigned D>
bool operator== (const face< D > &lhs, const face< D > &rhs)

  Comparison of two instances of mln::topo::face.

- template<unsigned D>
bool operator!= (const face< D > &lhs, const face< D > &rhs)

  Is lhs different from rhs?

- template<unsigned D>
bool operator< (const face< D > &lhs, const face< D > &rhs)

  Is lhs "less" than rhs?

- template<unsigned N, unsigned D>
bool operator== (const n_face< N, D > &lhs, const n_face< N, D > &rhs)

  Comparison of two instances of mln::topo::n_face.

- template<unsigned N, unsigned D>
bool operator!= (const n_face< N, D > &lhs, const n_face< N, D > &rhs)

  Is lhs different from rhs?

- template<unsigned N, unsigned D>
bool operator< (const n_face< N, D > &lhs, const n_face< N, D > &rhs)

  Is lhs "less" than rhs?

- template<unsigned N, unsigned D>
n_faces_set< N, D > operator+ (const algebraic_n_face< N, D > &f1, const algebraic_n_face< N, D > &f2)

  Addition.

- template<unsigned N, unsigned D>
n_faces_set< N, D > operator- (const algebraic_n_face< N, D > &f1, const algebraic_n_face< N, D > &f2)

  Subtraction.

9.141.1 Detailed Description

Namespace of "point-wise" expression tools.

9.141.2 Function Documentation

9.141.2.1 template< unsigned D, typename G > void mln::topo::detach (const complex_psite< D, G > & *f*, complex_image< D, G, bool > & *ima*) [inline]

Detach the cell corresponding to *f* from *ima*.

Precondition

f is a facet (it does not belong to any face of higher dimension).
ima is an image of Boolean values.

Definition at line 58 of file detach.hh.

References mln::make::detachment(), mln::data::fill(), and is_facet().

9.141.2.2 template< unsigned D> algebraic_n_face< 1, D > mln::topo::edge (const n_face< 0, D > & *f1*, const n_face< 0, D > & *f2*)

Helpers.

Return the algebraic 1-face (edge) linking the 0-faces (vertices) *f1* and *f2*. If there is no 1-face between *f1* and *f2*, return an invalid 1-face.

Precondition

f1 and *f2* must belong to the same complex.

Note: this routine assumes the complex is not degenerated, i.e,

- it does not check that *f1* and *f2* are the only 0-faces adjacent to an hypothetical 1-face; it just checks that *f1* and *f2* *share* a common 1-face;
- if there are several ajacent 1-faces shared by *f1* and *f2* (if the complex is ill-formed), there is no guarantee on the returned 1-face (the current implementation return the first 1-face found, but client code should not rely on this implementation-defined behavior).

Definition at line 286 of file algebraic_n_face.hh.

References mln::topo::n_face< N, D >::higher_dim_adj_faces().

9.141.2.3 template< unsigned D, typename G > bool mln::topo::is_facet (const complex_psite< D, G > & *f*) [inline]

Is *f* a facet, i.e., a face not “included in” (adjacent to) a face of higher dimension?

Definition at line 58 of file is_facet.hh.

Referenced by mln::make::attachment(), mln::make::cell(), detach(), and mln::make::detachment().

9.141.2.4 template< unsigned D> algebraic_face< D > mln::topo::make_algebraic_face (const face< D > & *f*, bool *sign*)

Create an algebraic face handle of a `D-complex`.

Definition at line 211 of file algebraic_face.hh.

9.141.2.5 template<unsigned D> bool mln::topo::operator!= (const algebraic_face< D > & *lhs*, const algebraic_face< D > & *rhs*) [inline]

Is *lhs* different from *rhs*?

Precondition

Arguments *lhs* and *rhs* must belong to the same mln::topo::complex.

Definition at line 250 of file algebraic_face.hh.

References mln::topo::face< D >::cplx().

9.141.2.6 template<unsigned D> bool mln::topo::operator!= (const face< D > & *lhs*, const face< D > & *rhs*) [inline]

Is *lhs* different from *rhs*?

Precondition

Arguments *lhs* and *rhs* must belong to the same mln::topo::complex.

Definition at line 394 of file face.hh.

References mln::topo::face< D >::cplx().

9.141.2.7 template<unsigned N, unsigned D> bool mln::topo::operator!= (const algebraic_n_face< N, D > & *lhs*, const algebraic_n_face< N, D > & *rhs*) [inline]

Is *lhs* different from *rhs*?

Precondition

Arguments *lhs* and *rhs* must belong to the same mln::topo::complex.

Definition at line 250 of file algebraic_n_face.hh.

References mln::topo::n_face< N, D >::cplx().

9.141.2.8 template<unsigned N, unsigned D> bool mln::topo::operator!= (const n_face< N, D > & *lhs*, const n_face< N, D > & *rhs*) [inline]

Is *lhs* different from *rhs*?

Precondition

Arguments *lhs* and *rhs* must belong to the same mln::topo::complex.

Definition at line 291 of file n_face.hh.

References mln::topo::n_face< N, D >::cplx().

9.141.2.9 template< unsigned N, unsigned D > n_faces_set< N, D > mln::topo::operator+ (const algebraic_n_face< N, D > & *f1*, const algebraic_n_face< N, D > & *f2*) [inline]

Addition.

Definition at line 206 of file n_faces_set.hh.

References mln::topo::n_faces_set< N, D >::add().

9.141.2.10 template< unsigned N, unsigned D > algebraic_n_face< N, D > mln::topo::operator- (const n_face< N, D > & *f*)

Inversion operators.

Definition at line 221 of file algebraic_n_face.hh.

9.141.2.11 template< unsigned N, unsigned D > n_faces_set< N, D > mln::topo::operator- (const algebraic_n_face< N, D > & *f1*, const algebraic_n_face< N, D > & *f2*) [inline]

Subtraction.

Definition at line 284 of file n_faces_set.hh.

References mln::topo::n_faces_set< N, D >::add().

9.141.2.12 template< unsigned D > algebraic_face< D > mln::topo::operator- (const face< D > & *f*)

Inversion operators.

Definition at line 219 of file algebraic_face.hh.

9.141.2.13 template< unsigned N, unsigned D > bool mln::topo::operator< (const n_face< N, D > & *lhs*, const n_face< N, D > & *rhs*) [inline]

Is *lhs* “less” than *rhs*?

This comparison is required by algorithms sorting face handles.

Precondition

Arguments *lhs* and *rhs* must belong to the same mln::topo::complex.

Definition at line 301 of file n_face.hh.

9.141.2.14 template< unsigned D > bool mln::topo::operator< (const face< D > & *lhs*, const face< D > & *rhs*) [inline]

Is *lhs* “less” than *rhs*?

This comparison is required by algorithms sorting face handles.

Precondition

Arguments *lhs* and *rhs* must belong to the same mln::topo::complex.
Arguments *lhs* and *rhs* must have the same dimension.

Definition at line 404 of file face.hh.

9.141.2.15 template<unsigned D> bool mln::topo::operator< (const algebraic_face< D > & *lhs*, const algebraic_face< D > & *rhs*) [inline]

Is *lhs* "less" than *rhs*?

This comparison is required by algorithms sorting algebraic face handles.

Precondition

Arguments *lhs* and *rhs* must belong to the same mln::topo::complex.
Arguments *lhs* and *rhs* must have the same dimension.

Definition at line 260 of file algebraic_face.hh.

9.141.2.16 template<unsigned N, unsigned D> bool mln::topo::operator< (const algebraic_n_face< N, D > & *lhs*, const algebraic_n_face< N, D > & *rhs*) [inline]

Is *lhs* "less" than *rhs*?

This comparison is required by algorithms sorting algebraic face handles.

Precondition

Arguments *lhs* and *rhs* must belong to the same mln::topo::complex.

Definition at line 261 of file algebraic_n_face.hh.

9.141.2.17 template<unsigned N, unsigned D> std::ostream & mln::topo::operator<< (std::ostream & *ostr*, const algebraic_n_face< N, D > & *f*) [inline]

Print an mln::topo::algebraic_n_face.

Definition at line 273 of file algebraic_n_face.hh.

9.141.2.18 template<unsigned D> std::ostream & mln::topo::operator<< (std::ostream & *ostr*, const face< D > & *f*) [inline]

Print an mln::topo::face.

Definition at line 416 of file face.hh.

9.141.2.19 template<unsigned N, unsigned D> std::ostream & mln::topo::operator<< (std::ostream & *ostr*, const n_face< N, D > & *f*) [inline]

Print an mln::topo::n_face.

Definition at line 312 of file n_face.hh.

9.141.2.20 template<unsigned D> std::ostream & mln::topo::operator<< (std::ostream & *ostr*, const complex< D > & *c*) [inline]

Pretty print a complex.

Definition at line 670 of file complex.hh.

References mln::topo::complex< D >::print().

9.141.2.21 template<unsigned D> std::ostream & mln::topo::operator<< (std::ostream & *ostr*, const algebraic_face< D > & *f*) [inline]

Print an mln::topo::algebraic_face.

Definition at line 273 of file algebraic_face.hh.

9.141.2.22 template<unsigned N, unsigned D> bool mln::topo::operator== (const algebraic_n_face< N, D > & *lhs*, const algebraic_n_face< N, D > & *rhs*) [inline]

Comparison of two instances of mln::topo::algebraic_n_face.

Is *lhs* equal to *rhs*?

Precondition

Arguments *lhs* and *rhs* must belong to the same mln::topo::complex.

Definition at line 239 of file algebraic_n_face.hh.

References mln::topo::n_face< N, D >::cplx(), mln::topo::n_face< N, D >::face_id(), and mln::topo::algebraic_n_face< N, D >::sign().

9.141.2.23 template<unsigned D> bool mln::topo::operator== (const complex< D > & *lhs*, const complex< D > & *rhs*) [inline]

Compare two complexes for equality.

Definition at line 657 of file complex.hh.

9.141.2.24 template<unsigned D> bool mln::topo::operator== (const face< D > & *lhs*, const face< D > & *rhs*) [inline]

Comparison of two instances of mln::topo::face.

Is *lhs* equal to *rhs*?

Precondition

Arguments *lhs* and *rhs* must belong to the same mln::topo::complex.

Definition at line 384 of file face.hh.

References mln::topo::face< D >::cplx(), mln::topo::face< D >::face_id(), and mln::topo::face< D >::n().

9.141.2.25 template<unsigned D> bool mln::topo::operator== (const algebraic_face< D > & *lhs*, const algebraic_face< D > & *rhs*) [inline]

Comparison of two instances of mln::topo::algebraic_face.

Is *lhs* equal to *rhs*?

Precondition

Arguments *lhs* and *rhs* must belong to the same mln::topo::complex.

Definition at line 237 of file algebraic_face.hh.

References mln::topo::face< D >::cplx(), mln::topo::face< D >::face_id(), mln::topo::face< D >::n(), and mln::topo::algebraic_face< D >::sign().

9.141.2.26 template<unsigned N, unsigned D> bool mln::topo::operator== (const n_face< N, D > & *lhs*, const n_face< N, D > & *rhs*) [inline]

Comparison of two instances of mln::topo::n_face.

Is *lhs* equal to *rhs*?

Precondition

Arguments *lhs* and *rhs* must belong to the same mln::topo::complex.

Definition at line 281 of file n_face.hh.

References mln::topo::n_face< N, D >::cplx(), and mln::topo::n_face< N, D >::face_id().

9.142 mln::trace Namespace Reference

Namespace of routines related to the trace mechanism.

9.142.1 Detailed Description

Namespace of routines related to the trace mechanism.

9.143 mln::trait Namespace Reference

Namespace where traits are defined.

9.143.1 Detailed Description

Namespace where traits are defined. Namespace for image traits.

9.144 mln::transform Namespace Reference

Namespace of transforms.

Functions

- template<typename I , typename N , typename D >
  util::couple< mln::trait::ch_value< I, D >::ret, mln::trait::ch_value< I, typename I::psite >::ret > distance_and_closest_point_geodesic (const Image< I > &input, const Neighborhood< N > &nbh, D max)

  Discrete geodesic distance transform.

- template<typename P , typename N , typename D >
  util::couple< mln_image_from_grid(mln_grid(P), D), mln_image_from_grid(mln_grid(P), unsigned)> distance_and_closest_point_geodesic (const p_array< P > &pset, const box< P > &closest_point_domain, const Neighborhood< N > &nbh, D max)

  Discrete geodesic distance transform.

- template<typename I , typename N , typename D >
  util::couple< mln::trait::ch_value< I, D >::ret, I > distance_and_influence_zone_geodesic (const Image< I > &input, const Neighborhood< N > &nbh, D max)

  Discrete geodesic distance transform.

- template<typename I , typename N , typename W , typename D >
  mln::trait::ch_value< I, D >::ret distance_front (const Image< I > &input, const Neighborhood< N > &nbh, const Weighted_Window< W > &w_win, D max)

  Discrete front distance transform.

- template<typename I , typename N , typename D >
  mln::trait::ch_value< I, D >::ret distance_geodesic (const Image< I > &input, const Neighborhood< N > &nbh, D max)

  Discrete geodesic distance transform.

- template<typename I >
  image2d< float > hough (const Image< I > &input_)

  Compute the hough transform from a binary image.

- template<typename I , typename N , typename W >
  mln::trait::concrete< I >::ret influence_zone_front (const Image< I > &input, const Neighborhood< N > &nbh, const Weighted_Window< W > &w_win)

  Influence zone transform.

- template<typename I , typename N , typename W , typename D >
  mln::trait::concrete< I >::ret influence_zone_front (const Image< I > &input, const Neighborhood< N > &nbh, const Weighted_Window< W > &w_win, D max)

  Influence zone transform.

- template<typename I , typename N >
  mln::trait::concrete< I >::ret influence_zone_geodesic (const Image< I > &input, const Neighborhood< N > &nbh)

  Geodesic influence zone transform.

- template<typename I , typename N , typename D >
  mln::trait::concrete< I >::ret influence_zone_geodesic_saturated (const Image< I > &input, const Neighborhood< N > &nbh, const D &max, const typename I::value &background_value)

  Geodesic influence zone transform.

- template<typename I , typename N , typename D >
  mln::trait::concrete< I >::ret influence_zone_geodesic_saturated (const Image< I > &input, const Neighborhood< N > &nbh, const D &max)

9.144.1 Detailed Description

Namespace of transforms.

9.144.2 Function Documentation

9.144.2.1 template<typename I , typename N , typename D > util::couple< mln::trait::ch_value< I, D >::ret, mln::trait::ch_value< I, typename I::psite >::ret > mln::transform::distance_and_closest_point_geodesic (const Image< I > & *input*, const Neighborhood< N > & *nbh*, D *max*) `[inline]`

Discrete geodesic distance transform.

Parameters

`[in]` ***input*** Image from which the geodesic distance is computed.

`[in]` ***nbh*** Neighborhood

`[in]` ***max*** Max distance of propagation.

Returns

a couple of images. The first one is the distance map and the second one is the closest point image. The closest point image contains sites.

Postcondition

The returned images have the same domain as `input`.

Definition at line 90 of file distance_and_closest_point_geodesic.hh.

References mln::make::couple(), and distance_geodesic().

9.144.2.2 template<typename P , typename N , typename D > util::couple< mln_image_from_grid(mln_grid(P), D), mln_image_from_grid(mln_grid(P), unsigned)> mln::transform::distance_and_closest_point_geodesic (const p_array< P > & *pset*, const box< P > & *closest_point_domain*, const Neighborhood< N > & *nbh*, D *max*) `[inline]`

Discrete geodesic distance transform.

Parameters

`[in]` ***pset*** an array of sites.

`[in]` ***closest_point_domain*** domain of the returned image.

`[in]` ***nbh*** neighborhood

`[in]` ***max*** max distance of propagation.

Returns

A couple of images. The first one is the distance map and the second one is the closest point image. The closest point image contains site indexes.

Postcondition

The returned image domains are defined on `closest_point_domain`.

Definition at line 110 of file distance_and_closest_point_geodesic.hh.

References mln::geom::bbox(), mln::make::couple(), distance_geodesic(), mln::data::fill(), and mln::box< P >::is_valid().

9.144.2.3 template<typename I , typename N , typename D > util::couple< mln::trait::ch_value< I, D >::ret, I > mln::transform::distance_and_influence_zone_geodesic (const Image< I > & *input*, const Neighborhood< N > & *nbh*, D *max*) `[inline]`

Discrete geodesic distance transform.

Parameters

`[in]` ***input*** Image from which the geodesic distance is computed.

`[in]` ***nbh*** Neighborhood

`[in]` ***max*** Max distance of propagation.

Returns

a couple of images. The first one is the distance map and the second one is the closest point image. The closest point image contains sites.

Postcondition

The returned images have the same domain as `input`.

Definition at line 69 of file distance_and_influence_zone_geodesic.hh.

References mln::make::couple(), and distance_geodesic().

9.144.2.4 template<typename I , typename N , typename W , typename D > mln::trait::ch_value< I, D >::ret mln::transform::distance_front (const Image< I > & *input*, const Neighborhood< N > & *nbh*, const Weighted_Window< W > & *w_win*, D *max*) `[inline]`

Discrete front distance transform.

Definition at line 56 of file transform/distance_front.hh.

9.144.2.5 template<typename I , typename N , typename D > mln::trait::ch_value< I, D >::ret mln::transform::distance_geodesic (const Image< I > & *input*, const Neighborhood< N > & *nbh*, D *max*) `[inline]`

Discrete geodesic distance transform.

Definition at line 55 of file transform/distance_geodesic.hh.

Referenced by distance_and_closest_point_geodesic(), and distance_and_influence_zone_geodesic().

9.144.2.6 template<typename I > image2d< float > mln::transform::hough (const Image< I > & *input_*)

Compute the hough transform from a binary image.

Objects used for computation must be set to 'true'.

Parameters

`[in]` ***input_*** A binary image.

Returns

A 2D image of float. Rows are used for the distance and columns are used for the angles. Angles go from 0 to 359. Distance goes from 0 to the maximum distance between the center and a corner. The site having the maximum value indicates through its column index the document inclination.

Definition at line 98 of file hough.hh.

References mln::opt::at(), mln::data::fill(), mln::geom::min_col(), mln::geom::min_row(), mln::geom::ncols(), and mln::geom::nrows().

9.144.2.7 template<typename I , typename N , typename W > mln::trait::concrete< I >::ret mln::transform::influence_zone_front (const Image< I > & *input,* const Neighborhood< N > & *nbh,* const Weighted_Window< W > & *w_win*)

Influence zone transform.

Definition at line 78 of file influence_zone_front.hh.

References influence_zone_front().

9.144.2.8 template<typename I , typename N , typename W , typename D > mln::trait::concrete< I >::ret mln::transform::influence_zone_front (const Image< I > & *input,* const Neighborhood< N > & *nbh,* const Weighted_Window< W > & *w_win,* D *max*)

Influence zone transform.

Definition at line 60 of file influence_zone_front.hh.

References mln::canvas::distance_front().

Referenced by influence_zone_front().

9.144.2.9 template<typename I , typename N > mln::trait::concrete< I >::ret mln::transform::influence_zone_geodesic (const Image< I > & *input,* const Neighborhood< N > & *nbh*)

Geodesic influence zone transform.

Parameters

`[in]` ***input*** An image.

`[in]` ***nbh*** A neighborhood.

Returns

An image of influence zone.

Definition at line 216 of file influence_zone_geodesic.hh.

9.144.2.10 template<typename I , typename N , typename D > mln::trait::concrete< I >::ret mln::transform::influence_zone_geodesic_saturated (const Image< I > & *input*, const Neighborhood< N > & *nbh*, const D & *max*, const typename I::value & *background_value*)

Geodesic influence zone transform.

Parameters

- [in] ***input*** An image.
- [in] ***nbh*** A neighborhood.
- [in] ***max*** The maximum influence zone distance.
- [in] ***background_value*** The value used as background (i.e. not propagated).

Returns

An image of influence zone.

Definition at line 73 of file influence_zone_geodesic_saturated.hh.

References mln::canvas::distance_geodesic().

Referenced by influence_zone_geodesic_saturated().

9.144.2.11 template<typename I , typename N , typename D > mln::trait::concrete< I >::ret mln::transform::influence_zone_geodesic_saturated (const Image< I > & *input*, const Neighborhood< N > & *nbh*, const D & *max*)

This is an overloaded member function, provided for convenience. It differs from the above function only in what argument(s) it accepts.

Definition at line 93 of file influence_zone_geodesic_saturated.hh.

References influence_zone_geodesic_saturated(), and mln::literal::zero.

9.145 mln::util Namespace Reference

Namespace of tools using for more complex algorithm.

Namespaces

- namespace impl

  Implementation namespace of util namespace.

Classes

- class adjacency_matrix

  A class of adjacency matrix.

- class array
  A dynamic array class.
- class branch
  Class of generic branch.
- class branch_iter
  Basic 2D image class.
- class branch_iter_ind
  Basic 2D image class.
- class couple
  Definition of a couple.
- struct eat
  Eat structure.
- class edge
  Edge of a graph `G`.
- class fibonacci_heap
  Fibonacci heap.
- class graph
  Undirected graph.
- class greater_point
  A "greater than" functor comparing points w.r.t.
- class greater_psite
  A "greater than" functor comparing psites w.r.t.
- class head
  Top structure of the soft heap.
- struct ignore
  Ignore structure.
- struct ilcell
  Element of an item list. Store the data (key) used in soft_heap.
- class line_graph
  Undirected line graph of a graph of type `G`.
- struct nil
  Nil structure.
- class node

Meta-data of an element in the heap.

- class object_id

  Base class of an object id.

- struct ord

  Function-object that defines an ordering between objects with type `T`: lhs R rhs.

- struct ord_pair

  Ordered pair structure s.a.

- struct pix

  Structure pix.

- class set

  An "efficient" mathematical set class.

- class site_pair

  A pair of sites.

- class soft_heap

  Soft heap.

- class timer

  Timer structure.

- struct tracked_ptr

  Smart pointer for shared data with tracking.

- class tree

  Class of generic tree.

- class tree_node

  Class of generic tree_node for tree.

- class vertex

  Vertex of a graph `G`.

- struct yes

  Object that always says "yes".

Typedefs

- typedef object_id< vertex_tag, unsigned > vertex_id_t

  Vertex id type.

Functions

- template<typename I , typename J >
  void display_branch (const Image< J > &ima_, tree_node< I > *tree_node)

  Display an arborescence from `tree_node`.

- template<typename I , typename J >
  void display_tree (const Image< J > &ima_, tree< I > &tree)

  Display a tree.

- template<typename I >
  I::psite lemmings (const Image< I > &ima, const typename I::psite &pt, const typename I::psite::delta &dpt, const typename I::value &val)

  Launch a lemmings on an image.

- template<typename I >
  greater_point< I > make_greater_point (const Image< I > &ima)

  Helper to build a mln::util::greater_point.

- template<typename I >
  greater_psite< I > make_greater_psite (const Image< I > &ima)

  Helper to build a mln::util::greater_psite.

- template<typename G >
  bool operator< (const vertex< G > &lhs, const vertex< G > &rhs)

  Less operator. Test whether lhs.id() < rhs.id().

- template<typename G >
  std::ostream & operator<< (std::ostream &ostr, const vertex< G > &v)

  Push the vertex `v` in the output stream `ostr`.

- template<typename T >
  std::ostream & operator<< (std::ostream &ostr, const array< T > &a)

  Operator<<.

- template<typename G >
  bool operator== (const vertex< G > &v1, const vertex< G > &v2)

  Equality operator.

- template<typename T >
  bool operator== (const array< T > &lhs, const array< T > &rhs)

  Operator==.

- template<typename T >
  bool ord_strict (const T &lhs, const T &rhs)

  Routine to test if lhs is strictly "less-than" rhs.

- template<typename T >
  bool ord_weak (const T &lhs, const T &rhs)

  Routine to test if lhs is "less-than or equal-to" rhs.

- template<typename T , typename I >
  void tree_fast_to_image (tree_fast< T > &tree, Image< I > &output_)
- template<typename T >
  tree_fast< T > tree_to_fast (tree< T > &input)

    Facade.

- template<typename T , typename I >
  void tree_to_image (tree< T > &tree, Image< I > &output_)

    Convert a tree into an image.

9.145.1 Detailed Description

Namespace of tools using for more complex algorithm. Forward declaration.

9.145.2 Typedef Documentation

9.145.2.1 typedef object_id< vertex_tag, unsigned > mln::util::vertex_id_t

Vertex id type.

Definition at line 43 of file graph_ids.hh.

9.145.3 Function Documentation

9.145.3.1 template<typename I , typename J > void mln::util::display_branch (const Image< J > & *ima_*, tree_node< I > ∗ *tree_node*) `[inline]`

Display an arborescence from `tree_node`.

Parameters

`[in]` ***ima_*** The domain of output image.

`[in]` ***tree_node*** The root tree_node to display.

Definition at line 210 of file tree_to_image.hh.

References mln::data::fill().

9.145.3.2 template<typename I , typename J > void mln::util::display_tree (const Image< J > & *ima_*, tree< I > & *tree*) `[inline]`

Display a tree.

Parameters

`[in]` ***ima_*** The domain of output image.

`[in]` ***tree*** The tree to display.

Definition at line 192 of file tree_to_image.hh.

References mln::util::tree< T >::root().

9.145.3.3 template< typename I > I::psite mln::util::lemmings (const Image< I > & *ima*, const typename I::psite & *pt*, const typename I::psite::delta & *dpt*, const typename I::value & *val*)

Launch a lemmings on an image.

A lemmings is the point `pt` that you put on an image `ima` . This point will move through the image using the delta-point `dpt` while consider his value on the given image.

Returns

The first point that is not in the domain `domain` or which value on the given image is different to the value `val`.

Precondition

The domain `domain` must be contained in the domain of `ima`.

Definition at line 104 of file lemmings.hh.

9.145.3.4 template< typename I > greater_point< I > mln::util::make_greater_point (const Image< I > & *ima*)

Helper to build a mln::util::greater_point.

Definition at line 82 of file greater_point.hh.

9.145.3.5 template< typename I > greater_psite< I > mln::util::make_greater_psite (const Image< I > & *ima*)

Helper to build a mln::util::greater_psite.

Definition at line 82 of file greater_psite.hh.

9.145.3.6 template< typename G > bool mln::util::operator< (const vertex< G > & *lhs*, const vertex< G > & *rhs*) `[inline]`

Less operator. Test whether lhs.id() < rhs.id().

Definition at line 390 of file vertex.hh.

9.145.3.7 template< typename G > std::ostream & mln::util::operator<< (std::ostream & *ostr*, const vertex< G > & *v*) `[inline]`

Push the vertex `v` in the output stream `ostr`.

Definition at line 372 of file vertex.hh.

9.145.3.8 template< typename T > std::ostream & mln::util::operator<< (std::ostream & *ostr*, const array< T > & *a*)

Operator<<.

Definition at line 796 of file util/array.hh.

References mln::util::array< T >::nelements().

9.145.3.9 template<typename G > bool mln::util::operator== (const vertex< G > & *v1*, const vertex< G > & *v2*) [inline]

Equality operator.

Test whether two vertices have the same id.

Definition at line 380 of file vertex.hh.

References mln::util::vertex< G >::graph(), and mln::util::vertex< G >::id().

9.145.3.10 template<typename T > bool mln::util::operator== (const array< T > & *lhs*, const array< T > & *rhs*)

Operator==.

Definition at line 815 of file util/array.hh.

References mln::util::array< T >::std_vector().

9.145.3.11 template<typename T > bool mln::util::ord_strict (const T & *lhs*, const T & *rhs*) [inline]

Routine to test if *lhs* is strictly "less-than" *rhs*.

Definition at line 90 of file util/ord.hh.

Referenced by mln::util::ord_pair< T >::change_both(), mln::util::ord_pair< T >::change_first(), and mln::util::ord_pair< T >::change_second().

9.145.3.12 template<typename T > bool mln::util::ord_weak (const T & *lhs*, const T & *rhs*) [inline]

Routine to test if *lhs* is "less-than or equal-to" *rhs*.

Definition at line 101 of file util/ord.hh.

Referenced by mln::util::ord_pair< T >::change_both(), mln::util::ord_pair< T >::change_first(), mln::util::ord_pair< T >::change_second(), and mln::box< P >::is_valid().

9.145.3.13 template<typename T , typename I > void mln::util::tree_fast_to_image (tree_fast< T > & *tree*, Image< I > & *output_*) [inline]

Convert a tree_fast into an image.

Parameters

- [in] ***tree*** The tree to convert.
- [out] ***output_*** The image containing tree informations.

Definition at line 99 of file tree_fast_to_image.hh.

9.145.3.14 template<typename T > tree_fast< T > mln::util::tree_to_fast (tree< T > & *input*) [inline]

Facade.

Convert a tree into an tree_fast.

Parameters

`[in]` ***input*** The tree to convert.

Returns

The tree_fast containing tree informations.

Definition at line 90 of file tree_to_fast.hh.

References mln::util::tree< T >::root().

9.145.3.15 template<typename T , typename I > void mln::util::tree_to_image (tree< T > & *tree*, Image< I > & *output_*) `[inline]`

Convert a tree into an image.

Parameters

`[in]` ***tree*** The tree to convert.

`[out]` ***output_*** The image containing tree information.

Definition at line 178 of file tree_to_image.hh.

9.146 mln::util::impl Namespace Reference

Implementation namespace of util namespace.

9.146.1 Detailed Description

Implementation namespace of util namespace.

9.147 mln::value Namespace Reference

Namespace of materials related to pixel value types.

Namespaces

- namespace impl

  Implementation namespace of value namespace.

Classes

- class float01

  Class for floating values restricted to the interval [0..1] and discretized with n bits.

- struct float01_f

  Class for floating values restricted to the interval [0..1].

- struct graylevel

  General gray-level class on n bits.

- struct graylevel_f

  General gray-level class on n bits.

- struct int_s

  Signed integer value class.

- struct int_u

  Unsigned integer value class.

- struct int_u_sat

  Unsigned integer value class with saturation behavior.

- struct Integer

  Concept of integer.

- struct Integer< void >

  Category flag type.

- struct label

  Label value class.

- struct lut_vec

  Class that defines FIXME.

- class proxy

  Generic proxy class for an image pixel value.

- struct rgb

  Color class for red-green-blue where every component is n-bit encoded.

- struct set

  Class that defines the set of values of type `T`*.*

- class sign

  The sign class represents the value type composed by the set (-1, 0, 1) sign value type is a subset of the int value type.

- struct stack_image

  Stack image class.

- struct super_value< sign >

  Specializations:

- struct value_array

  Generic array class over indexed by a value set with type T.

Typedefs

- typedef float01_< 16 > float01_16

  Alias for 16 bit float01.

- typedef float01_< 8 > float01_8

  Alias for 8 bit float01.

- typedef graylevel< 16 > gl16

  Alias for 16 bit graylevel.

- typedef graylevel< 8 > gl8

  Alias for 8 bit graylevel.

- typedef graylevel_f glf

  Alias for graylevels encoded by float.

- typedef int_s< 16 > int_s16

  Alias for signed 16-bit integers.

- typedef int_s< 32 > int_s32

  Alias for signed 32-bit integers.

- typedef int_s< 8 > int_s8

  Alias for signed 8-bit integers.

- typedef int_u< 12 > int_u12

  Alias for unsigned 12-bit integers.

- typedef int_u< 16 > int_u16

  Alias for unsigned 16-bit integers.

- typedef mln::value::int_u< 32 > int_u32

  Alias for unsigned 32-bit integers.

- typedef mln::value::int_u< 8 > int_u8

  Alias for unsigned 8-bit integers.

- typedef label< 16 > label_16

  Alias for 16-bit integers.

- typedef label< 32 > label_32

  Alias for 32-bit integers.

- typedef mln::value::label< 8 > label_8

Alias for 8-bit labels.

- typedef rgb< 16 > rgb16

  Color class for red-green-blue where every component is 16-bit encoded.

- typedef rgb< 8 > rgb8

  Color class for red-green-blue where every component is 8-bit encoded.

Functions

- template<typename Dest , typename Src >
  Dest cast (const Src &src)

  Cast a value `src` from type `Src` to type `Dest`.

- template<typename V >
  internal::equiv_< V >::ret equiv (const mln::Value< V > &v)

  Access to the equivalent value.

- template<unsigned n>
  rgb< n >::interop operator+ (const rgb< n > &lhs, const rgb< n > &rhs)

  Addition.

- template<typename H , typename S , typename L >
  hsl_< H, S, L > operator+ (const hsl_< H, S, L > &lhs, const hsl_< H, S, L > &rhs)

  Addition.

- template<unsigned n>
  std::ostream & operator<< (std::ostream &ostr, const label< n > &l)

  Print a label `l` into the output stream `ostr`.

- template<unsigned n>
  std::ostream & operator<< (std::ostream &ostr, const rgb< n > &c)

  Print an rgb `c` into the output stream `ostr`.

- std::ostream & operator<< (std::ostream &ostr, const graylevel_f &g)

  Op<<.

- template<typename T >
  std::ostream & operator<< (std::ostream &ostr, const scalar_< T > &s)

  Print a scalar `s` in an output stream `ostr`.

- template<typename H , typename S , typename L >
  std::ostream & operator<< (std::ostream &ostr, const hsl_< H, S, L > &c)

  Print an hsl `c` into the output stream `ostr`.

- template<unsigned n>
  std::ostream & operator<< (std::ostream &ostr, const graylevel< n > &g)

  Op<<.

- template<unsigned n>
  std::ostream & operator<< (std::ostream &ostr, const float01_< n > &f)

  Op<<.

- std::ostream & operator<< (std::ostream &ostr, const sign &i)

  Print an signed integer `i` *into the output stream* `ostr`.

- template<unsigned n>
  std::ostream & operator<< (std::ostream &ostr, const int_u< n > &i)

  Print an unsigned integer `i` *into the output stream* `ostr`.

- template<unsigned n>
  std::ostream & operator<< (std::ostream &ostr, const int_s< n > &i)

  Print an signed integer `i` *into the output stream* `ostr`.

- template<unsigned n>
  std::ostream & operator<< (std::ostream &ostr, const int_u_sat< n > &i)

  Print a saturated unsigned integer `i` *into the output stream* `ostr`.

- bool operator== (const sign &lhs, const sign &rhs)

  Comparaison operator.

- template<typename V >
  V other (const V &val)

  Give an other value than `val`.

  - template<typename H , typename S , typename L >
    hsl_< H, S, L > operator- (const hsl_< H, S, L > &lhs, const hsl_< H, S, L > &rhs)

    Subtraction.

  - template<typename H , typename S , typename L , typename S2 >
    hsl_< H, S, L > operator* (const hsl_< H, S, L > &lhs, const mln::value::scalar_< S2 > &s)

    Product.

  - template<typename H , typename S , typename L , typename S2 >
    hsl_< H, S, L > operator/ (const hsl_< H, S, L > &lhs, const mln::value::scalar_< S2 > &s)

    Division.

  - template<typename H , typename S , typename L >
    bool operator== (const hsl_< H, S, L > &lhs, const hsl_< H, S, L > &rhs)

    Comparison.

  - template<unsigned n>
    rgb< n >::interop operator- (const rgb< n > &lhs, const rgb< n > &rhs)

    Subtraction.

- template<unsigned n, typename S >
  rgb< n >::interop operator* (const rgb< n > &lhs, const mln::value::scalar_< S > &s)
  Product.

- template<unsigned n, typename S >
  rgb< n >::interop operator/ (const rgb< n > &lhs, const mln::value::scalar_< S > &s)
  Division.

- template<typename I >
  stack_image< 2, const I > stack (const Image< I > &ima1, const Image< I > &ima2)
  Shortcut to build a stack with two images.

9.147.1 Detailed Description

Namespace of materials related to pixel value types.

9.147.2 Typedef Documentation

9.147.2.1 typedef float01_<16> mln::value::float01_16

Alias for 16 bit float01.

Definition at line 45 of file float01_16.hh.

9.147.2.2 typedef float01_<8> mln::value::float01_8

Alias for 8 bit float01.

Definition at line 45 of file float01_8.hh.

9.147.2.3 typedef graylevel<16> mln::value::gl16

Alias for 16 bit graylevel.

Definition at line 45 of file gl16.hh.

9.147.2.4 typedef graylevel<8> mln::value::gl8

Alias for 8 bit graylevel.

Definition at line 45 of file gl8.hh.

9.147.2.5 typedef graylevel_f mln::value::glf

Alias for graylevels encoded by float.

Definition at line 44 of file glf.hh.

9.147.2.6 typedef int_s<16> mln::value::int_s16

Alias for signed 16-bit integers.

Definition at line 45 of file int_s16.hh.

9.147.2.7 typedef int_s<32> mln::value::int_s32

Alias for signed 32-bit integers.

Definition at line 45 of file int_s32.hh.

9.147.2.8 typedef int_s<8> mln::value::int_s8

Alias for signed 8-bit integers.

Definition at line 45 of file int_s8.hh.

9.147.2.9 typedef int_u<12> mln::value::int_u12

Alias for unsigned 12-bit integers.

Definition at line 45 of file int_u12.hh.

9.147.2.10 typedef int_u<16> mln::value::int_u16

Alias for unsigned 16-bit integers.

Definition at line 45 of file int_u16.hh.

9.147.2.11 typedef mln::value::int_u<32> mln::value::int_u32

Alias for unsigned 32-bit integers.

Definition at line 45 of file int_u32.hh.

9.147.2.12 typedef mln::value::int_u<8> mln::value::int_u8

Alias for unsigned 8-bit integers.

Definition at line 44 of file int_u8.hh.

9.147.2.13 typedef label<16> mln::value::label_16

Alias for 16-bit integers.

Definition at line 44 of file label_16.hh.

9.147.2.14 typedef label<32> mln::value::label_32

Alias for 32-bit integers.

Definition at line 44 of file label_32.hh.

9.147.2.15 typedef mln::value::label<8> mln::value::label_8

Alias for 8-bit labels.

Definition at line 44 of file label_8.hh.

9.147.2.16 typedef rgb<16> mln::value::rgb16

Color class for red-green-blue where every component is 16-bit encoded.

Definition at line 45 of file rgb16.hh.

9.147.2.17 typedef rgb<8> mln::value::rgb8

Color class for red-green-blue where every component is 8-bit encoded.

Definition at line 45 of file rgb8.hh.

9.147.3 Function Documentation

9.147.3.1 template<typename Dest , typename Src > Dest mln::value::cast (const Src & *src*) `[inline]`

Cast a value `src` from type `Src` to type `Dest`.

Definition at line 85 of file value/cast.hh.

9.147.3.2 template<typename V > internal::equiv_< V >::ret mln::value::equiv (const mln::Value< V > & *v*) `[inline]`

Access to the equivalent value.

Definition at line 153 of file equiv.hh.

Referenced by mln::labeling::superpose().

9.147.3.3 template<unsigned n, typename S > rgb< n >::interop mln::value::operator* (const rgb< n > & *lhs*, const mln::value::scalar_< S > & *s*) `[inline]`

Product.

Definition at line 717 of file value/rgb.hh.

9.147.3.4 template<typename H , typename S , typename L , typename S2 > hsl_< H, S, L > mln::value::operator* (const hsl_< H, S, L > & *lhs*, const mln::value::scalar_< S2 > & *s*)

Product.

Definition at line 357 of file hsl.hh.

9.147.3.5 template<unsigned n> rgb< n >::interop mln::value::operator+ (const rgb< n > & *lhs*, const rgb< n > & *rhs*) [inline]

Addition.

{

Definition at line 663 of file value/rgb.hh.

9.147.3.6 template<typename H , typename S , typename L > hsl_< H, S, L > mln::value::operator+ (const hsl_< H, S, L > & *lhs*, const hsl_< H, S, L > & *rhs*)

Addition.

{

Definition at line 337 of file hsl.hh.

9.147.3.7 template<unsigned n> rgb< n >::interop mln::value::operator- (const rgb< n > & *lhs*, const rgb< n > & *rhs*) [inline]

Subtraction.

Definition at line 690 of file value/rgb.hh.

9.147.3.8 template<typename H , typename S , typename L > hsl_< H, S, L > mln::value::operator- (const hsl_< H, S, L > & *lhs*, const hsl_< H, S, L > & *rhs*)

Subtraction.

Definition at line 347 of file hsl.hh.

9.147.3.9 template<unsigned n, typename S > rgb< n >::interop mln::value::operator/ (const rgb< n > & *lhs*, const mln::value::scalar_< S > & *s*) [inline]

Division.

Definition at line 735 of file value/rgb.hh.

9.147.3.10 template<typename H , typename S , typename L , typename S2 > hsl_< H, S, L > mln::value::operator/ (const hsl_< H, S, L > & *lhs*, const mln::value::scalar_< S2 > & *s*)

Division.

Definition at line 367 of file hsl.hh.

9.147.3.11 template<typename T > std::ostream & mln::value::operator<< (std::ostream & *ostr*, const scalar_< T > & *s*) [inline]

Print a scalar `s` in an output stream `ostr`.

Definition at line 130 of file scalar.hh.

9.147.3.12 std::ostream & mln::value::operator<< (std::ostream & *ostr*, const sign & *i*) [inline]

Print an signed integer `i` into the output stream `ostr`.

Parameters

`[in,out]` ***ostr*** An output stream.

`[in]` ***i*** An sign value

Returns

The modified output stream `ostr`.

Definition at line 184 of file value/sign.hh.

References mln::debug::format().

9.147.3.13 template<unsigned n> std::ostream & mln::value::operator<< (std::ostream & *ostr*, const int_s< n > & *i*) [inline]

Print an signed integer `i` into the output stream `ostr`.

Parameters

`[in,out]` ***ostr*** An output stream.

`[in]` ***i*** An signed integer.

Returns

The modified output stream `ostr`.

Definition at line 260 of file int_s.hh.

References mln::debug::format().

9.147.3.14 template<unsigned n> std::ostream & mln::value::operator<< (std::ostream & *ostr*, const graylevel< n > & *g*) [inline]

Op<<.

Definition at line 591 of file graylevel.hh.

9.147.3.15 template<unsigned n> std::ostream & mln::value::operator<< (std::ostream & *ostr*, const int_u< n > & *i*) [inline]

Print an unsigned integer `i` into the output stream `ostr`.

Parameters

`[in,out]` ***ostr*** An output stream.

`[in]` ***i*** An unsigned integer.

Returns

The modified output stream `ostr`.

Definition at line 357 of file int_u.hh.

References mln::debug::format().

9.147.3.16 template<unsigned n> std::ostream & mln::value::operator<< (std::ostream & *ostr*, const int_u_sat< n > & *i*) [inline]

Print a saturated unsigned integer `i` into the output stream `ostr`.

Parameters

`[in,out]` ***ostr*** An output stream.

`[in]` ***i*** A saturated unsigned integer.

Returns

The modified output stream `ostr`.

Definition at line 220 of file int_u_sat.hh.

References mln::debug::format().

9.147.3.17 template<unsigned n> std::ostream & mln::value::operator<< (std::ostream & *ostr*, const rgb< n > & *c*) [inline]

Print an rgb `c` into the output stream `ostr`.

Parameters

`[in,out]` ***ostr*** An output stream.

`[in]` ***c*** An rgb.

Returns

The modified output stream `ostr`.

Definition at line 743 of file value/rgb.hh.

References mln::debug::format().

9.147.3.18 template<unsigned n> std::ostream & mln::value::operator<< (std::ostream & *ostr*, const float01_< n > & *f*) [inline]

Op<<.

Definition at line 253 of file float01_.hh.

9.147.3.19 template<typename H , typename S , typename L > std::ostream & mln::value::operator<< (std::ostream & *ostr*, const hsl_< H, S, L > & *c*) [inline]

Print an hsl `c` into the output stream `ostr`.

Parameters

`[in,out]` ***ostr*** An output stream.

`[in]` ***c*** An rgb.

Returns

The modified output stream `ostr`.

Definition at line 326 of file hsl.hh.

References mln::debug::format().

9.147.3.20 template<unsigned n> std::ostream & mln::value::operator<< (std::ostream & *ostr*, const label< n > & *l*) [inline]

Print a label `l` into the output stream `ostr`.

Parameters

`[in,out]` ***ostr*** An output stream.

`[in]` ***l*** A label.

Returns

The modified output stream `ostr`.

Definition at line 353 of file label.hh.

References mln::debug::format().

9.147.3.21 std::ostream & mln::value::operator<< (std::ostream & *ostr*, const graylevel_f & *g*) [inline]

Op<<.

Definition at line 458 of file graylevel_f.hh.

References mln::value::graylevel_f::value().

9.147.3.22 template<typename H , typename S , typename L > bool mln::value::operator== (const hsl_< H, S, L > & *lhs*, const hsl_< H, S, L > & *rhs*)

Comparison.

Definition at line 376 of file hsl.hh.

9.147.3.23 bool mln::value::operator== (const sign & *lhs,* const sign & *rhs*) [inline]

Comparaison operator.

Definition at line 190 of file value/sign.hh.

9.147.3.24 template<typename V > V mln::value::other (const V & *val*) [inline]

Give an other value than `val`.

Definition at line 115 of file other.hh.

9.147.3.25 template<typename I > stack_image< 2, const I > mln::value::stack (const Image< I > & *ima1,* const Image< I > & *ima2*) [inline]

Shortcut to build a stack with two images.

Definition at line 306 of file stack.hh.

9.148 mln::value::impl Namespace Reference

Implementation namespace of value namespace.

9.148.1 Detailed Description

Implementation namespace of value namespace.

9.149 mln::win Namespace Reference

Namespace of image processing routines related to win.

Classes

- struct backdiag2d

  Diagonal line window defined on the 2D square grid.

- struct ball

  Generic ball window defined on a given grid.

- struct cube3d

  Cube window defined on the 3D grid.

- struct cuboid3d

  Cuboid defined on the 3-D square grid.

- struct diag2d

  Diagonal line window defined on the 2D square grid.

- struct line
  Generic line window defined on a given grid in the given dimension.
- class multiple
  Multiple window.
- class multiple_size
  Definition of a multiple-size window.
- struct octagon2d
  Octagon window defined on the 2D square grid.
- struct rectangle2d
  Rectangular window defined on the 2D square grid.

Typedefs

- typedef ball< grid::square, def::coord > disk2d
  2D disk window; precisely, ball-shaped window defined on the 2D square grid.
- typedef line< grid::square, 1, def::coord > hline2d
  Horizontal line window defined on the 2D square grid.
- typedef line< grid::tick, 0, def::coord > segment1d
  Segment window defined on the 1D grid.
- typedef line< grid::cube, 0, def::coord > sline3d
  Depth line window defined on the 3D cubic grid.
- typedef ball< grid::cube, def::coord > sphere3d
  3D sphere window; precisely, ball-shaped window defined on the 3D cubic grid.
- typedef line< grid::square, 0, def::coord > vline2d
  Vertical line window defined on the 2D square grid.

Functions

- template<typename N1 , typename N2 >
  neighb< typename N1::window::regular > diff (const Neighborhood< N1 > &nbh1, const Neighborhood< N2 > &nbh2)
  Set difference between a couple of neighborhoods `nbh1` and `nbh2`.
- template<typename W1 , typename W2 >
  mln_regular (W1) diff(const Window< W1 > &win1
  Set difference between a couple of windows `win1` and `win2`.
- template<typename W >
  mln_regular (W) shift(const Window< W > &win

Shift a window `win` with a delta-point `dp`.

- template<typename W >
  W sym (const Window< W > &win)

  Give the symmetrical window of `win`.

- template<typename W >
  W sym (const Weighted_Window< W > &w_win)

  Give the symmetrical weighted window of `w_win`.

9.149.1 Detailed Description

Namespace of image processing routines related to win.

9.149.2 Function Documentation

9.149.2.1 template<typename N1 , typename N2 > N2 neighb< typename N1::window::regular > mln::win::diff (const Neighborhood< N1 > & *nbh1*, const Neighborhood< N2 > & *nbh2*)

Set difference between a couple of neighborhoods `nbh1` and `nbh2`.

Definition at line 132 of file win/diff.hh.

Referenced by mln::operator-().

9.149.2.2 template<typename W1 , typename W2 > mln::win::mln_regular (W1) const `[inline]`

Set difference between a couple of windows `win1` and `win2`.

9.149.2.3 template<typename W > mln::win::mln_regular (W) const `[inline]`

Shift a window `win` with a delta-point `dp`.

9.149.2.4 template<typename W > W mln::win::sym (const Window< W > & *win*) `[inline]`

Give the symmetrical window of `win`.

Definition at line 59 of file sym.hh.

Referenced by mln::c18(), mln::c26(), mln::c4_3d(), mln::c6(), mln::morpho::hit_or_miss_background_-opening(), mln::morpho::hit_or_miss_opening(), mln::morpho::opening::approx::structural(), and mln::morpho::closing::approx::structural().

9.149.2.5 template<typename W > W mln::win::sym (const Weighted_Window< W > & *w_win*) `[inline]`

Give the symmetrical weighted window of `w_win`.

Definition at line 71 of file sym.hh.

Chapter 10

Class Documentation

10.1 mln::accu::center< P, V > Struct Template Reference

Mass center accumulator.

`#include <center.hh>`

Inherits base< V, center< P, V > >.

Public Member Functions

- bool is_valid () const

  Check whether this accu is able to return a result.

- unsigned nsites () const

  Return the number of sites taken in consideration.

- void take_as_init (const T &t)

  Take as initialization the value `t`.

- void take_n_times (unsigned n, const T &t)

  Take `n` times the value `t`.

- V to_result () const

  Get the value of the accumulator.

  - void init ()

    Manipulators.

10.1.1 Detailed Description

template<typename P, typename V = typename P::vec> struct mln::accu::center< P, V >

Mass center accumulator.

Template Parameters

P the type of site.

V the type of vector to be used as result. The default vector type is the one provided by P.

Definition at line 55 of file center.hh.

10.1.2 Member Function Documentation

10.1.2.1 template<typename P , typename V > void mln::accu::center< P, V >::init ( ) [inline]

Manipulators.

Definition at line 116 of file center.hh.

References mln::literal::zero.

10.1.2.2 template<typename P , typename V > bool mln::accu::center< P, V >::is_valid ( ) const [inline]

Check whether this accu is able to return a result.

Definition at line 160 of file center.hh.

Referenced by mln::accu::center< P, V >::to_result().

10.1.2.3 template<typename P , typename V > unsigned mln::accu::center< P, V >::nsites ( ) const [inline]

Return the number of sites taken in consideration.

Definition at line 168 of file center.hh.

10.1.2.4 void mln::Accumulator< center< P, V > >::take_as_init (const T & *t*) [inherited]

Take as initialization the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.1.2.5 void mln::Accumulator< center< P, V > >::take_n_times (unsigned *n*, const T & *t*) [inherited]

Take `n` times the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.1.2.6 template<typename P , typename V > V mln::accu::center< P, V >::to_result ( ) const [inline]

Get the value of the accumulator.

Definition at line 142 of file center.hh.

References mln::accu::center< P, V >::is_valid().

10.2 mln::accu::convolve< T1, T2, R > Struct Template Reference

Generic convolution accumulator class.

`#include <convolve.hh>`

Inherits base< R, convolve< T1, T2, R > >.

Public Member Functions

- bool is_valid () const

  Check whether this accu is able to return a result.

- void take_as_init (const T &t)

  Take as initialization the value `t`*.*

- void take_n_times (unsigned n, const T &t)

  Take `n` *times the value* `t`*.*

- R to_result () const

  Get the value of the accumulator.

  - void init ()

    Manipulators.

10.2.1 Detailed Description

template<typename T1, typename T2, typename R = typename mln::trait::value_< typename mln::trait::op::times< T1 , T2 >::ret >::sum> struct mln::accu::convolve< T1, T2, R >

Generic convolution accumulator class. Parameters `T1` and `T2` are the type of values to be convolved. Parameter `R` is the result type.

Definition at line 54 of file accu/convolve.hh.

10.2.2 Member Function Documentation

10.2.2.1 template<typename T1 , typename T2 , typename R > void mln::accu::convolve< T1, T2, R >::init ( ) `[inline]`

Manipulators.

Definition at line 96 of file accu/convolve.hh.

References mln::literal::zero.

10.2.2.2 template<typename T1 , typename T2 , typename R > bool mln::accu::convolve< T1, T2, R >::is_valid ( ) const [inline]

Check whether this accu is able to return a result.

Always true here.

Definition at line 137 of file accu/convolve.hh.

10.2.2.3 void mln::Accumulator< convolve< T1, T2, R > >::take_as_init (const T & *t*) [inherited]

Take as initialization the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.2.2.4 void mln::Accumulator< convolve< T1, T2, R > >::take_n_times (unsigned *n*, const T & *t*) [inherited]

Take `n` times the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.2.2.5 template<typename T1 , typename T2 , typename R > R mln::accu::convolve< T1, T2, R >::to_result ( ) const [inline]

Get the value of the accumulator.

Definition at line 129 of file accu/convolve.hh.

10.3 mln::accu::count_adjacent_vertices< F, S > Struct Template Reference

Accumulator class counting the number of vertices adjacent to a set of mln::p_edges_psite (i.e., a set of edges).

`#include <count_adjacent_vertices.hh>`

Inherits base< unsigned, count_adjacent_vertices< F, S > >.

Public Member Functions

- bool is_valid () const

  Return whether this accu can return a result.

- void take_as_init (const T &t)

  Take as initialization the value `t`.

- void take_n_times (unsigned n, const T &t)

  Take `n` times the value `t`.

- unsigned to_result () const

Get the value of the accumulator.

- void init ()
  Manipulators.
- void set_value (unsigned c)
  Force the value of the counter to c.

10.3.1 Detailed Description

template<typename F, typename S> struct mln::accu::count_adjacent_vertices< F, S >

Accumulator class counting the number of vertices adjacent to a set of mln::p_edges_psite (i.e., a set of edges). The type to be count is mln::util::pix< pw::image<F, S> > where F and S are the parameters of this class.

This accumulator is used by mln::closing_area_on_vertices and mln::opening_area_on_vertices.

Definition at line 58 of file accu/count_adjacent_vertices.hh.

10.3.2 Member Function Documentation

10.3.2.1 template<typename F , typename S > void mln::accu::count_adjacent_vertices< F, S >::init ( ) [inline]

Manipulators.

Definition at line 123 of file accu/count_adjacent_vertices.hh.

10.3.2.2 template<typename F , typename S > bool mln::accu::count_adjacent_vertices< F, S >::is_valid ( ) const [inline]

Return whether this accu can return a result.

Definition at line 177 of file accu/count_adjacent_vertices.hh.

10.3.2.3 template<typename F , typename S > void mln::accu::count_adjacent_vertices< F, S >::set_value (unsigned *c*) [inline]

Force the value of the counter to *c*.

Definition at line 159 of file accu/count_adjacent_vertices.hh.

10.3.2.4 void mln::Accumulator< count_adjacent_vertices< F, S > >::take_as_init (const T & *t*) [inherited]

Take as initialization the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.3.2.5 void mln::Accumulator< count_adjacent_vertices< F, S > >::take_n_times (unsigned *n*, const T & *t*) [inherited]

Take n times the value t.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.3.2.6 template<typename F , typename S > unsigned mln::accu::count_adjacent_vertices< F, S >::to_result ( ) const [inline]

Get the value of the accumulator.

Definition at line 151 of file accu/count_adjacent_vertices.hh.

10.4 mln::accu::count_labels< L > Struct Template Reference

Count the number of different labels in an image.

`#include <count_labels.hh>`

Inherits base< unsigned, count_labels< L > >.

Public Member Functions

- bool is_valid () const
  Check whether this accu is able to return a result.
- void take_as_init (const T &t)
  Take as initialization the value t*.*
- void take_n_times (unsigned n, const T &t)
  Take n *times the value* t*.*
- unsigned to_result () const
  Get the value of the accumulator.

  - void init ()
    Manipulators.
  - void set_value (unsigned c)
    Force the value of the counter to c.

10.4.1 Detailed Description

template<typename L> struct mln::accu::count_labels< L >

Count the number of different labels in an image. The parameter *L* is the label type to be count.

Definition at line 52 of file count_labels.hh.

10.4.2 Member Function Documentation

10.4.2.1 template<typename L > void mln::accu::count_labels< L >::init ( ) [inline]

Manipulators.

Definition at line 113 of file count_labels.hh.

10.4.2.2 template<typename L > bool mln::accu::count_labels< L >::is_valid ( ) const [inline]

Check whether this accu is able to return a result.

Always true here.

Definition at line 163 of file count_labels.hh.

10.4.2.3 template<typename L > void mln::accu::count_labels< L >::set_value (unsigned *c*) [inline]

Force the value of the counter to *c*.

Definition at line 155 of file count_labels.hh.

10.4.2.4 void mln::Accumulator< count_labels< L > >::take_as_init (const T & *t*) [inherited]

Take as initialization the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.4.2.5 void mln::Accumulator< count_labels< L > >::take_n_times (unsigned *n*, const T & *t*) [inherited]

Take `n` times the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.4.2.6 template<typename L > unsigned mln::accu::count_labels< L >::to_result ( ) const [inline]

Get the value of the accumulator.

Definition at line 146 of file count_labels.hh.

10.5 mln::accu::count_value< V > Struct Template Reference

Define an accumulator that counts the occurrence of a given value.

`#include <count_value.hh>`

Inherits base< unsigned, count_value< V > >.

Public Member Functions

- bool is_valid () const
  Check whether this accu is able to return a result.
- void take_as_init (const T &t)
  Take as initialization the value `t`.
- void take_n_times (unsigned n, const T &t)
  Take `n` times the value `t`.
- unsigned to_result () const
  Get the value of the accumulator.

  - void init ()
    Manipulators.
  - void set_value (unsigned c)
    Force the value of the counter to c.

10.5.1 Detailed Description

template<typename V> struct mln::accu::count_value< V >

Define an accumulator that counts the occurrence of a given value.

Definition at line 72 of file count_value.hh.

10.5.2 Member Function Documentation

10.5.2.1 template<typename V > void mln::accu::count_value< V >::init ( ) [inline]

Manipulators.

Definition at line 153 of file count_value.hh.

10.5.2.2 template<typename V > bool mln::accu::count_value< V >::is_valid ( ) const [inline]

Check whether this accu is able to return a result.

Always true here.

Definition at line 216 of file count_value.hh.

10.5.2.3 template<typename V > void mln::accu::count_value< V >::set_value (unsigned *c*) [inline]

Force the value of the counter to *c*.

Definition at line 208 of file count_value.hh.

10.5.2.4 void mln::Accumulator< count_value< V > >::take_as_init (const T & t) [inherited]

Take as initialization the value t.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.5.2.5 void mln::Accumulator< count_value< V > >::take_n_times (unsigned n, const T & t) [inherited]

Take n times the value t.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.5.2.6 template<typename V > unsigned mln::accu::count_value< V >::to_result ( ) const [inline]

Get the value of the accumulator.

Definition at line 199 of file count_value.hh.

10.6 mln::accu::histo< V > Struct Template Reference

Generic histogram class over a value set with type V.

`#include <histo.hh>`

Inherits base< const std::vector< unsigned > &, histo< V > >.

Public Member Functions

- bool is_valid () const

  Check whether this accu is able to return a result.

- void take_as_init (const T &t)

  Take as initialization the value t.

- void take_n_times (unsigned n, const T &t)

  Take n times the value t.

  - void take (const argument &t)

    Manipulators.

  - const std::vector< unsigned > & vect () const

    Get the value of the accumulator.

10.6.1 Detailed Description

template<typename V> struct mln::accu::histo< V >

Generic histogram class over a value set with type `V`.

Definition at line 56 of file accu/histo.hh.

10.6.2 Member Function Documentation

10.6.2.1 template<typename V > bool mln::accu::histo< V >::is_valid ( ) const [inline]

Check whether this accu is able to return a result.

Always true here.

Definition at line 236 of file accu/histo.hh.

10.6.2.2 template<typename V > void mln::accu::histo< V >::take (const argument & *t*) [inline]

Manipulators.

Definition at line 129 of file accu/histo.hh.

10.6.2.3 void mln::Accumulator< histo< V > >::take_as_init (const T & *t*) [inherited]

Take as initialization the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.6.2.4 void mln::Accumulator< histo< V > >::take_n_times (unsigned *n*, const T & *t*) [inherited]

Take `n` times the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.6.2.5 template<typename V > const std::vector< unsigned > & mln::accu::histo< V >::vect ( ) const [inline]

Get the value of the accumulator.

Definition at line 201 of file accu/histo.hh.

10.7 mln::accu::label_used< L > Struct Template Reference

References all the labels used.

`#include <label_used.hh>`

Inherits base< const fun::i2v::array< bool > &, label_used< L > >.

Public Member Functions

- void init ()
  Initialize accumulator attributes.
- bool is_valid () const
  Check whether this accu is able to return a result.
- void take_as_init (const T &t)
  Take as initialization the value t.
- void take_n_times (unsigned n, const T &t)
  Take n times the value t.
- const fun::i2v::array< bool > & to_result () const
  Get the value of the accumulator.

  - void take (const argument &)
    Manipulators.

10.7.1 Detailed Description

template<typename L> struct mln::accu::label_used< L >

References all the labels used. The parameter *L* is the label type.

Definition at line 53 of file label_used.hh.

10.7.2 Member Function Documentation

10.7.2.1 template<typename L > void mln::accu::label_used< L >::init ( ) [inline]

Initialize accumulator attributes.

Definition at line 110 of file label_used.hh.

10.7.2.2 template<typename L > bool mln::accu::label_used< L >::is_valid ( ) const [inline]

Check whether this accu is able to return a result.

Always true here.

Definition at line 150 of file label_used.hh.

10.7.2.3 template<typename L > void mln::accu::label_used< L >::take (const argument & *l*) [inline]

Manipulators.

Definition at line 118 of file label_used.hh.

10.7.2.4 void mln::Accumulator< label_used< L > >::take_as_init (const T & *t*) [inherited]

Take as initialization the value t.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.7.2.5 void mln::Accumulator< label_used< L > >::take_n_times (unsigned *n*, const T & *t*) [inherited]

Take n times the value t.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.7.2.6 template<typename L > const fun::i2v::array< bool > & mln::accu::label_used< L >::to_result ( ) const [inline]

Get the value of the accumulator.

Definition at line 142 of file label_used.hh.

10.8 mln::accu::logic::land Struct Reference

"Logical-and" accumulator.

`#include <land.hh>`

Inherits base< bool, land >.

Public Member Functions

- bool is_valid () const

  Check whether this accu is able to return a result.

- void take_as_init (const T &t)

  Take as initialization the value t.

- void take_n_times (unsigned n, const T &t)

  Take n times the value t.

- bool to_result () const

  Get the value of the accumulator.

  - void init ()

    Manipulators.

10.8.1 Detailed Description

"Logical-and" accumulator.

Definition at line 96 of file accu/logic/land.hh.

10.8.2 Member Function Documentation

10.8.2.1 void mln::accu::logic::land::init ( ) [inline]

Manipulators.

Definition at line 136 of file accu/logic/land.hh.

10.8.2.2 bool mln::accu::logic::land::is_valid ( ) const [inline]

Check whether this accu is able to return a result.

Always true here.

Definition at line 185 of file accu/logic/land.hh.

10.8.2.3 void mln::Accumulator< land >::take_as_init (const T & *t*) [inherited]

Take as initialization the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.8.2.4 void mln::Accumulator< land >::take_n_times (unsigned *n*, const T & *t*) [inherited]

Take `n` times the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.8.2.5 bool mln::accu::logic::land::to_result ( ) const [inline]

Get the value of the accumulator.

Definition at line 178 of file accu/logic/land.hh.

10.9 mln::accu::logic::land_basic Struct Reference

"Logical-and" accumulator.

`#include <land_basic.hh>`

Inherits base< bool, land_basic >.

Public Member Functions

- bool can_stop () const

Test if it is worth for this accumulator to take extra data.

- bool is_valid () const

  Check whether this accu is able to return a result.

- void take_as_init (const T &t)

  Take as initialization the value `t`*.*

- void take_n_times (unsigned n, const T &t)

  Take `n` *times the value* `t`*.*

- bool to_result () const

  Get the value of the accumulator.

- void init ()

  Manipulators.

10.9.1 Detailed Description

"Logical-and" accumulator. Conversely to accu::logic::land, this version does not have the 'untake' method but features the 'can_stop' method.

Definition at line 99 of file land_basic.hh.

10.9.2 Member Function Documentation

10.9.2.1 bool mln::accu::logic::land_basic::can_stop ( ) const [inline]

Test if it is worth for this accumulator to take extra data.

If the result is already 'false' (because this accumulator has already taken a 'false' value), can_stop returns true.

Definition at line 181 of file land_basic.hh.

10.9.2.2 void mln::accu::logic::land_basic::init ( ) [inline]

Manipulators.

Definition at line 140 of file land_basic.hh.

10.9.2.3 bool mln::accu::logic::land_basic::is_valid ( ) const [inline]

Check whether this accu is able to return a result.

Always true here.

Definition at line 174 of file land_basic.hh.

10.9.2.4 void mln::Accumulator< land_basic >::take_as_init (const T & *t*) [inherited]

Take as initialization the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.9.2.5 void mln::Accumulator< land_basic >::take_n_times (unsigned *n*, const T & *t*) [inherited]

Take `n` times the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.9.2.6 bool mln::accu::logic::land_basic::to_result ( ) const [inline]

Get the value of the accumulator.

Definition at line 167 of file land_basic.hh.

10.10 mln::accu::logic::lor Struct Reference

"Logical-or" accumulator.

`#include <lor.hh>`

Inherits base< bool, lor >.

Public Member Functions

- bool is_valid () const

  Check whether this accu is able to return a result.

- void take_as_init (const T &t)

  Take as initialization the value `t`.

- void take_n_times (unsigned n, const T &t)

  Take `n` times the value `t`.

- bool to_result () const

  Get the value of the accumulator.

  - void init ()

    Manipulators.

10.10.1 Detailed Description

"Logical-or" accumulator.

Definition at line 95 of file accu/logic/lor.hh.

10.10.2 Member Function Documentation

10.10.2.1 void mln::accu::logic::lor::init ( ) `[inline]`

Manipulators.

Definition at line 134 of file accu/logic/lor.hh.

10.10.2.2 bool mln::accu::logic::lor::is_valid ( ) const `[inline]`

Check whether this accu is able to return a result.

Always true here.

Definition at line 183 of file accu/logic/lor.hh.

10.10.2.3 void mln::Accumulator< lor >::take_as_init (const T & *t*) `[inherited]`

Take as initialization the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.10.2.4 void mln::Accumulator< lor >::take_n_times (unsigned *n*, const T & *t*) `[inherited]`

Take `n` times the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.10.2.5 bool mln::accu::logic::lor::to_result ( ) const `[inline]`

Get the value of the accumulator.

Definition at line 176 of file accu/logic/lor.hh.

10.11 mln::accu::logic::lor_basic Struct Reference

"Logical-or" accumulator class.

`#include <lor_basic.hh>`

Inherits base< bool, lor_basic >.

Public Member Functions

- bool can_stop () const

  Test if it is worth for this accumulator to take extra data.

- bool is_valid () const

  Check whether this accu is able to return a result.

- void take_as_init (const T &t)

Take as initialization the value `t`.

- void take_n_times (unsigned n, const T &t)

  Take `n` *times the value* `t`.

- bool to_result () const

  Get the value of the accumulator.

- void init ()

  Manipulators.

10.11.1 Detailed Description

"Logical-or" accumulator class. Conversely to accu::logic::lor, this version does not have the 'untake' method but features the 'can_stop' method.

Definition at line 98 of file lor_basic.hh.

10.11.2 Member Function Documentation

10.11.2.1 bool mln::accu::logic::lor_basic::can_stop ( ) const `[inline]`

Test if it is worth for this accumulator to take extra data.

If the result is already 'true' (because this accumulator has already taken a 'true' value), can_stop returns true.

Definition at line 180 of file lor_basic.hh.

10.11.2.2 void mln::accu::logic::lor_basic::init ( ) `[inline]`

Manipulators.

Definition at line 139 of file lor_basic.hh.

10.11.2.3 bool mln::accu::logic::lor_basic::is_valid ( ) const `[inline]`

Check whether this accu is able to return a result.

Always true here.

Definition at line 173 of file lor_basic.hh.

10.11.2.4 void mln::Accumulator< lor_basic >::take_as_init (const T & *t*) `[inherited]`

Take as initialization the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.11.2.5 void mln::Accumulator< lor_basic >::take_n_times (unsigned *n*, const T & *t*) [inherited]

Take n times the value t.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.11.2.6 bool mln::accu::logic::lor_basic::to_result ( ) const [inline]

Get the value of the accumulator.

Definition at line 166 of file lor_basic.hh.

10.12 mln::accu::maj_h< T > Struct Template Reference

Compute the majority value.

`#include <maj_h.hh>`

Inherits base< const T &, maj_h< T > >.

Public Member Functions

- bool is_valid () const

  Check whether this accu is able to return a result.

- void take_as_init (const T &t)

  Take as initialization the value t*.*

- void take_n_times (unsigned n, const T &t)

  Take n *times the value* t*.*

- const T & to_result () const

  Get the value of the accumulator.

  - void init ()

    Manipulators.

10.12.1 Detailed Description

template<typename T> struct mln::accu::maj_h< T >

Compute the majority value. It is based on a histogram. The parameter T is the type of values.

Definition at line 57 of file maj_h.hh.

10.12.2 Member Function Documentation

10.12.2.1 template<typename T > void mln::accu::maj_h< T >::init ( ) [inline]

Manipulators.

Definition at line 129 of file maj_h.hh.

10.12.2.2 template<typename T > bool mln::accu::maj_h< T >::is_valid ( ) const [inline]

Check whether this accu is able to return a result.

Always true here.

Definition at line 197 of file maj_h.hh.

10.12.2.3 void mln::Accumulator< maj_h< T > >::take_as_init (const T & *t*) [inherited]

Take as initialization the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.12.2.4 void mln::Accumulator< maj_h< T > >::take_n_times (unsigned *n*, const T & *t*) [inherited]

Take `n` times the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.12.2.5 template<typename T > const T & mln::accu::maj_h< T >::to_result ( ) const [inline]

Get the value of the accumulator.

Definition at line 187 of file maj_h.hh.

10.13 mln::accu::math::count< T > Struct Template Reference

Generic counter accumulator.

`#include <count.hh>`

Inherits base< unsigned, count< T > >.

Public Member Functions

- bool is_valid () const

  Check whether this accu is able to return a result.

- void take_as_init (const T &t)

  Take as initialization the value `t`*.*

- void take_n_times (unsigned n, const T &t)

  Take n *times the value* t.

- unsigned to_result () const

  Get the value of the accumulator.

  - void init ()

    Manipulators.

  - void set_value (unsigned c)

    Force the value of the counter to c.

10.13.1 Detailed Description

template<typename T> struct mln::accu::math::count< T >

Generic counter accumulator. The parameter *T* is the type to be count.

Definition at line 100 of file count.hh.

10.13.2 Member Function Documentation

10.13.2.1 template<typename T > void mln::accu::math::count< T >::init ( ) [inline]

Manipulators.

Definition at line 145 of file count.hh.

10.13.2.2 template<typename T > bool mln::accu::math::count< T >::is_valid ( ) const [inline]

Check whether this accu is able to return a result.

Always true here.

Definition at line 203 of file count.hh.

10.13.2.3 template<typename T > void mln::accu::math::count< T >::set_value (unsigned *c*) [inline]

Force the value of the counter to *c*.

Definition at line 195 of file count.hh.

10.13.2.4 void mln::Accumulator< count< T > >::take_as_init (const T & *t*) [inherited]

Take as initialization the value t.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.13.2.5 void mln::Accumulator< count< T > >::take_n_times (unsigned *n*, const T & *t*) [inherited]

Take n times the value t.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.13.2.6 template<typename T > unsigned mln::accu::math::count< T >::to_result ( ) const [inline]

Get the value of the accumulator.

Definition at line 187 of file count.hh.

10.14 mln::accu::math::inf< T > Struct Template Reference

Generic inf accumulator class.

`#include <inf.hh>`

Inherits base< const T &, inf< T > >.

Public Member Functions

- bool is_valid () const
  Check whether this accu is able to return a result.
- void take_as_init (const T &t)
  Take as initialization the value t*.*
- void take_n_times (unsigned n, const T &t)
  Take n *times the value* t*.*
- const T & to_result () const
  Get the value of the accumulator.

  - void init ()
    Manipulators.

10.14.1 Detailed Description

template<typename T> struct mln::accu::math::inf< T >

Generic inf accumulator class. The parameter T is the type of values.

Definition at line 56 of file accu/math/inf.hh.

10.14.2 Member Function Documentation

10.14.2.1 template<typename T > void mln::accu::math::inf< T >::init ( ) [inline]

Manipulators.

Definition at line 126 of file accu/math/inf.hh.

10.14.2.2 template<typename T > bool mln::accu::math::inf< T >::is_valid ( ) const [inline]

Check whether this accu is able to return a result.

Always true here.

Definition at line 164 of file accu/math/inf.hh.

10.14.2.3 void mln::Accumulator< inf< T > >::take_as_init (const T & *t*) [inherited]

Take as initialization the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.14.2.4 void mln::Accumulator< inf< T > >::take_n_times (unsigned *n*, const T & *t*) [inherited]

Take `n` times the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.14.2.5 template<typename T > const T & mln::accu::math::inf< T >::to_result ( ) const [inline]

Get the value of the accumulator.

Definition at line 156 of file accu/math/inf.hh.

10.15 mln::accu::math::sum< T, S > Struct Template Reference

Generic sum accumulator class.

`#include <sum.hh>`

Inherits base< const S &, sum< T, S > >.

Public Member Functions

- bool is_valid () const

  Check whether this accu is able to return a result.

- void take_as_init (const T &t)

  Take as initialization the value `t`.

- void take_n_times (unsigned n, const T &t)
  Take n times the value t.
- const S & to_result () const
  Get the value of the accumulator.

- void init ()
  Manipulators.

10.15.1 Detailed Description

template<typename T, typename S = typename mln::value::props< T >::sum> struct mln::accu::math::sum< T, S >

Generic sum accumulator class. Parameter T is the type of values that we sum. Parameter S is the type to store the value sum; the default type of S is the summation type (property) of T.

Definition at line 112 of file accu/math/sum.hh.

10.15.2 Member Function Documentation

10.15.2.1 template<typename T , typename S > void mln::accu::math::sum< T, S >::init ( ) [inline]

Manipulators.

Definition at line 161 of file accu/math/sum.hh.

References mln::literal::zero.

10.15.2.2 template<typename T , typename S > bool mln::accu::math::sum< T, S >::is_valid ( ) const [inline]

Check whether this accu is able to return a result.

Always true here.

Definition at line 222 of file accu/math/sum.hh.

10.15.2.3 void mln::Accumulator< sum< T, S > >::take_as_init (const T & *t*) [inherited]

Take as initialization the value t.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.15.2.4 void mln::Accumulator< sum< T, S > >::take_n_times (unsigned *n*, const T & *t*) [inherited]

Take n times the value t.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.15.2.5 template<typename T , typename S > const S & mln::accu::math::sum< T, S >::to_result ( ) const [inline]

Get the value of the accumulator.

Definition at line 206 of file accu/math/sum.hh.

10.16 mln::accu::math::sup< T > Struct Template Reference

Generic sup accumulator class.

`#include <sup.hh>`

Inherits base< const T &, sup< T > >.

Public Member Functions

- bool is_valid () const
  Check whether this accu is able to return a result.
- void take_as_init (const T &t)
  Take as initialization the value `t`*.*
- void take_n_times (unsigned n, const T &t)
  Take `n` *times the value* `t`*.*
- const T & to_result () const
  Get the value of the accumulator.

  - void init ()
    Manipulators.

10.16.1 Detailed Description

template<typename T> struct mln::accu::math::sup< T >

Generic sup accumulator class. The parameter `T` is the type of values.

Definition at line 56 of file accu/math/sup.hh.

10.16.2 Member Function Documentation

10.16.2.1 template<typename T > void mln::accu::math::sup< T >::init ( ) [inline]

Manipulators.

Definition at line 128 of file accu/math/sup.hh.

10.16.2.2 template<typename T > bool mln::accu::math::sup< T >::is_valid ( ) const [inline]

Check whether this accu is able to return a result.

Always true here.

Definition at line 166 of file accu/math/sup.hh.

10.16.2.3 void mln::Accumulator< sup< T > >::take_as_init (const T & *t*) [inherited]

Take as initialization the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.16.2.4 void mln::Accumulator< sup< T > >::take_n_times (unsigned *n*, const T & *t*) [inherited]

Take `n` times the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.16.2.5 template<typename T > const T & mln::accu::math::sup< T >::to_result ( ) const [inline]

Get the value of the accumulator.

Definition at line 158 of file accu/math/sup.hh.

10.17 mln::accu::max_site< I > Struct Template Reference

Define an accumulator that computes the first site with the maximum value in an image.

`#include <max_site.hh>`

Inherits base< I::psite, max_site< I > >.

Public Member Functions

- bool is_valid () const

  Check whether this accu is able to return a result.

- void take_as_init (const T &t)

  Take as initialization the value `t`*.*

- void take_n_times (unsigned n, const T &t)

  Take `n` *times the value* `t`*.*

- I::psite to_result () const

  Get the value of the accumulator.

- void init ()

  Manipulators.

10.17.1 Detailed Description

template<typename I> struct mln::accu::max_site< I >

Define an accumulator that computes the first site with the maximum value in an image.

Definition at line 53 of file max_site.hh.

10.17.2 Member Function Documentation

10.17.2.1 template<typename I > void mln::accu::max_site< I >::init ( ) [inline]

Manipulators.

Definition at line 114 of file max_site.hh.

10.17.2.2 template<typename I > bool mln::accu::max_site< I >::is_valid ( ) const [inline]

Check whether this accu is able to return a result.

Always true here.

Definition at line 174 of file max_site.hh.

10.17.2.3 void mln::Accumulator< max_site< I > >::take_as_init (const T & *t*) [inherited]

Take as initialization the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.17.2.4 void mln::Accumulator< max_site< I > >::take_n_times (unsigned *n*, const T & *t*) [inherited]

Take `n` times the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.17.2.5 template<typename I > I::psite mln::accu::max_site< I >::to_result ( ) const [inline]

Get the value of the accumulator.

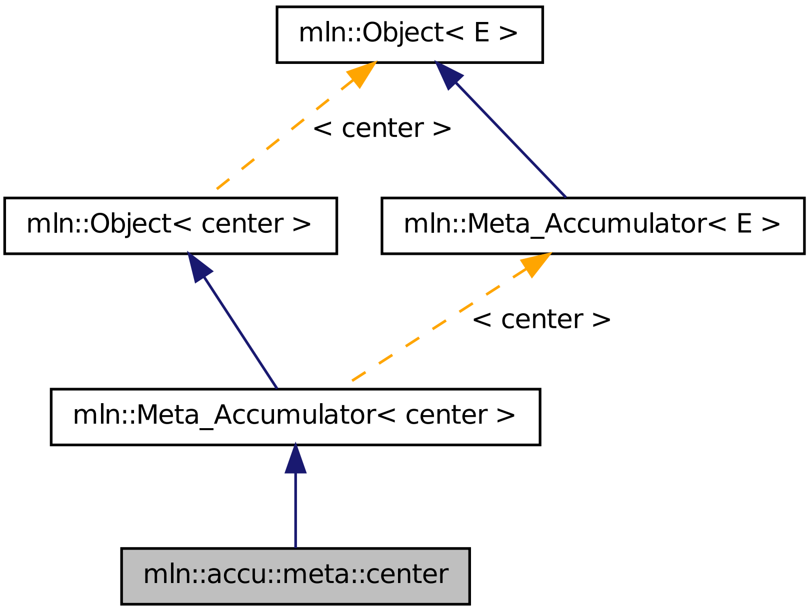
Definition at line 150 of file max_site.hh.

10.18 mln::accu::meta::center Struct Reference

Meta accumulator for center.

`#include <center.hh>`

Inheritance diagram for mln::accu::meta::center:



10.18.1 Detailed Description

Meta accumulator for center.

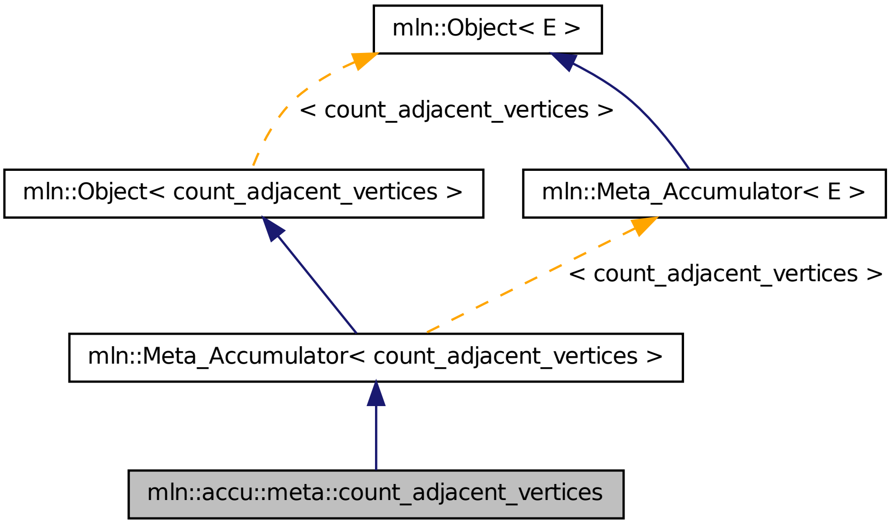
Definition at line 89 of file center.hh.

10.19 mln::accu::meta::count_adjacent_vertices Struct Reference

Meta accumulator for count_adjacent_vertices.

`#include <count_adjacent_vertices.hh>`

Inheritance diagram for mln::accu::meta::count_adjacent_vertices:



10.19.1 Detailed Description

Meta accumulator for count_adjacent_vertices.

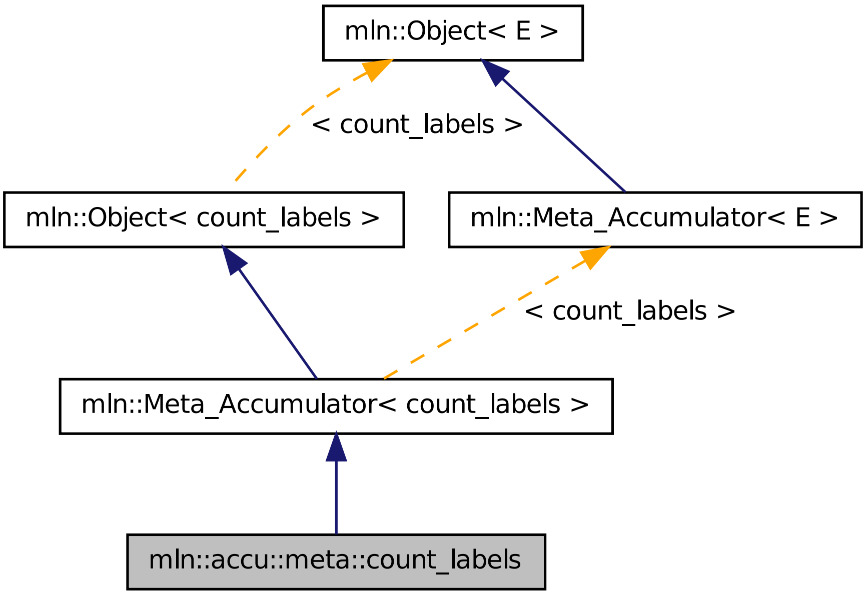
Definition at line 98 of file accu/count_adjacent_vertices.hh.

10.20 mln::accu::meta::count_labels Struct Reference

Meta accumulator for count_labels.

`#include <count_labels.hh>`

Inheritance diagram for mln::accu::meta::count_labels:



10.20.1 Detailed Description

Meta accumulator for count_labels.

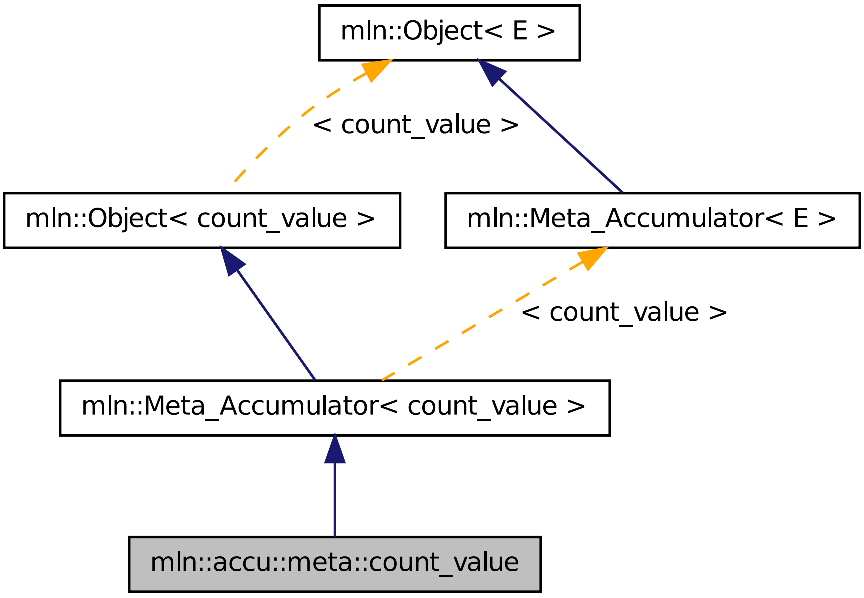
Definition at line 88 of file count_labels.hh.

10.21 mln::accu::meta::count_value Struct Reference

FIXME: How to write a meta accumulator with a constructor taking a generic argument? Meta accumulator for count_value.

```
#include <count_value.hh>
```

Inheritance diagram for mln::accu::meta::count_value:



10.21.1 Detailed Description

FIXME: How to write a meta accumulator with a constructor taking a generic argument? Meta accumulator for count_value.

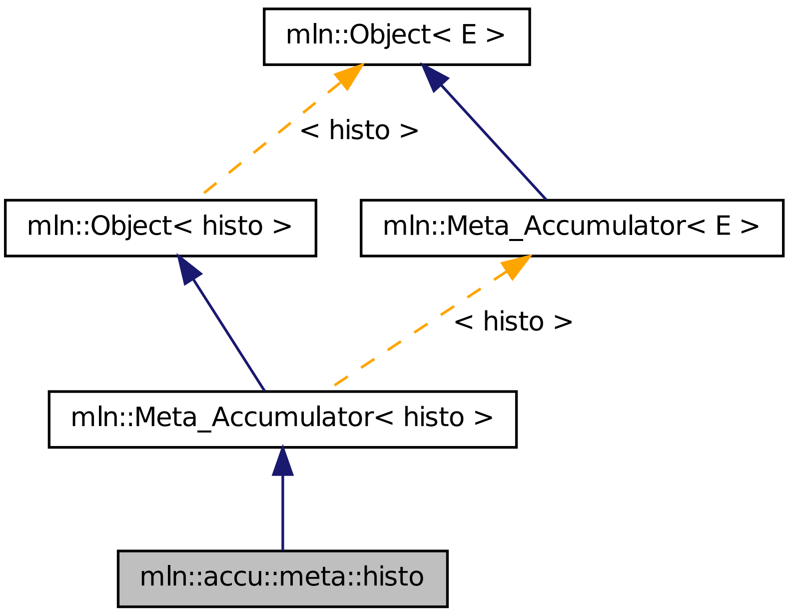
Definition at line 116 of file count_value.hh.

10.22 mln::accu::meta::histo Struct Reference

Meta accumulator for histo.

`#include <histo.hh>`

Inheritance diagram for mln::accu::meta::histo:



10.22.1 Detailed Description

Meta accumulator for histo.

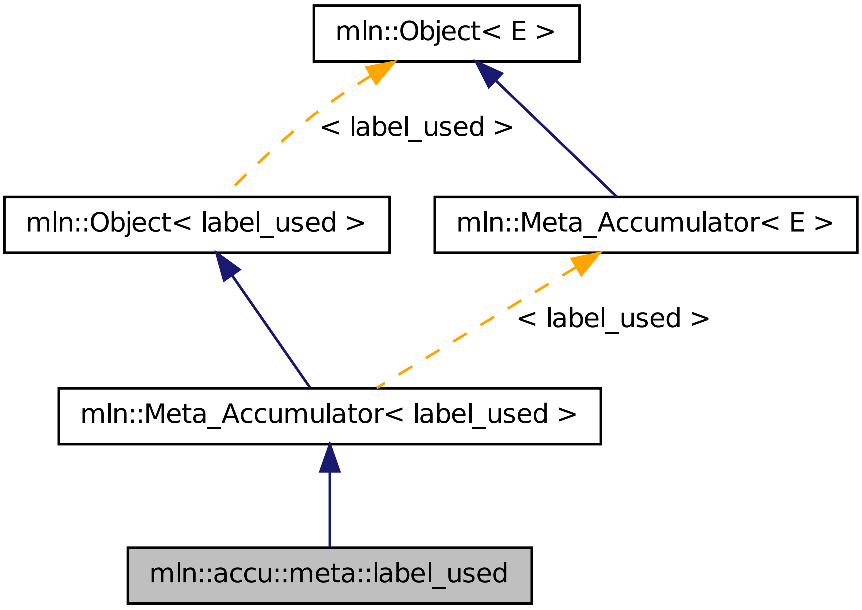
Definition at line 102 of file accu/histo.hh.

10.23 mln::accu::meta::label_used Struct Reference

Meta accumulator for label_used.

`#include <label_used.hh>`

Inheritance diagram for mln::accu::meta::label_used:



10.23.1 Detailed Description

Meta accumulator for label_used.

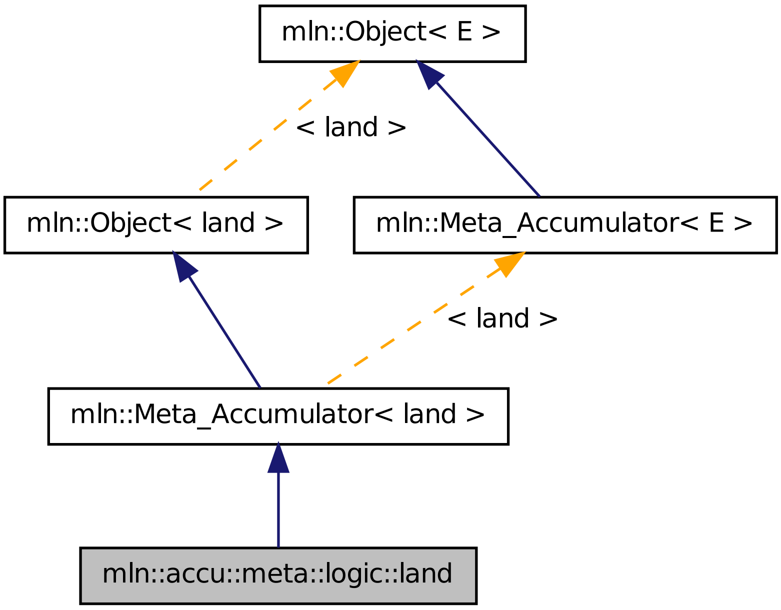
Definition at line 85 of file label_used.hh.

10.24 mln::accu::meta::logic::land Struct Reference

Meta accumulator for land.

`#include <land.hh>`

Inheritance diagram for mln::accu::meta::logic::land:



10.24.1 Detailed Description

Meta accumulator for land.

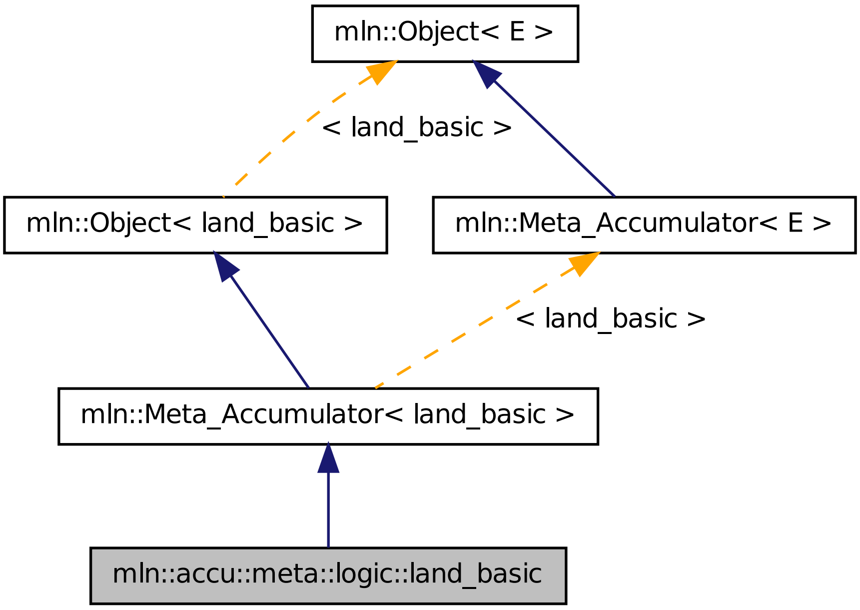
Definition at line 76 of file accu/logic/land.hh.

10.25 mln::accu::meta::logic::land_basic Struct Reference

Meta accumulator for land_basic.

`#include <land_basic.hh>`

Inheritance diagram for mln::accu::meta::logic::land_basic:



10.25.1 Detailed Description

Meta accumulator for land_basic.

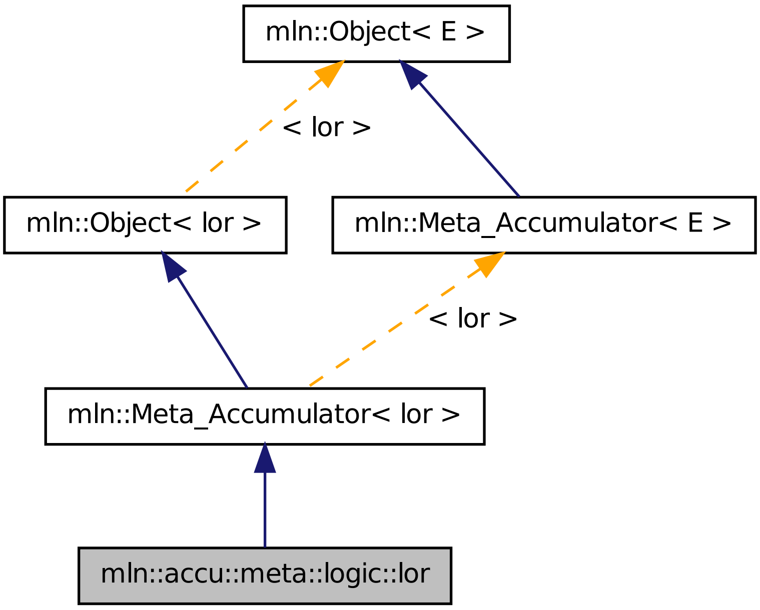
Definition at line 77 of file land_basic.hh.

10.26 mln::accu::meta::logic::lor Struct Reference

Meta accumulator for lor.

```
#include <lor.hh>
```

Inheritance diagram for mln::accu::meta::logic::lor:



10.26.1 Detailed Description

Meta accumulator for lor.

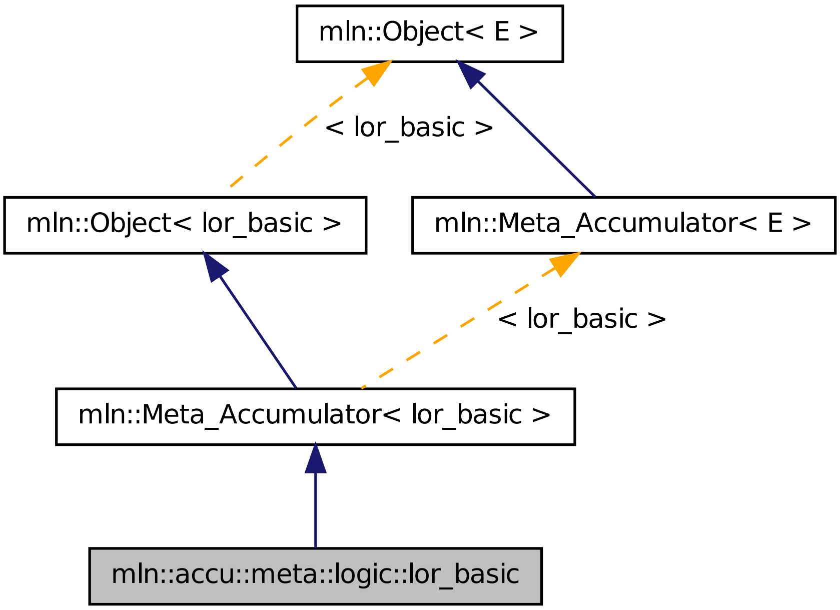
Definition at line 76 of file accu/logic/lor.hh.

10.27 mln::accu::meta::logic::lor_basic Struct Reference

Meta accumulator for lor_basic.

```
#include <lor_basic.hh>
```

Inheritance diagram for mln::accu::meta::logic::lor_basic:



10.27.1 Detailed Description

Meta accumulator for lor_basic.

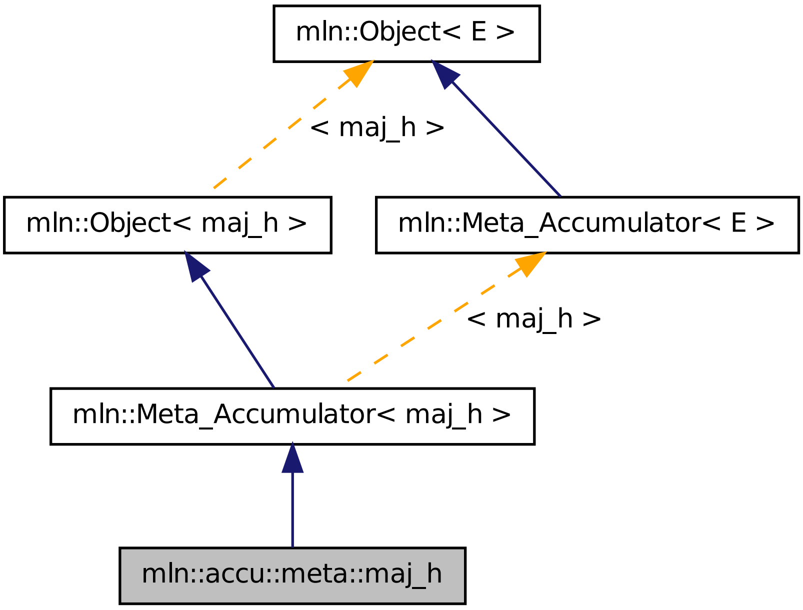
Definition at line 76 of file lor_basic.hh.

10.28 mln::accu::meta::maj_h Struct Reference

Meta accumulator for maj_h.

`#include <maj_h.hh>`

Inheritance diagram for mln::accu::meta::maj_h:



10.28.1 Detailed Description

Meta accumulator for maj_h.

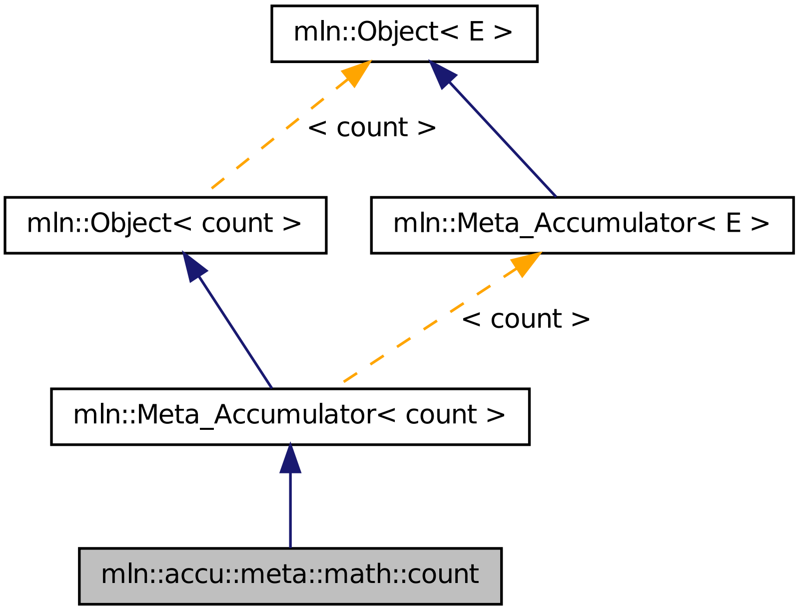
Definition at line 101 of file maj_h.hh.

10.29 mln::accu::meta::math::count Struct Reference

Meta accumulator for count.

```
#include <count.hh>
```

Inheritance diagram for mln::accu::meta::math::count:



10.29.1 Detailed Description

Meta accumulator for count.

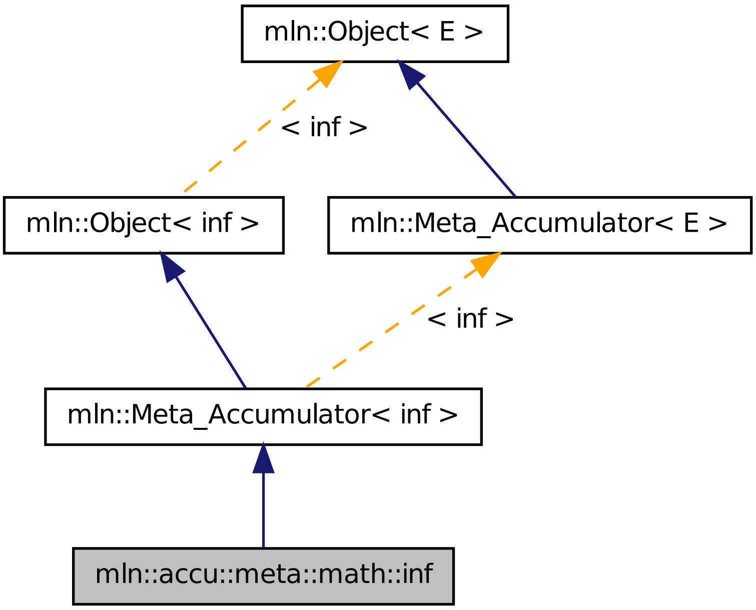
Definition at line 77 of file count.hh.

10.30 mln::accu::meta::math::inf Struct Reference

Meta accumulator for inf.

`#include <inf.hh>`

Inheritance diagram for mln::accu::meta::math::inf:



10.30.1 Detailed Description

Meta accumulator for inf.

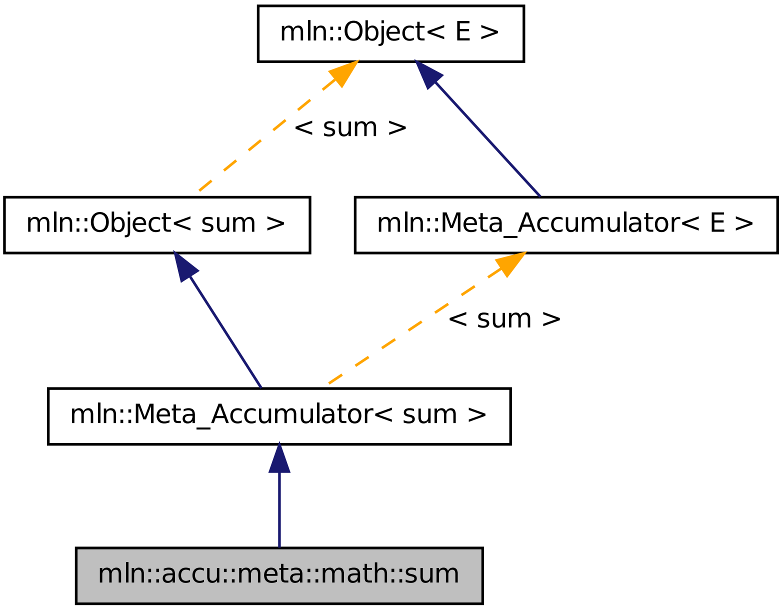
Definition at line 97 of file accu/math/inf.hh.

10.31 mln::accu::meta::math::sum Struct Reference

Meta accumulator for sum.

`#include <sum.hh>`

Inheritance diagram for mln::accu::meta::math::sum:



10.31.1 Detailed Description

Meta accumulator for sum.

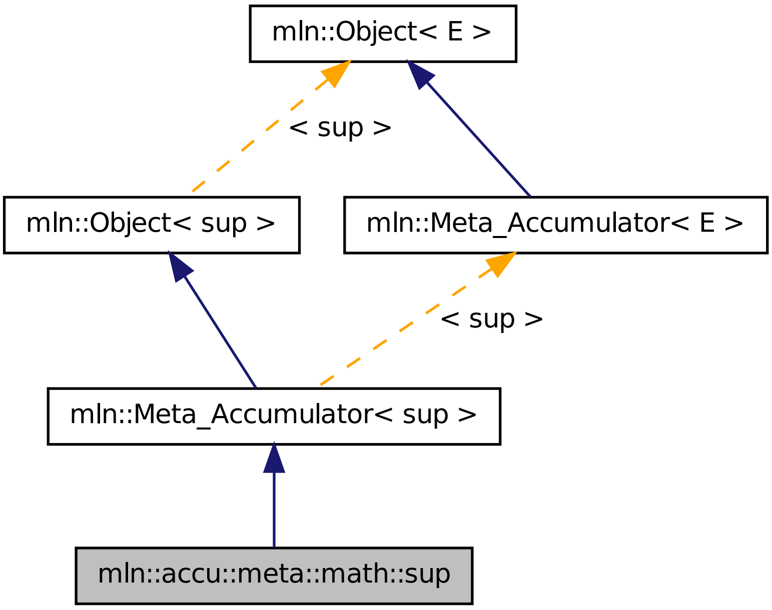
Definition at line 66 of file accu/math/sum.hh.

10.32 mln::accu::meta::math::sup Struct Reference

Meta accumulator for sup.

`#include <sup.hh>`

Inheritance diagram for mln::accu::meta::math::sup:



10.32.1 Detailed Description

Meta accumulator for sup.

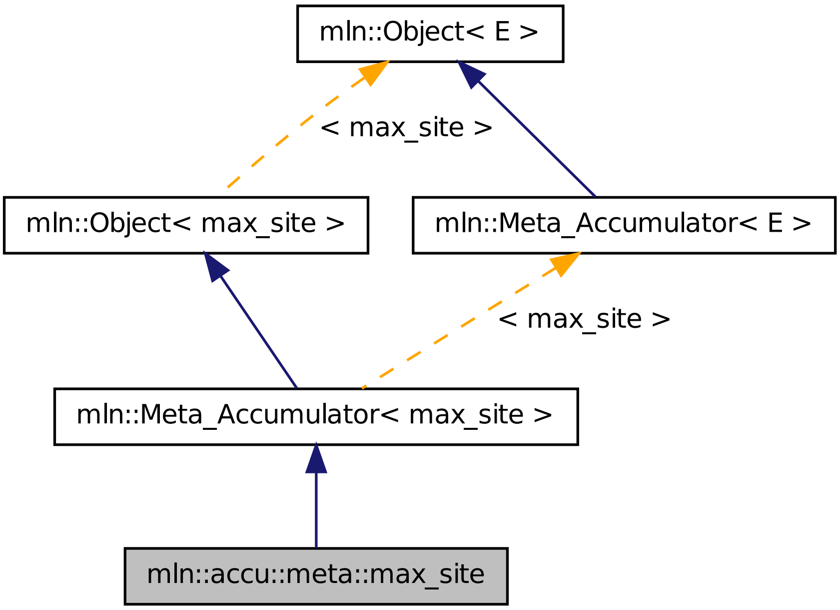
Definition at line 98 of file accu/math/sup.hh.

10.33 mln::accu::meta::max_site Struct Reference

Meta accumulator for max_site.

`#include <max_site.hh>`

Inheritance diagram for mln::accu::meta::max_site:



10.33.1 Detailed Description

Meta accumulator for max_site.

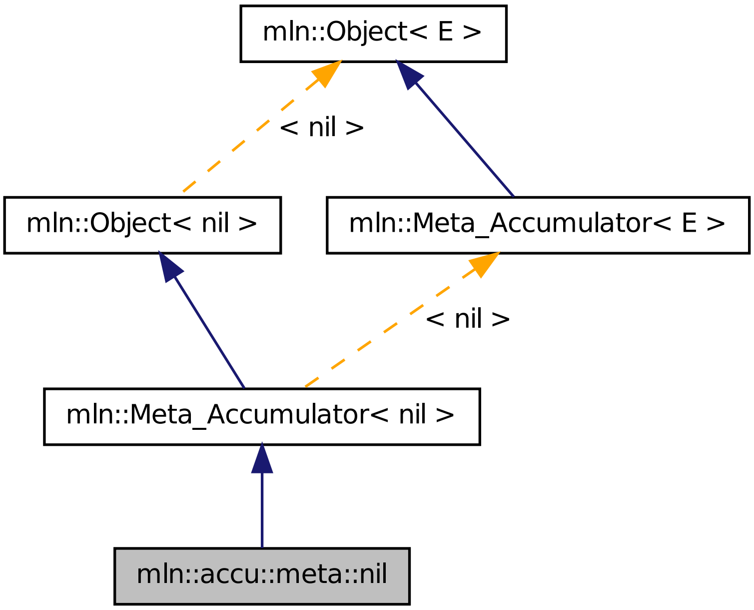
Definition at line 90 of file max_site.hh.

10.34 mln::accu::meta::nil Struct Reference

Meta accumulator for nil.

`#include <nil.hh>`

Inheritance diagram for mln::accu::meta::nil:



10.34.1 Detailed Description

Meta accumulator for nil.

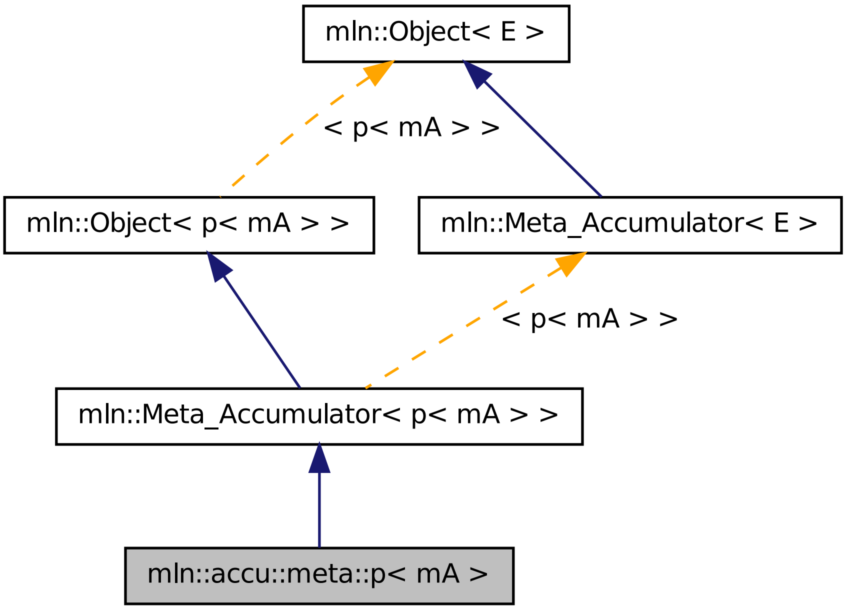
Definition at line 77 of file accu/nil.hh.

10.35 mln::accu::meta::p< mA > Struct Template Reference

Meta accumulator for p.

```
#include <p.hh>
```

Inheritance diagram for mln::accu::meta::p< mA >:



10.35.1 Detailed Description

template<typename mA> struct mln::accu::meta::p< mA >

Meta accumulator for p.

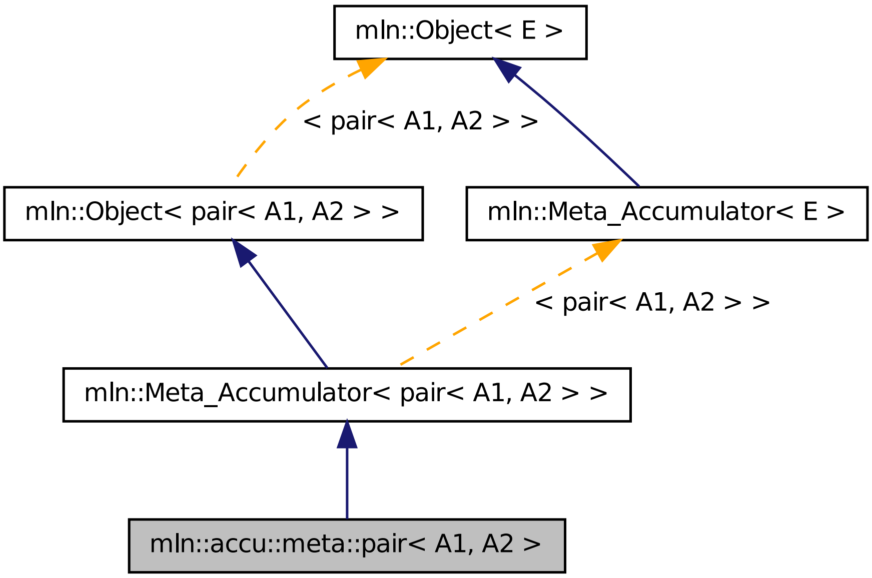
Definition at line 83 of file p.hh.

10.36 mln::accu::meta::pair< A1, A2 > Struct Template Reference

Meta accumulator for pair.

`#include <pair.hh>`

Inheritance diagram for mln::accu::meta::pair< A1, A2 >:



10.36.1 Detailed Description

template<typename A1, typename A2> struct mln::accu::meta::pair< A1, A2 >

Meta accumulator for pair.

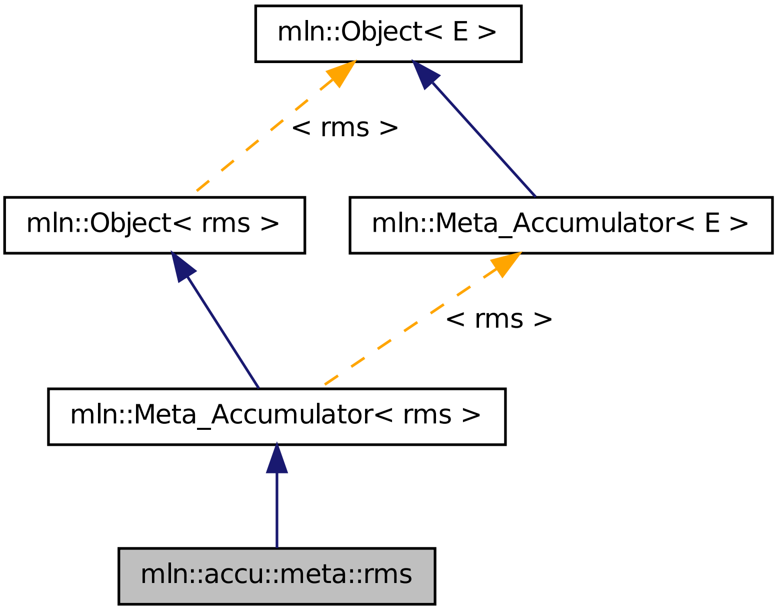
Definition at line 110 of file pair.hh.

10.37 mln::accu::meta::rms Struct Reference

Meta accumulator for rms.

`#include <rms.hh>`

Inheritance diagram for mln::accu::meta::rms:



10.37.1 Detailed Description

Meta accumulator for rms.

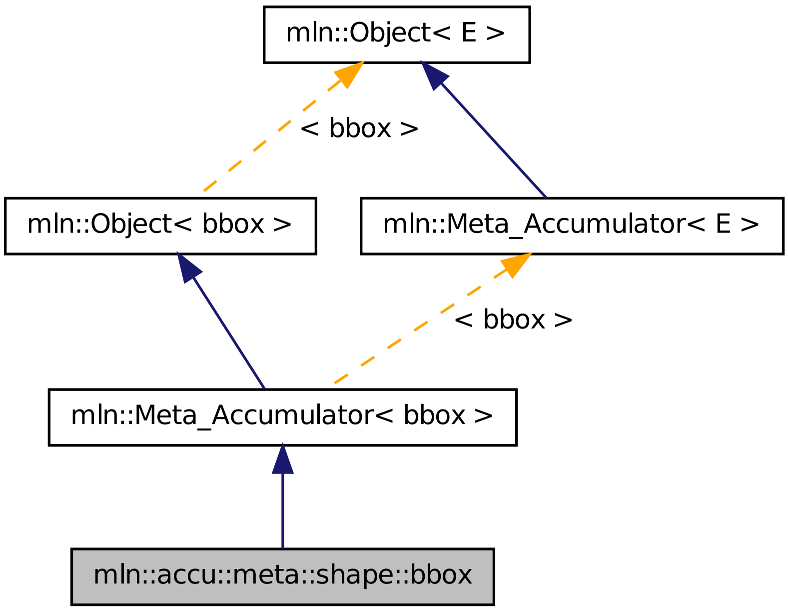
Definition at line 88 of file accu/rms.hh.

10.38 mln::accu::meta::shape::bbox Struct Reference

Meta accumulator for bbox.

`#include <bbox.hh>`

Inheritance diagram for mln::accu::meta::shape::bbox:



10.38.1 Detailed Description

Meta accumulator for bbox.

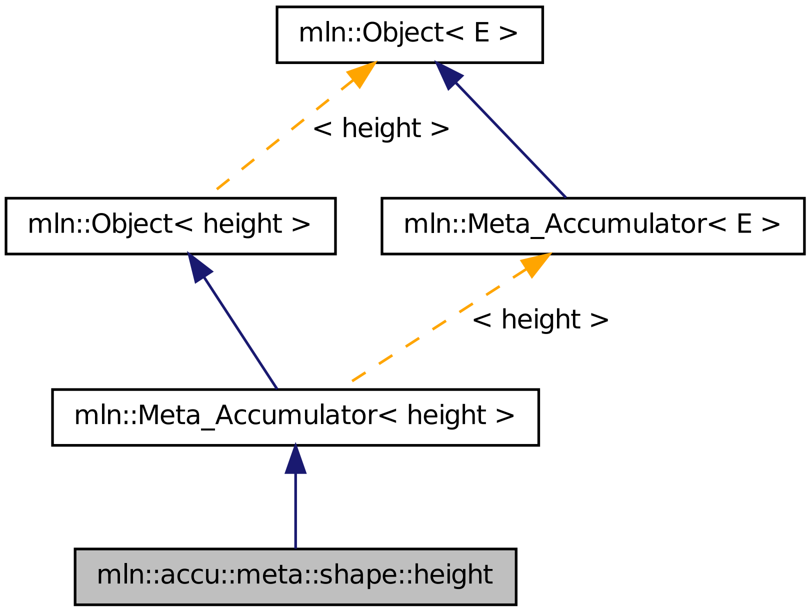
Definition at line 94 of file accu/shape/bbox.hh.

10.39 mln::accu::meta::shape::height Struct Reference

Meta accumulator for height.

`#include <height.hh>`

Inheritance diagram for mln::accu::meta::shape::height:



10.39.1 Detailed Description

Meta accumulator for height.

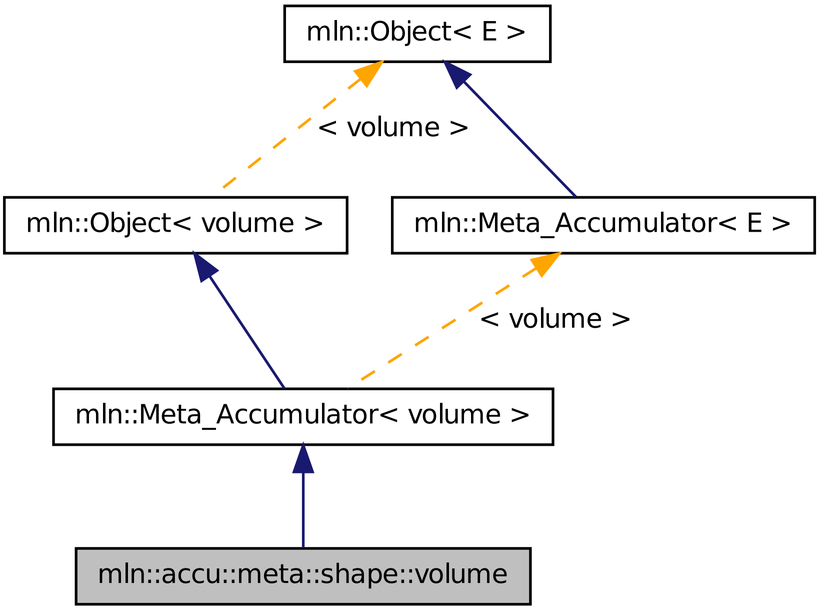
Definition at line 121 of file accu/shape/height.hh.

10.40 mln::accu::meta::shape::volume Struct Reference

Meta accumulator for volume.

```
#include <volume.hh>
```

Inheritance diagram for mln::accu::meta::shape::volume:



10.40.1 Detailed Description

Meta accumulator for volume.

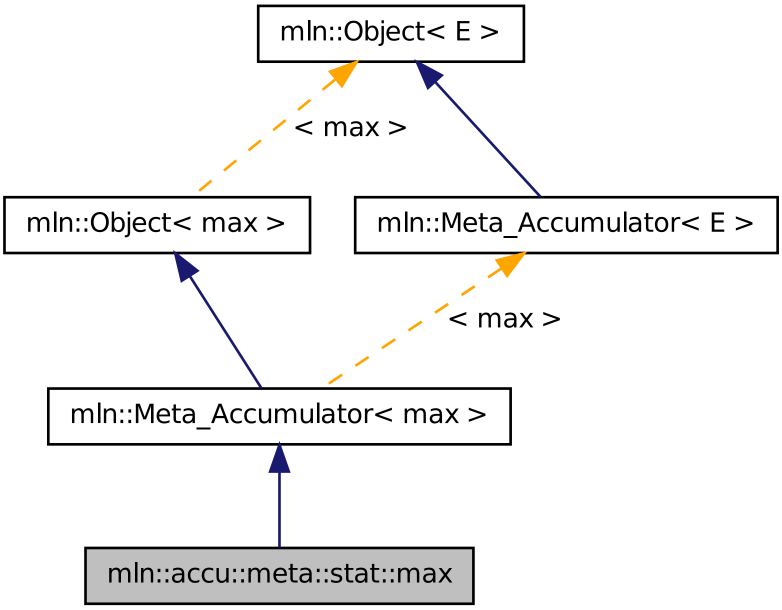
Definition at line 120 of file accu/shape/volume.hh.

10.41 mln::accu::meta::stat::max Struct Reference

Meta accumulator for max.

`#include <max.hh>`

Inheritance diagram for mln::accu::meta::stat::max:



10.41.1 Detailed Description

Meta accumulator for max.

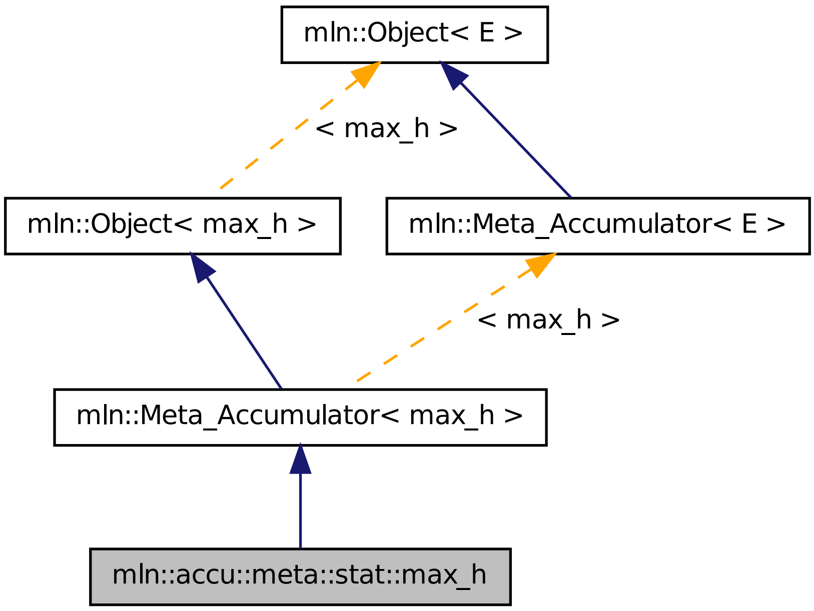
Definition at line 78 of file accu/stat/max.hh.

10.42 mln::accu::meta::stat::max_h Struct Reference

Meta accumulator for max.

`#include <max_h.hh>`

Inheritance diagram for mln::accu::meta::stat::max_h:



10.42.1 Detailed Description

Meta accumulator for max.

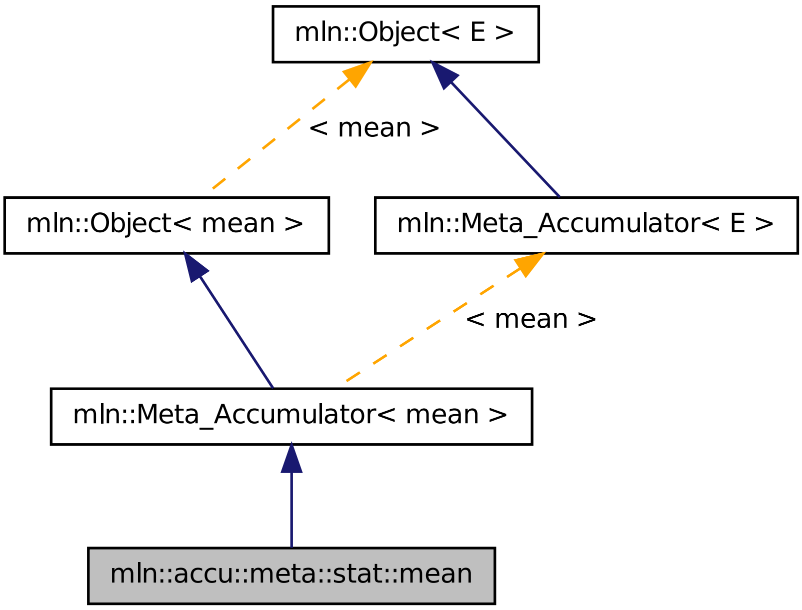
Definition at line 77 of file max_h.hh.

10.43 mln::accu::meta::stat::mean Struct Reference

Meta accumulator for mean.

```
#include <mean.hh>
```

Inheritance diagram for mln::accu::meta::stat::mean:



10.43.1 Detailed Description

Meta accumulator for mean.

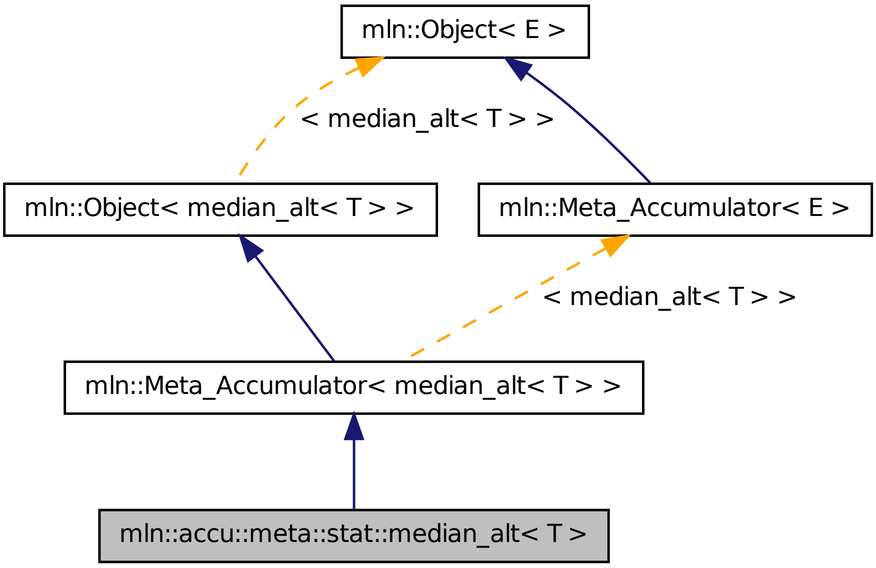
Definition at line 65 of file accu/stat/mean.hh.

10.44 mln::accu::meta::stat::median_alt< T > Struct Template Reference

Meta accumulator for median_alt.

`#include <median_alt.hh>`

Inheritance diagram for mln::accu::meta::stat::median_alt< T >:



10.44.1 Detailed Description

template<typename T> struct mln::accu::meta::stat::median_alt< T >

Meta accumulator for median_alt.

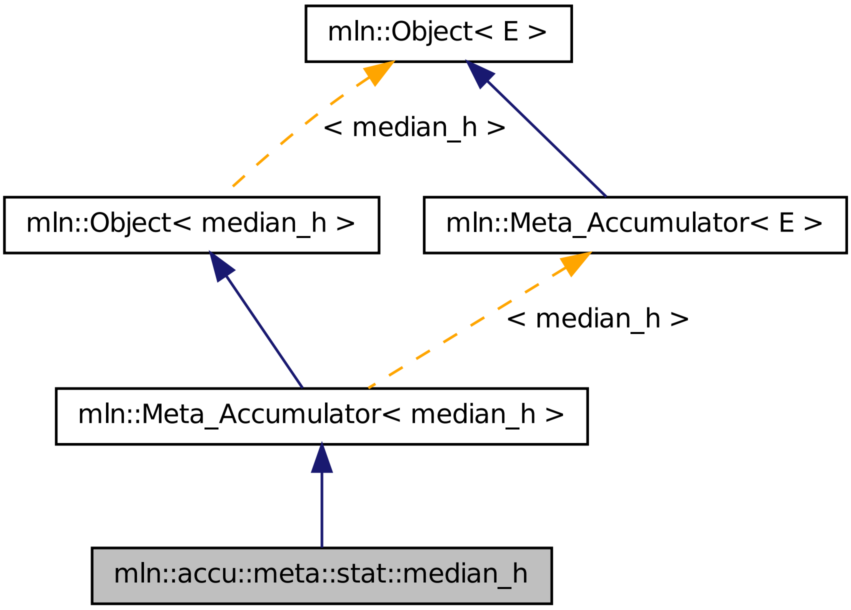
Definition at line 122 of file median_alt.hh.

10.45 mln::accu::meta::stat::median_h Struct Reference

Meta accumulator for median_h.

```
#include <median_h.hh>
```

Inheritance diagram for mln::accu::meta::stat::median_h:



10.45.1 Detailed Description

Meta accumulator for median_h.

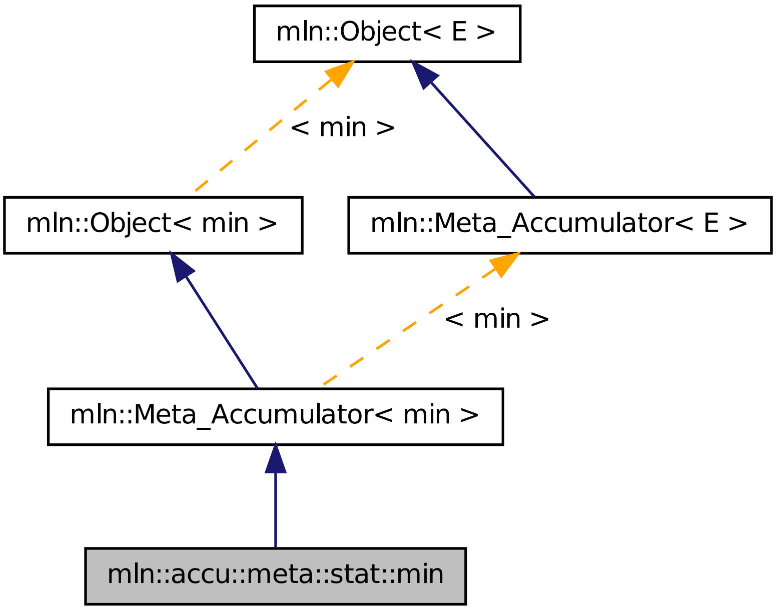
Definition at line 61 of file median_h.hh.

10.46 mln::accu::meta::stat::min Struct Reference

Meta accumulator for min.

`#include <min.hh>`

Inheritance diagram for mln::accu::meta::stat::min:



10.46.1 Detailed Description

Meta accumulator for min.

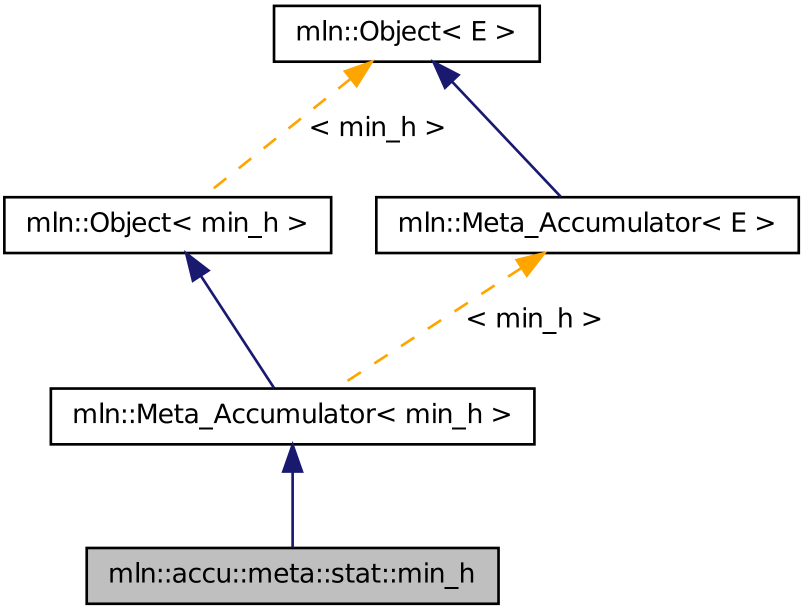
Definition at line 78 of file accu/stat/min.hh.

10.47 mln::accu::meta::stat::min_h Struct Reference

Meta accumulator for min.

`#include <min_h.hh>`

Inheritance diagram for mln::accu::meta::stat::min_h:



10.47.1 Detailed Description

Meta accumulator for min.

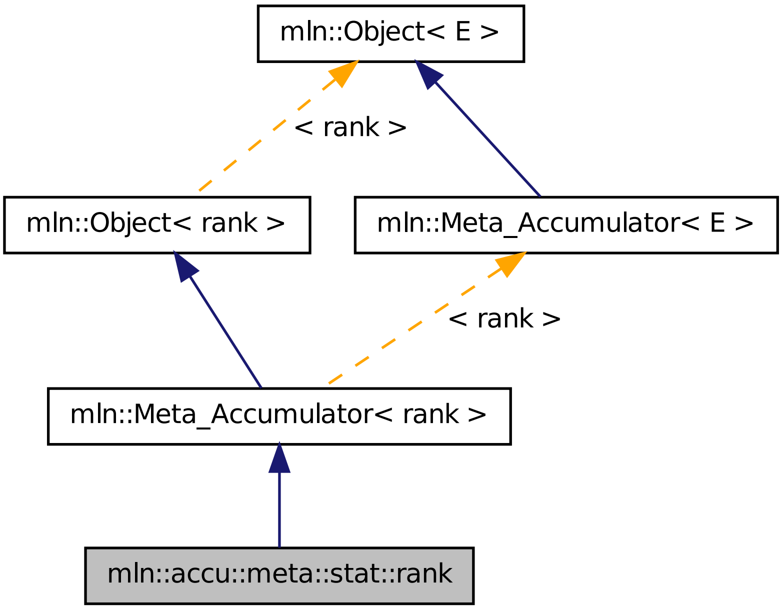
Definition at line 77 of file min_h.hh.

10.48 mln::accu::meta::stat::rank Struct Reference

Meta accumulator for rank.

```
#include <rank.hh>
```

Inheritance diagram for mln::accu::meta::stat::rank:



10.48.1 Detailed Description

Meta accumulator for rank.

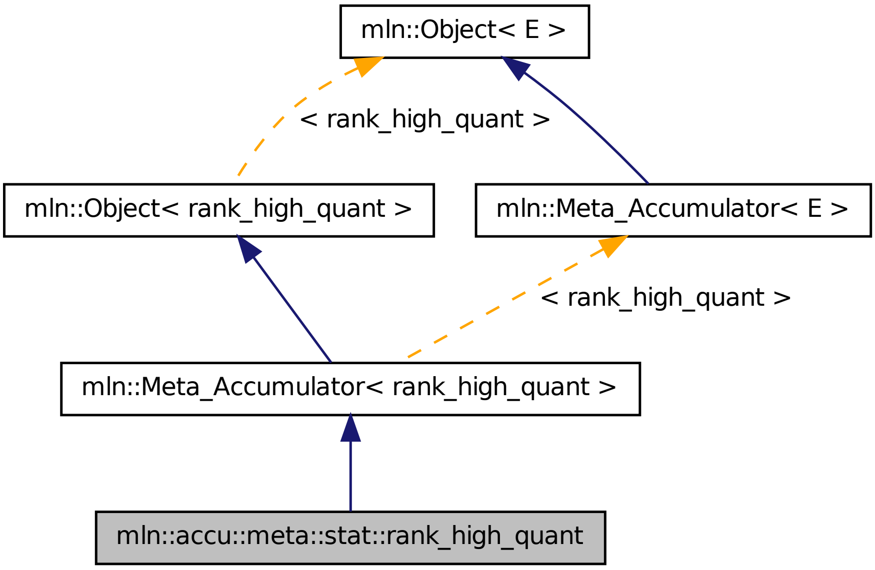
Definition at line 123 of file rank.hh.

10.49 mln::accu::meta::stat::rank_high_quant Struct Reference

Meta accumulator for rank_high_quant.

```
#include <rank_high_quant.hh>
```

Inheritance diagram for mln::accu::meta::stat::rank_high_quant:



10.49.1 Detailed Description

Meta accumulator for rank_high_quant.

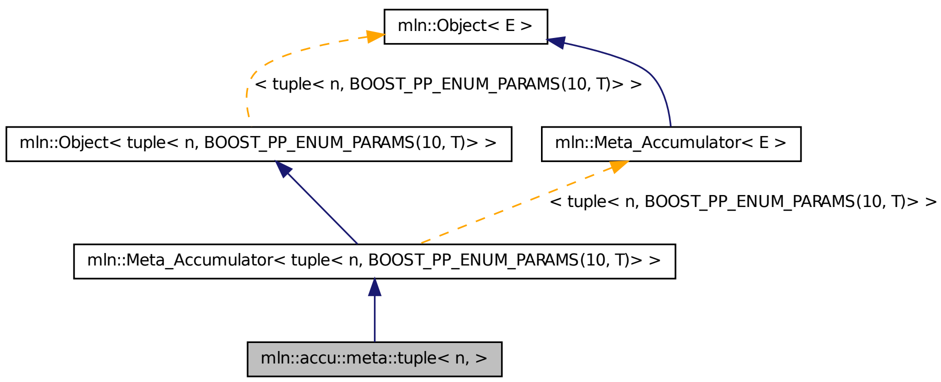
Definition at line 102 of file rank_high_quant.hh.

10.50 mln::accu::meta::tuple< n, > Struct Template Reference

Meta accumulator for tuple.

`#include <tuple.hh>`

Inheritance diagram for mln::accu::meta::tuple< n, >:



10.50.1 Detailed Description

template<unsigned n, BOOST_PP_ENUM_PARAMS_WITH_A_DEFAULT(10, typename T, boost::tuples::null_type)> struct mln::accu::meta::tuple< n, >

Meta accumulator for tuple.

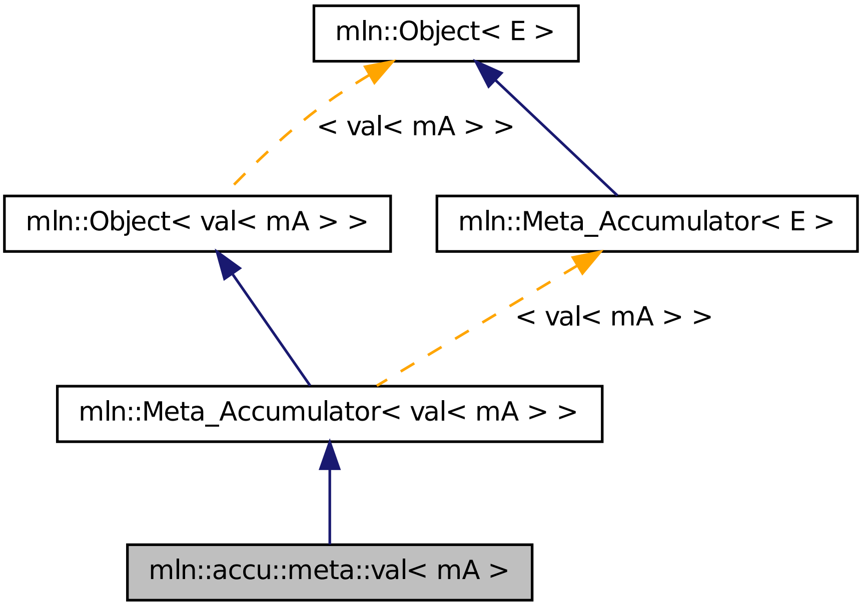
Definition at line 111 of file tuple.hh.

10.51 mln::accu::meta::val< mA > Struct Template Reference

Meta accumulator for val.

`#include <v.hh>`

Inheritance diagram for mln::accu::meta::val< mA >:



10.51.1 Detailed Description

template<typename mA> struct mln::accu::meta::val< mA >

Meta accumulator for val.

Definition at line 87 of file v.hh.

10.52 mln::accu::nil< T > Struct Template Reference

Define an accumulator that does nothing.

`#include <nil.hh>`

Inherits base< util::ignore, nil< T > >.

Public Member Functions

- bool is_valid () const

  Check whether this accu is able to return a result.

- void take_as_init (const T &t)

Take as initialization the value `t`.

- void take_n_times (unsigned n, const T &t)

  Take `n` *times the value* `t`.

- util::ignore to_result () const

  Get the value of the accumulator.

- void init ()

  Manipulators.

10.52.1 Detailed Description

template<typename T> struct mln::accu::nil< T >

Define an accumulator that does nothing.

Definition at line 49 of file accu/nil.hh.

10.52.2 Member Function Documentation

10.52.2.1 template<typename T > void mln::accu::nil< T >::init ( ) [inline]

Manipulators.

Definition at line 100 of file accu/nil.hh.

10.52.2.2 template<typename T > bool mln::accu::nil< T >::is_valid ( ) const [inline]

Check whether this accu is able to return a result.

Always true here.

Definition at line 136 of file accu/nil.hh.

10.52.2.3 void mln::Accumulator< nil< T > >::take_as_init (const T & *t*) [inherited]

Take as initialization the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.52.2.4 void mln::Accumulator< nil< T > >::take_n_times (unsigned *n*, const T & *t*) [inherited]

Take `n` times the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.52.2.5 template< typename T > util::ignore mln::accu::nil< T >::to_result ( ) const [inline]

Get the value of the accumulator.

Definition at line 128 of file accu/nil.hh.

10.53 mln::accu::p< A > Struct Template Reference

Generic p of accumulators.

`#include <p.hh>`

Inherits base< const A::result &, p< A > >.

Public Member Functions

- bool is_valid () const

  Check whether this accu is able to return a result.

- void take_as_init (const T &t)

  Take as initialization the value `t`*.*

- void take_n_times (unsigned n, const T &t)

  Take `n` *times the value* `t`*.*

- const A::result & to_result () const

  Get the value of the accumulator.

  - void init ()

    Manipulators.

10.53.1 Detailed Description

template<typename A> struct mln::accu::p< A >

Generic p of accumulators. The parameter `V` is the type of values.

Definition at line 50 of file p.hh.

10.53.2 Member Function Documentation

10.53.2.1 template< typename A > void mln::accu::p< A >::init ( ) [inline]

Manipulators.

Definition at line 115 of file p.hh.

10.53.2.2 template<typename A > bool mln::accu::p< A >::is_valid ( ) const [inline]

Check whether this accu is able to return a result.

Always true here.

Definition at line 155 of file p.hh.

10.53.2.3 void mln::Accumulator< p< A > >::take_as_init (const T & *t*) [inherited]

Take as initialization the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.53.2.4 void mln::Accumulator< p< A > >::take_n_times (unsigned *n*, const T & *t*) [inherited]

Take `n` times the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.53.2.5 template<typename A > const A::result & mln::accu::p< A >::to_result ( ) const [inline]

Get the value of the accumulator.

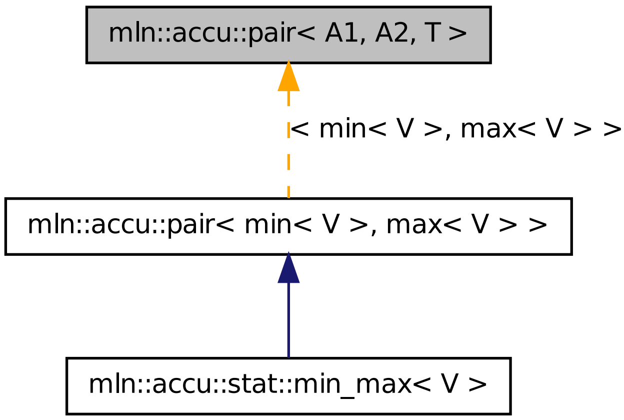
Definition at line 147 of file p.hh.

10.54 mln::accu::pair< A1, A2, T > Struct Template Reference

Generic pair of accumulators.

`#include <pair.hh>`

Inheritance diagram for mln::accu::pair< A1, A2, T >:



Public Member Functions

- A1::result first () const
  Return the result of the first accumulator.
- A1 first_accu () const
  Return the first accumulator.
- bool is_valid () const
  Check whether this accu is able to return a result.
- A2::result second () const
  Return the result of the second accumulator.
- A2 second_accu () const
  Return the second accumulator.
- void take_as_init (const T &t)
  Take as initialization the value `t`.
- void take_n_times (unsigned n, const T &t)
  Take `n` times the value `t`.

- void init ()
  Manipulators.

- std::pair< typename A1::result, typename A2::result > to_result () const
  Get the value of the accumulator.

10.54.1 Detailed Description

template<typename A1, typename A2, typename T = mln_argument(A1)> struct mln::accu::pair< A1, A2, T >

Generic pair of accumulators. The parameter `T` is the type of values.

Definition at line 58 of file pair.hh.

10.54.2 Member Function Documentation

10.54.2.1 template<typename A1 , typename A2 , typename T > A1::result mln::accu::pair< A1, A2, T >::first ( ) const [inline]

Return the result of the first accumulator.

Definition at line 191 of file pair.hh.

10.54.2.2 template<typename A1 , typename A2 , typename T > A1 mln::accu::pair< A1, A2, T >::first_accu ( ) const [inline]

Return the first accumulator.

Definition at line 209 of file pair.hh.

10.54.2.3 template<typename A1 , typename A2 , typename T > void mln::accu::pair< A1, A2, T >::init ( ) [inline]

Manipulators.

Definition at line 136 of file pair.hh.

10.54.2.4 template<typename A1 , typename A2 , typename T > bool mln::accu::pair< A1, A2, T >::is_valid ( ) const [inline]

Check whether this accu is able to return a result.

Always true here.

Definition at line 226 of file pair.hh.

10.54.2.5 template<typename A1 , typename A2 , typename T > A2::result mln::accu::pair< A1, A2, T >::second ( ) const [inline]

Return the result of the second accumulator.

Definition at line 199 of file pair.hh.

10.54.2.6 template<typename A1 , typename A2 , typename T > A2 mln::accu::pair< A1, A2, T >::second_accu ( ) const [inline]

Return the second accumulator.

Definition at line 217 of file pair.hh.

10.54.2.7 void mln::Accumulator< pair< A1, A2, T > >::take_as_init (const T & *t*) [inherited]

Take as initialization the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.54.2.8 void mln::Accumulator< pair< A1, A2, T > >::take_n_times (unsigned *n*, const T & *t*) [inherited]

Take `n` times the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.54.2.9 template<typename A1 , typename A2 , typename T > std::pair< typename A1::result, typename A2::result > mln::accu::pair< A1, A2, T >::to_result ( ) const [inline]

Get the value of the accumulator.

Definition at line 172 of file pair.hh.

10.55 mln::accu::rms< T, V > Struct Template Reference

Generic root mean square accumulator class.

`#include <rms.hh>`

Inherits base< V, rms< T, V > >.

Public Member Functions

- bool is_valid () const

  Check whether this accu is able to return a result.

- void take_as_init (const T &t)

  Take as initialization the value `t`*.*

- void take_n_times (unsigned n, const T &t)

  Take `n` *times the value* `t`*.*

- V to_result () const

  Get the value of the accumulator.

- void init ()
  Manipulators.

10.55.1 Detailed Description

template<typename T, typename V> struct mln::accu::rms< T, V >

Generic root mean square accumulator class. The parameter `T` is the type of the root mean square value.

Definition at line 52 of file accu/rms.hh.

10.55.2 Member Function Documentation

10.55.2.1 template<typename T , typename V > void mln::accu::rms< T, V >::init ( ) [inline]

Manipulators.

Definition at line 112 of file accu/rms.hh.

References mln::literal::zero.

10.55.2.2 template<typename T , typename V > bool mln::accu::rms< T, V >::is_valid ( ) const [inline]

Check whether this accu is able to return a result.

Always true here.

Definition at line 166 of file accu/rms.hh.

10.55.2.3 void mln::Accumulator< rms< T, V > >::take_as_init (const T & *t*) [inherited]

Take as initialization the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.55.2.4 void mln::Accumulator< rms< T, V > >::take_n_times (unsigned *n*, const T & *t*) [inherited]

Take `n` times the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.55.2.5 template<typename T , typename V > V mln::accu::rms< T, V >::to_result ( ) const [inline]

Get the value of the accumulator.

Definition at line 148 of file accu/rms.hh.

10.56 mln::accu::shape::bbox< P > Struct Template Reference

Generic bounding box accumulator class.

`#include <bbox.hh>`

Inherits base< const box< P > &, bbox< P > >.

Public Member Functions

- bool is_valid () const

  Check whether this accu is able to return a result.

- void take_as_init (const T &t)

  Take as initialization the value `t`*.*

- void take_n_times (unsigned n, const T &t)

  Take `n` *times the value* `t`*.*

- const box< P > & to_result () const

  Get the value of the accumulator.

- void init ()

  Manipulators.

10.56.1 Detailed Description

template<typename P> struct mln::accu::shape::bbox< P >

Generic bounding box accumulator class. The parameter `P` is the type of points.

Definition at line 55 of file accu/shape/bbox.hh.

10.56.2 Member Function Documentation

10.56.2.1 template<typename P > void mln::accu::shape::bbox< P >::init ( ) `[inline]`

Manipulators.

Definition at line 124 of file accu/shape/bbox.hh.

10.56.2.2 template<typename P > bool mln::accu::shape::bbox< P >::is_valid ( ) const `[inline]`

Check whether this accu is able to return a result.

Always true here.

Definition at line 224 of file accu/shape/bbox.hh.

10.56.2.3 void mln::Accumulator< bbox< P > >::take_as_init (const T & *t*) [inherited]

Take as initialization the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.56.2.4 void mln::Accumulator< bbox< P > >::take_n_times (unsigned *n*, const T & *t*) [inherited]

Take `n` times the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.56.2.5 template<typename P > const box< P > & mln::accu::shape::bbox< P >::to_result ( ) const [inline]

Get the value of the accumulator.

Definition at line 215 of file accu/shape/bbox.hh.

Referenced by mln::geom::rotate().

10.57 mln::accu::shape::height< I > Struct Template Reference

Height accumulator.

`#include <height.hh>`

Inherits base< unsigned, height< I > >.

Public Types

- typedef util::pix< I > argument

    The accumulated data type.

- typedef argument::value value

    The value type associated to the pixel type.

Public Member Functions

- bool is_valid () const

    Check whether this accu is able to return a result.

- void take_as_init (const T &t)

    Take as initialization the value `t`.

- void take_n_times (unsigned n, const T &t)

    Take `n` *times the value* `t`.

- unsigned to_result () const

Get the value of the accumulator.

- void init ()
  Manipulators.
- void set_value (unsigned h)
  Force the value of the counter to h.

10.57.1 Detailed Description

template<typename I> struct mln::accu::shape::height< I >

Height accumulator. The parameter `I` is the image type on which the accumulator of pixels is built.

Definition at line 68 of file accu/shape/height.hh.

10.57.2 Member Typedef Documentation

10.57.2.1 template<typename I> typedef util::pix<I> mln::accu::shape::height< I >::argument

The accumulated data type.

The height of component is represented by the height of its root pixel. See mln::morpho::closing_-height and mln::morpho::opening_height for actual uses of this accumulator. FIXME: Replaced by mln::morpho::attribute::height

Definition at line 78 of file accu/shape/height.hh.

10.57.2.2 template<typename I> typedef argument::value mln::accu::shape::height< I >::value

The value type associated to the pixel type.

Definition at line 80 of file accu/shape/height.hh.

10.57.3 Member Function Documentation

10.57.3.1 template<typename I > void mln::accu::shape::height< I >::init ( ) `[inline]`

Manipulators.

Definition at line 150 of file accu/shape/height.hh.

10.57.3.2 template<typename I > bool mln::accu::shape::height< I >::is_valid ( ) const `[inline]`

Check whether this accu is able to return a result.

Always true here.

Definition at line 199 of file accu/shape/height.hh.

10.57.3.3 template<typename I > void mln::accu::shape::height< I >::set_value (unsigned *h*) [inline]

Force the value of the counter to *h*.

Definition at line 188 of file accu/shape/height.hh.

10.57.3.4 void mln::Accumulator< height< I > >::take_as_init (const T & *t*) [inherited]

Take as initialization the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.57.3.5 void mln::Accumulator< height< I > >::take_n_times (unsigned *n*, const T & *t*) [inherited]

Take `n` times the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.57.3.6 template<typename I > unsigned mln::accu::shape::height< I >::to_result ( ) const [inline]

Get the value of the accumulator.

Definition at line 180 of file accu/shape/height.hh.

10.58 mln::accu::shape::volume< I > Struct Template Reference

Volume accumulator class.

`#include <volume.hh>`

Inherits base< unsigned, volume< I > >.

Public Types

- typedef util::pix< I > argument

  The accumulated data type.

- typedef argument::value value

  The value type associated to the pixel type.

Public Member Functions

- bool is_valid () const

  Check whether this accu is able to return a result.

- void take_as_init (const T &t)

  Take as initialization the value `t`.

- void take_n_times (unsigned n, const T &t)

  Take `n` *times the value* `t`*.*

- unsigned to_result () const

  Get the value of the accumulator.

  - void init ()

    Manipulators.

  - void set_value (unsigned v)

    Force the value of the counter to v.

10.58.1 Detailed Description

template<typename I> struct mln::accu::shape::volume< I >

Volume accumulator class. The parameter `I` is the image type on which the accumulator of pixels is built.

Definition at line 66 of file accu/shape/volume.hh.

10.58.2 Member Typedef Documentation

10.58.2.1 template<typename I> typedef util::pix<I> mln::accu::shape::volume< I >::argument

The accumulated data type.

The volume of component is represented by the volume of its root pixel. See mln::morpho::closing_-volume and mln::morpho::opening_volume for actual uses of this accumulator. FIXME: Replaced by mln::morpho::attribute::volume

Definition at line 76 of file accu/shape/volume.hh.

10.58.2.2 template<typename I> typedef argument::value mln::accu::shape::volume< I >::value

The value type associated to the pixel type.

Definition at line 78 of file accu/shape/volume.hh.

10.58.3 Member Function Documentation

10.58.3.1 template<typename I > void mln::accu::shape::volume< I >::init ( ) `[inline]`

Manipulators.

Definition at line 148 of file accu/shape/volume.hh.

References mln::literal::zero.

10.58.3.2 template<typename I > bool mln::accu::shape::volume< I >::is_valid ( ) const [inline]

Check whether this accu is able to return a result.

Always true here.

Definition at line 215 of file accu/shape/volume.hh.

10.58.3.3 template<typename I > void mln::accu::shape::volume< I >::set_value (unsigned *v*) [inline]

Force the value of the counter to *v*.

Definition at line 204 of file accu/shape/volume.hh.

References mln::literal::zero.

10.58.3.4 void mln::Accumulator< volume< I > >::take_as_init (const T & *t*) [inherited]

Take as initialization the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.58.3.5 void mln::Accumulator< volume< I > >::take_n_times (unsigned *n*, const T & *t*) [inherited]

Take `n` times the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.58.3.6 template<typename I > unsigned mln::accu::shape::volume< I >::to_result ( ) const [inline]

Get the value of the accumulator.

Definition at line 196 of file accu/shape/volume.hh.

10.59 mln::accu::site_set::rectangularity< P > Class Template Reference

Compute the rectangularity of a site set.

`#include <rectangularity.hh>`

Inherits couple< accu::shape::bbox< P >, accu::math::count< P >, float, rectangularity< P > >.

Public Member Functions

- A2::result area () const
  Return the site set area.

- A1::result bbox () const

  Return the site set bounding box.

- rectangularity ()

  Constructor.

- template<typename T >
  void take_as_init (const T &t)

  Take as initialization the value `t`*.*

- template<typename T >
  void take_n_times (unsigned n, const T &t)

  Take `n` *times the value* `t`*.*

- result to_result () const

  Return the rectangularity value.

10.59.1 Detailed Description

template<typename P> class mln::accu::site_set::rectangularity< P >

Compute the rectangularity of a site set.

Definition at line 51 of file rectangularity.hh.

10.59.2 Constructor & Destructor Documentation

10.59.2.1 template<typename P > mln::accu::site_set::rectangularity< P >::rectangularity ( ) [inline]

Constructor.

Definition at line 91 of file rectangularity.hh.

10.59.3 Member Function Documentation

10.59.3.1 template<typename P > rectangularity< P >::A2::result mln::accu::site_set::rectangularity< P >::area ( ) const [inline]

Return the site set area.

Definition at line 107 of file rectangularity.hh.

10.59.3.2 template<typename P > rectangularity< P >::A1::result mln::accu::site_set::rectangularity< P >::bbox ( ) const [inline]

Return the site set bounding box.

Definition at line 98 of file rectangularity.hh.

10.59.3.3 template<typename E > template<typename T > void mln::Accumulator< E >::take_as_init (const T & *t*) [inherited]

Take as initialization the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

Definition at line 186 of file accumulator.hh.

References mln::mln_exact().

10.59.3.4 template<typename E > template<typename T > void mln::Accumulator< E >::take_n_times (unsigned *n*, const T & *t*) [inherited]

Take `n` times the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

Definition at line 213 of file accumulator.hh.

References mln::mln_exact().

10.59.3.5 template<typename P > rectangularity< P >::result mln::accu::site_-set::rectangularity< P >::to_result ( ) const [inline]

Return the rectangularity value.

Definition at line 116 of file rectangularity.hh.

10.60 mln::accu::stat::deviation< T, S, M > Struct Template Reference

Generic standard deviation accumulator class.

`#include <deviation.hh>`

Inherits base< M, deviation< T, S, M > >.

Public Member Functions

- bool is_valid () const

  Check whether this accu is able to return a result.

- void take_as_init (const T &t)

  Take as initialization the value `t`.

- void take_n_times (unsigned n, const T &t)

  Take `n` times the value `t`.

- M to_result () const

  Get the value of the accumulator.

- void init ()
  Manipulators.

10.60.1 Detailed Description

template<typename T, typename S = typename mln::value::props< T >::sum, typename M = S> struct mln::accu::stat::deviation< T, S, M >

Generic standard deviation accumulator class. Parameter `T` is the type of values that we sum. Parameter `S` is the type to store the standard deviation; the default type of `S` is the summation type (property) of `T`. Parameter `M` is the type of the mean value; the default type of `M` is `S`.

Definition at line 62 of file deviation.hh.

10.60.2 Member Function Documentation

10.60.2.1 template<typename T , typename S , typename M > void mln::accu::stat::deviation< T, S, M >::init ( ) [inline]

Manipulators.

Definition at line 132 of file deviation.hh.

10.60.2.2 template<typename T , typename S , typename M > bool mln::accu::stat::deviation< T, S, M >::is_valid ( ) const [inline]

Check whether this accu is able to return a result.

Always true here.

Definition at line 177 of file deviation.hh.

10.60.2.3 void mln::Accumulator< deviation< T, S, M > >::take_as_init (const T & *t*) [inherited]

Take as initialization the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.60.2.4 void mln::Accumulator< deviation< T, S, M > >::take_n_times (unsigned *n*, const T & *t*) [inherited]

Take `n` times the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.60.2.5 template<typename T , typename S , typename M > M mln::accu::stat::deviation< T, S, M >::to_result ( ) const [inline]

Get the value of the accumulator.

Definition at line 159 of file deviation.hh.

10.61 mln::accu::stat::histo3d_rgb< V > Struct Template Reference

Define a histogram as accumulator which returns an image3d.

```
#include <histo3d_rgb.hh>
```

Inherits base< image3d< unsigned >, histo3d_rgb< V > >.

Public Member Functions

- bool is_valid () const

  Check whethever this accumulator is able to return a result.

- void take_as_init (const T &t)

  Take as initialization the value `t`*.*

- void take_n_times (unsigned n, const T &t)

  Take `n` *times the value* `t`*.*

  - histo3d_rgb ()

    Constructors.

  - void init ()

    Manipulators.

  - void take (const argument &t)

    Update the histogram with the RGB pixel t.

  - void take (const histo3d_rgb< V > &other)

    Update the histogram with an other histogram.

  - result to_result () const

    Accessors.

10.61.1 Detailed Description

template<typename V> struct mln::accu::stat::histo3d_rgb< V >

Define a histogram as accumulator which returns an image3d. Param V defines the type of the input image value. It is in this space that we count the values. For instance, this histogram works well for image2d< rgb<2> > or with image2d< rgb<7> >. The number of bins depends directly the values V. For 8 bits there is 256x3 bins. Note that less quantification works too.

Definition at line 167 of file histo3d_rgb.hh.

10.61.2 Constructor & Destructor Documentation

10.61.2.1 template<typename V > mln::accu::stat::histo3d_rgb< V >::histo3d_rgb ( ) [inline]

Constructors.

Infer the size of the resulting image3d domain. By evaluating the minimum and the maximum of V, we define the domain of the resulting image3d.

Definition at line 244 of file histo3d_rgb.hh.

10.61.3 Member Function Documentation

10.61.3.1 template<typename V > void mln::accu::stat::histo3d_rgb< V >::init ( ) [inline]

Manipulators.

Initialize the histogram with zero value. This method must be called just before starting the use of the histogram. If it's not, resulting values won't converge to the density.

Definition at line 268 of file histo3d_rgb.hh.

References mln::data::fill(), and mln::literal::zero.

10.61.3.2 template<typename V > bool mln::accu::stat::histo3d_rgb< V >::is_valid ( ) const [inline]

Check whethever this accumulator is able to return a result.

Depends if the resulting image1d is valid. We can assume it is quite always the case.

Definition at line 307 of file histo3d_rgb.hh.

10.61.3.3 template<typename V > void mln::accu::stat::histo3d_rgb< V >::take (const argument & *t*) [inline]

Update the histogram with the RGB pixel t.

Parameters

[in] ***t*** a graylevel pixel of type V.

The end user shouldn't call this method. In place of it, he can go through the data compute interface.

Definition at line 275 of file histo3d_rgb.hh.

10.61.3.4 template<typename V> void mln::accu::stat::histo3d_rgb< V >::take (const histo3d_rgb< V > & *other*) [inline]

Update the histogram with an other histogram.

Parameters

[in] ***other*** the other histogram.

The end user shouldn't call this method. This is part of data compute interface mechanism.

Definition at line 286 of file histo3d_rgb.hh.

10.61.3.5 void mln::Accumulator< histo3d_rgb< V > >::take_as_init (const T & *t*) [inherited]

Take as initialization the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.61.3.6 void mln::Accumulator< histo3d_rgb< V > >::take_n_times (unsigned *n*, const T & *t*) [inherited]

Take `n` times the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.61.3.7 template<typename V > histo3d_rgb< V >::result mln::accu::stat::histo3d_rgb< V >::to_result ( ) const [inline]

Accessors.

Return the histogram as an RGB image3d. This is the machinery to communicate with data compute interface. The end user should'nt use it.

Definition at line 293 of file histo3d_rgb.hh.

10.62 mln::accu::stat::max< T > Struct Template Reference

Generic max accumulator class.

`#include <max.hh>`

Inherits base< const T &, max< T > >.

Public Member Functions

- bool is_valid () const

  Check whether this accu is able to return a result.

- void set_value (const T &t)

  Force the value of the min to t.

- void take_as_init (const T &t)

  Take as initialization the value `t`.

- void take_n_times (unsigned n, const T &t)

  Take `n` *times the value* `t`.

- const T & to_result () const

  Get the value of the accumulator.

- void init ()
  Manipulators.

10.62.1 Detailed Description

template<typename T> struct mln::accu::stat::max< T >

Generic max accumulator class. The parameter `T` is the type of values.

Definition at line 101 of file accu/stat/max.hh.

10.62.2 Member Function Documentation

10.62.2.1 template<typename T > void mln::accu::stat::max< T >::init ( ) `[inline]`

Manipulators.

Definition at line 146 of file accu/stat/max.hh.

10.62.2.2 template<typename T > bool mln::accu::stat::max< T >::is_valid ( ) const `[inline]`

Check whether this accu is able to return a result.

Always true here.

Definition at line 196 of file accu/stat/max.hh.

10.62.2.3 template<typename T > void mln::accu::stat::max< T >::set_value (const T & *t*) `[inline]`

Force the value of the min to *t*.

Definition at line 180 of file accu/stat/max.hh.

10.62.2.4 void mln::Accumulator< max< T > >::take_as_init (const T & *t*) `[inherited]`

Take as initialization the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.62.2.5 void mln::Accumulator< max< T > >::take_n_times (unsigned *n*, const T & *t*) `[inherited]`

Take `n` times the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.62.2.6 template<typename T > const T & mln::accu::stat::max< T >::to_result ( ) const [inline]

Get the value of the accumulator.

Definition at line 188 of file accu/stat/max.hh.

10.63 mln::accu::stat::max_h< V > Struct Template Reference

Generic max function based on histogram over a value set with type V.

`#include <max_h.hh>`

Inherits base< const V &, max_h< V > >.

Public Member Functions

- bool is_valid () const
  Check whether this accu is able to return a result.
- void take_as_init (const T &t)
  Take as initialization the value t.
- void take_n_times (unsigned n, const T &t)
  Take n times the value t.
- const argument & to_result () const
  Get the value of the accumulator.

  - void init ()
    Manipulators.

10.63.1 Detailed Description

template<typename V> struct mln::accu::stat::max_h< V >

Generic max function based on histogram over a value set with type V.

Definition at line 100 of file max_h.hh.

10.63.2 Member Function Documentation

10.63.2.1 template<typename V > void mln::accu::stat::max_h< V >::init ( ) [inline]

Manipulators.

Definition at line 280 of file max_h.hh.

10.63.2.2 template<typename V > bool mln::accu::stat::max_h< V >::is_valid ( ) const [inline]

Check whether this accu is able to return a result.

Always true here.

Definition at line 323 of file max_h.hh.

10.63.2.3 void mln::Accumulator< max_h< V > >::take_as_init (const T & *t*) [inherited]

Take as initialization the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.63.2.4 void mln::Accumulator< max_h< V > >::take_n_times (unsigned *n*, const T & *t*) [inherited]

Take `n` times the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.63.2.5 template<typename V > const max_h< V >::argument & mln::accu::stat::max_h< V >::to_result ( ) const [inline]

Get the value of the accumulator.

Definition at line 304 of file max_h.hh.

10.64 mln::accu::stat::mean< T, S, M > Struct Template Reference

Generic mean accumulator class.

`#include <mean.hh>`

Inherits base< M, mean< T, S, M > >.

Public Member Functions

- accu::math::count< T >::result count () const

  Get the cardinality.

- bool is_valid () const

  Check whether this accu is able to return a result.

- accu::math::sum< T >::result sum () const

  Get the sum of values.

- void take_as_init (const T &t)

  Take as initialization the value `t`*.*

- void take_n_times (unsigned n, const T &t)

Take `n` *times the value* `t`.

- M to_result () const

  Get the value of the accumulator.

- void init ()

  Manipulators.

10.64.1 Detailed Description

template<typename T, typename S = typename mln::value::props< T >::sum, typename M = S> struct mln::accu::stat::mean< T, S, M >

Generic mean accumulator class. Parameter `T` is the type of values that we sum. Parameter `S` is the type to store the sum of values; the default type of `S` is the summation type (property) of `T`. Parameter `M` is the type of the mean value; the default type of `M` is `S`.

Definition at line 119 of file accu/stat/mean.hh.

10.64.2 Member Function Documentation

10.64.2.1 template<typename T , typename S , typename M > accu::math::count< T >::result mln::accu::stat::mean< T, S, M >::count ( ) const `[inline]`

Get the cardinality.

Definition at line 242 of file accu/stat/mean.hh.

10.64.2.2 template<typename T , typename S , typename M > void mln::accu::stat::mean< T, S, M >::init ( ) `[inline]`

Manipulators.

Definition at line 173 of file accu/stat/mean.hh.

10.64.2.3 template<typename T , typename S , typename M > bool mln::accu::stat::mean< T, S, M >::is_valid ( ) const `[inline]`

Check whether this accu is able to return a result.

Always true here.

Definition at line 234 of file accu/stat/mean.hh.

10.64.2.4 template<typename T , typename S , typename M > accu::math::sum< T >::result mln::accu::stat::mean< T, S, M >::sum ( ) const `[inline]`

Get the sum of values.

Definition at line 251 of file accu/stat/mean.hh.

10.64.2.5 void mln::Accumulator< mean< T, S, M > >::take_as_init (const T & *t*) [inherited]

Take as initialization the value t.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.64.2.6 void mln::Accumulator< mean< T, S, M > >::take_n_times (unsigned *n*, const T & *t*) [inherited]

Take n times the value t.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.64.2.7 template<typename T , typename S , typename M > M mln::accu::stat::mean< T, S, M >::to_result ( ) const [inline]

Get the value of the accumulator.

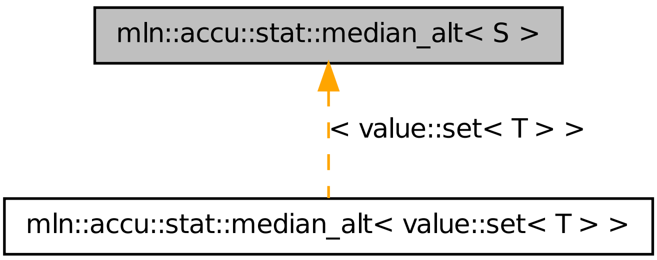
Definition at line 216 of file accu/stat/mean.hh.

10.65 mln::accu::stat::median_alt< S > Struct Template Reference

Generic median_alt function based on histogram over a value set with type S.

`#include <median_alt.hh>`

Inheritance diagram for mln::accu::stat::median_alt< S >:



Public Member Functions

- bool is_valid () const

    Check whether this accu is able to return a result.

- void take_as_init (const T &t)

Take as initialization the value `t`*.*

- void take_n_times (unsigned n, const T &t)

  Take `n` *times the value* `t`*.*

- const argument & to_result () const

  Get the value of the accumulator.

- void take (const argument &t)

  Manipulators.

10.65.1 Detailed Description

template<typename S> struct mln::accu::stat::median_alt< S >

Generic median_alt function based on histogram over a value set with type `S`.

Definition at line 54 of file median_alt.hh.

10.65.2 Member Function Documentation

10.65.2.1 template<typename S > bool mln::accu::stat::median_alt< S >::is_valid ( ) const [inline]

Check whether this accu is able to return a result.

Always true here.

Definition at line 282 of file median_alt.hh.

10.65.2.2 template<typename S > void mln::accu::stat::median_alt< S >::take (const argument & *t*) [inline]

Manipulators.

Definition at line 165 of file median_alt.hh.

10.65.2.3 void mln::Accumulator< median_alt< S > >::take_as_init (const T & *t*) [inherited]

Take as initialization the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.65.2.4 void mln::Accumulator< median_alt< S > >::take_n_times (unsigned *n*, const T & *t*) [inherited]

Take `n` times the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.65.2.5 template<typename S > const median_alt< S >::argument & mln::accu::stat::median_alt< S >::to_result ( ) const [inline]

Get the value of the accumulator.

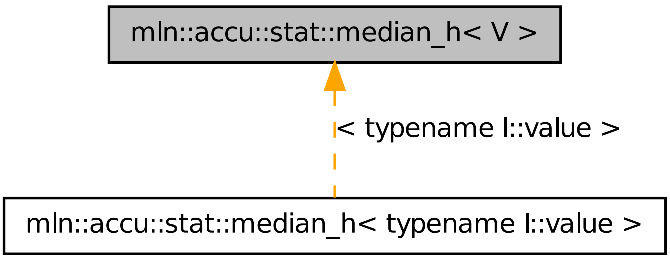
Definition at line 274 of file median_alt.hh.

10.66 mln::accu::stat::median_h< V > Struct Template Reference

Generic median function based on histogram over a value set with type `V`.

`#include <median_h.hh>`

Inheritance diagram for mln::accu::stat::median_h< V >:



Public Member Functions

- bool is_valid () const
  Check whether this accu is able to return a result.
- void take_as_init (const T &t)
  Take as initialization the value `t`*.*
- void take_n_times (unsigned n, const T &t)
  Take `n` *times the value* `t`*.*
- const argument & to_result () const
  Get the value of the accumulator.

- void init ()
  Manipulators.

10.66.1 Detailed Description

template<typename V> struct mln::accu::stat::median_h< V >

Generic median function based on histogram over a value set with type `V`.

Definition at line 82 of file median_h.hh.

10.66.2 Member Function Documentation

10.66.2.1 template<typename V > void mln::accu::stat::median_h< V >::init ( ) `[inline]`

Manipulators.

Definition at line 267 of file median_h.hh.

10.66.2.2 template<typename V > bool mln::accu::stat::median_h< V >::is_valid ( ) const `[inline]`

Check whether this accu is able to return a result.

Always true here.

Definition at line 299 of file median_h.hh.

10.66.2.3 void mln::Accumulator< median_h< V > >::take_as_init (const T & *t*) `[inherited]`

Take as initialization the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.66.2.4 void mln::Accumulator< median_h< V > >::take_n_times (unsigned *n*, const T & *t*) `[inherited]`

Take `n` times the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.66.2.5 template<typename V > const median_h< V >::argument & mln::accu::stat::median_h< V >::to_result ( ) const `[inline]`

Get the value of the accumulator.

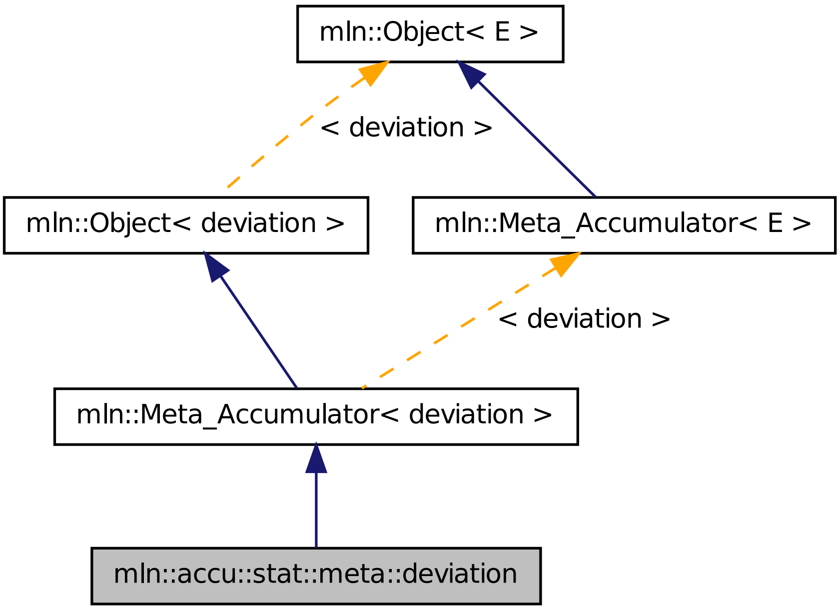
Definition at line 281 of file median_h.hh.

10.67 mln::accu::stat::meta::deviation Struct Reference

Meta accumulator for deviation.

`#include <deviation.hh>`

Inheritance diagram for mln::accu::stat::meta::deviation:



10.67.1 Detailed Description

Meta accumulator for deviation.

Definition at line 105 of file deviation.hh.

10.68 mln::accu::stat::min< T > Struct Template Reference

Generic min accumulator class.

`#include <min.hh>`

Inherits base< const T &, min< T > >.

Public Member Functions

- bool is_valid () const

  Check whether this accu is able to return a result.

- void set_value (const T &t)

  Force the value of the min to t.

- void take_as_init (const T &t)

  Take as initialization the value `t`.

- void take_n_times (unsigned n, const T &t)

  Take `n` *times the value* `t`.

- const T & to_result () const

  Get the value of the accumulator.

  - void init ()

    Manipulators.

10.68.1 Detailed Description

template<typename T> struct mln::accu::stat::min< T >

Generic min accumulator class. The parameter `T` is the type of values.

Definition at line 102 of file accu/stat/min.hh.

10.68.2 Member Function Documentation

10.68.2.1 template<typename T > void mln::accu::stat::min< T >::init ( ) [inline]

Manipulators.

Definition at line 147 of file accu/stat/min.hh.

10.68.2.2 template<typename T > bool mln::accu::stat::min< T >::is_valid ( ) const [inline]

Check whether this accu is able to return a result.

Always true here.

Definition at line 195 of file accu/stat/min.hh.

10.68.2.3 template<typename T > void mln::accu::stat::min< T >::set_value (const T & *t*) [inline]

Force the value of the min to *t*.

Definition at line 179 of file accu/stat/min.hh.

10.68.2.4 void mln::Accumulator< min< T > >::take_as_init (const T & *t*) [inherited]

Take as initialization the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.68.2.5 void mln::Accumulator< min< T > >::take_n_times (unsigned *n*, const T & *t*) [inherited]

Take n times the value t.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.68.2.6 template<typename T > const T & mln::accu::stat::min< T >::to_result ( ) const [inline]

Get the value of the accumulator.

Definition at line 187 of file accu/stat/min.hh.

10.69 mln::accu::stat::min_h< V > Struct Template Reference

Generic min function based on histogram over a value set with type V.

`#include <min_h.hh>`

Inherits base< const V &, min_h< V > >.

Public Member Functions

- bool is_valid () const

  Check whether this accu is able to return a result.

- void take_as_init (const T &t)

  Take as initialization the value t.

- void take_n_times (unsigned n, const T &t)

  Take n times the value t.

- const argument & to_result () const

  Get the value of the accumulator.

- void init ()

  Manipulators.

10.69.1 Detailed Description

template<typename V> struct mln::accu::stat::min_h< V >

Generic min function based on histogram over a value set with type V.

Definition at line 100 of file min_h.hh.

10.69.2 Member Function Documentation

10.69.2.1 template<typename V > void mln::accu::stat::min_h< V >::init ( ) [inline]

Manipulators.

Definition at line 256 of file min_h.hh.

10.69.2.2 template<typename V > bool mln::accu::stat::min_h< V >::is_valid ( ) const [inline]

Check whether this accu is able to return a result.

Always true here.

Definition at line 298 of file min_h.hh.

10.69.2.3 void mln::Accumulator< min_h< V > >::take_as_init (const T & *t*) [inherited]

Take as initialization the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.69.2.4 void mln::Accumulator< min_h< V > >::take_n_times (unsigned *n*, const T & *t*) [inherited]

Take `n` times the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.69.2.5 template<typename V > const min_h< V >::argument & mln::accu::stat::min_h< V >::to_result ( ) const [inline]

Get the value of the accumulator.

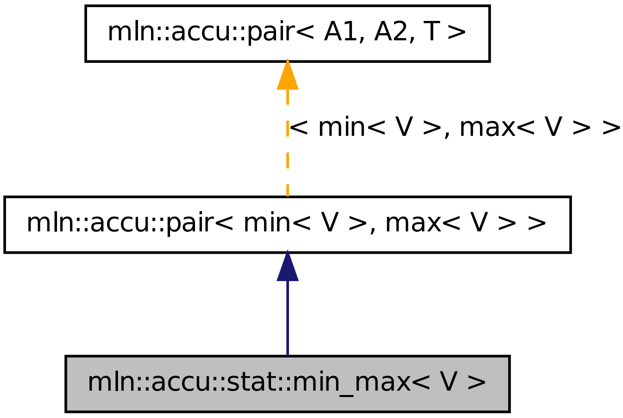
Definition at line 280 of file min_h.hh.

10.70 mln::accu::stat::min_max< V > Struct Template Reference

Generic min and max accumulator class.

`#include <min_max.hh>`

Inheritance diagram for mln::accu::stat::min_max< V >:



Public Member Functions

- min< V >::result first () const
  Return the result of the first accumulator.
- min< V > first_accu () const
  Return the first accumulator.
- bool is_valid () const
  Check whether this accu is able to return a result.
- max< V >::result second () const
  Return the result of the second accumulator.
- max< V > second_accu () const
  Return the second accumulator.
- template<typename T >
  void take_as_init (const T &t)
  Take as initialization the value `t`*.*
- template<typename T >
  void take_n_times (unsigned n, const T &t)
  Take `n` *times the value* `t`*.*

- void init ()
  Manipulators.

- std::pair< typename min< V >::result, typename max< V >::result > to_result () const
  Get the value of the accumulator.

10.70.1 Detailed Description

template<typename V> struct mln::accu::stat::min_max< V >

Generic min and max accumulator class. The parameter `V` is the type of values.

Definition at line 61 of file accu/stat/min_max.hh.

10.70.2 Member Function Documentation

10.70.2.1 min< V > ::result mln::accu::pair< min< V > , max< V > , mln_argument(min< V >) >::first ( ) const `[inherited]`

Return the result of the first accumulator.

10.70.2.2 min< V > mln::accu::pair< min< V > , max< V > , mln_argument(min< V >) >::first_accu ( ) const `[inherited]`

Return the first accumulator.

10.70.2.3 void mln::accu::pair< min< V > , max< V > , mln_argument(min< V >) >::init ( ) `[inherited]`

Manipulators.

10.70.2.4 bool mln::accu::pair< min< V > , max< V > , mln_argument(min< V >) >::is_valid ( ) const `[inherited]`

Check whether this accu is able to return a result.

Always true here.

10.70.2.5 max< V > ::result mln::accu::pair< min< V > , max< V > , mln_argument(min< V >) >::second ( ) const `[inherited]`

Return the result of the second accumulator.

10.70.2.6 max< V > mln::accu::pair< min< V > , max< V > , mln_argument(min< V >) >::second_accu ( ) const `[inherited]`

Return the second accumulator.

10.70.2.7 template<typename E > template<typename T > void mln::Accumulator< E >::take_as_init (const T & *t*) [inherited]

Take as initialization the value t.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

Definition at line 186 of file accumulator.hh.

References mln::mln_exact().

10.70.2.8 template<typename E > template<typename T > void mln::Accumulator< E >::take_n_times (unsigned *n*, const T & *t*) [inherited]

Take n times the value t.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

Definition at line 213 of file accumulator.hh.

References mln::mln_exact().

10.70.2.9 std::pair<typename min< V > ::result, typename max< V > ::result> mln::accu::pair< min< V > , max< V > , mln_argument(min< V >) >::to_result ( ) const [inherited]

Get the value of the accumulator.

10.71 mln::accu::stat::rank< T > Struct Template Reference

Generic rank accumulator class.

`#include <rank.hh>`

Inherits base< const T &, rank< T > >.

Public Member Functions

- bool is_valid () const

  Check whether this accu is able to return a result.

- unsigned k () const

  Give the rank.

- void take_as_init (const T &t)

  Take as initialization the value t.

- void take_n_times (unsigned n, const T &t)

  Take n times the value t.

- const T & to_result () const

  Get the value of the accumulator.

- void init ()
  Manipulators.

10.71.1 Detailed Description

template<typename T> struct mln::accu::stat::rank< T >

Generic rank accumulator class. The parameter `T` is the type of values.

Definition at line 60 of file rank.hh.

10.71.2 Member Function Documentation

10.71.2.1 template<typename T > void mln::accu::stat::rank< T >::init ( ) `[inline]`

Manipulators.

Definition at line 319 of file rank.hh.

10.71.2.2 template<typename T > bool mln::accu::stat::rank< T >::is_valid ( ) const `[inline]`

Check whether this accu is able to return a result.

Always true here.

Definition at line 343 of file rank.hh.

10.71.2.3 template<typename T > unsigned mln::accu::stat::rank< T >::k ( ) const `[inline]`

Give the rank.

Definition at line 178 of file rank.hh.

10.71.2.4 void mln::Accumulator< rank< T > >::take_as_init (const T & *t*) `[inherited]`

Take as initialization the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.71.2.5 void mln::Accumulator< rank< T > >::take_n_times (unsigned *n*, const T & *t*) `[inherited]`

Take `n` times the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.71.2.6 template<typename T > const T & mln::accu::stat::rank< T >::to_result ( ) const [inline]

Get the value of the accumulator.

Definition at line 333 of file rank.hh.

10.72 mln::accu::stat::rank< bool > Struct Template Reference

rank accumulator class for Boolean.

`#include <rank_bool.hh>`

Inherits base< bool, rank< bool > >.

Public Member Functions

- bool is_valid () const

  Check whether this accu is able to return a result.

- void take_as_init (const T &t)

  Take as initialization the value `t`.

- void take_n_times (unsigned n, const T &t)

  Take `n` *times the value* `t`.

- bool to_result () const

  Get the value of the accumulator.

  - void init ()

    Manipulators.

10.72.1 Detailed Description

template<> struct mln::accu::stat::rank< bool >

rank accumulator class for Boolean.

Definition at line 58 of file rank_bool.hh.

10.72.2 Member Function Documentation

10.72.2.1 void mln::accu::stat::rank< bool >::init ( ) [inline]

Manipulators.

Definition at line 105 of file rank_bool.hh.

10.72.2.2 bool mln::accu::stat::rank< bool >::is_valid ( ) const [inline]

Check whether this accu is able to return a result.

Always true here.

Definition at line 157 of file rank_bool.hh.

10.72.2.3 void mln::Accumulator< rank< bool > >::take_as_init (const T & *t*) [inherited]

Take as initialization the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.72.2.4 void mln::Accumulator< rank< bool > >::take_n_times (unsigned *n*, const T & *t*) [inherited]

Take `n` times the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.72.2.5 bool mln::accu::stat::rank< bool >::to_result ( ) const [inline]

Get the value of the accumulator.

Definition at line 150 of file rank_bool.hh.

10.73 mln::accu::stat::rank_high_quant< T > Struct Template Reference

Generic rank accumulator class.

`#include <rank_high_quant.hh>`

Inherits base< const T &, rank_high_quant< T > >.

Public Member Functions

- bool is_valid () const

  Check whether this accu is able to return a result.
- void take_as_init (const T &t)

  Take as initialization the value `t`*.*
- void take_n_times (unsigned n, const T &t)

  Take `n` *times the value* `t`*.*
- const T & to_result () const

  Get the value of the accumulator.

- void init ()
  Manipulators.

10.73.1 Detailed Description

template<typename T> struct mln::accu::stat::rank_high_quant< T >

Generic rank accumulator class. The parameter `T` is the type of values.

Definition at line 57 of file rank_high_quant.hh.

10.73.2 Member Function Documentation

10.73.2.1 template<typename T > void mln::accu::stat::rank_high_quant< T >::init ( ) [inline]

Manipulators.

Definition at line 148 of file rank_high_quant.hh.

10.73.2.2 template<typename T > bool mln::accu::stat::rank_high_quant< T >::is_valid ( ) const [inline]

Check whether this accu is able to return a result.

Always true here.

Definition at line 197 of file rank_high_quant.hh.

10.73.2.3 void mln::Accumulator< rank_high_quant< T > >::take_as_init (const T & *t*) [inherited]

Take as initialization the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.73.2.4 void mln::Accumulator< rank_high_quant< T > >::take_n_times (unsigned *n*, const T & *t*) [inherited]

Take `n` times the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.73.2.5 template<typename T > const T & mln::accu::stat::rank_high_quant< T >::to_result ( ) const [inline]

Get the value of the accumulator.

Definition at line 183 of file rank_high_quant.hh.

10.74 mln::accu::stat::var< T > Struct Template Reference

Var accumulator class.

`#include <var.hh>`

Inherits base< algebra::mat< T::dim, T::dim, float >, var< T > >.

Public Types

- typedef algebra::vec< dim, float > mean_t

    Type equipment.

Public Member Functions

- bool is_valid () const

    Check whether this accu returns a valid result.

- mean_t mean () const

    Get the mean vector.

- unsigned n_items () const

    Get the number of items.

- void take_as_init (const T &t)

    Take as initialization the value `t`*.*

- void take_n_times (unsigned n, const T &t)

    Take `n` *times the value* `t`*.*

- result to_result () const

    Get the accumulator result (the var value).

- result variance () const

    Get the variance matrix.

  - void init ()

      Manipulators.

10.74.1 Detailed Description

template<typename T> struct mln::accu::stat::var< T >

Var accumulator class. Parameter `T` is the type of vectors

Definition at line 58 of file accu/stat/var.hh.

10.74.2 Member Typedef Documentation

10.74.2.1 template<typename T> typedef algebra::vec<dim,float> mln::accu::stat::var< T >::mean_t

Type equipment.

Definition at line 88 of file accu/stat/var.hh.

10.74.3 Member Function Documentation

10.74.3.1 template<typename T > void mln::accu::stat::var< T >::init ( ) [inline]

Manipulators.

Definition at line 118 of file accu/stat/var.hh.

10.74.3.2 template<typename T > bool mln::accu::stat::var< T >::is_valid ( ) const [inline]

Check whether this accu returns a valid result.

Definition at line 213 of file accu/stat/var.hh.

10.74.3.3 template<typename T > var< T >::mean_t mln::accu::stat::var< T >::mean ( ) const [inline]

Get the mean vector.

Definition at line 200 of file accu/stat/var.hh.

References mln::literal::zero.

10.74.3.4 template<typename T > unsigned mln::accu::stat::var< T >::n_items ( ) const [inline]

Get the number of items.

Definition at line 192 of file accu/stat/var.hh.

10.74.3.5 void mln::Accumulator< var< T > >::take_as_init (const T & *t*) [inherited]

Take as initialization the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.74.3.6 void mln::Accumulator< var< T > >::take_n_times (unsigned *n*, const T & *t*) [inherited]

Take `n` times the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.74.3.7 template<typename T > var< T >::result mln::accu::stat::var< T >::to_result ( ) const [inline]

Get the accumulator result (the var value).

Definition at line 168 of file accu/stat/var.hh.

References mln::literal::zero.

10.74.3.8 template<typename T > var< T >::result mln::accu::stat::var< T >::variance ( ) const [inline]

Get the variance matrix.

Definition at line 184 of file accu/stat/var.hh.

10.75 mln::accu::stat::variance< T, S, R > Struct Template Reference

Variance accumulator class.

```
#include <variance.hh>
```

Inherits base< R, variance< T, S, R > >.

Public Member Functions

- bool is_valid () const

  Check whether this accu is able to return a result.

- R mean () const

  Get the mean value.

- unsigned n_items () const

  Get the number of items.

- R standard_deviation () const

  Get the standard deviation value.

- S sum () const

  Get the sum value.

- void take_as_init (const T &t)

  Take as initialization the value `t`*.*

- void take_n_times (unsigned n, const T &t)

  Take `n` *times the value* `t`*.*

- R to_result () const

  Get the accumulator result (the variance value).

- R var () const
  Get the variance value.

- void init ()
  Manipulators.

10.75.1 Detailed Description

template<typename T, typename S = typename mln::value::props< T >::sum, typename R = S> struct mln::accu::stat::variance< T, S, R >

Variance accumulator class. Parameter `T` is the type of values that we sum. Parameter `S` is the type to store the value sum and the sum of value $*$ value; the default type of `S` is the summation type (property) of `T`. Parameter `R` is the type of the mean and variance values; the default type of `R` is `S`.

Definition at line 61 of file variance.hh.

10.75.2 Member Function Documentation

10.75.2.1 template<typename T , typename S , typename R > void mln::accu::stat::variance< T, S, R >::init ( ) `[inline]`

Manipulators.

Definition at line 125 of file variance.hh.

References mln::literal::zero.

10.75.2.2 template<typename T , typename S , typename R > bool mln::accu::stat::variance< T, S, R >::is_valid ( ) const `[inline]`

Check whether this accu is able to return a result.

Always true here.

Definition at line 229 of file variance.hh.

10.75.2.3 template<typename T , typename S , typename R > R mln::accu::stat::variance< T, S, R >::mean ( ) const `[inline]`

Get the mean value.

Definition at line 187 of file variance.hh.

References mln::literal::zero.

10.75.2.4 template<typename T , typename S , typename R > unsigned mln::accu::stat::variance< T, S, R >::n_items ( ) const `[inline]`

Get the number of items.

Definition at line 205 of file variance.hh.

10.75.2.5 template<typename T , typename S , typename R > R mln::accu::stat::variance< T, S, R >::standard_deviation ( ) const [inline]

Get the standard deviation value.

Definition at line 221 of file variance.hh.

References mln::accu::stat::variance< T, S, R >::to_result().

10.75.2.6 template<typename T , typename S , typename R > S mln::accu::stat::variance< T, S, R >::sum ( ) const [inline]

Get the sum value.

Definition at line 197 of file variance.hh.

10.75.2.7 void mln::Accumulator< variance< T, S, R > >::take_as_init (const T & *t*) [inherited]

Take as initialization the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.75.2.8 void mln::Accumulator< variance< T, S, R > >::take_n_times (unsigned *n*, const T & *t*) [inherited]

Take `n` times the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.75.2.9 template<typename T , typename S , typename R > R mln::accu::stat::variance< T, S, R >::to_result ( ) const [inline]

Get the accumulator result (the variance value).

Definition at line 176 of file variance.hh.

Referenced by mln::accu::stat::variance< T, S, R >::standard_deviation(), and mln::accu::stat::variance< T, S, R >::var().

10.75.2.10 template<typename T , typename S , typename R > R mln::accu::stat::variance< T, S, R >::var ( ) const [inline]

Get the variance value.

Definition at line 213 of file variance.hh.

References mln::accu::stat::variance< T, S, R >::to_result().

10.76 mln::accu::tuple< A, n, > Struct Template Reference

Generic tuple of accumulators.

`#include <tuple.hh>`

Inherits base< boost::tuple< BOOST_PP_REPEAT(10, RESULT_ACCU, Le Ricard ya que ca de vrai!) >, tuple< A, n, BOOST_PP_ENUM_PARAMS(10, T)> >.

Public Member Functions

- bool is_valid () const

  Check whether this accu is able to return a result.

- void take_as_init (const T &t)

  Take as initialization the value `t`*.*

- void take_n_times (unsigned n, const T &t)

  Take `n` *times the value* `t`*.*

- res to_result () const

  Get the value of the accumulator.

  - void init ()

    Manipulators.

10.76.1 Detailed Description

template<typename A, unsigned n, BOOST_PP_ENUM_PARAMS_WITH_A_DEFAULT(10, typename T, boost::tuples::null_type)> struct mln::accu::tuple< A, n, >

Generic tuple of accumulators. The parameter `T` is the type of values.

Definition at line 74 of file tuple.hh.

10.76.2 Member Function Documentation

10.76.2.1 template<typename A , unsigned n, BOOST_PP_ENUM_PARAMS(10, typename T) > void mln::accu::tuple< A, n, >::init ( ) [inline]

Manipulators.

Definition at line 197 of file tuple.hh.

10.76.2.2 template<typename A , unsigned n, BOOST_PP_ENUM_PARAMS(10, typename T) > bool mln::accu::tuple< A, n, >::is_valid ( ) const [inline]

Check whether this accu is able to return a result.

Always true here.

Definition at line 239 of file tuple.hh.

10.76.2.3 void mln::Accumulator< tuple< A, n, BOOST_PP_ENUM_PARAMS(10, T)> >::take_as_init (const T & *t*) [inherited]

Take as initialization the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.76.2.4 void mln::Accumulator< tuple< A, n, BOOST_PP_ENUM_PARAMS(10, T)> >::take_n_times (unsigned *n*, const T & *t*) [inherited]

Take `n` times the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.76.2.5 template<typename A , unsigned n, BOOST_PP_ENUM_PARAMS(10, typename T) > tuple< A, n, BOOST_PP_ENUM_PARAMS(10, T) >::res mln::accu::tuple< A, n, >::to_result ( ) const [inline]

Get the value of the accumulator.

Definition at line 229 of file tuple.hh.

10.77 mln::accu::val< A > Struct Template Reference

Generic val of accumulators.

`#include <v.hh>`

Inherits base< const A::result &, val< A > >.

Public Member Functions

- bool is_valid () const

  Check whether this accu is able to return a result.

- void take_as_init (const T &t)

  Take as initialization the value `t`*.*

- void take_n_times (unsigned n, const T &t)

  Take `n` *times the value* `t`*.*

- const A::result & to_result () const

  Get the value of the accumulator.

- void init ()

  Manipulators.

10.77.1 Detailed Description

template<typename A> struct mln::accu::val< A >

Generic val of accumulators.

Definition at line 50 of file v.hh.

10.77.2 Member Function Documentation

10.77.2.1 template<typename A > void mln::accu::val< A >::init ( ) `[inline]`

Manipulators.

Definition at line 119 of file v.hh.

10.77.2.2 template<typename A > bool mln::accu::val< A >::is_valid ( ) const `[inline]`

Check whether this accu is able to return a result.

Always true here.

Definition at line 177 of file v.hh.

10.77.2.3 void mln::Accumulator< val< A > >::take_as_init (const T & *t*) `[inherited]`

Take as initialization the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.77.2.4 void mln::Accumulator< val< A > >::take_n_times (unsigned *n*, const T & *t*) `[inherited]`

Take `n` times the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.77.2.5 template<typename A > const A::result & mln::accu::val< A >::to_result ( ) const `[inline]`

Get the value of the accumulator.

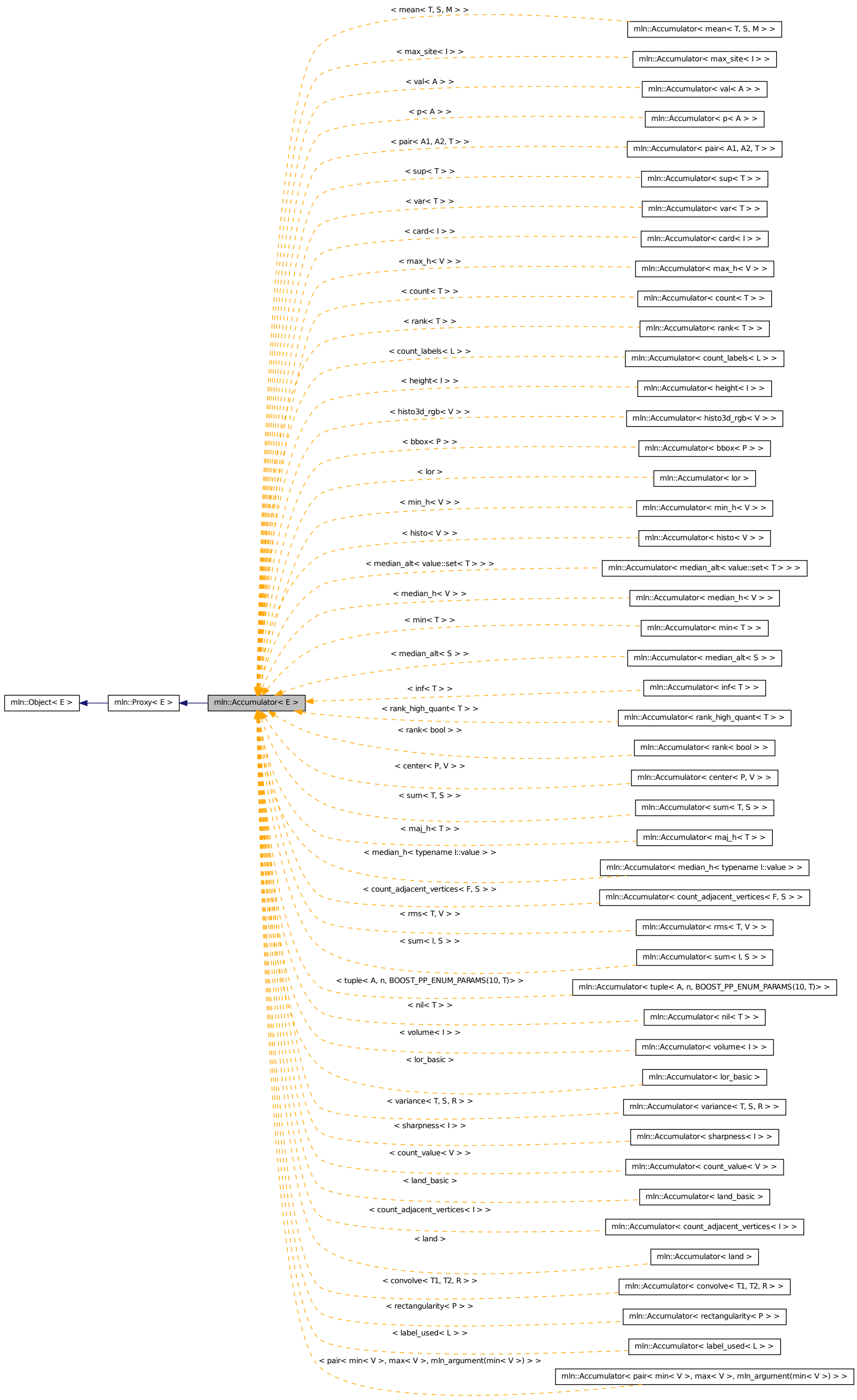
Definition at line 169 of file v.hh.

10.78 mln::Accumulator< E > Struct Template Reference

Base class for implementation of accumulators.

`#include <accumulator.hh>`

Inheritance diagram for mln::Accumulator< E >:



Public Member Functions

- template<typename T >
  void take_as_init (const T &t)
  Take as initialization the value `t`*.*
- template<typename T >
  void take_n_times (unsigned n, const T &t)
  Take `n` *times the value* `t`*.*

10.78.1 Detailed Description

template<typename E> struct mln::Accumulator< E >

Base class for implementation of accumulators. The parameter *E* is the exact type.

See also

mln::doc::Accumulator for a complete documentation of this class contents.

Definition at line 78 of file accumulator.hh.

10.78.2 Member Function Documentation

10.78.2.1 template<typename E > template<typename T > void mln::Accumulator< E >::take_as_init (const T & *t*)

Take as initialization the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

Definition at line 186 of file accumulator.hh.

References mln::mln_exact().

10.78.2.2 template<typename E > template<typename T > void mln::Accumulator< E >::take_n_times (unsigned *n*, const T & *t*)

Take `n` times the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

Definition at line 213 of file accumulator.hh.

References mln::mln_exact().

10.79 mln::algebra::h_mat< d, T > Struct Template Reference

N-Dimensional matrix with homogeneous coordinates.

`#include <h_mat.hh>`

Inherits mln::algebra::mat< d+1, d+1, T >.

Public Types

- enum
  Dimension is the 'natural' one (3 for 3D), not the one of the vector (dim + 1).

Public Member Functions

- mat< n, m, T > _1 () const
  Return the inverse of the matrix.
- h_mat ()
  Constructor without argument.
- h_mat (const mat< d+1, d+1, T > &x)
  Constructor with the underlying matrix.
- mat< m, n, T > t () const
  Return the transpose of the matrix.

10.79.1 Detailed Description

template<unsigned d, typename T> struct mln::algebra::h_mat< d, T >

N-Dimensional matrix with homogeneous coordinates.

Definition at line 49 of file algebra/h_mat.hh.

10.79.2 Member Enumeration Documentation

10.79.2.1 template<unsigned d, typename T> anonymous enum

Dimension is the 'natural' one (3 for 3D), not the one of the vector (dim + 1).

Definition at line 52 of file algebra/h_mat.hh.

10.79.3 Constructor & Destructor Documentation

10.79.3.1 template<unsigned d, typename T > mln::algebra::h_mat< d, T >::h_mat ( ) [inline]

Constructor without argument.

Definition at line 67 of file algebra/h_mat.hh.

10.79.3.2 template<unsigned d, typename T > mln::algebra::h_mat< d, T >::h_mat (const mat< d+1, d+1, T > & *x*) [inline]

Constructor with the underlying matrix.

Definition at line 74 of file algebra/h_mat.hh.

10.79.4 Member Function Documentation

10.79.4.1 template<unsigned n, unsigned m, typename T > mat< n, m, T > mln::algebra::mat< n, m, T >::_1 ( ) const [inline, inherited]

Return the inverse of the matrix.

Only compile on square matrix.

Definition at line 604 of file algebra/mat.hh.

10.79.4.2 template<unsigned n, unsigned m, typename T > mat< m, n, T > mln::algebra::mat< n, m, T >::t ( ) const [inline, inherited]

Return the transpose of the matrix.

Definition at line 538 of file algebra/mat.hh.

10.80 mln::algebra::h_vec< d, C > Class Template Reference

N-Dimensional vector with homogeneous coordinates.

`#include <h_vec.hh>`

Inherits mln::algebra::vec< d+1, C >.

Public Types

- enum

  Dimension is the 'natural' one (3 for 3D), not the one of the vector (dim + 1).

Public Member Functions

- h_vec ()

  Constructor without argument.

- h_vec (const vec< d+1, C > &other)

  Constructor with the underlying vector.

- template<typename U >
  operator mat< n, 1, U > () const

  Conversion to a matrix.

- mat< 1, n, T > t () const

  Transposition.

- vec< d, C > to_vec () const

  Back to the natural (non-homogeneous) space.

Static Public Attributes

- static const vec< n, T > origin = all_to(0)

  Origin value.

- static const vec< n, T > zero = all_to(0)

  Zero value.

10.80.1 Detailed Description

template<unsigned d, typename C> class mln::algebra::h_vec< d, C >

N-Dimensional vector with homogeneous coordinates.

Definition at line 94 of file h_vec.hh.

10.80.2 Member Enumeration Documentation

10.80.2.1 template<unsigned d, typename C> anonymous enum

Dimension is the 'natural' one (3 for 3D), not the one of the vector (dim + 1).

Definition at line 98 of file h_vec.hh.

10.80.3 Constructor & Destructor Documentation

10.80.3.1 template<unsigned d, typename C > mln::algebra::h_vec< d, C >::h_vec ( ) [inline]

Constructor without argument.

Definition at line 117 of file h_vec.hh.

References mln::literal::one.

10.80.3.2 template<unsigned d, typename C > mln::algebra::h_vec< d, C >::h_vec (const vec< d+1, C > & *other*) [inline]

Constructor with the underlying vector.

Definition at line 128 of file h_vec.hh.

10.80.4 Member Function Documentation

10.80.4.1 template<unsigned n, typename T > template<typename U > mln::algebra::vec< n, T >::operator mat< n, 1, U > ( ) const [inline, inherited]

Conversion to a matrix.

Definition at line 368 of file algebra/mat.hh.

10.80.4.2 template< unsigned n, typename T > mat< 1, n, T > mln::algebra::vec< n, T >::t ( ) const [inline, inherited]

Transposition.

Definition at line 858 of file algebra/mat.hh.

10.80.4.3 template< unsigned d, typename C > vec< d, C > mln::algebra::h_vec< d, C >::to_vec ( ) const [inline]

Back to the natural (non-homogeneous) space.

Definition at line 145 of file h_vec.hh.

10.80.5 Member Data Documentation

10.80.5.1 template< unsigned n, typename T> const vec< n, T > mln::algebra::vec< n, T >::origin = all_to(0) [static, inherited]

Origin value.

Definition at line 247 of file algebra/vec.hh.

10.80.5.2 template< unsigned n, typename T> const vec< n, T > mln::algebra::vec< n, T >::zero = all_to(0) [static, inherited]

Zero value.

Definition at line 244 of file algebra/vec.hh.

10.81 mln::bkd_pixter1d< I > Class Template Reference

Backward pixel iterator on a 1-D image with border.

`#include <pixter1d.hh>`

Inherits backward_pixel_iterator_base_< I, bkd_pixter1d< I > >.

Public Types

- typedef I image
  Image type.

Public Member Functions

- bkd_pixter1d (I &image)
  Constructor.
- void next ()
  Go to the next element.

10.81.1 Detailed Description

template<typename I> class mln::bkd_pixter1d< I >

Backward pixel iterator on a 1-D image with border.

Definition at line 69 of file pixter1d.hh.

10.81.2 Member Typedef Documentation

10.81.2.1 template<typename I > typedef I mln::bkd_pixter1d< I >::image

Image type.

Definition at line 76 of file pixter1d.hh.

10.81.3 Constructor & Destructor Documentation

10.81.3.1 template<typename I > mln::bkd_pixter1d< I >::bkd_pixter1d (I & *image*) `[inline]`

Constructor.

Parameters

`[in]` ***image*** The image this pixel iterator is bound to.

Definition at line 117 of file pixter1d.hh.

10.81.4 Member Function Documentation

10.81.4.1 void mln::Iterator< bkd_pixter1d< I > >::next ( ) `[inherited]`

Go to the next element.

Warning

This is a final method; iterator classes should not re-defined this method. The actual "next" operation has to be defined through the the *next_* method.

Precondition

The iterator is valid.

10.82 mln::bkd_pixter2d< I > Class Template Reference

Backward pixel iterator on a 2-D image with border.

`#include <pixter2d.hh>`

Inherits backward_pixel_iterator_base_< I, bkd_pixter2d< I > >.

Public Types

- typedef I image

    Image type.

Public Member Functions

- bkd_pixter2d (I &image)

    Constructor.

- void next ()

    Go to the next element.

10.82.1 Detailed Description

template<typename I> class mln::bkd_pixter2d< I >

Backward pixel iterator on a 2-D image with border.

Definition at line 87 of file pixter2d.hh.

10.82.2 Member Typedef Documentation

10.82.2.1 template<typename I > typedef I mln::bkd_pixter2d< I >::image

Image type.

Definition at line 94 of file pixter2d.hh.

10.82.3 Constructor & Destructor Documentation

10.82.3.1 template<typename I > mln::bkd_pixter2d< I >::bkd_pixter2d (I & *image*) `[inline]`

Constructor.

Parameters

`[in]` ***image*** The image this pixel iterator is bound to.

Definition at line 169 of file pixter2d.hh.

10.82.4 Member Function Documentation

10.82.4.1 void mln::Iterator< bkd_pixter2d< I > >::next ( ) `[inherited]`

Go to the next element.

Warning

This is a final method; iterator classes should not re-defined this method. The actual "next" operation has to be defined through the *next_* method.

Precondition

The iterator is valid.

10.83 mln::bkd_pixter3d< I > Class Template Reference

Backward pixel iterator on a 3-D image with border.

`#include <pixter3d.hh>`

Inherits backward_pixel_iterator_base_< I, bkd_pixter3d< I > >.

Public Types

- typedef I image

  Image type.

Public Member Functions

- bkd_pixter3d (I &image)

  Constructor.

- void next ()

  Go to the next element.

10.83.1 Detailed Description

template<typename I> class mln::bkd_pixter3d< I >

Backward pixel iterator on a 3-D image with border.

Definition at line 100 of file pixter3d.hh.

10.83.2 Member Typedef Documentation

10.83.2.1 template<typename I > typedef I mln::bkd_pixter3d< I >::image

Image type.

Definition at line 107 of file pixter3d.hh.

10.83.3 Constructor & Destructor Documentation

10.83.3.1 template<typename I > mln::bkd_pixter3d< I >::bkd_pixter3d (I & *image*) [inline]

Constructor.

Parameters

[in] ***image*** The image this pixel iterator is bound to.

Definition at line 207 of file pixter3d.hh.

10.83.4 Member Function Documentation

10.83.4.1 void mln::Iterator< bkd_pixter3d< I > >::next ( ) [inherited]

Go to the next element.

Warning

This is a final method; iterator classes should not re-defined this method. The actual "next" operation has to be defined through the *next_* method.

Precondition

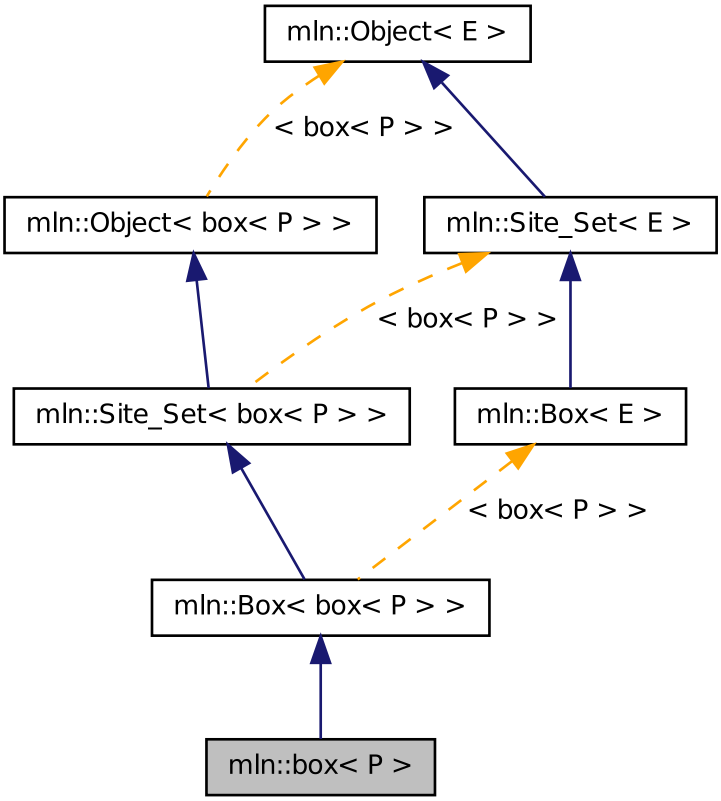
The iterator is valid.

10.84 mln::box< P > Class Template Reference

Generic box class: site set containing points of a regular grid.

`#include <box.hh>`

Inheritance diagram for mln::box< P >:



Public Types

- enum
  Dimension.
- typedef box_bkd_piter_< P > bkd_piter
  Backward Site_Iterator associated type.
- typedef P element
  Element associated type.
- typedef box_fwd_piter_< P > fwd_piter
  Forward Site_Iterator associated type.
- typedef fwd_piter piter
  Site_Iterator associated type.

- typedef P psite

  Psite associated type.

- typedef P site

  Site associated type.

Public Member Functions

- const box< P > & bbox () const

  Give the bounding box of this site set.

- box ()

  Constructor without argument.

- box (const site &pmin, const site &pmax)

  Constructor of a box going from `pmin` to `pmax`.

- void crop_wrt (const box< P > &b)

  Crop this bbox in order to fit in the reference box `b`.

- void enlarge (unsigned b)

  Enlarge the box with a border `b`.

- void enlarge (unsigned dim, unsigned b)

  Enlarge the box with a border `b` for dimension `dim`.

- bool has (const P &p) const

  Test if `p` belongs to the box.

- bool is_empty () const

  Test if this box is empty.

- bool is_valid () const

  Test that the box owns valid data, i.e., is initialized and with pmin being 'less-than' pmax.

- unsigned len (unsigned i) const

  Give the length of the `i-th` side of the box.

- std::size_t memory_size () const

  Return the size of this site set in memory.

- void merge (const box< P > &b)

  Merge inplace with another box.

- unsigned nsites () const

  Give the number of sites of this box.

- P pcenter () const
  Return the approximated central site of this box.
- P & pmax ()
  Reference to the maximum point.
- P pmax () const
  Maximum point.
- P pmin () const
  Minimum point.
- P & pmin ()
  Reference to the minimum point.
- box< P > to_larger (unsigned b) const
  Give a larger box.

  - box (typename P::coord ninds)

Related Functions

(Note that these are not member functions.)

- template<typename P >
  std::ostream & operator<< (std::ostream &ostr, const box< P > &b)
  Print a generic box `b` into the output stream `ostr`.

10.84.1 Detailed Description

template<typename P> class mln::box< P >

Generic box class: site set containing points of a regular grid. Parameter `P` is the corresponding type of point.

Definition at line 81 of file core/site_set/box.hh.

10.84.2 Member Typedef Documentation

10.84.2.1 template<typename P> typedef box_bkd_piter_<P> mln::box< P >::bkd_piter

Backward Site_Iterator associated type.

Definition at line 105 of file core/site_set/box.hh.

10.84.2.2 template<typename P> typedef P mln::box< P >::element

Element associated type.

Definition at line 90 of file core/site_set/box.hh.

10.84.2.3 template<typename P> typedef box_fwd_piter_<P> mln::box< P >::fwd_piter

Forward Site_Iterator associated type.

Definition at line 99 of file core/site_set/box.hh.

10.84.2.4 template<typename P> typedef fwd_piter mln::box< P >::piter

Site_Iterator associated type.

Definition at line 102 of file core/site_set/box.hh.

10.84.2.5 template<typename P> typedef P mln::box< P >::psite

Psite associated type.

Definition at line 93 of file core/site_set/box.hh.

10.84.2.6 template<typename P> typedef P mln::box< P >::site

Site associated type.

Definition at line 96 of file core/site_set/box.hh.

10.84.3 Member Enumeration Documentation

10.84.3.1 template<typename P> anonymous enum

Dimension.

Definition at line 87 of file core/site_set/box.hh.

10.84.4 Constructor & Destructor Documentation

10.84.4.1 template<typename P > mln::box< P >::box ( ) `[inline]`

Constructor without argument.

Definition at line 275 of file core/site_set/box.hh.

10.84.4.2 template<typename P > mln::box< P >::box (const site & *pmin*, const site & *pmax*) `[inline]`

Constructor of a box going from `pmin` to `pmax`.

Definition at line 284 of file core/site_set/box.hh.

References mln::box< P >::is_valid().

10.84.4.3 template<typename P > mln::box< P >::box (typename P::coord *ninds*) `[inline, explicit]`

Constructors with different numbers of arguments (sizes) w.r.t. the dimension.

Definition at line 293 of file core/site_set/box.hh.

References mln::literal::origin.

10.84.5 Member Function Documentation

10.84.5.1 const box< P > & mln::Box< box< P > >::bbox ( ) const [inherited]

Give the bounding box of this site set.

Return the bounding box of this site set, so that is itself. This method is declared by the mln::Site_Set concept.

Warning

This method is final for all box classes.

10.84.5.2 template<typename P > void mln::box< P >::crop_wrt (const box< P > & *b*) [inline]

Crop this bbox in order to fit in the reference box `b`.

Definition at line 205 of file core/site_set/box.hh.

References mln::box< P >::pmax(), and mln::box< P >::pmin().

Referenced by mln::debug::draw_graph(), and mln::make_debug_graph_image().

10.84.5.3 template<typename P > void mln::box< P >::enlarge (unsigned *b*) [inline]

Enlarge the box with a border `b`.

Definition at line 337 of file core/site_set/box.hh.

References mln::box< P >::is_valid().

Referenced by mln::registration::icp().

10.84.5.4 template<typename P > void mln::box< P >::enlarge (unsigned *dim*, unsigned *b*) [inline]

Enlarge the box with a border `b` for dimension `dim`.

Definition at line 351 of file core/site_set/box.hh.

References mln::box< P >::is_valid().

10.84.5.5 template<typename P > bool mln::box< P >::has (const P & *p*) const [inline]

Test if `p` belongs to the box.

Parameters

`[in]` ***p*** A point site.

Definition at line 325 of file core/site_set/box.hh.

References mln::box< P >::is_valid().

Referenced by mln::morpho::line_gradient().

10.84.5.6 bool mln::Box< box< P > >::is_empty ( ) const [inherited]

Test if this box is empty.

10.84.5.7 template<typename P > bool mln::box< P >::is_valid ( ) const [inline]

Test that the box owns valid data, i.e., is initialized and with pmin being 'less-than' pmax.

Definition at line 195 of file core/site_set/box.hh.

References mln::util::ord_weak().

Referenced by mln::box< P >::box(), mln::transform::distance_and_closest_point_geodesic(), mln::box< P >::enlarge(), mln::box< P >::has(), mln::box< P >::merge(), mln::box< P >::pcenter(), mln::box< P >::pmax(), mln::box< P >::pmin(), and mln::box< P >::to_larger().

10.84.5.8 unsigned mln::Box< box< P > >::len (unsigned *i*) const [inherited]

Give the length of the `i-th` side of the box.

Precondition

i < site::dim

Warning

This method is final for all box classes.

10.84.5.9 template<typename P > std::size_t mln::box< P >::memory_size ( ) const [inline]

Return the size of this site set in memory.

Definition at line 407 of file core/site_set/box.hh.

10.84.5.10 template<typename P > void mln::box< P >::merge (const box< P > & *b*) [inline]

Merge inplace with another box.

Definition at line 221 of file core/site_set/box.hh.

References mln::box< P >::is_valid(), mln::box< P >::pmax(), and mln::box< P >::pmin().

10.84.5.11 unsigned mln::Box< box< P > >::nsites ( ) const [inherited]

Give the number of sites of this box.

Return the number of sites of this box. This method is declared by the mln::Site_Set concept.

Warning

This method is final for all box classes.

10.84.5.12 template<typename P > P mln::box< P >::pcenter ( ) const [inline]

Return the approximated central site of this box.

Definition at line 395 of file core/site_set/box.hh.

References mln::box< P >::is_valid().

10.84.5.13 template<typename P > P mln::box< P >::pmax ( ) const [inline]

Maximum point.

Definition at line 259 of file core/site_set/box.hh.

References mln::box< P >::is_valid().

Referenced by mln::box< P >::crop_wrt(), mln::make::image3d(), mln::larger_than(), mln::io::fld::load(), and mln::box< P >::merge().

10.84.5.14 template<typename P > P & mln::box< P >::pmax ( ) [inline]

Reference to the maximum point.

Definition at line 268 of file core/site_set/box.hh.

10.84.5.15 template<typename P > P & mln::box< P >::pmin ( ) [inline]

Reference to the minimum point.

Definition at line 251 of file core/site_set/box.hh.

10.84.5.16 template<typename P > P mln::box< P >::pmin ( ) const [inline]

Minimum point.

Definition at line 242 of file core/site_set/box.hh.

References mln::box< P >::is_valid().

Referenced by mln::box< P >::crop_wrt(), mln::make::image3d(), mln::larger_than(), mln::io::fld::load(), and mln::box< P >::merge().

10.84.5.17 template<typename P > box< P > mln::box< P >::to_larger (unsigned *b*) const [inline]

Give a larger box.

Definition at line 378 of file core/site_set/box.hh.

References mln::box< P >::is_valid().

10.84.6 Friends And Related Function Documentation

10.84.6.1 template<typename P > std::ostream & operator<< (std::ostream & *ostr*, const box< P > & *b*) [related]

Print a generic box `b` into the output stream `ostr`.

Parameters

[in,out] ***ostr*** An output stream.

[in] ***b*** A generic box.

Returns

The modified output stream `ostr`.

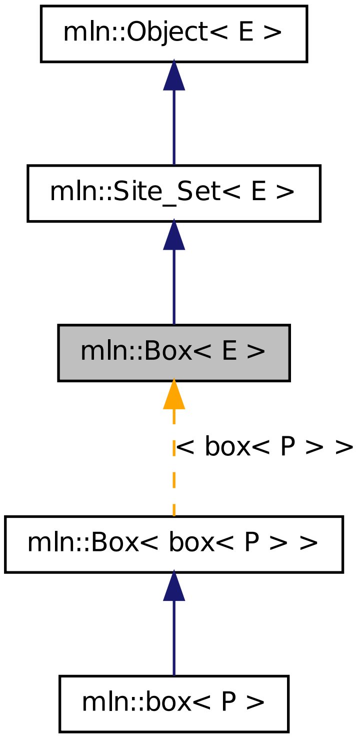
Definition at line 414 of file core/site_set/box.hh.

10.85 mln::Box< E > Struct Template Reference

Base class for implementation classes of boxes.

`#include <box.hh>`

Inheritance diagram for mln::Box< E >:



Public Member Functions

- const E & bbox () const

  Give the bounding box of this site set.

- bool is_empty () const

  Test if this box is empty.

- unsigned len (unsigned i) const

  Give the length of the `i-th` side of the box.

- unsigned nsites () const

  Give the number of sites of this box.

Related Functions

(Note that these are not member functions.)

- template<typename Sl , typename Sr >
p_set< typename Sl::site > diff (const Site_Set< Sl > &lhs, const Site_Set< Sr > &rhs)

    Set theoretic difference of `lhs` *and* `rhs`*.*

- template<typename Sl , typename Sr >
p_set< typename Sl::site > inter (const Site_Set< Sl > &lhs, const Site_Set< Sr > &rhs)

    Intersection between a couple of point sets.

- template<typename Sl , typename Sr >
bool operator< (const Site_Set< Sl > &lhs, const Site_Set< Sr > &rhs)

    Strict inclusion test between site sets `lhs` *and* `rhs`*.*

- template<typename Bl , typename Br >
bool operator< (const Box< Bl > &lhs, const Box< Br > &rhs)

    Strict inclusion test between boxes `lhs` *and* `rhs`*.*

- template<typename S >
std::ostream & operator<< (std::ostream &ostr, const Site_Set< S > &set)

    Print a site set `set` *into the output stream* `ostr`*.*

- template<typename Sl , typename Sr >
bool operator<= (const Site_Set< Sl > &lhs, const Site_Set< Sr > &rhs)

    Inclusion test between site sets `lhs` *and* `rhs`*.*

- template<typename Bl , typename Br >
bool operator<= (const Box< Bl > &lhs, const Box< Br > &rhs)

    Inclusion test between boxes `lhs` *and* `rhs`*.*

- template<typename Sl , typename Sr >
bool operator== (const Site_Set< Sl > &lhs, const Site_Set< Sr > &rhs)

    Equality test between site sets `lhs` *and* `rhs`*.*

- template<typename Sl , typename Sr >
p_set< typename Sl::site > sym_diff (const Site_Set< Sl > &lhs, const Site_Set< Sr > &rhs)

    Set theoretic symmetrical difference of `lhs` *and* `rhs`*.*

- template<typename Sl , typename Sr >
p_set< typename Sl::site > uni (const Site_Set< Sl > &lhs, const Site_Set< Sr > &rhs)

    Union of a couple of point sets.

- template<typename S >
p_set< typename S::site > unique (const Site_Set< S > &s)

    Give the unique set of `s`*.*

10.85.1 Detailed Description

template<typename E> struct mln::Box< E >

Base class for implementation classes of boxes. Boxes are particular site sets useful to bound any set of sites defined on a regular grid.

See also

mln::doc::Box for a complete documentation of this class contents.

Definition at line 48 of file core/concept/box.hh.

10.85.2 Member Function Documentation

10.85.2.1 template<typename E > const E & mln::Box< E >::bbox ( ) const [inline]

Give the bounding box of this site set.

Return the bounding box of this site set, so that is itself. This method is declared by the mln::Site_Set concept.

Warning

This method is final for all box classes.

Definition at line 124 of file core/concept/box.hh.

10.85.2.2 template<typename E > bool mln::Box< E >::is_empty ( ) const [inline]

Test if this box is empty.

Definition at line 167 of file core/concept/box.hh.

10.85.2.3 template<typename E > unsigned mln::Box< E >::len (unsigned *i*) const [inline]

Give the length of the `i-th` side of the box.

Precondition

i < site::dim

Warning

This method is final for all box classes.

Definition at line 131 of file core/concept/box.hh.

10.85.2.4 template<typename E > unsigned mln::Box< E >::nsites ( ) const [inline]

Give the number of sites of this box.

Return the number of sites of this box. This method is declared by the mln::Site_Set concept.

Warning

This method is final for all box classes.

Definition at line 153 of file core/concept/box.hh.

Referenced by mln::morpho::line_gradient().

10.85.3 Friends And Related Function Documentation

10.85.3.1 template<typename Sl , typename Sr > p_set< typename Sl::site > diff (const Site_Set< Sl > & *lhs*, const Site_Set< Sr > & *rhs*) `[related, inherited]`

Set theoretic difference of `lhs` and `rhs`.

Definition at line 66 of file set/diff.hh.

10.85.3.2 template<typename Sl , typename Sr > p_set< typename Sl::site > inter (const Site_Set< Sl > & *lhs*, const Site_Set< Sr > & *rhs*) `[related, inherited]`

Intersection between a couple of point sets.

Definition at line 62 of file set/inter.hh.

10.85.3.3 template<typename Sl , typename Sr > bool operator< (const Site_Set< Sl > & *lhs*, const Site_Set< Sr > & *rhs*) `[related, inherited]`

Strict inclusion test between site sets `lhs` and `rhs`.

Parameters

`[in]` ***lhs*** A site set (strictly included?).
`[in]` ***rhs*** Another site set (includer?).

Definition at line 479 of file operators.hh.

10.85.3.4 template<typename Bl , typename Br > bool operator< (const Box< Bl > & *lhs*, const Box< Br > & *rhs*) `[related]`

Strict inclusion test between boxes `lhs` and `rhs`.

Parameters

`[in]` ***lhs*** A box (strictly included?).
`[in]` ***rhs*** Another box (includor?).

Definition at line 193 of file core/concept/box.hh.

10.85.3.5 template<typename S > std::ostream & operator<< (std::ostream & *ostr*, const Site_Set< S > & *set*) `[related, inherited]`

Print a site set `set` into the output stream `ostr`.

Parameters

`[in,out]` ***ostr*** An output stream.
`[in]` ***set*** A site set.

Returns

The modified output stream `ostr`.

Definition at line 505 of file operators.hh.

10.85.3.6 template<typename Sl , typename Sr > bool operator<= (const Site_Set< Sl > & *lhs*, const Site_Set< Sr > & *rhs*) [related, inherited]

Inclusion test between site sets `lhs` and `rhs`.

Parameters

`[in]` ***lhs*** A site set (included?).

`[in]` ***rhs*** Another site set (includer?).

Definition at line 491 of file operators.hh.

10.85.3.7 template<typename Bl , typename Br > bool operator<= (const Box< Bl > & *lhs*, const Box< Br > & *rhs*) [related]

Inclusion test between boxes `lhs` and `rhs`.

Parameters

`[in]` ***lhs*** A box (included?).

`[in]` ***rhs*** Another box (includor?).

Definition at line 178 of file core/concept/box.hh.

10.85.3.8 template<typename Sl , typename Sr > bool operator== (const Site_Set< Sl > & *lhs*, const Site_Set< Sr > & *rhs*) [related, inherited]

Equality test between site sets `lhs` and `rhs`.

Parameters

`[in]` ***lhs*** A site set.

`[in]` ***rhs*** Another site set.

Definition at line 467 of file operators.hh.

10.85.3.9 template<typename Sl , typename Sr > p_set< typename Sl::site > sym_diff (const Site_Set< Sl > & *lhs*, const Site_Set< Sr > & *rhs*) [related, inherited]

Set theoretic symmetrical difference of `lhs` and `rhs`.

Definition at line 65 of file sym_diff.hh.

10.85.3.10 template<typename Sl , typename Sr > p_set< typename Sl::site > uni (const Site_Set< Sl > & *lhs*, const Site_Set< Sr > & *rhs*) [related, inherited]

Union of a couple of point sets.

Definition at line 61 of file uni.hh.

10.85.3.11 template< typename S > p_set< typename S::site > unique (const Site_Set< S > & *s*) [related, inherited]

Give the unique set of `s`.

Definition at line 61 of file unique.hh.

10.86 mln::box_runend_piter< P > Class Template Reference

A generic backward iterator on points by lines.

`#include <box_runend_piter.hh>`

Inherits site_set_iterator_base< box< P >, box_runend_piter< P > >.

Public Member Functions

- box_runend_piter (const box< P > &b)

  Constructor.

- void next ()

  Go to the next element.

- unsigned run_length () const

  Give the lenght of the run.

10.86.1 Detailed Description

template<typename P> class mln::box_runend_piter< P >

A generic backward iterator on points by lines. The parameter `P` is the type of points.

Definition at line 49 of file box_runend_piter.hh.

10.86.2 Constructor & Destructor Documentation

10.86.2.1 template<typename P > mln::box_runend_piter< P >::box_runend_piter (const box< P > & *b*) [inline]

Constructor.

Parameters

`[in]` ***b*** A box.

Definition at line 105 of file box_runend_piter.hh.

10.86.3 Member Function Documentation

10.86.3.1 void mln::Site_Iterator< box_runend_piter< P > >::next ( ) [inherited]

Go to the next element.

Warning

This is a final method; iterator classes should not re-defined this method. The actual "next" operation has to be defined through the *next_* method.

Precondition

The iterator is valid.

10.86.3.2 template<typename P > unsigned mln::box_runend_piter< P >::run_length ( ) const [inline]

Give the lenght of the run.

Definition at line 167 of file box_runend_piter.hh.

10.87 mln::box_runstart_piter< P > Class Template Reference

A generic forward iterator on points by lines.

`#include <box_runstart_piter.hh>`

Inherits site_set_iterator_base< box< P >, box_runstart_piter< P > >.

Public Member Functions

- box_runstart_piter (const box< P > &b)

  Constructor.

- void next ()

  Go to the next element.

- unsigned run_length () const

  Give the lenght of the run.

10.87.1 Detailed Description

template<typename P> class mln::box_runstart_piter< P >

A generic forward iterator on points by lines. The parameter `P` is the type of points.

Definition at line 49 of file box_runstart_piter.hh.

10.87.2 Constructor & Destructor Documentation

10.87.2.1 template< typename P > mln::box_runstart_piter< P >::box_runstart_piter (const box< P > & *b*) [inline]

Constructor.

Parameters

`[in]` ***b*** A box.

Definition at line 105 of file box_runstart_piter.hh.

10.87.3 Member Function Documentation

10.87.3.1 void mln::Site_Iterator< box_runstart_piter< P > >::next ( ) [inherited]

Go to the next element.

Warning

This is a final method; iterator classes should not re-defined this method. The actual "next" operation has to be defined through the *next_* method.

Precondition

The iterator is valid.

10.87.3.2 template< typename P > unsigned mln::box_runstart_piter< P >::run_length ( ) const [inline]

Give the lenght of the run.

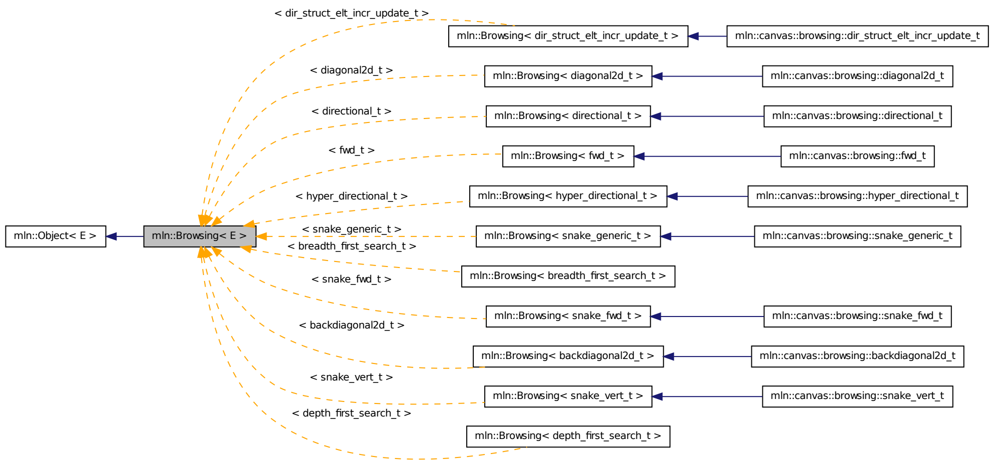
Definition at line 167 of file box_runstart_piter.hh.

10.88 mln::Browsing< E > Struct Template Reference

Base class for implementation classes that are browsings.

`#include <browsing.hh>`

Inheritance diagram for mln::Browsing< E >:



10.88.1 Detailed Description

template<typename E> struct mln::Browsing< E >

Base class for implementation classes that are browsings.

See also

mln::doc::Browsing for a complete documentation of this class contents.

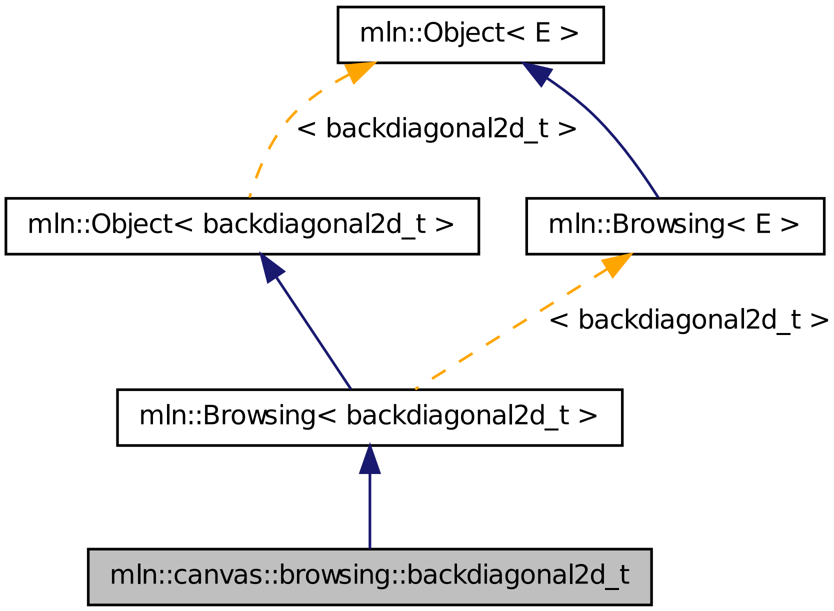
Definition at line 56 of file browsing.hh.

10.89 mln::canvas::browsing::backdiagonal2d_t Struct Reference

Browsing in a certain direction.

`#include <backdiagonal2d.hh>`

Inheritance diagram for mln::canvas::browsing::backdiagonal2d_t:



10.89.1 Detailed Description

Browsing in a certain direction. This canvas browse all the point of an image 'input' of type 'I' and of dimension 'dim' in the direction 'dir'.

The functor should provide (In addition to 'input', 'I', 'dim' and 'dir') three methods :

- init() : Will be called at the beginning.
- next() : Will be called at each point 'p' (also provided by the fonctor).
- final(): Will be called at the end.

F shall features :

{

--- as types:

I;

--- as attributes:

dim;

dir; // and test dir $<$ dim

input;

p;

--- as methods:

void init();

void next();

void final();

}

Example :

-------> | 4 7 9 | 2 5 8 | 1 3 6

Definition at line 83 of file backdiagonal2d.hh.

10.90 mln::canvas::browsing::breadth_first_search_t Struct Reference

Breadth-first search algorithm for graph, on vertices.

`#include <breadth_first_search.hh>`

Inherits graph_first_search_t< breadth_first_search_t, std::queue >.

10.90.1 Detailed Description

Breadth-first search algorithm for graph, on vertices.

Definition at line 79 of file breadth_first_search.hh.

10.91 mln::canvas::browsing::depth_first_search_t Struct Reference

Breadth-first search algorithm for graph, on vertices.

`#include <depth_first_search.hh>`

Inherits graph_first_search_t< depth_first_search_t, std::stack >.

10.91.1 Detailed Description

Breadth-first search algorithm for graph, on vertices.

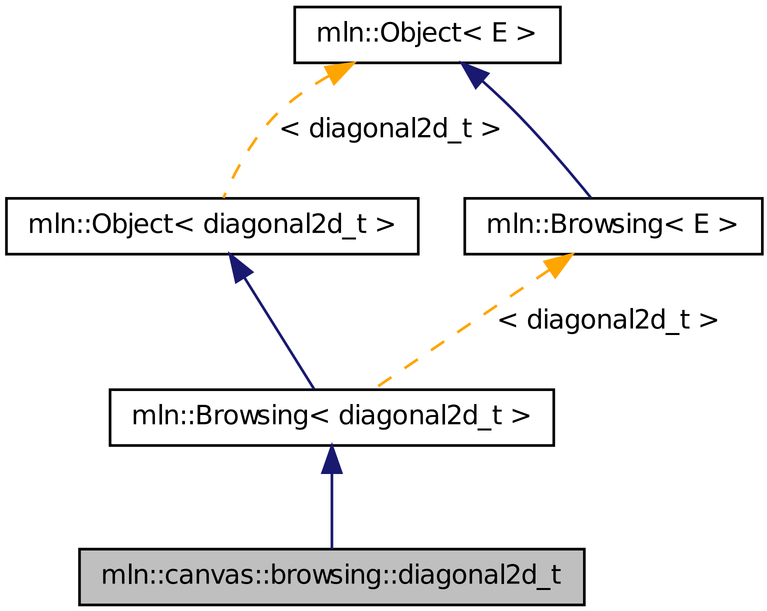
Definition at line 80 of file depth_first_search.hh.

10.92 mln::canvas::browsing::diagonal2d_t Struct Reference

Browsing in a certain direction.

`#include <diagonal2d.hh>`

Inheritance diagram for mln::canvas::browsing::diagonal2d_t:



10.92.1 Detailed Description

Browsing in a certain direction. This canvas browse all the point of an image 'input' of type 'I' and of dimension 'dim' in the direction 'dir'.

The functor should provide (In addition to 'input', 'I', 'dim' and 'dir') three methods :

- init() : Will be called at the beginning.
- next() : Will be called at each point 'p' (also provided by the fonctor).
- final(): Will be called at the end.

F shall features :

{

--- as types:

I;

--- as attributes:

dim;

dir; // and test dir < dim

input;

p;

--- as methods:

void init();

void next();

void final();

}

Example :

| 1 3 6 | 2 5 8 | 4 7 9 L------>

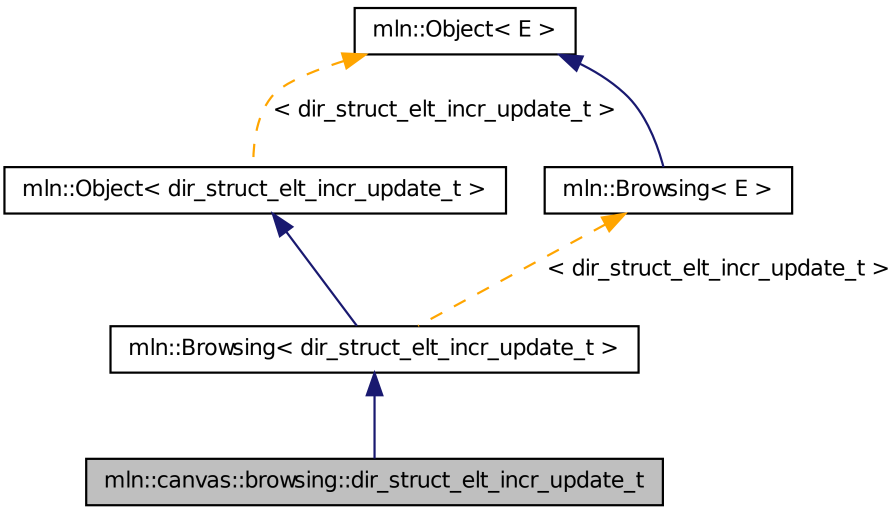
Definition at line 82 of file diagonal2d.hh.

10.93 mln::canvas::browsing::dir_struct_elt_incr_update_t Struct Reference

Browsing in a certain direction with a segment.

`#include <dir_struct_elt_incr_update.hh>`

Inheritance diagram for mln::canvas::browsing::dir_struct_elt_incr_update_t:



10.93.1 Detailed Description

Browsing in a certain direction with a segment. This canvas browse all the point of an image 'input' of type 'I', of dimension 'dim' in the direction 'dir' with considering weigh the 'length' nearest points.

The functor should provide (In addition to 'input', 'I', 'dim', 'dir' and 'length') six methods :

- init() : Will be called at the beginning.
- init_line() : Will be called at the beginning of each line.
- add_point(q) : Will be called for taking the new point 'q' into account.
- remove_point(q): Will be called for untaking the new point 'q' into account.
- next() : Will be called at each point 'p' (also provided by the functor).
- final() : Will be called at the end.

F shall features :

{

--- as types:

I;

--- as attributes:

dim;

dir; // and test dir < dim

input;

p;

length;

--- as methods:

void init();

void init_line();

void add_point(q)

void remove_point(q)

void next();

void final();

}

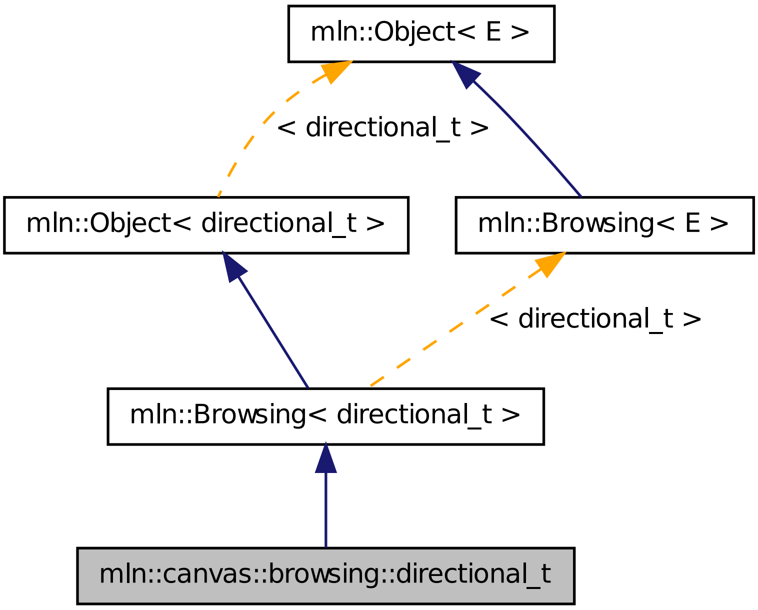
Definition at line 86 of file dir_struct_elt_incr_update.hh.

10.94 mln::canvas::browsing::directional_t Struct Reference

Browsing in a certain direction.

`#include <directional.hh>`

Inheritance diagram for mln::canvas::browsing::directional_t:



10.94.1 Detailed Description

Browsing in a certain direction. This canvas browse all the point of an image 'input' of type 'I' and of dimension 'dim' in the direction 'dir'.

The functor should provide (In addition to 'input', 'I', 'dim' and 'dir') three methods :

- init() : Will be called at the beginning.
- next() : Will be called at each point 'p' (also provided by the fonctor).
- final(): Will be called at the end.

F shall features :

{

--- as types:

I;

--- as attributes:

dim;

dir; // and test dir < dim

input;

p;

--- as methods:

void init();

void next();

void final();

}

Example :

1 0 0 2 0 0 3 0 0

4 0 0 5 0 0 6 0 0

7 0 0 8 0 0 9 0 0

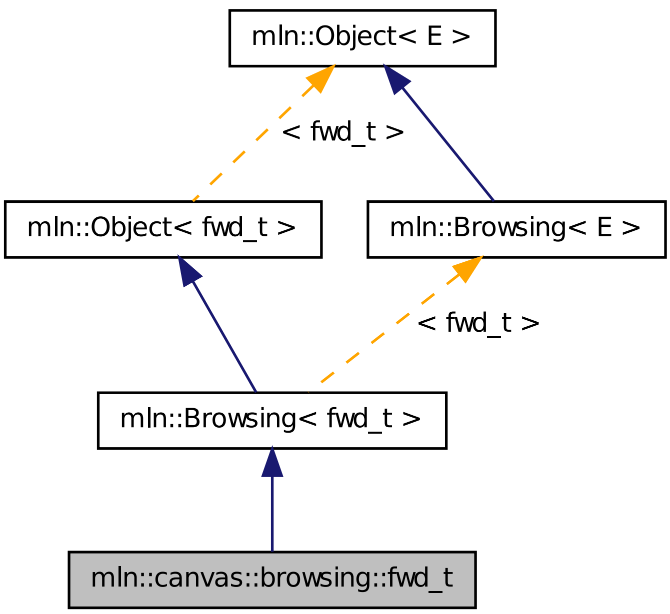
Definition at line 90 of file directional.hh.

10.95 mln::canvas::browsing::fwd_t Struct Reference

Canvas for forward browsing.

`#include <fwd.hh>`

Inheritance diagram for mln::canvas::browsing::fwd_t:



10.95.1 Detailed Description

Canvas for forward browsing. This canvas browse all the points of an image 'input' of type 'I' from left to right and from top to bottom

The fonctor should provide (In addition of 'I' and 'input') three methods :

- init() : Will be called at the beginning.
- next() : Will be called at each point 'p' (also provided by the functor).
- final(): Will be called at the end.

F shall feature:

{

--- as typedef:

I;

--as attributes:

input;

p;

--- as method:

void init();

void next();

void final();

}

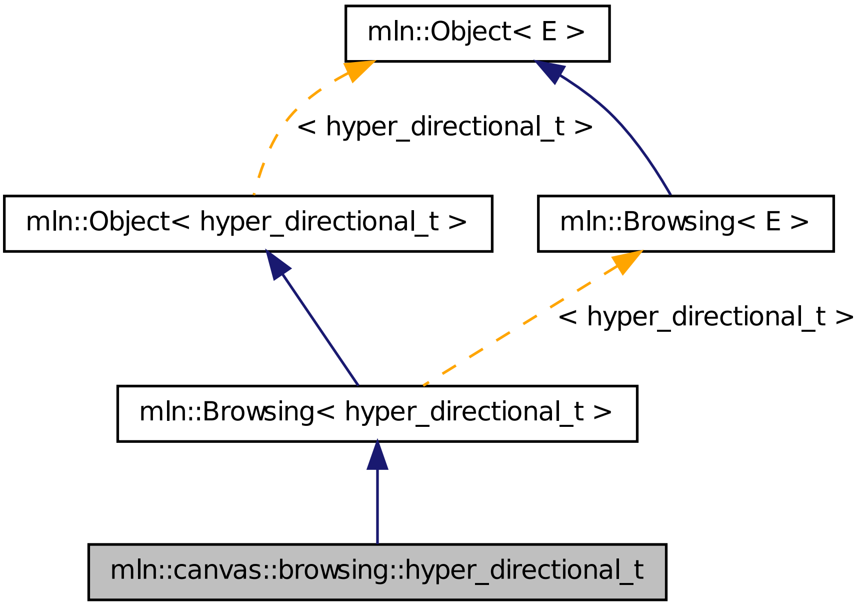
Definition at line 72 of file fwd.hh.

10.96 mln::canvas::browsing::hyper_directional_t Struct Reference

Browsing in a certain direction.

`#include <hyper_directional.hh>`

Inheritance diagram for mln::canvas::browsing::hyper_directional_t:



10.96.1 Detailed Description

Browsing in a certain direction. This canvas browse all the point of an image 'input' of type 'I' and of dimension 'dim' in the direction 'dir'.

The functor should provide (In addition to 'input', 'I', 'dim' and 'dir') three methods :

- init() : Will be called at the beginning.
- next() : Will be called at each point 'p' (also provided by the fonctor).
- final(): Will be called at the end.

F shall features :

{

--- as types:

I;

--- as attributes:

dim;

dir; // and test dir < dim

input;

p;

--- as methods:

void init();

void next();

void final();

}

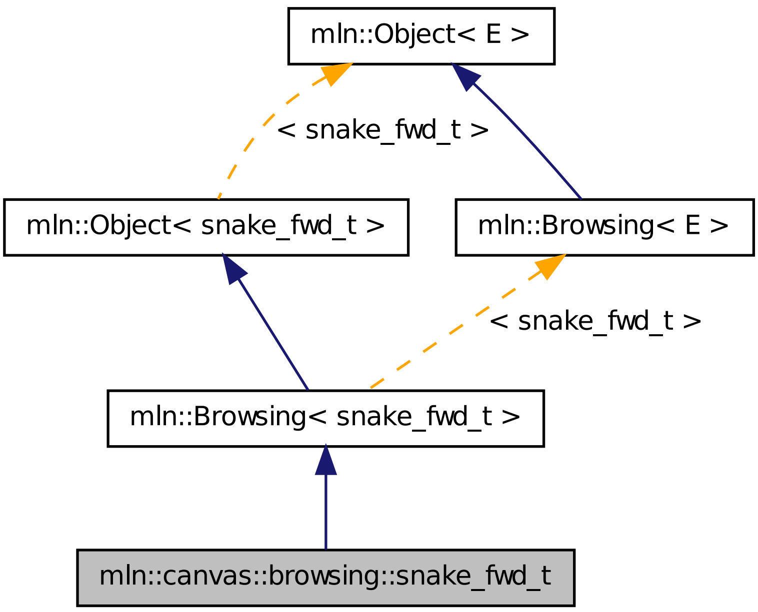
Definition at line 74 of file hyper_directional.hh.

10.97 mln::canvas::browsing::snake_fwd_t Struct Reference

Browsing in a snake-way, forward.

`#include <snake_fwd.hh>`

Inheritance diagram for mln::canvas::browsing::snake_fwd_t:



10.97.1 Detailed Description

Browsing in a snake-way, forward. This canvas browse all the point of an image 'input' like this :

-------> <------' '------>

The fonctor should provide (In addition to 'input') four methods :

- init() : Will be called at the beginning.

- down() : Will be called after each moving down. (will also be called once at the first point).

- fwd() : Will be called after each moving right.

- bwd() : Will ba called after each moving left.

This methods should acces to the current working point 'p' also provided by the functor.

Warning: This canvas works only on 2D.

F shall feature:

{

--- as attributes:

input;

p;

--- as methods:

void init();

void down();

void fwd();

void bkd();

}

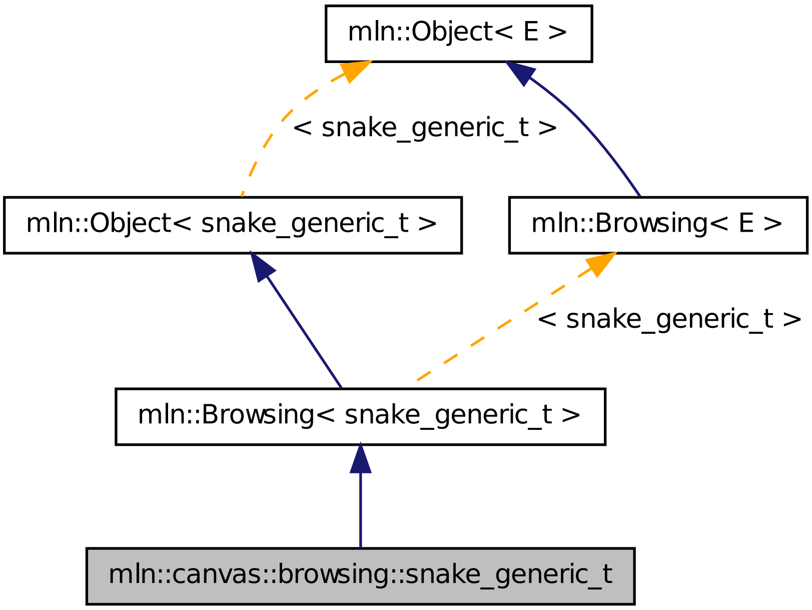
Definition at line 84 of file snake_fwd.hh.

10.98 mln::canvas::browsing::snake_generic_t Struct Reference

Multidimentional Browsing in a given-way.

`#include <snake_generic.hh>`

Inheritance diagram for mln::canvas::browsing::snake_generic_t:



10.98.1 Detailed Description

Multidimentional Browsing in a given-way. F shall feature:

{

--- as attributes:

input;

p;

--- as methods:

void init();

void ∗() moves[];

dpsite dps[];

}

init is called before browsing

The snake follow dimension using the delta point site of dps. dps[0] = delta psite following the global dimension (forward) dps[1] = delta psite following the 2nd dimension to follow (forward). dps[2] = delta psite following the 2nd dimension to follow (backward). dps[3] = delta psite following the 3nd dimension to follow (forward). dps[3] = delta psite following the 3nd dimension to follow (backward).

moves contains pointer to f's members. These merbers will be call in each time the snake progress in the correct dimension :

moves[i] is called at each move following the delta psite dps[i]

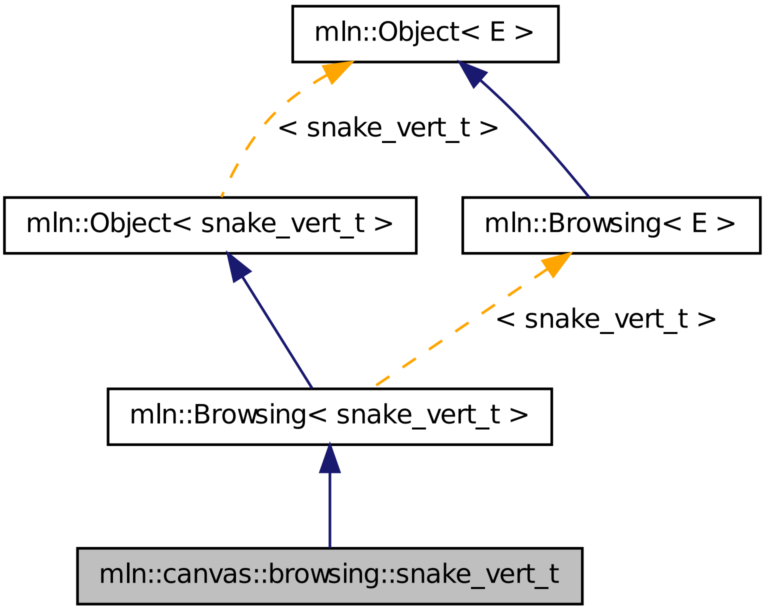
Definition at line 76 of file snake_generic.hh.

10.99 mln::canvas::browsing::snake_vert_t Struct Reference

Browsing in a snake-way, forward.

`#include <snake_vert.hh>`

Inheritance diagram for mln::canvas::browsing::snake_vert_t:



10.99.1 Detailed Description

Browsing in a snake-way, forward. This canvas browse all the point of an image 'input' like this :

| /\ | | | | \/ | \/

The fonctor should provide (In addition to 'input') four methods :

- init() : Will be called at the beginning.
- down() : Will be called after each moving down.
- up() : Will ba called after each moving up.

- fwd() : Will be called after each moving right. (will also be called once at the first point).

This methods should acces to the current working point 'p' also provided by the functor.

Warning: This canvas works only on 2D.

F shall feature:

{

--- as attributes:

input;

p;

--- as methods:

void init();

void down();

void up();

void fwd();

}

Definition at line 83 of file snake_vert.hh.

10.100 mln::canvas::chamfer< F > Struct Template Reference

Compute chamfer distance.

`#include <chamfer.hh>`

10.100.1 Detailed Description

template<typename F> struct mln::canvas::chamfer< F >

Compute chamfer distance.

Definition at line 47 of file canvas/chamfer.hh.

10.101 mln::category< R(*)(A) > Struct Template Reference

Category declaration for a unary C function.

`#include <c.hh>`

10.101.1 Detailed Description

template<typename R, typename A> struct mln::category< R(*)(A) >

Category declaration for a unary C function.

Definition at line 51 of file c.hh.

10.102 mln::complex_image< D, G, V > Class Template Reference

Image based on a complex.

`#include <complex_image.hh>`

Inherits image_primary< V, p_complex< D, G >, complex_image< D, G, V > >.

Public Types

- typedef G geom
  The geometry type of the complex.
- typedef V & lvalue
  Return type of read-write access.
- typedef const V & rvalue
  Return type of read-only access.
- typedef complex_image< D, tag::psite_< G >, tag::value_< V > > skeleton
  Skeleton.
- typedef V value
  Value associated type.

Public Member Functions

- rvalue operator() (const complex_psite< D, G > &p) const
  Read-only access of face value at point site p*.*
- lvalue operator() (const complex_psite< D, G > &p)
  Read-write access of face value at point site p*.*

  - complex_image ()
    Constructors.

  - const p_complex< D, G > & domain () const
    Accessors.
  - const metal::vec< D+1, std::vector< mlc_unbool(V) > > & values () const
    Return the array of values associated to the faces.

Static Public Attributes

- static const unsigned dim = D
  The dimension of the complex.

10.102.1 Detailed Description

template<unsigned D, typename G, typename V> class mln::complex_image< D, G, V >

Image based on a complex. Values attached to each face of the complex.

Template Parameters

- ***D*** The dimension of the complex.
- ***G*** The geometry type of the complex.
- ***V*** The value type of the image.

Definition at line 164 of file mln/core/image/complex_image.hh.

10.102.2 Member Typedef Documentation

10.102.2.1 template<unsigned D, typename G, typename V> typedef G mln::complex_image< D, G, V >::geom

The geometry type of the complex.

Definition at line 172 of file mln/core/image/complex_image.hh.

10.102.2.2 template<unsigned D, typename G, typename V> typedef V& mln::complex_image< D, G, V >::lvalue

Return type of read-write access.

Definition at line 177 of file mln/core/image/complex_image.hh.

10.102.2.3 template<unsigned D, typename G, typename V> typedef const V& mln::complex_image< D, G, V >::rvalue

Return type of read-only access.

Definition at line 180 of file mln/core/image/complex_image.hh.

10.102.2.4 template<unsigned D, typename G, typename V> typedef complex_image< D, tag::psite_<G>, tag::value_<V> > mln::complex_image< D, G, V >::skeleton

Skeleton.

Definition at line 183 of file mln/core/image/complex_image.hh.

10.102.2.5 template<unsigned D, typename G, typename V> typedef V mln::complex_image< D, G, V >::value

Value associated type.

Definition at line 174 of file mln/core/image/complex_image.hh.

10.102.3 Constructor & Destructor Documentation

10.102.3.1 template< unsigned D, typename G , typename V > mln::complex_image< D, G, V >::complex_image ( ) [inline]

Constructors.

Definition at line 276 of file mln/core/image/complex_image.hh.

10.102.4 Member Function Documentation

10.102.4.1 template< unsigned D, typename G , typename V > const p_complex< D, G > & mln::complex_image< D, G, V >::domain ( ) const [inline]

Accessors.

Return the domain of psites od the image.

Definition at line 343 of file mln/core/image/complex_image.hh.

10.102.4.2 template< unsigned D, typename G, typename V > complex_image< D, G, V >::lvalue mln::complex_image< D, G, V >::operator() (const complex_psite< D, G > & *p*) [inline]

Read-write access of face value at point site p.

Definition at line 326 of file mln/core/image/complex_image.hh.

References mln::complex_psite< D, G >::face_id(), and mln::complex_psite< D, G >::n().

10.102.4.3 template< unsigned D, typename G, typename V > complex_image< D, G, V >::rvalue mln::complex_image< D, G, V >::operator() (const complex_psite< D, G > & *p*) const [inline]

Read-only access of face value at point site p.

Definition at line 317 of file mln/core/image/complex_image.hh.

References mln::complex_psite< D, G >::face_id(), and mln::complex_psite< D, G >::n().

10.102.4.4 template< unsigned D, typename G , typename V > const metal::vec< D+1, std::vector< mlc_unbool(V) > > & mln::complex_image< D, G, V >::values ( ) const [inline]

Return the array of values associated to the faces.

Definition at line 335 of file mln/core/image/complex_image.hh.

10.102.5 Member Data Documentation

10.102.5.1 template< unsigned D, typename G, typename V> const unsigned mln::complex_image< D, G, V >::dim = D [static]

The dimension of the complex.

Definition at line 170 of file mln/core/image/complex_image.hh.

10.103 mln::complex_neighborhood_bkd_piter< I, G, N > Class Template Reference

Backward iterator on complex neighborhood.

`#include <complex_neighborhood_piter.hh>`

Inherits site_relative_iterator_base< N, complex_neighborhood_bkd_piter< I, G, N > >.

Public Types

- typedef N::complex_bkd_iter iter_type

  The type of the underlying complex iterator.

- typedef N::psite psite

  The Pseudo_Site type.

Public Member Functions

- void next ()

  Go to the next element.

  - complex_neighborhood_bkd_piter ()

    Construction.

  - const iter_type & iter () const

    Accessors.

10.103.1 Detailed Description

template<typename I, typename G, typename N> class mln::complex_neighborhood_bkd_piter< I, G, N >

Backward iterator on complex neighborhood.

Definition at line 124 of file complex_neighborhood_piter.hh.

10.103.2 Member Typedef Documentation

10.103.2.1 template<typename I, typename G, typename N> typedef N::complex_bkd_iter mln::complex_neighborhood_bkd_piter< I, G, N >::iter_type

The type of the underlying complex iterator.

Definition at line 135 of file complex_neighborhood_piter.hh.

10.103.2.2 template<typename I, typename G, typename N> typedef N ::psite mln::complex_neighborhood_bkd_piter< I, G, N >::psite

The Pseudo_Site type.

Definition at line 133 of file complex_neighborhood_piter.hh.

10.103.3 Constructor & Destructor Documentation

10.103.3.1 template<typename I , typename G , typename N > mln::complex_neighborhood_bkd_piter< I, G, N >::complex_neighborhood_bkd_piter ( ) [inline]

Construction.

Definition at line 305 of file complex_neighborhood_piter.hh.

10.103.4 Member Function Documentation

10.103.4.1 template<typename I , typename G , typename N > const N::complex_bkd_iter & mln::complex_neighborhood_bkd_piter< I, G, N >::iter ( ) const [inline]

Accessors.

Definition at line 382 of file complex_neighborhood_piter.hh.

10.103.4.2 void mln::Site_Iterator< complex_neighborhood_bkd_piter< I, G, N > >::next ( ) [inherited]

Go to the next element.

Warning

This is a final method; iterator classes should not re-defined this method. The actual "next" operation has to be defined through the *next_* method.

Precondition

The iterator is valid.

10.104 mln::complex_neighborhood_fwd_piter< I, G, N > Class Template Reference

Forward iterator on complex neighborhood.

`#include <complex_neighborhood_piter.hh>`

Inherits site_relative_iterator_base< N, complex_neighborhood_fwd_piter< I, G, N > >.

Public Types

- typedef N::complex_fwd_iter iter_type

The type of the underlying complex iterator.

- typedef N::psite psite

  The Pseudo_Site type.

Public Member Functions

- void next ()

  Go to the next element.

  - complex_neighborhood_fwd_piter ()

    Construction.

  - const iter_type & iter () const

    Accessors.

10.104.1 Detailed Description

template<typename I, typename G, typename N> class mln::complex_neighborhood_fwd_piter< I, G, N >

Forward iterator on complex neighborhood.

Definition at line 53 of file complex_neighborhood_piter.hh.

10.104.2 Member Typedef Documentation

10.104.2.1 template<typename I, typename G, typename N> typedef N::complex_fwd_iter mln::complex_neighborhood_fwd_piter< I, G, N >::iter_type

The type of the underlying complex iterator.

Definition at line 64 of file complex_neighborhood_piter.hh.

10.104.2.2 template<typename I, typename G, typename N> typedef N ::psite mln::complex_neighborhood_fwd_piter< I, G, N >::psite

The Pseudo_Site type.

Definition at line 62 of file complex_neighborhood_piter.hh.

10.104.3 Constructor & Destructor Documentation

10.104.3.1 template<typename I , typename G , typename N > mln::complex_neighborhood_fwd_piter< I, G, N >::complex_neighborhood_fwd_piter ( ) [inline]

Construction.

Definition at line 198 of file complex_neighborhood_piter.hh.

10.104.4 Member Function Documentation

10.104.4.1 template<typename I , typename G , typename N > const N::complex_fwd_iter & mln::complex_neighborhood_fwd_piter< I, G, N >::iter ( ) const [inline]

Accessors.

Definition at line 275 of file complex_neighborhood_piter.hh.

10.104.4.2 void mln::Site_Iterator< complex_neighborhood_fwd_piter< I, G, N > >::next ( ) [inherited]

Go to the next element.

Warning

This is a final method; iterator classes should not re-defined this method. The actual "next" operation has to be defined through the *next_* method.

Precondition

The iterator is valid.

10.105 mln::complex_psite< D, G > Class Template Reference

Point site associated to a mln::p_complex.

`#include <complex_psite.hh>`

Inherits pseudo_site_base_< const G::site &, complex_psite< D, G > >.

Public Member Functions

- complex_psite ()
  Construction and assignment.
- complex_psite (const p_complex< D, G > &pc, const topo::face< D > &face)
- bool is_valid () const
  Psite manipulators.
- void invalidate ()
  Invalidate this psite.

- const target & site_set () const
  Site set manipulators.
- void change_target (const target &new_target)
  Set the target site_set.

- const topo::face< D > & face () const
  Face handle manipulators.
- unsigned n () const
  Return the dimension of the face of this psite.
- unsigned face_id () const
  Return the id of the face of this psite.

10.105.1 Detailed Description

template<unsigned D, typename G> class mln::complex_psite< D, G >

Point site associated to a mln::p_complex.

Template Parameters

D The dimension of the complex this psite belongs to.

G The geometry of the complex.

Definition at line 60 of file complex_psite.hh.

10.105.2 Constructor & Destructor Documentation

10.105.2.1 template<unsigned D, typename G > mln::complex_psite< D, G >::complex_psite ( ) [inline]

Construction and assignment.

Definition at line 203 of file complex_psite.hh.

References mln::complex_psite< D, G >::invalidate().

10.105.2.2 template<unsigned D, typename G > mln::complex_psite< D, G >::complex_psite (const p_complex< D, G > & *pc*, const topo::face< D > & *face*) [inline]

Precondition

pc.cplx() == face.cplx().

Definition at line 211 of file complex_psite.hh.

References mln::topo::face< D >::cplx(), mln::p_complex< D, G >::cplx(), and mln::complex_psite< D, G >::is_valid().

10.105.3 Member Function Documentation

10.105.3.1 template<unsigned D, typename G > void mln::complex_psite< D, G >::change_target (const target & *new_target*) [inline]

Set the target site_set.

Definition at line 280 of file complex_psite.hh.

References mln::p_complex< D, G >::cplx(), and mln::complex_psite< D, G >::invalidate().

10.105.3.2 template<unsigned D, typename G > const topo::face< D > & mln::complex_psite< D, G >::face ( ) const [inline]

Face handle manipulators.

Return the face handle of this point site.

Definition at line 301 of file complex_psite.hh.

Referenced by mln::operator!=(), and mln::operator==().

10.105.3.3 template<unsigned D, typename G > unsigned mln::complex_psite< D, G >::face_id ( ) const [inline]

Return the id of the face of this psite.

Definition at line 317 of file complex_psite.hh.

Referenced by mln::complex_image< D, G, V >::operator()().

10.105.3.4 template<unsigned D, typename G > void mln::complex_psite< D, G >::invalidate ( ) [inline]

Invalidate this psite.

Definition at line 251 of file complex_psite.hh.

Referenced by mln::complex_psite< D, G >::change_target(), and mln::complex_psite< D, G >::complex_psite().

10.105.3.5 template<unsigned D, typename G > bool mln::complex_psite< D, G >::is_valid ( ) const [inline]

Psite manipulators.

Is this psite valid?

Definition at line 239 of file complex_psite.hh.

Referenced by mln::complex_psite< D, G >::complex_psite(), and mln::p_complex< D, G >::has().

10.105.3.6 template<unsigned D, typename G > unsigned mln::complex_psite< D, G >::n ( ) const [inline]

Return the dimension of the face of this psite.

Definition at line 309 of file complex_psite.hh.

Referenced by mln::make::cell(), and mln::complex_image< D, G, V >::operator()().

10.105.3.7 template<unsigned D, typename G > const p_complex< D, G > & mln::complex_psite< D, G >::site_set ( ) const [inline]

Site set manipulators.

Return the mln::p_complex this site is built on. (shortcut for *target()).

Precondition

Member face_ is valid.

Definition at line 259 of file complex_psite.hh.

Referenced by mln::p_complex< D, G >::has(), mln::operator!=(), and mln::operator==().

10.106 mln::complex_window_bkd_piter< I, G, W > Class Template Reference

Backward iterator on complex window.

`#include <complex_window_piter.hh>`

Inherits site_relative_iterator_base< W, complex_window_bkd_piter< I, G, W > >.

Public Types

- typedef W::complex_bkd_iter iter_type

  The type of the underlying complex iterator.

- typedef W::psite psite

  The Pseudo_Site type.

Public Member Functions

- void next ()

  Go to the next element.

  - complex_window_bkd_piter ()

    Construction.

  - const iter_type & iter () const

    Accessors.

10.106.1 Detailed Description

template<typename I, typename G, typename W> class mln::complex_window_bkd_piter< I, G, W >

Backward iterator on complex window.

Definition at line 124 of file complex_window_piter.hh.

10.106.2 Member Typedef Documentation

10.106.2.1 template<typename I, typename G, typename W> typedef W::complex_bkd_iter mln::complex_window_bkd_piter< I, G, W >::iter_type

The type of the underlying complex iterator.

Definition at line 135 of file complex_window_piter.hh.

10.106.2.2 template<typename I, typename G, typename W> typedef W ::psite mln::complex_window_bkd_piter< I, G, W >::psite

The Pseudo_Site type.

Definition at line 133 of file complex_window_piter.hh.

10.106.3 Constructor & Destructor Documentation

10.106.3.1 template<typename I , typename G , typename W > mln::complex_window_bkd_piter< I, G, W >::complex_window_bkd_piter ( ) [inline]

Construction.

Definition at line 305 of file complex_window_piter.hh.

10.106.4 Member Function Documentation

10.106.4.1 template<typename I , typename G , typename W > const W::complex_bkd_iter & mln::complex_window_bkd_piter< I, G, W >::iter ( ) const [inline]

Accessors.

Definition at line 384 of file complex_window_piter.hh.

10.106.4.2 void mln::Site_Iterator< complex_window_bkd_piter< I, G, W > >::next ( ) [inherited]

Go to the next element.

Warning

This is a final method; iterator classes should not re-defined this method. The actual "next" operation has to be defined through the *next_* method.

Precondition

The iterator is valid.

10.107 mln::complex_window_fwd_piter< I, G, W > Class Template Reference

Forward iterator on complex window.

`#include <complex_window_piter.hh>`

Inherits site_relative_iterator_base< W, complex_window_fwd_piter< I, G, W > >.

Public Types

- typedef W::complex_fwd_iter iter_type

  The type of the underlying complex iterator.

- typedef W::psite psite

  The Pseudo_Site type.

Public Member Functions

- void next ()

  Go to the next element.

- complex_window_fwd_piter ()

  Construction.

- const iter_type & iter () const

  Accessors.

10.107.1 Detailed Description

template<typename I, typename G, typename W> class mln::complex_window_fwd_piter< I, G, W >

Forward iterator on complex window.

Definition at line 54 of file complex_window_piter.hh.

10.107.2 Member Typedef Documentation

10.107.2.1 template<typename I, typename G, typename W> typedef W::complex_fwd_iter mln::complex_window_fwd_piter< I, G, W >::iter_type

The type of the underlying complex iterator.

Definition at line 65 of file complex_window_piter.hh.

10.107.2.2 template<typename I, typename G, typename W> typedef W ::psite mln::complex_window_fwd_piter< I, G, W >::psite

The Pseudo_Site type.

Definition at line 63 of file complex_window_piter.hh.

10.107.3 Constructor & Destructor Documentation

10.107.3.1 template<typename I , typename G , typename W > mln::complex_-window_fwd_piter< I, G, W >::complex_window_fwd_piter ( ) [inline]

Construction.

Definition at line 197 of file complex_window_piter.hh.

10.107.4 Member Function Documentation

10.107.4.1 template<typename I , typename G , typename W > const W::complex_fwd_iter & mln::complex_window_fwd_piter< I, G, W >::iter ( ) const [inline]

Accessors.

Definition at line 275 of file complex_window_piter.hh.

10.107.4.2 void mln::Site_Iterator< complex_window_fwd_piter< I, G, W > >::next ( ) [inherited]

Go to the next element.

Warning

This is a final method; iterator classes should not re-defined this method. The actual "next" operation has to be defined through the *next_* method.

Precondition

The iterator is valid.

10.108 mln::decorated_image< I, D > Struct Template Reference

Image that can have additional features.

```
#include <decorated_image.hh>
```

Inherits decorated_image_impl_< I, decorated_image< I, D > >, and image_identity< I, I::domain_t, decorated_image< I, D > >.

Public Types

- typedef impl_::lvalue lvalue

Return type of read-write access.

- typedef I::psite psite

  Type of the psite.

- typedef I::rvalue rvalue

  Return type of read-only access.

- typedef decorated_image< tag::image_< I >, tag::data_< D > > skeleton

  Skeleton.

Public Member Functions

- decorated_image ()

  Ctors.

- D & decoration ()

  Give the decoration.

- const D & decoration () const

  Give the decoration.

- operator decorated_image< const I, D > () const

  Const promotion via conversion.

- rvalue operator() (const psite &p) const

  Read-only access of pixel value at point site p.

- lvalue operator() (const psite &p)

  Read-write access of pixel value at point site p.

- ~decorated_image ()

  Dtor.

10.108.1 Detailed Description

template<typename I, typename D> struct mln::decorated_image< I, D >

Image that can have additional features.

Definition at line 81 of file decorated_image.hh.

10.108.2 Member Typedef Documentation

10.108.2.1 template<typename I, typename D> typedef impl_::lvalue mln::decorated_image< I, D >::lvalue

Return type of read-write access.

Definition at line 95 of file decorated_image.hh.

10.108.2.2 template<typename I, typename D> typedef I ::psite mln::decorated_image< I, D >::psite

Type of the psite.

Definition at line 90 of file decorated_image.hh.

10.108.2.3 template<typename I, typename D> typedef I ::rvalue mln::decorated_image< I, D >::rvalue

Return type of read-only access.

Definition at line 93 of file decorated_image.hh.

10.108.2.4 template<typename I, typename D> typedef decorated_image< tag::image_<I>, tag::data_<D> > mln::decorated_image< I, D >::skeleton

Skeleton.

Definition at line 108 of file decorated_image.hh.

10.108.3 Constructor & Destructor Documentation

10.108.3.1 template<typename I , typename D > mln::decorated_image< I, D >::decorated_image ( ) [inline]

Ctors.

Definition at line 161 of file decorated_image.hh.

10.108.3.2 template<typename I , typename D > mln::decorated_image< I, D >::~decorated_image ( ) [inline]

Dtor.

Definition at line 184 of file decorated_image.hh.

10.108.4 Member Function Documentation

10.108.4.1 template<typename I , typename D > const D & mln::decorated_image< I, D >::decoration ( ) const [inline]

Give the decoration.

Definition at line 249 of file decorated_image.hh.

10.108.4.2 template<typename I , typename D > D & mln::decorated_image< I, D >::decoration ( ) [inline]

Give the decoration.

Definition at line 257 of file decorated_image.hh.

10.108.4.3 template<typename I , typename D > mln::decorated_image< I, D >::operator decorated_image< const I, D > ( ) const [inline]

Const promotion via conversion.

Definition at line 239 of file decorated_image.hh.

10.108.4.4 template<typename I , typename D > decorated_image< I, D >::rvalue mln::decorated_image< I, D >::operator() (const psite & *p*) const [inline]

Read-only access of pixel value at point site `p`.

Definition at line 197 of file decorated_image.hh.

10.108.4.5 template<typename I , typename D > decorated_image< I, D >::lvalue mln::decorated_image< I, D >::operator() (const psite & *p*) [inline]

Read-write access of pixel value at point site `p`.

Definition at line 206 of file decorated_image.hh.

10.109 mln::Delta_Point_Site< void > Struct Template Reference

Delta point site category flag type.

`#include <delta_point_site.hh>`

10.109.1 Detailed Description

template<> struct mln::Delta_Point_Site< void >

Delta point site category flag type.

Definition at line 70 of file delta_point_site.hh.

10.110 mln::doc::Accumulator< E > Struct Template Reference

Documentation class for mln::Accumulator.

`#include <accumulator.hh>`

Public Types

- typedef void argument

  The argument type of elements to accumulate.

Public Member Functions

- void init ()

  Initialize the accumulator.

- void take (const E &other)

  Take into account another accumulator `other`.

- void take (const argument &t)

  Take into account a argument `t` *(an element).*

10.110.1 Detailed Description

template<typename E> struct mln::doc::Accumulator< E >

Documentation class for mln::Accumulator.

See also

mln::Accumulator

Definition at line 36 of file doc/accumulator.hh.

10.110.2 Member Typedef Documentation

10.110.2.1 template<typename E > typedef void mln::doc::Accumulator< E >::argument

The argument type of elements to accumulate.

Definition at line 39 of file doc/accumulator.hh.

10.110.3 Member Function Documentation

10.110.3.1 template<typename E > void mln::doc::Accumulator< E >::init ( )

Initialize the accumulator.

10.110.3.2 template<typename E > void mln::doc::Accumulator< E >::take (const E & *other*)

Take into account another accumulator `other`.

10.110.3.3 template<typename E > void mln::doc::Accumulator< E >::take (const argument & *t*)

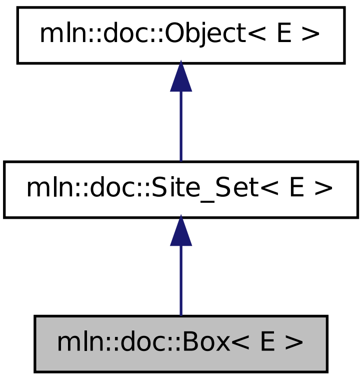
Take into account a argument `t` (an element).

10.111 mln::doc::Box< E > Struct Template Reference

Documentation class for mln::Box.

`#include <box.hh>`

Inheritance diagram for mln::doc::Box< E >:



Public Types

- typedef void bkd_piter

  Backward Site_Iterator associated type.

- typedef void fwd_piter

  Forward Site_Iterator associated type.

- typedef void psite

  PSite associated type.

- typedef void site

  Site associated type.

Public Member Functions

- const E & bbox () const

  Return the bounding box of this point set.

- bool has (const psite &p) const

  Test if p *belongs to this site set.*

10.111.3 Member Function Documentation

10.111.3.1 template<typename E > const E& mln::doc::Box< E >::bbox ( ) const

Return the bounding box of this point set.

Return the bounding box of this point set, so that is itself. This method is declared by the mln::Site_Set concept.

Warning

This method is final for all box classes.

10.111.3.2 template<typename E > bool mln::doc::Site_Set< E >::has (const psite & *p*) const `[inherited]`

Test if `p` belongs to this site set.

Parameters

`[in]` ***p*** A psite.

Returns

True if `p` is an element of the site set.

10.111.3.3 template<typename E > unsigned mln::doc::Box< E >::nsites ( ) const

Return the number of points of this box.

Return the number of points of this box. This method is declared by the mln::Site_Set concept.

Warning

This method is final for all box classes.

10.111.3.4 template<typename E > const site& mln::doc::Box< E >::pmax ( ) const

Give the box "maximum" point.

Return the "maximum" point w.r.t. the ordering between points. For instance, with mln::box2d, this maximum is the bottom right point of the box.

10.111.3.5 template<typename E > const site& mln::doc::Box< E >::pmin ( ) const

Give the box "minimum" point.

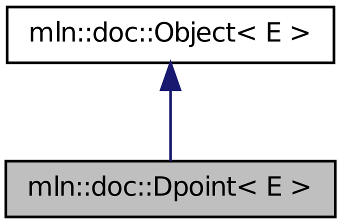
Return the "minimum" point w.r.t. the ordering between points. For instance, with mln::box2d, this minimum is the top left point of the box.

10.112 mln::doc::Dpoint< E > Struct Template Reference

Documentation class for mln::Dpoint.

`#include <dpoint.hh>`

Inheritance diagram for mln::doc::Dpoint< E >:



Public Types

- enum { dim }
- typedef void coord
- typedef void dpoint

  Dpsite associated type.

- typedef void point

  Site associated type.

Public Member Functions

- coord operator[ ] (unsigned i) const

  Read-only access to the `i-th` coordinate value.

10.112.1 Detailed Description

template<typename E> struct mln::doc::Dpoint< E >

Documentation class for mln::Dpoint.

See also

mln::Dpoint

Definition at line 36 of file concept/doc/dpoint.hh.

10.112.2 Member Typedef Documentation

10.112.2.1 template<typename E > typedef void mln::doc::Dpoint< E >::coord

Coordinate associated type.

Definition at line 56 of file concept/doc/dpoint.hh.

10.112.2.2 template<typename E > typedef void mln::doc::Dpoint< E >::dpoint

Dpsite associated type.

Invariant

This type has to derive from mln::Dpoint.

Definition at line 52 of file concept/doc/dpoint.hh.

10.112.2.3 template<typename E > typedef void mln::doc::Dpoint< E >::point

Site associated type.

Invariant

This type has to derive from mln::Point.

Definition at line 47 of file concept/doc/dpoint.hh.

10.112.3 Member Enumeration Documentation

10.112.3.1 template<typename E > anonymous enum

Enumerator:

dim Dimension of the space.

Invariant

dim > 0

Definition at line 42 of file concept/doc/dpoint.hh.

10.112.4 Member Function Documentation

10.112.4.1 template<typename E > coord mln::doc::Dpoint< E >::operator[] (unsigned *i*) const

Read-only access to the `i-th` coordinate value.

Parameters

`[in]` ***i*** The coordinate index.

Precondition

i < dim

Returns

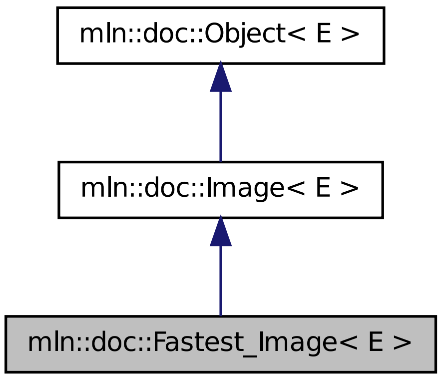
The value of the i-th coordinate.

10.113 mln::doc::Fastest_Image< E > Struct Template Reference

Documentation class for the concept of images that have the speed property set to "fastest".

`#include <image_fastest.hh>`

Inheritance diagram for mln::doc::Fastest_Image< E >:



Public Types

- typedef void bkd_piter

  Backward point iterator associated type.

- typedef void coord

  Coordinate associated type.

- typedef void dpoint

  Dpsite associated type.

- typedef void fwd_piter

  Forward point iterator associated type.

- typedef void lvalue

  Type returned by the read-write pixel value operator.

- typedef void point

  Site associated type.

- typedef void pset

  Point set associated type.

- typedef void psite

  Point_Site associated type.

- typedef void rvalue

  Type returned by the read pixel value operator.

- typedef void skeleton

  Associate type that describes how this type of image is constructed.

- typedef void value

  Value associated type.

- typedef void vset

  Value set associated type.

Public Member Functions

- const box< point > & bbox () const

  Give a bounding box of the image domain.

- unsigned border ()

  Give the border thickness.

- const value ∗ buffer () const

  Give a hook to the value buffer.

- int delta_index (const dpoint &dp)

  Give the offset corresponding to the delta-point `dp`*.*

- const pset & domain () const

  Give the definition domain of the image.

- bool has (const psite &p) const

  Test if the image owns the point site `p`*.*

- bool has (const psite &p) const

  Test if `p` *belongs to the image domain.*

- bool is_valid () const

  Test if the image have been initialized.

- unsigned nelements () const

  Give the number of pixels of the image including those of the virtual border.

- unsigned nsites () const

  Give the number of points of the image domain.

- lvalue operator() (const psite &p)

  Read-write access to the image value located at p.

- rvalue operator() (const psite &p) const

  Read-only access to the image value located at p.

- rvalue operator[ ] (unsigned o) const

  Read-only access to the image value at offset o.

- lvalue operator[ ] (unsigned o)

  Read-write access to the image value at offset o.

- point point_at_index (unsigned o) const

  Give the point at offset o.

- const vset & values () const

  Give the set of values of the image.

10.113.1 Detailed Description

template<typename E> struct mln::doc::Fastest_Image< E >

Documentation class for the concept of images that have the speed property set to "fastest".

Definition at line 36 of file concept/doc/image_fastest.hh.

10.113.2 Member Typedef Documentation

10.113.2.1 template<typename E > typedef void mln::doc::Image< E >::bkd_piter [inherited]

Backward point iterator associated type.

Invariant

This type has to derive from mln::Site_Iterator.

Definition at line 147 of file core/concept/doc/image.hh.

10.113.2.2 template<typename E > typedef void mln::doc::Image< E >::coord [inherited]

Coordinate associated type.

Definition at line 131 of file core/concept/doc/image.hh.

10.113.2.3 template<typename E > typedef void mln::doc::Image< E >::dpoint [inherited]

Dpsite associated type.

Invariant

This type has to derive from mln::Dpoint.

Definition at line 136 of file core/concept/doc/image.hh.

10.113.2.4 template<typename E > typedef void mln::doc::Image< E >::fwd_piter [inherited]

Forward point iterator associated type.

Invariant

This type has to derive from mln::Site_Iterator.

Definition at line 142 of file core/concept/doc/image.hh.

10.113.2.5 template<typename E > typedef void mln::doc::Image< E >::lvalue [inherited]

Type returned by the read-write pixel value operator.

Definition at line 52 of file core/concept/doc/image.hh.

10.113.2.6 template<typename E > typedef void mln::doc::Image< E >::point [inherited]

Site associated type.

Invariant

This type has to derive from mln::Point.

Definition at line 121 of file core/concept/doc/image.hh.

10.113.2.7 template<typename E > typedef void mln::doc::Image< E >::pset [inherited]

Point set associated type.

Invariant

This type has to derive from mln::Site_Set.

Definition at line 116 of file core/concept/doc/image.hh.

10.113.2.8 template<typename E > typedef void mln::doc::Image< E >::psite [inherited]

Point_Site associated type.

Invariant

This type has to derive from mln::Point_Site.

Definition at line 126 of file core/concept/doc/image.hh.

10.113.2.9 template<typename E > typedef void mln::doc::Image< E >::rvalue [inherited]

Type returned by the read pixel value operator.

Definition at line 48 of file core/concept/doc/image.hh.

10.113.2.10 template<typename E > typedef void mln::doc::Image< E >::skeleton [inherited]

Associate type that describes how this type of image is constructed.

Definition at line 64 of file core/concept/doc/image.hh.

10.113.2.11 template<typename E > typedef void mln::doc::Image< E >::value [inherited]

Value associated type.

Invariant

This type is neither qualified by const, nor by reference.

Definition at line 44 of file core/concept/doc/image.hh.

10.113.2.12 template<typename E > typedef void mln::doc::Image< E >::vset [inherited]

Value set associated type.

Invariant

This type has to derive from mln::Value_Set.

Definition at line 57 of file core/concept/doc/image.hh.

10.113.3 Member Function Documentation

10.113.3.1 template<typename E > const box<point>& mln::doc::Image< E >::bbox ( ) const [inherited]

Give a bounding box of the image domain.

This bounding box may be larger than the smallest bounding box (the optimal one). Practically an image type is not obliged to update its bounding box so that it is always optimal.

Returns

A bounding box of the image domain.

10.113.3.2 template<typename E > unsigned mln::doc::Fastest_Image< E >::border ( )

Give the border thickness.

Precondition

The image has to be initialized.

10.113.3.3 template<typename E > const value∗ mln::doc::Fastest_Image< E >::buffer ( ) const

Give a hook to the value buffer.

Precondition

The image has to be initialized.

10.113.3.4 template<typename E > int mln::doc::Fastest_Image< E >::delta_index (const dpoint & *dp*)

Give the offset corresponding to the delta-point `dp`.

Parameters

`[in]` ***dp*** A delta-point.

Precondition

The image has to be initialized.

10.113.3.5 template<typename E > const pset& mln::doc::Image< E >::domain ( ) const `[inherited]`

Give the definition domain of the image.

Returns

A reference to the domain point set.

10.113.3.6 template<typename E > bool mln::doc::Image< E >::has (const psite & *p*) const `[inherited]`

Test if the image owns the point site `p`.

Returns

True if accessing the image value at `p` is possible, that is, does not abort the execution.

10.113.3.7 template< typename E > bool mln::doc::Image< E >::has (const psite & *p*) const [inherited]

Test if p belongs to the image domain.

Parameters

[in] ***p*** A point site.

Returns

True if p belongs to the image domain.

Invariant

has(p) is true => has(p) is also true.

10.113.3.8 template< typename E > bool mln::doc::Image< E >::is_valid ( ) const [inherited]

Test if the image have been initialized.

10.113.3.9 template< typename E > unsigned mln::doc::Fastest_Image< E >::nelements ( ) const

Give the number of pixels of the image including those of the virtual border.

Precondition

The image has to be initialized.

10.113.3.10 template< typename E > unsigned mln::doc::Image< E >::nsites ( ) const [inherited]

Give the number of points of the image domain.

10.113.3.11 template< typename E > lvalue mln::doc::Image< E >::operator() (const psite & *p*) [inherited]

Read-write access to the image value located at p.

Parameters

[in] ***p*** A point site.

Precondition

The image has to own the site p.

Returns

The value at p (assignable).

10.113.3.12 template<typename E > rvalue mln::doc::Image< E >::operator() (const psite & *p*) const [inherited]

Read-only access to the image value located at p.

Parameters

[in] ***p*** A point site.

Precondition

The image has to own the site p.

Returns

The value at p (not assignable).

10.113.3.13 template<typename E > rvalue mln::doc::Fastest_Image< E >::operator[ ] (unsigned *o*) const

Read-only access to the image value at offset o.

Parameters

[in] ***o*** An offset.

Precondition

o < nelements()

Returns

The value at o (not assignable).

10.113.3.14 template<typename E > lvalue mln::doc::Fastest_Image< E >::operator[ ] (unsigned *o*)

Read-write access to the image value at offset o.

Parameters

[in] ***o*** An offset.

Precondition

o < nelements()

Returns

The value at o (assignable).

10.113.3.15 template< typename E > point mln::doc::Fastest_Image< E >::point_at_index (unsigned *o*) const

Give the point at offset `o`.

Parameters

`[in]` ***o*** An offset.

Precondition

The image has to be initialized.
o < nelements()

10.113.3.16 template< typename E > const vset& mln::doc::Image< E >::values ( ) const `[inherited]`

Give the set of values of the image.

Returns

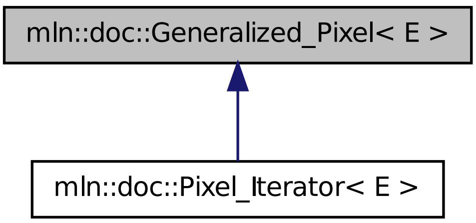
A reference to the value set.

10.114 mln::doc::Generalized_Pixel< E > Struct Template Reference

Documentation class for mln::Generalized_Pixel.

`#include <generalized_pixel.hh>`

Inheritance diagram for mln::doc::Generalized_Pixel< E >:



Public Types

- typedef void image

  Image associated type (with possible const qualification).

- typedef void rvalue

  Read-only value associated type.

- typedef void value

  Value associated type.

Public Member Functions

- image & ima () const

  Give the image of this generalized pixel.

- rvalue val () const

  Give the value of this generalized pixel.

10.114.1 Detailed Description

template<typename E> struct mln::doc::Generalized_Pixel< E >

Documentation class for mln::Generalized_Pixel.

See also

mln::Generalized_Pixel

Definition at line 45 of file doc/generalized_pixel.hh.

10.114.2 Member Typedef Documentation

10.114.2.1 template<typename E > typedef void mln::doc::Generalized_Pixel< E >::image

Image associated type (with possible const qualification).

Definition at line 49 of file doc/generalized_pixel.hh.

10.114.2.2 template<typename E > typedef void mln::doc::Generalized_Pixel< E >::rvalue

Read-only value associated type.

Definition at line 55 of file doc/generalized_pixel.hh.

10.114.2.3 template<typename E > typedef void mln::doc::Generalized_Pixel< E >::value

Value associated type.

Definition at line 52 of file doc/generalized_pixel.hh.

10.114.3 Member Function Documentation

10.114.3.1 template<typename E > image& mln::doc::Generalized_Pixel< E >::ima ( ) const

Give the image of this generalized pixel.

The constness of a pixel object is not transmitted to the underlying image.

10.114.3.2 template<typename E > rvalue mln::doc::Generalized_Pixel< E >::val ( ) const

Give the value of this generalized pixel.

Returns

A read-only value.

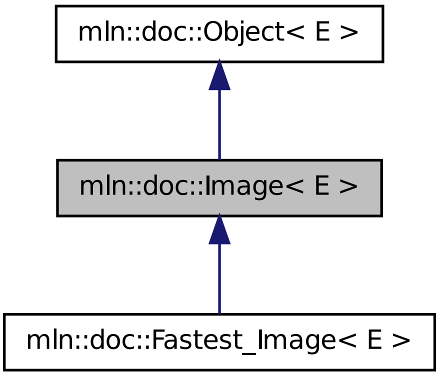
Reimplemented in mln::doc::Pixel_Iterator< E >.

10.115 mln::doc::Image< E > Struct Template Reference

Documentation class for mln::Image.

`#include <image.hh>`

Inheritance diagram for mln::doc::Image< E >:



Public Types

- typedef void bkd_piter

  Backward point iterator associated type.

- typedef void coord

Coordinate associated type.

- typedef void dpoint

  Dpsite associated type.

- typedef void fwd_piter

  Forward point iterator associated type.

- typedef void lvalue

  Type returned by the read-write pixel value operator.

- typedef void point

  Site associated type.

- typedef void pset

  Point set associated type.

- typedef void psite

  Point_Site associated type.

- typedef void rvalue

  Type returned by the read pixel value operator.

- typedef void skeleton

  Associate type that describes how this type of image is constructed.

- typedef void value

  Value associated type.

- typedef void vset

  Value set associated type.

Public Member Functions

- const box< point > & bbox () const

  Give a bounding box of the image domain.

- const pset & domain () const

  Give the definition domain of the image.

- bool has (const psite &p) const

  Test if the image owns the point site p*.*

- bool has (const psite &p) const

  Test if p *belongs to the image domain.*

- bool is_valid () const

  Test if the image have been initialized.

- unsigned nsites () const

  Give the number of points of the image domain.

- rvalue operator() (const psite &p) const

  Read-only access to the image value located at p.

- lvalue operator() (const psite &p)

  Read-write access to the image value located at p.

- const vset & values () const

  Give the set of values of the image.

10.115.1 Detailed Description

template<typename E> struct mln::doc::Image< E >

Documentation class for mln::Image.

See also

mln::Image

Definition at line 36 of file core/concept/doc/image.hh.

10.115.2 Member Typedef Documentation

10.115.2.1 template<typename E > typedef void mln::doc::Image< E >::bkd_piter

Backward point iterator associated type.

Invariant

This type has to derive from mln::Site_Iterator.

Definition at line 147 of file core/concept/doc/image.hh.

10.115.2.2 template<typename E > typedef void mln::doc::Image< E >::coord

Coordinate associated type.

Definition at line 131 of file core/concept/doc/image.hh.

10.115.2.3 template<typename E > typedef void mln::doc::Image< E >::dpoint

Dpsite associated type.

Invariant

This type has to derive from mln::Dpoint.

Definition at line 136 of file core/concept/doc/image.hh.

10.115.2.4 template<typename E > typedef void mln::doc::Image< E >::fwd_piter

Forward point iterator associated type.

Invariant

This type has to derive from mln::Site_Iterator.

Definition at line 142 of file core/concept/doc/image.hh.

10.115.2.5 template<typename E > typedef void mln::doc::Image< E >::lvalue

Type returned by the read-write pixel value operator.

Definition at line 52 of file core/concept/doc/image.hh.

10.115.2.6 template<typename E > typedef void mln::doc::Image< E >::point

Site associated type.

Invariant

This type has to derive from mln::Point.

Definition at line 121 of file core/concept/doc/image.hh.

10.115.2.7 template<typename E > typedef void mln::doc::Image< E >::pset

Point set associated type.

Invariant

This type has to derive from mln::Site_Set.

Definition at line 116 of file core/concept/doc/image.hh.

10.115.2.8 template<typename E > typedef void mln::doc::Image< E >::psite

Point_Site associated type.

Invariant

This type has to derive from mln::Point_Site.

Definition at line 126 of file core/concept/doc/image.hh.

10.115.2.9 template<typename E > typedef void mln::doc::Image< E >::rvalue

Type returned by the read pixel value operator.

Definition at line 48 of file core/concept/doc/image.hh.

10.115.2.10 template< typename E > typedef void mln::doc::Image< E >::skeleton

Associate type that describes how this type of image is constructed.

Definition at line 64 of file core/concept/doc/image.hh.

10.115.2.11 template< typename E > typedef void mln::doc::Image< E >::value

Value associated type.

Invariant

This type is neither qualified by const, nor by reference.

Definition at line 44 of file core/concept/doc/image.hh.

10.115.2.12 template< typename E > typedef void mln::doc::Image< E >::vset

Value set associated type.

Invariant

This type has to derive from mln::Value_Set.

Definition at line 57 of file core/concept/doc/image.hh.

10.115.3 Member Function Documentation

10.115.3.1 template< typename E > const box< point >& mln::doc::Image< E >::bbox ( ) const

Give a bounding box of the image domain.

This bounding box may be larger than the smallest bounding box (the optimal one). Practically an image type is not obliged to update its bounding box so that it is always optimal.

Returns

A bounding box of the image domain.

10.115.3.2 template< typename E > const pset& mln::doc::Image< E >::domain ( ) const

Give the definition domain of the image.

Returns

A reference to the domain point set.

10.115.3.3 template< typename E > bool mln::doc::Image< E >::has (const psite & *p*) const

Test if the image owns the point site `p`.

Returns

True if accessing the image value at `p` is possible, that is, does not abort the execution.

10.115.3.4 template<typename E > bool mln::doc::Image< E >::has (const psite & *p*) const

Test if `p` belongs to the image domain.

Parameters

`[in]` ***p*** A point site.

Returns

True if `p` belongs to the image domain.

Invariant

has(p) is true => has(p) is also true.

10.115.3.5 template<typename E > bool mln::doc::Image< E >::is_valid ( ) const

Test if the image have been initialized.

10.115.3.6 template<typename E > unsigned mln::doc::Image< E >::nsites ( ) const

Give the number of points of the image domain.

10.115.3.7 template<typename E > rvalue mln::doc::Image< E >::operator() (const psite & *p*) const

Read-only access to the image value located at `p`.

Parameters

`[in]` ***p*** A point site.

Precondition

The image has to own the site `p`.

Returns

The value at `p` (not assignable).

10.115.3.8 template<typename E > lvalue mln::doc::Image< E >::operator() (const psite & *p*)

Read-write access to the image value located at `p`.

Parameters

`[in]` ***p*** A point site.

Precondition

The image has to own the site `p`.

Returns

The value at `p` (assignable).

10.115.3.9 template<typename E > const vset& mln::doc::Image< E >::values ( ) const

Give the set of values of the image.

Returns

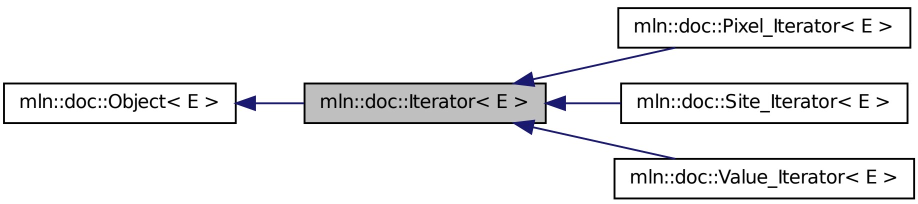
A reference to the value set.

10.116 mln::doc::Iterator< E > Struct Template Reference

Documentation class for mln::Iterator.

`#include <iterator.hh>`

Inheritance diagram for mln::doc::Iterator< E >:



Public Member Functions

- void invalidate ()

  Invalidate the iterator.

- bool is_valid () const

  Returns true if the iterator is valid, that is, designates an element.

- void start ()

  Start an iteration.

10.116.1 Detailed Description

template<typename E> struct mln::doc::Iterator< E >

Documentation class for mln::Iterator.

See also

mln::Iterator

Definition at line 36 of file doc/iterator.hh.

10.116.2 Member Function Documentation

10.116.2.1 template<typename E > void mln::doc::Iterator< E >::invalidate ( )

Invalidate the iterator.

10.116.2.2 template<typename E > bool mln::doc::Iterator< E >::is_valid ( ) const

Returns true if the iterator is valid, that is, designates an element.

10.116.2.3 template<typename E > void mln::doc::Iterator< E >::start ( )

Start an iteration.

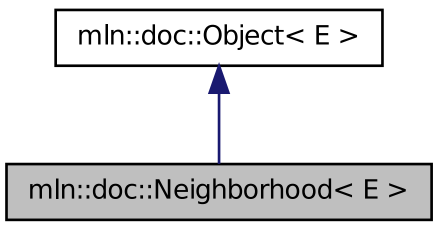
Make the iterator designate the first element if it exists. If this first element does not exist, the iterator is not valid.

10.117 mln::doc::Neighborhood< E > Struct Template Reference

Documentation class for mln::Neighborhood.

`#include <neighborhood.hh>`

Inheritance diagram for mln::doc::Neighborhood< E >:



Public Types

- typedef void bkd_niter

    Site_Iterator type associated to this neighborhood to browse neighbors in a backward way.

- typedef void dpoint

    Dpsite associated type.

- typedef void fwd_niter

    Site_Iterator type associated to this neighborhood to browse neighbors in a forward way.

- typedef void niter

  Site_Iterator type associated to this neighborhood to browse neighbors.

- typedef void point

  Site associated type.

10.117.1 Detailed Description

template<typename E> struct mln::doc::Neighborhood< E >

Documentation class for mln::Neighborhood.

See also

mln::Neighborhood

Definition at line 37 of file core/concept/doc/neighborhood.hh.

10.117.2 Member Typedef Documentation

10.117.2.1 template<typename E > typedef void mln::doc::Neighborhood< E >::bkd_niter

Site_Iterator type associated to this neighborhood to browse neighbors in a backward way.

Definition at line 52 of file core/concept/doc/neighborhood.hh.

10.117.2.2 template<typename E > typedef void mln::doc::Neighborhood< E >::dpoint

Dpsite associated type.

Definition at line 55 of file core/concept/doc/neighborhood.hh.

10.117.2.3 template<typename E > typedef void mln::doc::Neighborhood< E >::fwd_niter

Site_Iterator type associated to this neighborhood to browse neighbors in a forward way.

Definition at line 47 of file core/concept/doc/neighborhood.hh.

10.117.2.4 template<typename E > typedef void mln::doc::Neighborhood< E >::niter

Site_Iterator type associated to this neighborhood to browse neighbors.

Definition at line 42 of file core/concept/doc/neighborhood.hh.

10.117.2.5 template<typename E > typedef void mln::doc::Neighborhood< E >::point

Site associated type.

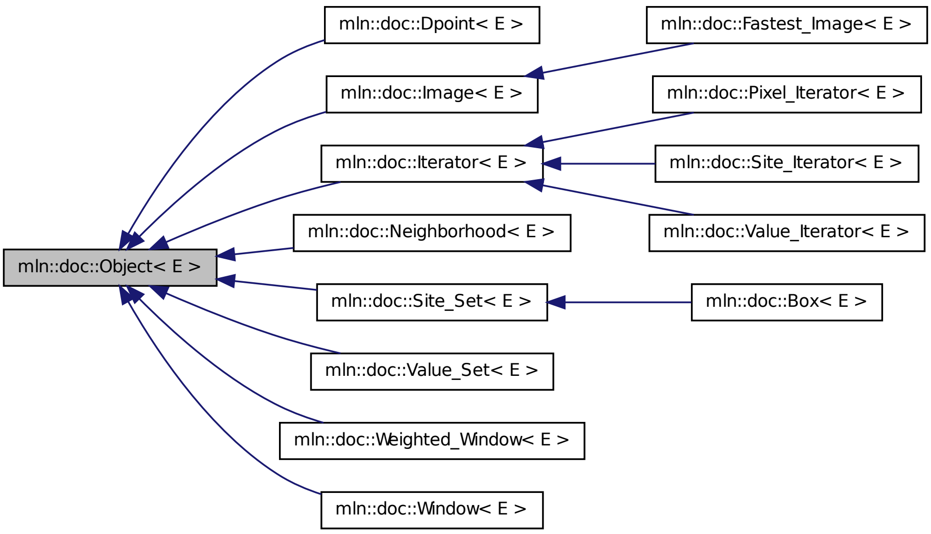
Definition at line 58 of file core/concept/doc/neighborhood.hh.

10.118 mln::doc::Object< E > Struct Template Reference

Documentation class for mln::Object.

`#include <object.hh>`

Inheritance diagram for mln::doc::Object< E >:



10.118.1 Detailed Description

template<typename E> struct mln::doc::Object< E >

Documentation class for mln::Object.

See also

mln::Object

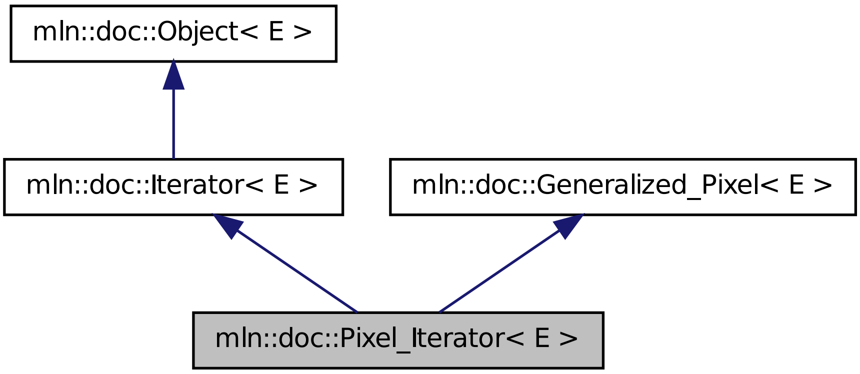
Definition at line 46 of file doc/object.hh.

10.119 mln::doc::Pixel_Iterator< E > Struct Template Reference

Documentation class for mln::Iterator.

`#include <pixel_iterator.hh>`

Inheritance diagram for mln::doc::Pixel_Iterator< E >:



Public Types

- typedef void image

  Image associated type (with possible const qualification).

- typedef void lvalue

  Type returned by the read-write dereference operator.

- typedef void rvalue

  Read-only value associated type.

- typedef void value

  Value associated type.

Public Member Functions

- image & ima () const

  Give the image of this generalized pixel.

- void invalidate ()

  Invalidate the iterator.

- bool is_valid () const

  Returns true if the iterator is valid, that is, designates an element.

- void start ()

  Start an iteration.

- lvalue val () const

  Give the pixel value.

10.119.1 Detailed Description

template<typename E> struct mln::doc::Pixel_Iterator< E >

Documentation class for mln::Iterator.

See also

mln::Pixel_Iterator

Definition at line 36 of file doc/pixel_iterator.hh.

10.119.2 Member Typedef Documentation

10.119.2.1 template<typename E > typedef void mln::doc::Generalized_Pixel< E >::image [inherited]

Image associated type (with possible const qualification).

Definition at line 49 of file doc/generalized_pixel.hh.

10.119.2.2 template<typename E > typedef void mln::doc::Pixel_Iterator< E >::lvalue

Type returned by the read-write dereference operator.

Definition at line 41 of file doc/pixel_iterator.hh.

10.119.2.3 template<typename E > typedef void mln::doc::Generalized_Pixel< E >::rvalue [inherited]

Read-only value associated type.

Definition at line 55 of file doc/generalized_pixel.hh.

10.119.2.4 template<typename E > typedef void mln::doc::Generalized_Pixel< E >::value [inherited]

Value associated type.

Definition at line 52 of file doc/generalized_pixel.hh.

10.119.3 Member Function Documentation

10.119.3.1 template<typename E > image& mln::doc::Generalized_Pixel< E >::ima ( ) const [inherited]

Give the image of this generalized pixel.

The constness of a pixel object is not transmitted to the underlying image.

10.119.3.2 template< typename E > void mln::doc::Iterator< E >::invalidate ( ) [inherited]

Invalidate the iterator.

10.119.3.3 template< typename E > bool mln::doc::Iterator< E >::is_valid ( ) const [inherited]

Returns true if the iterator is valid, that is, designates an element.

10.119.3.4 template< typename E > void mln::doc::Iterator< E >::start ( ) [inherited]

Start an iteration.

Make the iterator designate the first element if it exists. If this first element does not exist, the iterator is not valid.

10.119.3.5 template< typename E > lvalue mln::doc::Pixel_Iterator< E >::val ( ) const

Give the pixel value.

Returns

The current pixel value; this value cannot be modified.

Reimplemented from mln::doc::Generalized_Pixel< E >.

10.120 mln::doc::Point_Site< E > Struct Template Reference

Documentation class for mln::Point_Site.

`#include <point_site.hh>`

Public Types

- enum { dim }
- typedef void coord
- typedef void dpoint

  Dpsite associated type.
- typedef void mesh

  Mesh associated type.
- typedef void point

  Site associated type.

Public Member Functions

- coord operator[ ] (unsigned i) const

    Read-only access to the `i-th` coordinate value.

- const point & to_point () const

    Give a reference to the corresponding point.

10.120.1 Detailed Description

template<typename E> struct mln::doc::Point_Site< E >

Documentation class for mln::Point_Site.

See also

mln::Point_Site

Definition at line 37 of file doc/point_site.hh.

10.120.2 Member Typedef Documentation

10.120.2.1 template<typename E > typedef void mln::doc::Point_Site< E >::coord

Coordinate associated type.

Definition at line 62 of file doc/point_site.hh.

10.120.2.2 template<typename E > typedef void mln::doc::Point_Site< E >::dpoint

Dpsite associated type.

Invariant

This type has to derive from mln::Dpoint.

Definition at line 58 of file doc/point_site.hh.

10.120.2.3 template<typename E > typedef void mln::doc::Point_Site< E >::mesh

Mesh associated type.

Invariant

This type has to derive from mln::Mesh.

Definition at line 48 of file doc/point_site.hh.

10.120.2.4 template<typename E > typedef void mln::doc::Point_Site< E >::point

Site associated type.

Invariant

This type has to derive from mln::Point.

Definition at line 53 of file doc/point_site.hh.

10.120.3 Member Enumeration Documentation

10.120.3.1 template<typename E > anonymous enum

Enumerator:

dim Dimension of the space.

Invariant

dim > 0

Definition at line 43 of file doc/point_site.hh.

10.120.4 Member Function Documentation

10.120.4.1 template<typename E > coord mln::doc::Point_Site< E >::operator[ ] (unsigned *i*) const

Read-only access to the `i-th` coordinate value.

Parameters

`[in]` ***i*** The coordinate index.

Precondition

`i < dim`

Returns

The value of the `i-th` coordinate.

10.120.4.2 template<typename E > const point& mln::doc::Point_Site< E >::to_point ( ) const

Give a reference to the corresponding point.

This method allows for iterators to refer to a point.

Returns

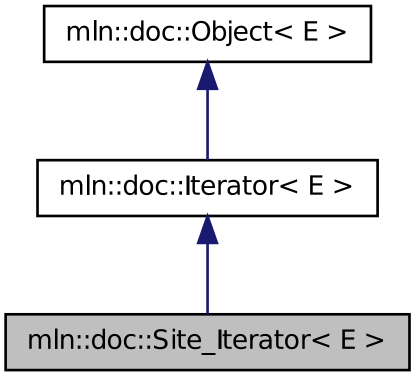
A point constant reference.

10.121 mln::doc::Site_Iterator< E > Struct Template Reference

Documentation class for mln::Site_Iterator.

`#include <point_iterator.hh>`

Inheritance diagram for mln::doc::Site_Iterator< E >:



Public Types

- typedef void psite

  Point_Site associated type.

Public Member Functions

- void invalidate ()

  Invalidate the iterator.

- bool is_valid () const

  Returns true if the iterator is valid, that is, designates an element.

- operator psite () const

  Conversion into a point-site.

- void start ()

  Start an iteration.

10.121.1 Detailed Description

template<typename E> struct mln::doc::Site_Iterator< E >

Documentation class for mln::Site_Iterator.

See also

mln::Site_Iterator

Definition at line 37 of file point_iterator.hh.

10.121.2 Member Typedef Documentation

10.121.2.1 template<typename E > typedef void mln::doc::Site_Iterator< E >::psite

Point_Site associated type.

Invariant

This type has to derive from mln::Point_Site.

Definition at line 43 of file point_iterator.hh.

10.121.3 Member Function Documentation

10.121.3.1 template<typename E > void mln::doc::Iterator< E >::invalidate ( ) [inherited]

Invalidate the iterator.

10.121.3.2 template<typename E > bool mln::doc::Iterator< E >::is_valid ( ) const [inherited]

Returns true if the iterator is valid, that is, designates an element.

10.121.3.3 template<typename E > mln::doc::Site_Iterator< E >::operator psite ( ) const

Conversion into a point-site.

Returns

A point site.

10.121.3.4 template<typename E > void mln::doc::Iterator< E >::start ( ) [inherited]

Start an iteration.

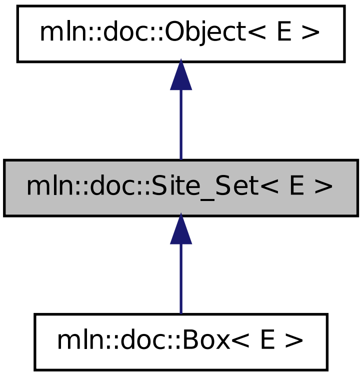
Make the iterator designate the first element if it exists. If this first element does not exist, the iterator is not valid.

10.122 mln::doc::Site_Set< E > Struct Template Reference

Documentation class for mln::Site_Set.

`#include <site_set.hh>`

Inheritance diagram for mln::doc::Site_Set< E >:



Public Types

- typedef void bkd_piter

  Backward Site_Iterator associated type.

- typedef void fwd_piter

  Forward Site_Iterator associated type.

- typedef void psite

  PSite associated type.

- typedef void site

  Site associated type.

Public Member Functions

- bool has (const psite &p) const

  Test if `p` *belongs to this site set.*

10.122.1 Detailed Description

template<typename E> struct mln::doc::Site_Set< E >

Documentation class for mln::Site_Set.

See also

mln::Site_Set

Definition at line 37 of file mln/core/concept/doc/site_set.hh.

10.122.2 Member Typedef Documentation

10.122.2.1 template<typename E > typedef void mln::doc::Site_Set< E >::bkd_piter

Backward Site_Iterator associated type.

Definition at line 53 of file mln/core/concept/doc/site_set.hh.

10.122.2.2 template<typename E > typedef void mln::doc::Site_Set< E >::fwd_piter

Forward Site_Iterator associated type.

Definition at line 49 of file mln/core/concept/doc/site_set.hh.

10.122.2.3 template<typename E > typedef void mln::doc::Site_Set< E >::psite

PSite associated type.

Definition at line 45 of file mln/core/concept/doc/site_set.hh.

10.122.2.4 template<typename E > typedef void mln::doc::Site_Set< E >::site

Site associated type.

Definition at line 41 of file mln/core/concept/doc/site_set.hh.

10.122.3 Member Function Documentation

10.122.3.1 template<typename E > bool mln::doc::Site_Set< E >::has (const psite & *p*) const

Test if `p` belongs to this site set.

Parameters

`[in]` ***p*** A psite.

Returns

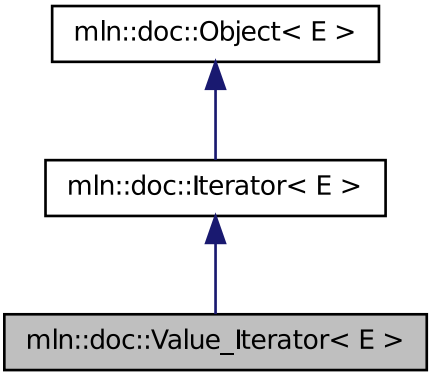
True if `p` is an element of the site set.

10.123 mln::doc::Value_Iterator< E > Struct Template Reference

Documentation class for mln::Value_Iterator.

`#include <value_iterator.hh>`

Inheritance diagram for mln::doc::Value_Iterator< E >:



Public Types

- typedef void value

  Value associated type.

Public Member Functions

- void invalidate ()

  Invalidate the iterator.

- bool is_valid () const

  Returns true if the iterator is valid, that is, designates an element.

- operator value () const

  Conversion into a value.

- void start ()

  Start an iteration.

10.123.1 Detailed Description

template<typename E> struct mln::doc::Value_Iterator< E >

Documentation class for mln::Value_Iterator.

See also

mln::Value_Iterator

Definition at line 37 of file doc/value_iterator.hh.

10.123.2 Member Typedef Documentation

10.123.2.1 template<typename E > typedef void mln::doc::Value_Iterator< E >::value

Value associated type.

Definition at line 41 of file doc/value_iterator.hh.

10.123.3 Member Function Documentation

10.123.3.1 template<typename E > void mln::doc::Iterator< E >::invalidate ( ) [inherited]

Invalidate the iterator.

10.123.3.2 template<typename E > bool mln::doc::Iterator< E >::is_valid ( ) const [inherited]

Returns true if the iterator is valid, that is, designates an element.

10.123.3.3 template<typename E > mln::doc::Value_Iterator< E >::operator value ( ) const

Conversion into a value.

Returns

A value.

10.123.3.4 template<typename E > void mln::doc::Iterator< E >::start ( ) [inherited]

Start an iteration.

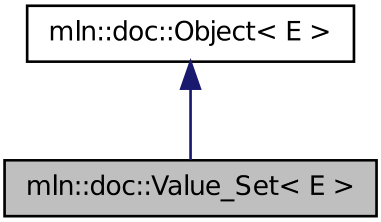
Make the iterator designate the first element if it exists. If this first element does not exist, the iterator is not valid.

10.124 mln::doc::Value_Set< E > Struct Template Reference

Documentation class for mln::Value_Set.

`#include <value_set.hh>`

Inheritance diagram for mln::doc::Value_Set< E >:



Public Types

- typedef void bkd_viter
  Backward Value_Iterator associated type.
- typedef void fwd_viter
  Forward Value_Iterator associated type.
- typedef void value
  Value associated type.

Public Member Functions

- bool has (const value &v) const
  Test if `v` belongs to this set of values.
- unsigned index_of (const value &v) const
  Give the index of value `v` in this set.
- unsigned nvalues () const
  Give the number of values in this set.
- value operator[ ] (unsigned i) const
  Give the `i-th` value of this set.

10.124.1 Detailed Description

template<typename E> struct mln::doc::Value_Set< E >

Documentation class for mln::Value_Set.

See also

mln::Value_Set

Definition at line 37 of file doc/value_set.hh.

10.124.2 Member Typedef Documentation

10.124.2.1 template<typename E > typedef void mln::doc::Value_Set< E >::bkd_viter

Backward Value_Iterator associated type.

Definition at line 49 of file doc/value_set.hh.

10.124.2.2 template<typename E > typedef void mln::doc::Value_Set< E >::fwd_viter

Forward Value_Iterator associated type.

Definition at line 45 of file doc/value_set.hh.

10.124.2.3 template<typename E > typedef void mln::doc::Value_Set< E >::value

Value associated type.

Definition at line 41 of file doc/value_set.hh.

10.124.3 Member Function Documentation

10.124.3.1 template<typename E > bool mln::doc::Value_Set< E >::has (const value & *v*) const

Test if `v` belongs to this set of values.

Parameters

`[in]` ***v*** A value.

Returns

True if `v` is an element of the set of values.

10.124.3.2 template<typename E > unsigned mln::doc::Value_Set< E >::index_of (const value & *v*) const

Give the index of value `v` in this set.

10.124.3.3 template<typename E > unsigned mln::doc::Value_Set< E >::nvalues ( ) const

Give the number of values in this set.

10.124.3.4 template<typename E > value mln::doc::Value_Set< E >::operator[ ] (unsigned *i*) const

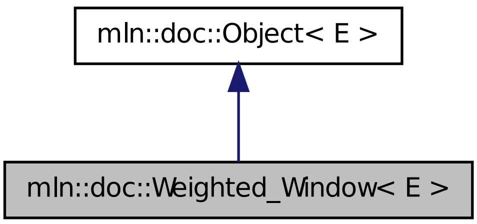
Give the `i-th` value of this set.

10.125 mln::doc::Weighted_Window< E > Struct Template Reference

Documentation class for mln::Weighted_Window.

`#include <weighted_window.hh>`

Inheritance diagram for mln::doc::Weighted_Window< E >:



Public Types

- typedef void bkd_qiter

  Site_Iterator type associated to this weighted_window to browse its points in a backward way.

- typedef void dpoint

  Dpsite associated type.

- typedef void fwd_qiter

  Site_Iterator type associated to this weighted_window to browse its points in a forward way.

- typedef void point

  Site associated type.

- typedef void weight

  Weight associated type.

- typedef void window

  Window associated type.

Public Member Functions

- unsigned delta () const
  Give the maximum coordinate gap between the window center and a window point.
- bool is_centered () const
  Test if the weighted_window is centered.
- bool is_empty () const
  Test if the weighted window is empty.
- E & sym ()
  Apply a central symmetry to the target weighted window.
- const window & win () const
  Give the corresponding window.

10.125.1 Detailed Description

template<typename E> struct mln::doc::Weighted_Window< E >

Documentation class for mln::Weighted_Window. A weighted_window is the definition of a set of points located around a central point, with a weight associated to each point.

See also

mln::Weighted_Window

Definition at line 40 of file doc/weighted_window.hh.

10.125.2 Member Typedef Documentation

10.125.2.1 template<typename E > typedef void mln::doc::Weighted_Window< E >::bkd_qiter

Site_Iterator type associated to this weighted_window to browse its points in a backward way.

Definition at line 51 of file doc/weighted_window.hh.

10.125.2.2 template<typename E > typedef void mln::doc::Weighted_Window< E >::dpoint

Dpsite associated type.

Definition at line 57 of file doc/weighted_window.hh.

10.125.2.3 template<typename E > typedef void mln::doc::Weighted_Window< E >::fwd_qiter

Site_Iterator type associated to this weighted_window to browse its points in a forward way.

Definition at line 46 of file doc/weighted_window.hh.

10.125.2.4 template<typename E > typedef void mln::doc::Weighted_Window< E >::point

Site associated type.

Definition at line 54 of file doc/weighted_window.hh.

10.125.2.5 template<typename E > typedef void mln::doc::Weighted_Window< E >::weight

Weight associated type.

Definition at line 60 of file doc/weighted_window.hh.

10.125.2.6 template<typename E > typedef void mln::doc::Weighted_Window< E >::window

Window associated type.

Definition at line 63 of file doc/weighted_window.hh.

10.125.3 Member Function Documentation

10.125.3.1 template<typename E > unsigned mln::doc::Weighted_Window< E >::delta ( ) const

Give the maximum coordinate gap between the window center and a window point.

10.125.3.2 template<typename E > bool mln::doc::Weighted_Window< E >::is_centered ( ) const

Test if the weighted_window is centered.

A weighted window is centered is the origin belongs to it.

10.125.3.3 template<typename E > bool mln::doc::Weighted_Window< E >::is_empty ( ) const

Test if the weighted window is empty.

A weighted_window of null size is empty.

10.125.3.4 template<typename E > E& mln::doc::Weighted_Window< E >::sym ( )

Apply a central symmetry to the target weighted window.

10.125.3.5 template<typename E > const window& mln::doc::Weighted_Window< E >::win ( ) const

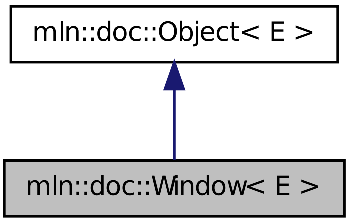
Give the corresponding window.

10.126 mln::doc::Window< E > Struct Template Reference

Documentation class for mln::Window.

`#include <window.hh>`

Inheritance diagram for mln::doc::Window< E >:



Public Types

- typedef void bkd_qiter

    Site_Iterator type associated to this window to browse its points in a backward way.

- typedef void fwd_qiter

    Site_Iterator type associated to this window to browse its points in a forward way.

- typedef void qiter

    Site_Iterator type associated to this window to browse its points.

10.126.1 Detailed Description

template<typename E> struct mln::doc::Window< E >

Documentation class for mln::Window. A window is the definition of a set of points located around a central point.

See also

mln::Window

Definition at line 40 of file concept/doc/window.hh.

10.126.2 Member Typedef Documentation

10.126.2.1 template<typename E > typedef void mln::doc::Window< E >::bkd_qiter

Site_Iterator type associated to this window to browse its points in a backward way.

Definition at line 55 of file concept/doc/window.hh.

10.126.2.2 template<typename E > typedef void mln::doc::Window< E >::fwd_qiter

Site_Iterator type associated to this window to browse its points in a forward way.

Definition at line 50 of file concept/doc/window.hh.

10.126.2.3 template<typename E > typedef void mln::doc::Window< E >::qiter

Site_Iterator type associated to this window to browse its points.

Definition at line 45 of file concept/doc/window.hh.

10.127 mln::Dpoint< E > Struct Template Reference

Base class for implementation of delta-point classes.

`#include <dpoint.hh>`

Inherits mln::Delta_Point_Site< E >.

Public Member Functions

- const E & to_dpoint () const

  It is a Dpoint so it returns itself.

10.127.1 Detailed Description

template<typename E> struct mln::Dpoint< E >

Base class for implementation of delta-point classes. A delta-point is a vector defined by a couple of points.

Given two points, A and B, the vector AB is mapped into the delta-point D = AB. Practically one can write: D = B - A.

See also

mln::doc::Dpoint for a complete documentation of this class contents.

Definition at line 63 of file concept/dpoint.hh.

10.127.2 Member Function Documentation

10.127.2.1 template<typename E > const E & mln::Dpoint< E >::to_dpoint ( ) const [inline]

It is a Dpoint so it returns itself.

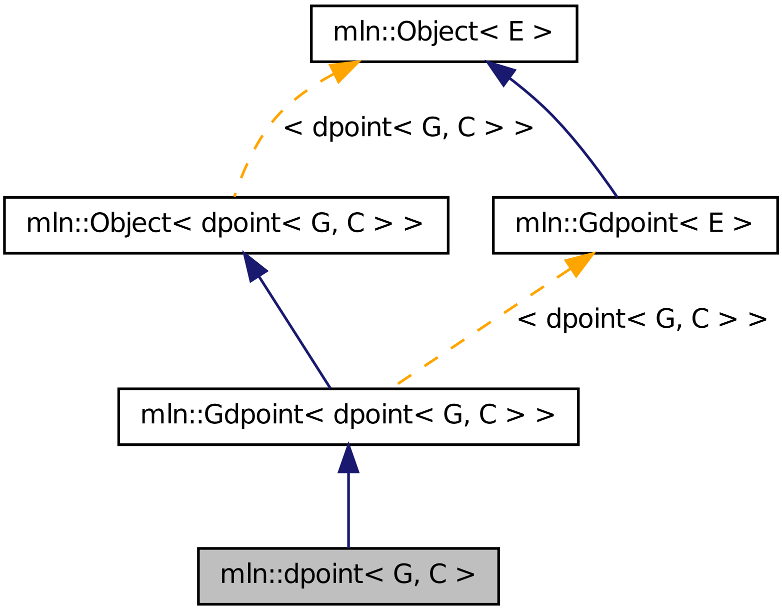
Definition at line 88 of file concept/dpoint.hh.

10.128 mln::dpoint< G, C > Struct Template Reference

Generic delta-point class.

`#include <dpoint.hh>`

Inheritance diagram for mln::dpoint< G, C >:



Public Types

- enum { dim = G::dim }
- typedef C coord

  Coordinate associated type.

- typedef G grid

  Grid associated type.

- typedef point< G, C > psite

  Psite associated type.

- typedef point< G, C > site

  Site associated type.

- typedef algebra::vec< G::dim, C > vec

  Algebra vector (vec) associated type.

Public Member Functions

- dpoint ()

  Constructor without argument.

- template<typename C2 >
  dpoint (const algebra::vec< dim, C2 > &v)

  Constructor from an algebra vector.

- template<typename F >
  dpoint (const Function_v2v< F > &f)

  Constructor; coordinates are set by function `f`*.*

- template<typename Q >
  operator mln::algebra::vec< dpoint< G, C >::dim, Q > () const

  Conversion towards a algebra::vec.

- C operator[ ] (unsigned i) const

  Read-only access to the `i-th` *coordinate value.*

- C & operator[ ] (unsigned i)

  Read-write access to the `i-th` *coordinate value.*

- void set_all (C c)

  Set all coordinates to the value `c`*.*

- vec to_vec () const

  Explicit conversion.

  - dpoint (C ind)
  - dpoint (const literal::zero_t &)

    Constructors/assignments with literals.

10.128.1 Detailed Description

template<typename G, typename C> struct mln::dpoint< G, C >

Generic delta-point class. Parameters are `G` the dimension of the space and `C` the coordinate type in this space.

Definition at line 58 of file dpoint.hh.

10.128.2 Member Typedef Documentation

10.128.2.1 template<typename G, typename C> typedef C mln::dpoint< G, C >::coord

Coordinate associated type.

Definition at line 76 of file dpoint.hh.

10.128.2.2 template<typename G, typename C> typedef G mln::dpoint< G, C >::grid

Grid associated type.

Definition at line 67 of file dpoint.hh.

10.128.2.3 template<typename G, typename C> typedef point<G,C> mln::dpoint< G, C >::psite

Psite associated type.

Definition at line 70 of file dpoint.hh.

10.128.2.4 template<typename G, typename C> typedef point<G,C> mln::dpoint< G, C >::site

Site associated type.

Definition at line 73 of file dpoint.hh.

10.128.2.5 template<typename G, typename C> typedef algebra::vec<G::dim, C> mln::dpoint< G, C >::vec

Algebra vector (vec) associated type.

Definition at line 79 of file dpoint.hh.

10.128.3 Member Enumeration Documentation

10.128.3.1 template<typename G, typename C> anonymous enum

Enumerator:

dim Dimension of the space.

Invariant

dim > 0

Definition at line 64 of file dpoint.hh.

10.128.4 Constructor & Destructor Documentation

10.128.4.1 template<typename G , typename C > mln::dpoint< G, C >::dpoint ( ) `[inline]`

Constructor without argument.

Definition at line 152 of file dpoint.hh.

10.128.4.2 template<typename G , typename C > template<typename C2 > mln::dpoint< G, C >::dpoint (const algebra::vec< dim, C2 > & *v*) `[inline]`

Constructor from an algebra vector.

Definition at line 159 of file dpoint.hh.

References mln::dpoint< G, C >::dim.

10.128.4.3 template<typename G , typename C> mln::dpoint< G, C >::dpoint (C *ind*) [inline]

Constructors with different numbers of arguments (coordinates) w.r.t. the dimension.

Definition at line 176 of file dpoint.hh.

10.128.4.4 template<typename G , typename C> mln::dpoint< G, C >::dpoint (const literal::zero_t &) [inline]

Constructors/assignments with literals.

Definition at line 203 of file dpoint.hh.

10.128.4.5 template<typename G , typename C > template<typename F > mln::dpoint< G, C >::dpoint (const Function_v2v< F > & *f*) [inline]

Constructor; coordinates are set by function `f`.

Definition at line 238 of file dpoint.hh.

10.128.5 Member Function Documentation

10.128.5.1 template<typename G , typename C > template<typename Q > mln::dpoint< G, C >::operator mln::algebra::vec< dpoint< G, C >::dim, Q > ( ) const [inline]

Conversion towards a algebra::vec.

Definition at line 257 of file dpoint.hh.

References mln::dpoint< G, C >::to_vec().

10.128.5.2 template<typename G , typename C > C & mln::dpoint< G, C >::operator[ ] (unsigned *i*) [inline]

Read-write access to the `i-th` coordinate value.

Parameters

`[in]` ***i*** The coordinate index.

Precondition

`i < dim`

Definition at line 144 of file dpoint.hh.

References mln::dpoint< G, C >::dim.

10.128.5.3 template<typename G , typename C > C mln::dpoint< G, C >::operator[ ] (unsigned *i*) const [inline]

Read-only access to the `i-th` coordinate value.

Parameters

[in] ***i*** The coordinate index.

Precondition

i < dim

Definition at line 136 of file dpoint.hh.

References mln::dpoint< G, C >::dim.

10.128.5.4 template<typename G , typename C> void mln::dpoint< G, C >::set_all (C *c*) [inline]

Set all coordinates to the value c.

Definition at line 248 of file dpoint.hh.

Referenced by mln::win::line< M, i, C >::line().

10.128.5.5 template<typename G , typename C > dpoint< G, C >::vec mln::dpoint< G, C >::to_vec ( ) const [inline]

Explicit conversion.

Definition at line 265 of file dpoint.hh.

References mln::dpoint< G, C >::dim.

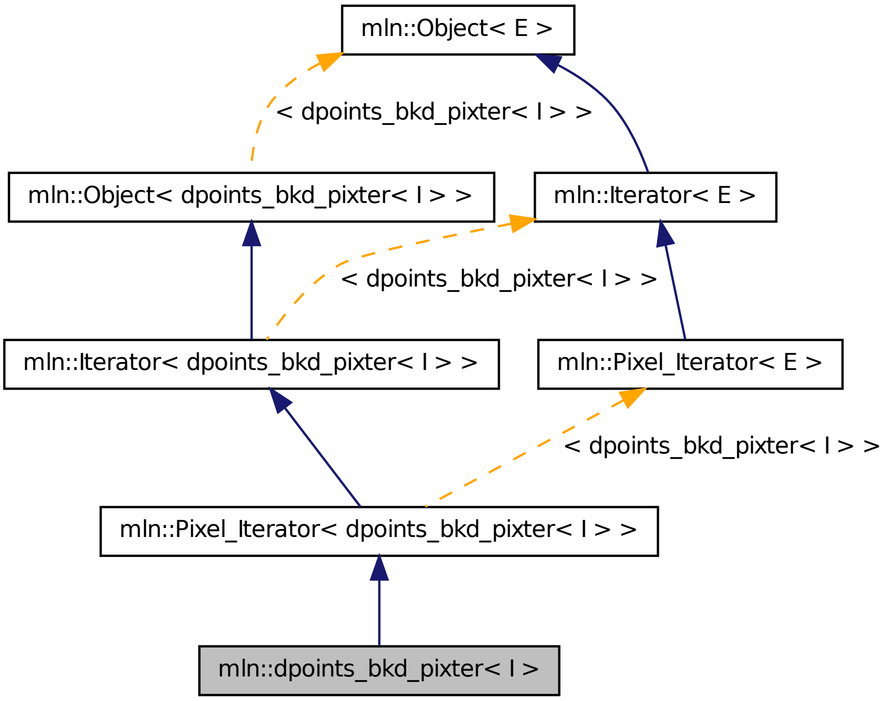
Referenced by mln::dpoint< G, C >::operator mln::algebra::vec< dpoint< G, C >::dim, Q >().

10.129 mln::dpoints_bkd_pixter< I > Class Template Reference

A generic backward iterator on the pixels of a dpoint-based window or neighborhood.

`#include <dpoints_pixter.hh>`

Inheritance diagram for mln::dpoints_bkd_pixter< I >:



Public Member Functions

- const I::value & center_val () const

  The value around which this iterator moves.

- template<typename Dps , typename Pref >
  dpoints_bkd_pixter (const Generalized_Pixel< Pref > &pxl_ref, const Dps &dps)

  Constructor (using a generalized pixel).

- template<typename Dps , typename Pref >
  dpoints_bkd_pixter (I &image, const Dps &dps, const Pref &p_ref)

  Constructor (using an image).

- void next ()

  Go to the next element.

  - void start ()

    Manipulation.

- void invalidate ()

  Invalidate the iterator.

- bool is_valid () const

  Test the iterator validity.

- void update ()

  Force this iterator to update its location to take into account that its center point may have moved.

10.129.1 Detailed Description

template<typename I> class mln::dpoints_bkd_pixter< I >

A generic backward iterator on the pixels of a dpoint-based window or neighborhood. Parameter `I` is the image type.

Definition at line 140 of file dpoints_pixter.hh.

10.129.2 Constructor & Destructor Documentation

10.129.2.1 template<typename I > template<typename Dps , typename Pref > mln::dpoints_bkd_pixter< I >::dpoints_bkd_pixter (I & *image*, const Dps & *dps*, const Pref & *p_ref*) `[inline]`

Constructor (using an image).

Parameters

`[in]` ***image*** The image to iterate over.

`[in]` ***dps*** An object (neighborhood or window) that can provide a set of delta-points.

`[in]` ***p_ref*** Center (resp. reference) point of the neighborhood (resp. window).

Definition at line 338 of file dpoints_pixter.hh.

10.129.2.2 template<typename I > template<typename Dps , typename Pref > mln::dpoints_bkd_pixter< I >::dpoints_bkd_pixter (const Generalized_Pixel< Pref > & *pxl_ref*, const Dps & *dps*) `[inline]`

Constructor (using a generalized pixel).

Parameters

`[in]` ***pxl_ref*** Center (generalized) pixel to iterate around.

`[in]` ***dps*** An object (neighborhood or window) that can provide a set of delta-points.

Definition at line 352 of file dpoints_pixter.hh.

10.129.3 Member Function Documentation

10.129.3.1 template<typename I > const I::value & mln::dpoints_bkd_pixter< I >::center_val ( ) const [inline]

The value around which this iterator moves.

Definition at line 367 of file dpoints_pixter.hh.

10.129.3.2 template<typename I > void mln::dpoints_bkd_pixter< I >::invalidate ( ) [inline]

Invalidate the iterator.

Definition at line 436 of file dpoints_pixter.hh.

10.129.3.3 template<typename I > bool mln::dpoints_bkd_pixter< I >::is_valid ( ) const [inline]

Test the iterator validity.

Definition at line 428 of file dpoints_pixter.hh.

Referenced by mln::dpoints_bkd_pixter< I >::update().

10.129.3.4 void mln::Iterator< dpoints_bkd_pixter< I > >::next ( ) [inherited]

Go to the next element.

Warning

This is a final method; iterator classes should not re-defined this method. The actual "next" operation has to be defined through the *next_* method.

Precondition

The iterator is valid.

10.129.3.5 template<typename I > void mln::dpoints_bkd_pixter< I >::start ( ) [inline]

Manipulation.

Start an iteration.

Definition at line 409 of file dpoints_pixter.hh.

References mln::dpoints_bkd_pixter< I >::update().

10.129.3.6 template<typename I > void mln::dpoints_bkd_pixter< I >::update ( ) [inline]

Force this iterator to update its location to take into account that its center point may have moved.

Definition at line 395 of file dpoints_pixter.hh.

References mln::dpoints_bkd_pixter< I >::is_valid().

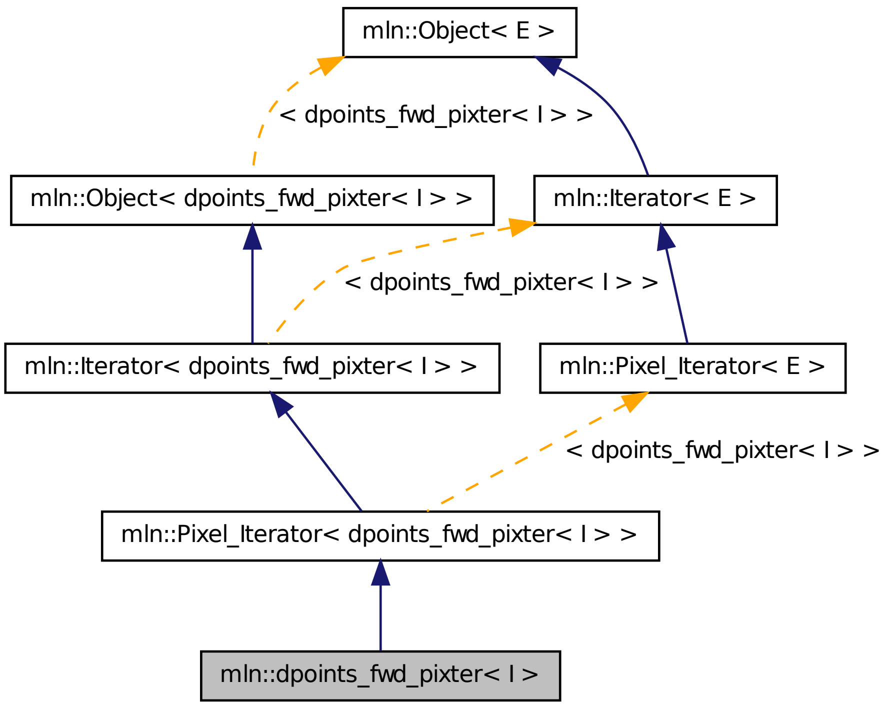
Referenced by mln::dpoints_bkd_pixter< I >::start().

10.130 mln::dpoints_fwd_pixter< I > Class Template Reference

A generic forward iterator on the pixels of a dpoint-based window or neighborhood.

`#include <dpoints_pixter.hh>`

Inheritance diagram for mln::dpoints_fwd_pixter< I >:



Public Member Functions

- const I::value & center_val () const

  The value around which this iterator moves.

- template<typename Dps , typename Pref >
  dpoints_fwd_pixter (const Generalized_Pixel< Pref > &pxl_ref, const Dps &dps)

  Constructor (using a generalized pixel).

- template<typename Dps , typename Pref >
  dpoints_fwd_pixter (I &image, const Dps &dps, const Pref &p_ref)

  Constructor (using an image).

- void next ()

  Go to the next element.

- void start ()
  Manipulation.
- void invalidate ()
  Invalidate the iterator.
- bool is_valid () const
  Test the iterator validity.
- void update ()
  Force this iterator to update its location to take into account that its center point may have moved.

10.130.1 Detailed Description

template<typename I> class mln::dpoints_fwd_pixter< I >

A generic forward iterator on the pixels of a dpoint-based window or neighborhood. Parameter `I` is the image type.

Definition at line 57 of file dpoints_pixter.hh.

10.130.2 Constructor & Destructor Documentation

10.130.2.1 template<typename I > template<typename Dps , typename Pref > mln::dpoints_fwd_pixter< I >::dpoints_fwd_pixter (I & *image*, const Dps & *dps*, const Pref & *p_ref*) `[inline]`

Constructor (using an image).

Parameters

`[in]` ***image*** The image to iterate over.
`[in]` ***dps*** An object (neighborhood or window) that can provide a set of delta-points.
`[in]` ***p_ref*** Center (resp. reference) point of the neighborhood (resp. window).

Definition at line 224 of file dpoints_pixter.hh.

10.130.2.2 template<typename I > template<typename Dps , typename Pref > mln::dpoints_fwd_pixter< I >::dpoints_fwd_pixter (const Generalized_Pixel< Pref > & *pxl_ref*, const Dps & *dps*) `[inline]`

Constructor (using a generalized pixel).

Parameters

`[in]` ***pxl_ref*** Center (generalized) pixel to iterate around.
`[in]` ***dps*** An object (neighborhood or window) that can provide a set of delta-points.

Definition at line 241 of file dpoints_pixter.hh.

10.130.3 Member Function Documentation

10.130.3.1 template< typename I > const I::value & mln::dpoints_fwd_pixter< I >::center_val ( ) const [inline]

The value around which this iterator moves.

Definition at line 256 of file dpoints_pixter.hh.

10.130.3.2 template< typename I > void mln::dpoints_fwd_pixter< I >::invalidate ( ) [inline]

Invalidate the iterator.

Definition at line 325 of file dpoints_pixter.hh.

10.130.3.3 template< typename I > bool mln::dpoints_fwd_pixter< I >::is_valid ( ) const [inline]

Test the iterator validity.

Definition at line 317 of file dpoints_pixter.hh.

Referenced by mln::dpoints_fwd_pixter< I >::update().

10.130.3.4 void mln::Iterator< dpoints_fwd_pixter< I > >::next ( ) [inherited]

Go to the next element.

Warning

This is a final method; iterator classes should not re-defined this method. The actual "next" operation has to be defined through the *next_* method.

Precondition

The iterator is valid.

10.130.3.5 template< typename I > void mln::dpoints_fwd_pixter< I >::start ( ) [inline]

Manipulation.

Start an iteration.

Definition at line 298 of file dpoints_pixter.hh.

References mln::dpoints_fwd_pixter< I >::update().

10.130.3.6 template< typename I > void mln::dpoints_fwd_pixter< I >::update ( ) [inline]

Force this iterator to update its location to take into account that its center point may have moved.

Definition at line 284 of file dpoints_pixter.hh.

References mln::dpoints_fwd_pixter< I >::is_valid().

Referenced by mln::dpoints_fwd_pixter< I >::start().

10.131 mln::Edge< E > Struct Template Reference

edge category flag type.

`#include <edge.hh>`

10.131.1 Detailed Description

template<typename E> struct mln::Edge< E >

edge category flag type.

Definition at line 52 of file edge.hh.

10.132 mln::edge_image< P, V, G > Class Template Reference

Image based on graph edges.

`#include <edge_image.hh>`

Inherits image_base< fun::i2v::array< V >, p_edges< G, internal::efsite_selector< P, G >::site_-function_t >, edge_image< P, V, G > >.

Public Types

- typedef graph_elt_neighborhood< G, p_edges< G, site_function_t > > edge_nbh_t

  Neighborhood type.

- typedef graph_elt_window< G, p_edges< G, site_function_t > > edge_win_t

  Edge Window type.

- typedef G graph_t

  The type of the underlying graph.

- typedef edge_nbh_t nbh_t

  Default Neighborhood type.

- typedef internal::efsite_selector< P, G >::site_function_t site_function_t

  Function mapping graph elements to sites.

- typedef edge_image< tag::psite_< P >, tag::value_< V >, tag::graph_< G > > skeleton

  Skeleton type.

- typedef edge_win_t win_t

  Default Window type.

Public Member Functions

- edge_image ()
  Constructors.
- rvalue operator() (unsigned e_id) const
  Value accessors/operators overloads.

10.132.1 Detailed Description

template<typename P, typename V, typename G = util::graph> class mln::edge_image< P, V, G >

Image based on graph edges.

Definition at line 123 of file core/image/edge_image.hh.

10.132.2 Member Typedef Documentation

10.132.2.1 template<typename P, typename V, typename G = util::graph> typedef graph_elt_neighborhood<G,p_edges<G,site_function_t> > mln::edge_image< P, V, G >::edge_nbh_t

Neighborhood type.

Definition at line 153 of file core/image/edge_image.hh.

10.132.2.2 template<typename P, typename V, typename G = util::graph> typedef graph_elt_window<G,p_edges<G,site_function_t> > mln::edge_image< P, V, G >::edge_win_t

Edge Window type.

Definition at line 151 of file core/image/edge_image.hh.

10.132.2.3 template<typename P, typename V, typename G = util::graph> typedef G mln::edge_image< P, V, G >::graph_t

The type of the underlying graph.

Definition at line 138 of file core/image/edge_image.hh.

10.132.2.4 template<typename P, typename V, typename G = util::graph> typedef edge_nbh_t mln::edge_image< P, V, G >::nbh_t

Default Neighborhood type.

Definition at line 159 of file core/image/edge_image.hh.

10.132.2.5 template<typename P, typename V, typename G = util::graph> typedef internal::efsite_selector<P,G>::site_function_t mln::edge_image< P, V, G >::site_function_t

Function mapping graph elements to sites.

Definition at line 147 of file core/image/edge_image.hh.

10.132.2.6 template<typename P, typename V, typename G = util::graph> typedef edge_image< tag::psite_<P>, tag::value_<V>, tag::graph_<G> > mln::edge_image< P, V, G >::skeleton

Skeleton type.

Definition at line 143 of file core/image/edge_image.hh.

10.132.2.7 template<typename P, typename V, typename G = util::graph> typedef edge_win_t mln::edge_image< P, V, G >::win_t

Default Window type.

Definition at line 156 of file core/image/edge_image.hh.

10.132.3 Constructor & Destructor Documentation

10.132.3.1 template<typename P , typename V , typename G > mln::edge_image< P, V, G >::edge_image ( ) `[inline]`

Constructors.

Definition at line 248 of file core/image/edge_image.hh.

10.132.4 Member Function Documentation

10.132.4.1 template<typename P , typename V , typename G > edge_image< P, V, G >::rvalue mln::edge_image< P, V, G >::operator() (unsigned *e_id*) const

Value accessors/operators overloads.

Definition at line 302 of file core/image/edge_image.hh.

10.133 mln::extended< I > Struct Template Reference

Makes an image become restricted by a point set.

`#include <extended.hh>`

Inherits image_domain_morpher< I, box< I::site >, extended< I > >.

Public Types

- typedef tag::image_< I > skeleton

Skeleton.

- typedef I::value value

  Value type.

Public Member Functions

- const box< typename I::site > & domain () const

  Give the definition domain.

- extended ()

  Constructor without argument.

- extended (I &ima, const box< typename I::site > &b)

  Constructor.

10.133.1 Detailed Description

template<typename I> struct mln::extended< I >

Makes an image become restricted by a point set.

Definition at line 92 of file extended.hh.

10.133.2 Member Typedef Documentation

10.133.2.1 template<typename I> typedef tag::image_<I> mln::extended< I >::skeleton

Skeleton.

Definition at line 102 of file extended.hh.

10.133.2.2 template<typename I> typedef I ::value mln::extended< I >::value

Value type.

Definition at line 99 of file extended.hh.

10.133.3 Constructor & Destructor Documentation

10.133.3.1 template<typename I > mln::extended< I >::extended ( ) `[inline]`

Constructor without argument.

Definition at line 169 of file extended.hh.

10.133.3.2 template<typename I > mln::extended< I >::extended (I & *ima*, const box< typename I::site > & *b*) [inline]

Constructor.

Definition at line 175 of file extended.hh.

10.133.4 Member Function Documentation

10.133.4.1 template<typename I > const box< typename I::site > & mln::extended< I >::domain ( ) const [inline]

Give the definition domain.

Definition at line 192 of file extended.hh.

10.134 mln::extension_fun< I, F > Class Template Reference

Extends the domain of an image with a function.

`#include <extension_fun.hh>`

Inherits image_identity< I, I::domain_t, extension_fun< I, F > >.

Public Types

- typedef I::value rvalue

  Return type of read-only access.

- typedef extension_fun< tag::image_< I >, tag::function_< F > > skeleton

  Skeleton.

- typedef I::value value

  Image value type.

Public Member Functions

- const F & extension () const

  Give the extension function.

- extension_fun (I &ima, const F &fun)

  Constructor from an image `ima` and a function `fun`.

- extension_fun ()

  Constructor without argument.

- template<typename P >
  bool has (const P &p) const

  Test if `p` is valid.

- internal::morpher_lvalue_< I >::ret operator() (const typename I::psite &p)

  Read-write access to the image value located at site p.

- I::value operator() (const typename I::psite &p) const

  Read-only access to the image value located at site p;.

10.134.1 Detailed Description

template<typename I, typename F> class mln::extension_fun< I, F >

Extends the domain of an image with a function.

Definition at line 99 of file extension_fun.hh.

10.134.2 Member Typedef Documentation

10.134.2.1 template<typename I, typename F> typedef I ::value mln::extension_fun< I, F >::rvalue

Return type of read-only access.

Definition at line 112 of file extension_fun.hh.

10.134.2.2 template<typename I, typename F> typedef extension_fun< tag::image_<I>, tag::function_<F> > mln::extension_fun< I, F >::skeleton

Skeleton.

Definition at line 106 of file extension_fun.hh.

10.134.2.3 template<typename I, typename F> typedef I ::value mln::extension_fun< I, F >::value

Image value type.

Definition at line 109 of file extension_fun.hh.

10.134.3 Constructor & Destructor Documentation

10.134.3.1 template<typename I , typename F > mln::extension_fun< I, F >::extension_fun ( ) `[inline]`

Constructor without argument.

Definition at line 178 of file extension_fun.hh.

10.134.3.2 template<typename I , typename F > mln::extension_fun< I, F >::extension_fun (I & *ima*, const F & *fun*) [inline]

Constructor from an image ima and a function fun.

Definition at line 184 of file extension_fun.hh.

10.134.4 Member Function Documentation

10.134.4.1 template<typename I , typename F > const F & mln::extension_fun< I, F >::extension ( ) const [inline]

Give the extension function.

Definition at line 243 of file extension_fun.hh.

10.134.4.2 template<typename I , typename F > template<typename P > bool mln::extension_fun< I, F >::has (const P & *p*) const [inline]

Test if p is valid.

It returns always true, assuming that the function is valid for any p.

Definition at line 201 of file extension_fun.hh.

10.134.4.3 template<typename I , typename F > internal::morpher_lvalue_< I >::ret mln::extension_fun< I, F >::operator() (const typename I::psite & *p*) [inline]

Read-write access to the image value located at site p.

Definition at line 223 of file extension_fun.hh.

10.134.4.4 template<typename I , typename F > I::value mln::extension_fun< I, F >::operator() (const typename I::psite & *p*) const [inline]

Read-only access to the image value located at site p;.

Definition at line 209 of file extension_fun.hh.

10.135 mln::extension_ima< I, J > Class Template Reference

Extends the domain of an image with an image.

`#include <extension_ima.hh>`

Inherits image_identity< I, I::domain_t, extension_ima< I, J > >.

Public Types

- typedef I::value rvalue

  Return type of read-only access.

- typedef extension_ima< tag::image_< I >, tag::ext_< J > > skeleton

  Skeleton.

- typedef I::value value

  Image value type.

Public Member Functions

- const J & extension () const

  Read-only access to the extension domain (image).

- extension_ima (I &ima, const J &ext)

  Constructor from an image `ima` and a function `ext`.

- extension_ima ()

  Constructor without argument.

- template<typename P >
  bool has (const P &p) const

  Test if `p` is valid.

- internal::morpher_lvalue_< I >::ret operator() (const typename I::psite &p)

  Read-write access to the image value located at site `p`.

- I::value operator() (const typename I::psite &p) const

  Read-only access to the image value located at site `p`;.

10.135.1 Detailed Description

template<typename I, typename J> class mln::extension_ima< I, J >

Extends the domain of an image with an image.

Definition at line 97 of file extension_ima.hh.

10.135.2 Member Typedef Documentation

10.135.2.1 template<typename I, typename J> typedef I ::value mln::extension_ima< I, J >::rvalue

Return type of read-only access.

Definition at line 111 of file extension_ima.hh.

10.135.2.2 template<typename I, typename J> typedef extension_ima< tag::image_<I>, tag::ext_<J> > mln::extension_ima< I, J >::skeleton

Skeleton.

Definition at line 105 of file extension_ima.hh.

10.135.2.3 template<typename I, typename J> typedef I ::value mln::extension_ima< I, J >::value

Image value type.

Definition at line 108 of file extension_ima.hh.

10.135.3 Constructor & Destructor Documentation

10.135.3.1 template<typename I , typename J > mln::extension_ima< I, J >::extension_ima ( ) [inline]

Constructor without argument.

Definition at line 173 of file extension_ima.hh.

10.135.3.2 template<typename I , typename J > mln::extension_ima< I, J >::extension_ima (I & *ima*, const J & *ext*) [inline]

Constructor from an image `ima` and a function `ext`.

Definition at line 179 of file extension_ima.hh.

10.135.4 Member Function Documentation

10.135.4.1 template<typename I , typename J > const J & mln::extension_ima< I, J >::extension ( ) const [inline]

Read-only access to the extension domain (image).

Definition at line 244 of file extension_ima.hh.

10.135.4.2 template<typename I , typename J > template<typename P > bool mln::extension_ima< I, J >::has (const P & *p*) const [inline]

Test if `p` is valid.

Definition at line 196 of file extension_ima.hh.

10.135.4.3 template<typename I , typename J > internal::morpher_lvalue_< I >::ret mln::extension_ima< I, J >::operator() (const typename I::psite & *p*) [inline]

Read-write access to the image value located at site `p`.

Definition at line 223 of file extension_ima.hh.

10.135.4.4 template<typename I , typename J > I::value mln::extension_ima< I, J >::operator() (const typename I::psite & *p*) const [inline]

Read-only access to the image value located at site `p`;.

Definition at line 208 of file extension_ima.hh.

10.136 mln::extension_val< I > Class Template Reference

Extends the domain of an image with a value.

`#include <extension_val.hh>`

Inherits image_identity< I, I::domain_t, extension_val< I > >.

Public Types

- typedef I::value rvalue
  Return type of read-only access.
- typedef extension_val< tag::image_< I > > skeleton
  Skeleton.
- typedef I::value value
  Image value type.

Public Member Functions

- void change_extension (const typename I::value &val)
  Change the value of the extension domain.
- const I::value & extension () const
  Read-only access to the value of the extension domain.
- extension_val (I &ima, const typename I::value &val)
  Constructor from an image `ima` and a value `val`.
- extension_val ()
  Constructor without argument.
- template<typename P >
  bool has (const P &p) const
  Test if `p` is valid. It returns always true.
- internal::morpher_lvalue_< I >::ret operator() (const typename I::psite &p)
  Read-write access to the image value located at site `p`.
- I::value operator() (const typename I::psite &p) const
  Read-only access to the image value located at site `p`;.

10.136.1 Detailed Description

template<typename I> class mln::extension_val< I >

Extends the domain of an image with a value.

Definition at line 98 of file extension_val.hh.

10.136.2 Member Typedef Documentation

10.136.2.1 template<typename I> typedef I ::value mln::extension_val< I >::rvalue

Return type of read-only access.

Definition at line 110 of file extension_val.hh.

10.136.2.2 template<typename I> typedef extension_val< tag::image_<I> > mln::extension_val< I >::skeleton

Skeleton.

Definition at line 104 of file extension_val.hh.

10.136.2.3 template<typename I> typedef I ::value mln::extension_val< I >::value

Image value type.

Definition at line 107 of file extension_val.hh.

10.136.3 Constructor & Destructor Documentation

10.136.3.1 template<typename I > mln::extension_val< I >::extension_val ( ) [inline]

Constructor without argument.

Definition at line 176 of file extension_val.hh.

10.136.3.2 template<typename I > mln::extension_val< I >::extension_val (I & *ima*, const typename I::value & *val*) [inline]

Constructor from an image `ima` and a value `val`.

Definition at line 182 of file extension_val.hh.

10.136.4 Member Function Documentation

10.136.4.1 template<typename I > void mln::extension_val< I >::change_extension (const typename I::value & *val*) [inline]

Change the value of the extension domain.

Definition at line 247 of file extension_val.hh.

10.136.4.2 template< typename I > const I::value & mln::extension_val< I >::extension ( ) const [inline]

Read-only access to the value of the extension domain.

Definition at line 238 of file extension_val.hh.

10.136.4.3 template< typename I > template< typename P > bool mln::extension_val< I >::has (const P & *p*) const [inline]

Test if `p` is valid. It returns always true.

Definition at line 199 of file extension_val.hh.

10.136.4.4 template< typename I > internal::morpher_lvalue_< I >::ret mln::extension_val< I >::operator() (const typename I::psite & *p*) [inline]

Read-write access to the image value located at site `p`.

Definition at line 220 of file extension_val.hh.

10.136.4.5 template< typename I > I::value mln::extension_val< I >::operator() (const typename I::psite & *p*) const [inline]

Read-only access to the image value located at site `p`;.

Definition at line 207 of file extension_val.hh.

10.137 mln::faces_psite< N, D, P > Class Template Reference

Point site associated to a mln::p_faces.

`#include <faces_psite.hh>`

Inherits pseudo_site_base_< const P &, faces_psite< N, D, P > >.

Public Member Functions

- faces_psite ()
  Construction and assignment.
- faces_psite (const p_faces< N, D, P > &pf, const topo::n_face< N, D > &face)
- bool is_valid () const
  Psite manipulators.
- void invalidate ()
  Invalidate this psite.
- const target & site_set () const
  Site set manipulators.

- void change_target (const target &new_target)

    Set the target site_set.

- topo::n_face< N, D > face () const

    Face handle manipulators.

- unsigned n () const

    Return the dimension of the face of this psite.

- unsigned face_id () const

    Return the id of the face of this psite.

10.137.1 Detailed Description

template<unsigned N, unsigned D, typename P> class mln::faces_psite< N, D, P >

Point site associated to a mln::p_faces.

Template Parameters

N The dimension of the face associated to this psite.

D The dimension of the complex this psite belongs to.

P The type of point associated to this psite.

Definition at line 56 of file faces_psite.hh.

10.137.2 Constructor & Destructor Documentation

10.137.2.1 template<unsigned N, unsigned D, typename P > mln::faces_psite< N, D, P >::faces_psite ( ) [inline]

Construction and assignment.

Definition at line 190 of file faces_psite.hh.

References mln::faces_psite< N, D, P >::invalidate().

10.137.2.2 template<unsigned N, unsigned D, typename P > mln::faces_psite< N, D, P >::faces_psite (const p_faces< N, D, P > & *pf*, const topo::n_face< N, D > & *face*) [inline]

Precondition

pf.cplx() == face.cplx().

Definition at line 201 of file faces_psite.hh.

10.137.3 Member Function Documentation

10.137.3.1 template< unsigned N, unsigned D, typename P > void mln::faces_psite< N, D, P >::change_target (const target & *new_target*) [inline]

Set the target site_set.

Definition at line 265 of file faces_psite.hh.

References mln::p_faces< N, D, P >::cplx(), and mln::faces_psite< N, D, P >::invalidate().

10.137.3.2 template< unsigned N, unsigned D, typename P > topo::n_face< N, D > mln::faces_psite< N, D, P >::face ( ) const [inline]

Face handle manipulators.

Return the face handle of this point site.

Definition at line 289 of file faces_psite.hh.

Referenced by mln::operator!=(), and mln::operator==().

10.137.3.3 template< unsigned N, unsigned D, typename P > unsigned mln::faces_psite< N, D, P >::face_id ( ) const [inline]

Return the id of the face of this psite.

Definition at line 305 of file faces_psite.hh.

10.137.3.4 template< unsigned N, unsigned D, typename P > void mln::faces_psite< N, D, P >::invalidate ( ) [inline]

Invalidate this psite.

Definition at line 239 of file faces_psite.hh.

Referenced by mln::faces_psite< N, D, P >::change_target(), and mln::faces_psite< N, D, P >::faces_-psite().

10.137.3.5 template< unsigned N, unsigned D, typename P > bool mln::faces_psite< N, D, P >::is_valid ( ) const [inline]

Psite manipulators.

Is this psite valid?

Definition at line 230 of file faces_psite.hh.

10.137.3.6 template< unsigned N, unsigned D, typename P > unsigned mln::faces_psite< N, D, P >::n ( ) const [inline]

Return the dimension of the face of this psite.

Definition at line 297 of file faces_psite.hh.

10.137.3.7 template<unsigned N, unsigned D, typename P > const p_faces< N, D, P > & mln::faces_psite< N, D, P >::site_set ( ) const [inline]

Site set manipulators.

Return the p_faces this site is built on. (shortcut for *target()).

Precondition

Member face_ is valid.

Definition at line 247 of file faces_psite.hh.

Referenced by mln::operator!=(), and mln::operator==().

10.138 mln::flat_image< T, S > Struct Template Reference

Image with a single value.

`#include <flat_image.hh>`

Inherits image_primary< T, S, flat_image< T, S > >.

Public Types

- typedef T & lvalue

  Return type of read-write access.

- typedef const T & rvalue

  Return type of read-only access.

- typedef flat_image< tag::value_< T >, tag::domain_< S > > skeleton

  Skeleton.

- typedef T value

  Value associated type.

Public Member Functions

- const S & domain () const

  Give the definition domain.

- flat_image (const T &val, const S &pset)

  Constructor.

- flat_image ()

  Constructor without argument.

- bool has (const typename S::psite &p) const

  Test if p is valid: always return true.

- const T & operator() (const typename S::psite &p) const

  Read-only access to the image value located at point p.

- T & operator() (const typename S::psite &p)

  Read-write access to the image value located at point p.

10.138.1 Detailed Description

template<typename T, typename S> struct mln::flat_image< T, S >

Image with a single value.

Definition at line 105 of file flat_image.hh.

10.138.2 Member Typedef Documentation

10.138.2.1 template<typename T, typename S> typedef T& mln::flat_image< T, S >::lvalue

Return type of read-write access.

Definition at line 118 of file flat_image.hh.

10.138.2.2 template<typename T, typename S> typedef const T& mln::flat_image< T, S >::rvalue

Return type of read-only access.

Definition at line 115 of file flat_image.hh.

10.138.2.3 template<typename T, typename S> typedef flat_image< tag::value_<T>, tag::domain_<S> > mln::flat_image< T, S >::skeleton

Skeleton.

Definition at line 108 of file flat_image.hh.

10.138.2.4 template<typename T, typename S> typedef T mln::flat_image< T, S >::value

Value associated type.

Definition at line 112 of file flat_image.hh.

10.138.3 Constructor & Destructor Documentation

10.138.3.1 template<typename T , typename S > mln::flat_image< T, S >::flat_image ( ) `[inline]`

Constructor without argument.

Definition at line 191 of file flat_image.hh.

10.138.3.2 template<typename T , typename S > mln::flat_image< T, S >::flat_image (const T & *val,* const S & *pset*) [inline]

Constructor.

Definition at line 197 of file flat_image.hh.

10.138.4 Member Function Documentation

10.138.4.1 template<typename T , typename S > const S & mln::flat_image< T, S >::domain ( ) const [inline]

Give the definition domain.

Definition at line 214 of file flat_image.hh.

10.138.4.2 template<typename T , typename S > bool mln::flat_image< T, S >::has (const typename S::psite & *p*) const [inline]

Test if `p` is valid: always return true.

Definition at line 222 of file flat_image.hh.

10.138.4.3 template<typename T , typename S > const T & mln::flat_image< T, S >::operator() (const typename S::psite & *p*) const [inline]

Read-only access to the image value located at point `p`.

Definition at line 230 of file flat_image.hh.

10.138.4.4 template<typename T , typename S > T & mln::flat_image< T, S >::operator() (const typename S::psite & *p*) [inline]

Read-write access to the image value located at point `p`.

Definition at line 239 of file flat_image.hh.

10.139 mln::fun::from_accu< A > Struct Template Reference

Wrap an accumulator into a function.

`#include <from_accu.hh>`

Inherits mln::fun::unary_param< from_accu< A >, A ∗ >.

10.139.1 Detailed Description

template<typename A> struct mln::fun::from_accu< A >

Wrap an accumulator into a function.

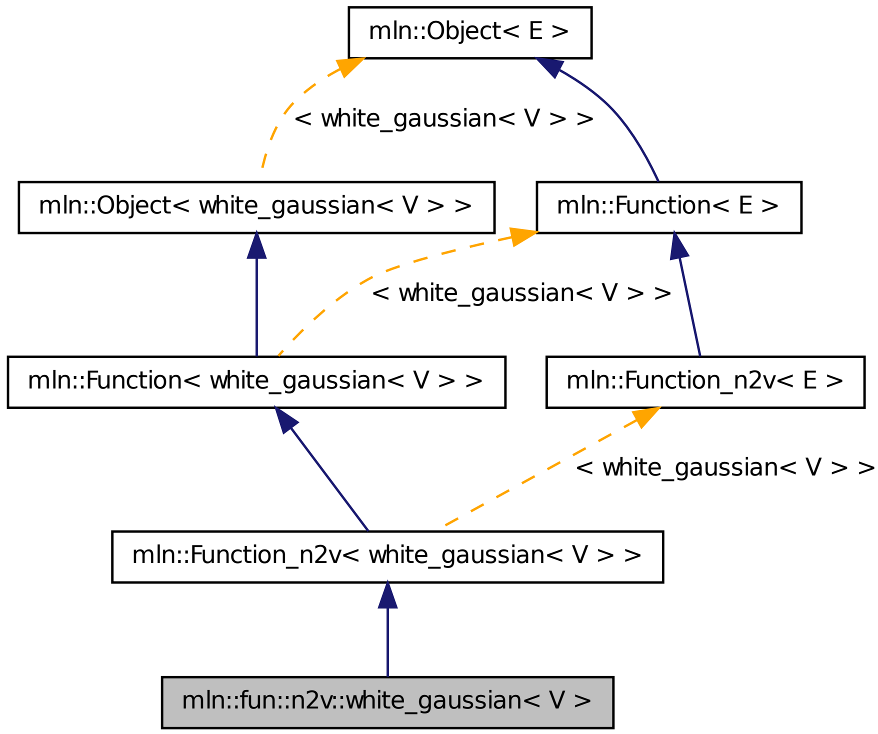
Definition at line 49 of file from_accu.hh.

10.140 mln::fun::n2v::white_gaussian< V > Struct Template Reference

Generate a White Gaussian Noise.

`#include <white_gaussian.hh>`

Inheritance diagram for mln::fun::n2v::white_gaussian< V >:



10.140.1 Detailed Description

template<typename V> struct mln::fun::n2v::white_gaussian< V >

Generate a White Gaussian Noise. Reference: `http://www.dspguru.com/dsp/howtos/how-to-generate-whit`

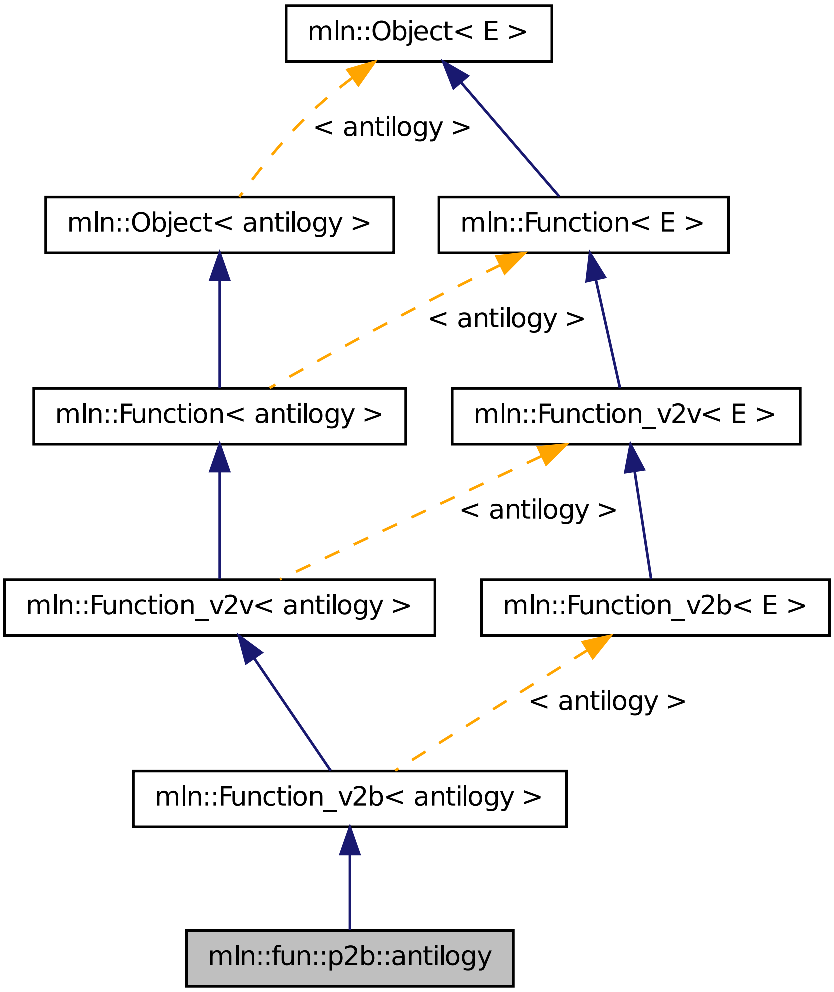
Definition at line 56 of file white_gaussian.hh.

10.141 mln::fun::p2b::antilogy Struct Reference

A p2b function always returning `false`.

`#include <antilogy.hh>`

Inheritance diagram for mln::fun::p2b::antilogy:



10.141.1 Detailed Description

A p2b function always returning `false`. A simpler name would be 'false', but this is not a valid C++ identifier, as `false` is a keyword of the language.

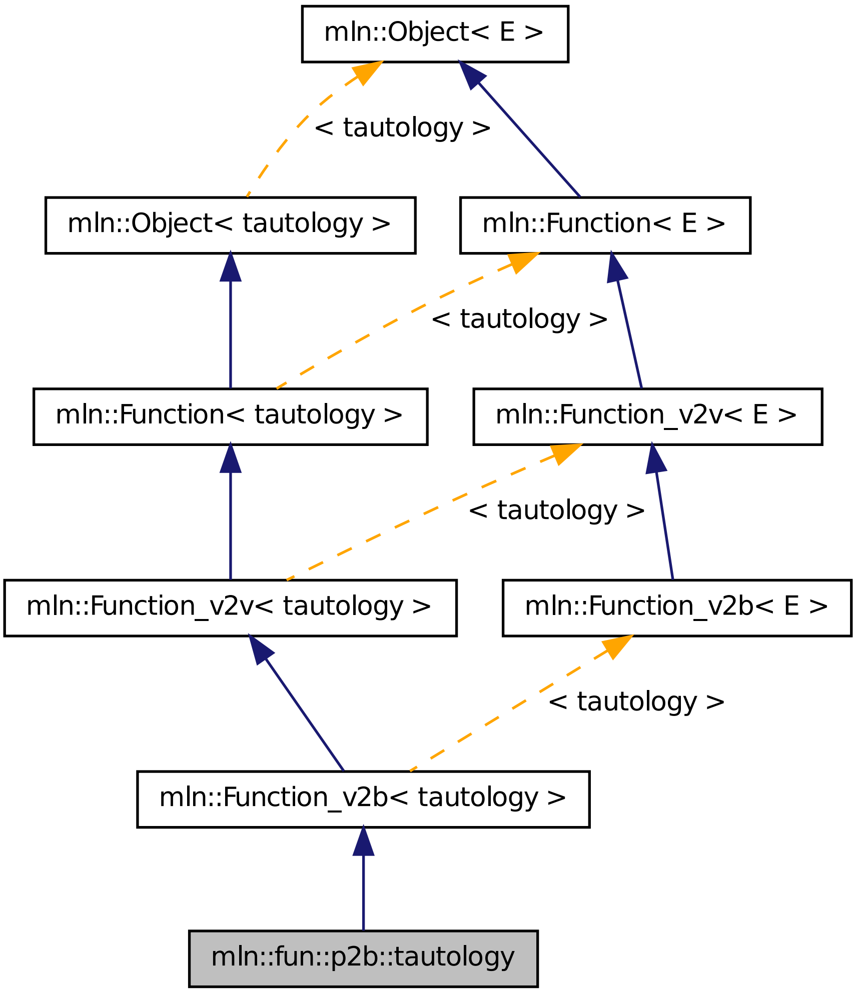
Definition at line 50 of file antilogy.hh.

10.142 mln::fun::p2b::tautology Struct Reference

A p2b function always returning `true`.

`#include <tautology.hh>`

Inheritance diagram for mln::fun::p2b::tautology:



10.142.1 Detailed Description

A p2b function always returning `true`. A simpler name would be 'true', but this is not a valid C++ identifier, as `true` is a keyword of the language.

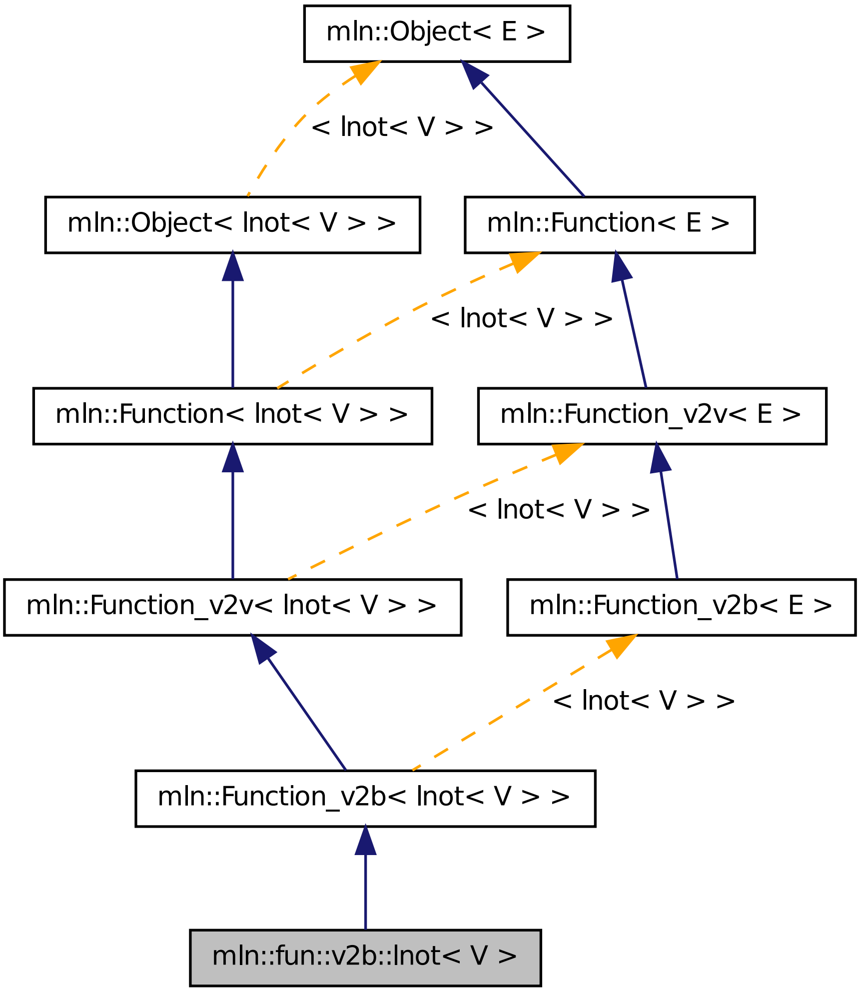
Definition at line 50 of file tautology.hh.

10.143 mln::fun::v2b::lnot< V > Struct Template Reference

Functor computing logical-not on a value.

`#include <lnot.hh>`

Inheritance diagram for mln::fun::v2b::lnot< V >:



10.143.1 Detailed Description

template<typename V> struct mln::fun::v2b::lnot< V >

Functor computing logical-not on a value.

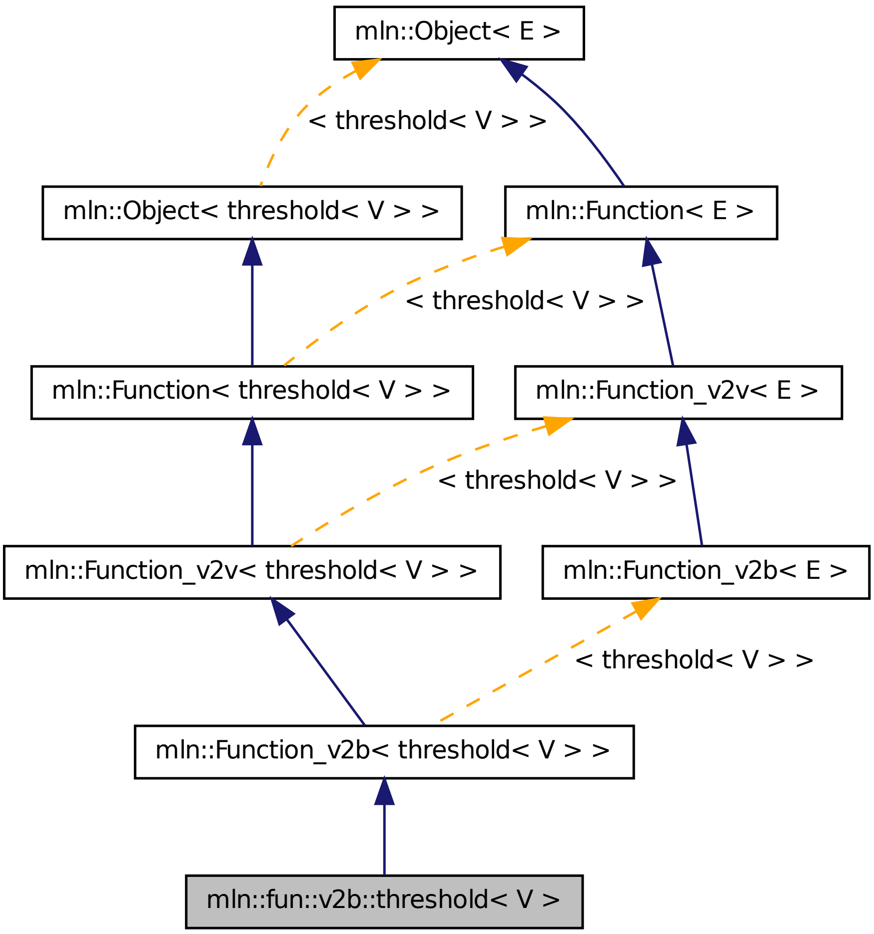
Definition at line 47 of file lnot.hh.

10.144 mln::fun::v2b::threshold< V > Struct Template Reference

Threshold function.

`#include <threshold.hh>`

Inheritance diagram for mln::fun::v2b::threshold< V >:



10.144.1 Detailed Description

template<typename V> struct mln::fun::v2b::threshold< V >

Threshold function. f(v) = (v >= threshold).

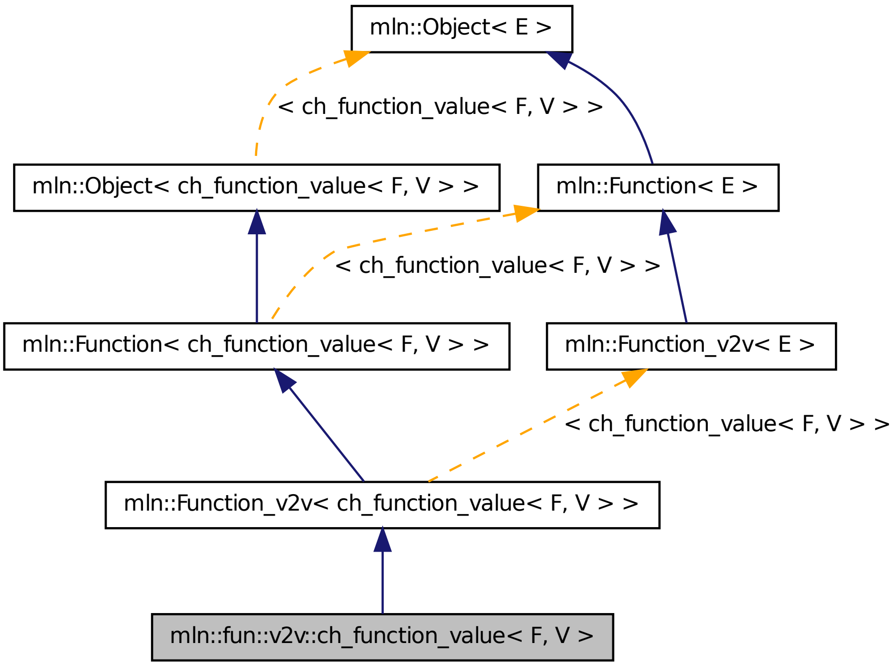
Definition at line 48 of file fun/v2b/threshold.hh.

10.145 mln::fun::v2v::ch_function_value< F, V > Class Template Reference

Wrap a function v2v and convert its result to another type.

`#include <ch_function_value.hh>`

Inheritance diagram for mln::fun::v2v::ch_function_value< F, V >:



10.145.1 Detailed Description

template<typename F, typename V> class mln::fun::v2v::ch_function_value< F, V >

Wrap a function v2v and convert its result to another type.

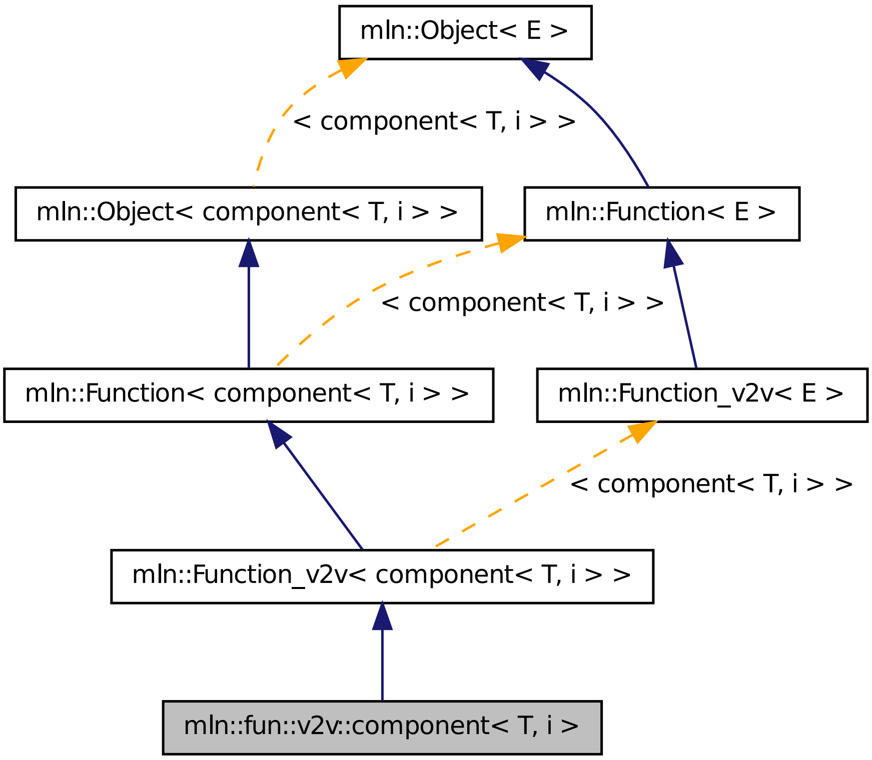
Definition at line 52 of file fun/v2v/ch_function_value.hh.

10.146 mln::fun::v2v::component< T, i > Struct Template Reference

Functor that accesses the i-th component of a value.

`#include <component.hh>`

Inheritance diagram for mln::fun::v2v::component< T, i >:



10.146.1 Detailed Description

template<typename T, unsigned i> struct mln::fun::v2v::component< T, i >

Functor that accesses the i-th component of a value.

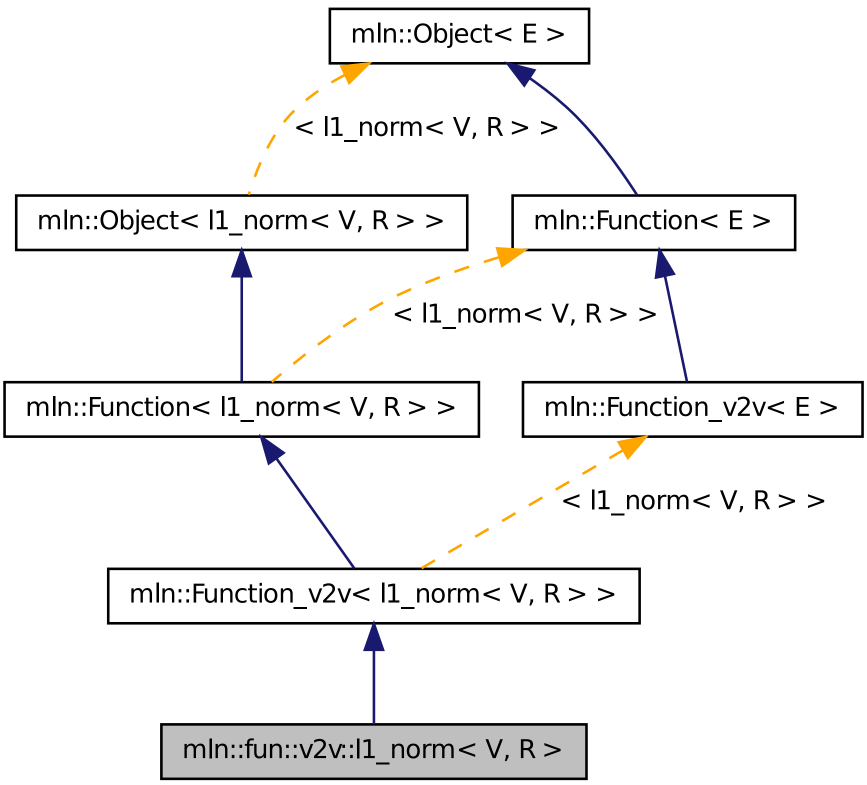
Definition at line 51 of file component.hh.

10.147 mln::fun::v2v::l1_norm< V, R > Struct Template Reference

L1-norm.

```
#include <norm.hh>
```

Inheritance diagram for mln::fun::v2v::l1_norm< V, R >:



10.147.1 Detailed Description

template<typename V, typename R> struct mln::fun::v2v::l1_norm< V, R >

L1-norm. `V` is the type of input values; `R` is the result type.

See also

mln::norm::l1.

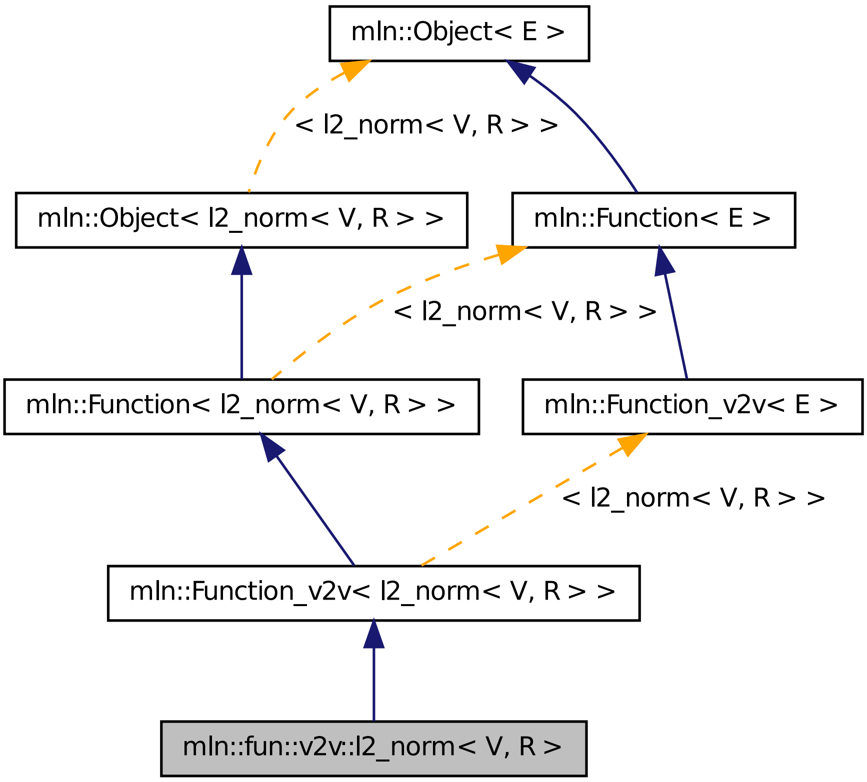
Definition at line 57 of file v2v/norm.hh.

10.148 mln::fun::v2v::l2_norm< V, R > Struct Template Reference

L2-norm.

`#include <norm.hh>`

Inheritance diagram for mln::fun::v2v::l2_norm< V, R >:



10.148.1 Detailed Description

template<typename V, typename R> struct mln::fun::v2v::l2_norm< V, R >

L2-norm. `V` is the type of input values; `R` is the result type.

See also

mln::norm::l2.

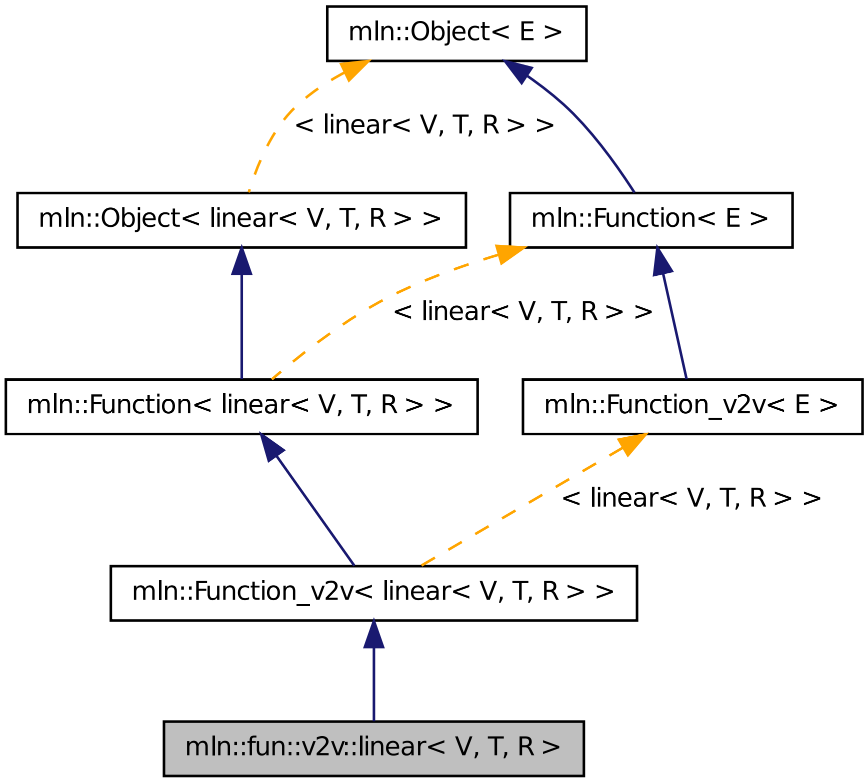
Definition at line 69 of file v2v/norm.hh.

10.149 mln::fun::v2v::linear< V, T, R > Struct Template Reference

Linear function. f(v) = a ∗ v + b. `V` is the type of input values; `T` is the type used to compute the result; `R` is the result type.

`#include <linear.hh>`

Inheritance diagram for mln::fun::v2v::linear< V, T, R >:



10.149.1 Detailed Description

template<typename V, typename T = V, typename R = T> struct mln::fun::v2v::linear< V, T, R >

Linear function. f(v) = a ∗ v + b. `V` is the type of input values; `T` is the type used to compute the result; `R` is the result type. By defaut, `T` is `V` and `R` is `T`.

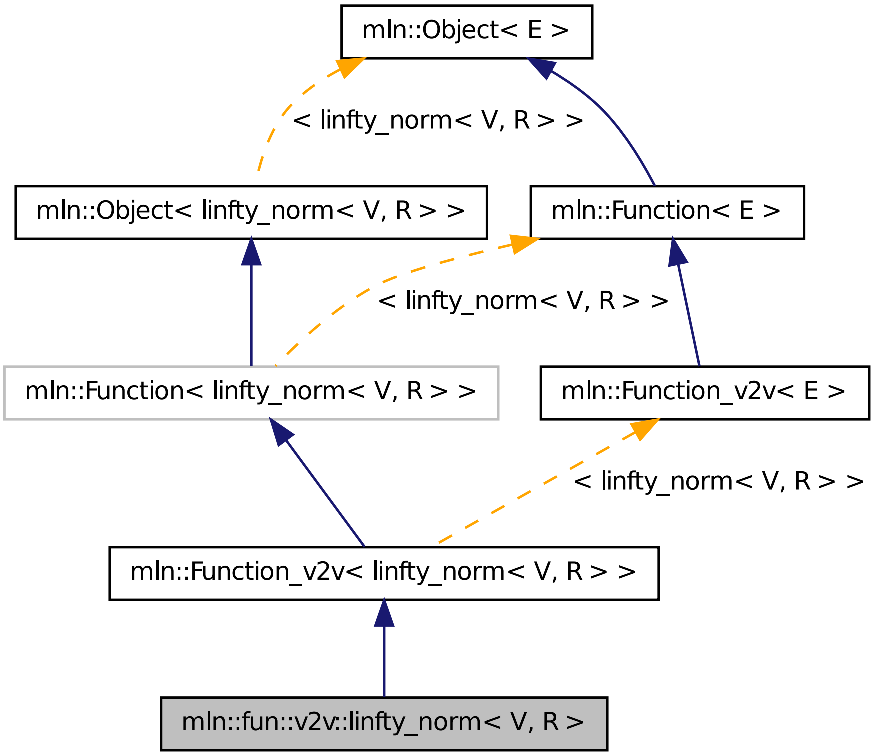
Definition at line 55 of file v2v/linear.hh.

10.150 mln::fun::v2v::linfty_norm< V, R > Struct Template Reference

L-infty norm.

`#include <norm.hh>`

Inheritance diagram for mln::fun::v2v::linfty_norm< V, R >:



10.150.1 Detailed Description

template<typename V, typename R> struct mln::fun::v2v::linfty_norm< V, R >

L-infty norm. `V` is the type of input values; `R` is the result type.

See also

mln::norm::linfty.

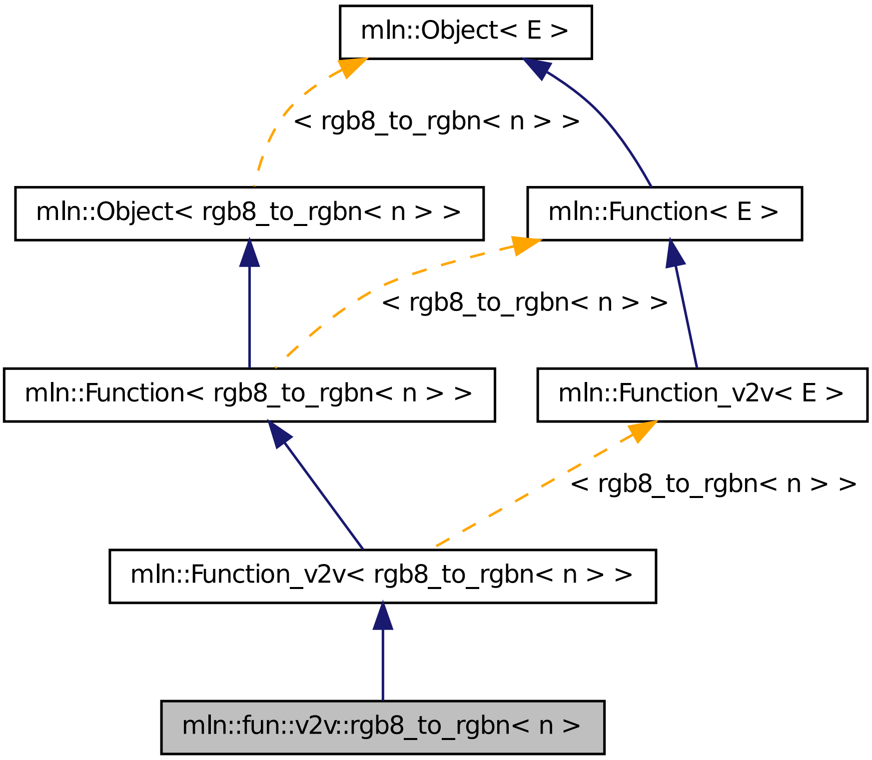
Definition at line 81 of file v2v/norm.hh.

10.151 mln::fun::v2v::rgb8_to_rgbn< n > Struct Template Reference

Convert a rgb8 value to a rgn, n < 8.

`#include <rgb8_to_rgbn.hh>`

Inheritance diagram for mln::fun::v2v::rgb8_to_rgbn< n >:



Public Member Functions

- result operator() (const argument &c) const

  Convert a rgb8 value to a rgn, n < 8.

10.151.1 Detailed Description

template<unsigned n> struct mln::fun::v2v::rgb8_to_rgbn< n >

Convert a rgb8 value to a rgn, n < 8.

Parameters

n defines the output quantification used for the transformation.

Definition at line 56 of file rgb8_to_rgbn.hh.

10.151.2 Member Function Documentation

10.151.2.1 template<unsigned n> rgb8_to_rgbn< n >::result mln::fun::v2v::rgb8_to_rgbn< n >::operator() (const argument & *c*) const

Convert a rgb8 value to a rgn, n < 8.

Parameters

`[in]` ***v*** the rgb8 value to convert.

Conversion is done by computing the size by which we divide each rgb component.

Parameters

n defines the output quantification used for the transformation.

Definition at line 83 of file rgb8_to_rgbn.hh.

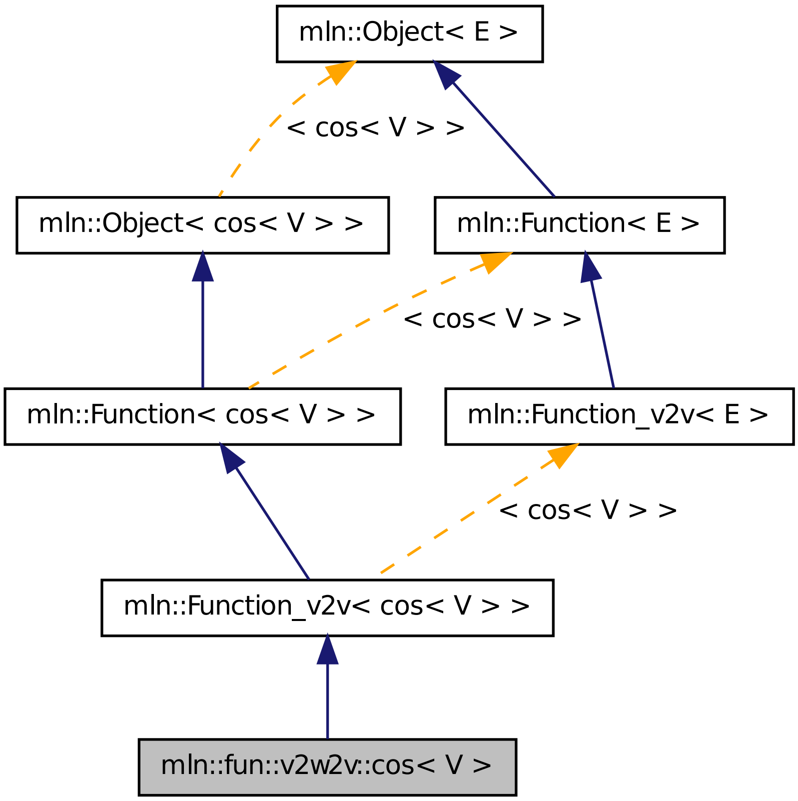
References mln::value::rgb< n >::red().

10.152 mln::fun::v2w2v::cos< V > Struct Template Reference

Cosinus bijective functor.

`#include <cos.hh>`

Inheritance diagram for mln::fun::v2w2v::cos< V >:



10.152.1 Detailed Description

template<typename V> struct mln::fun::v2w2v::cos< V >

Cosinus bijective functor. `V` is the type of input values and the result type.

See also

mln::math::cos.

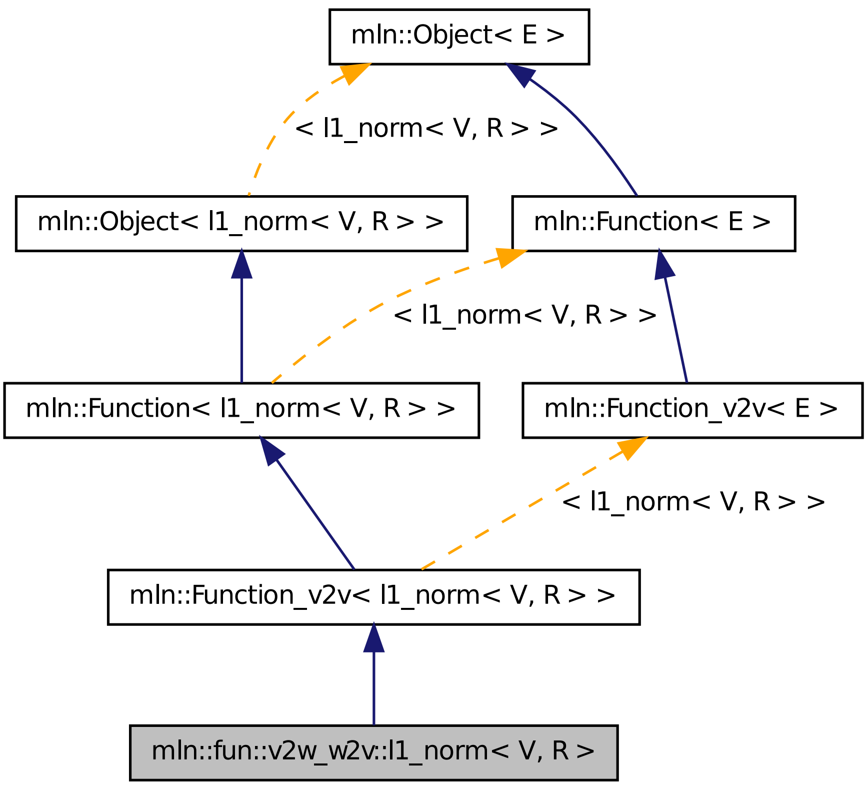
Definition at line 59 of file fun/v2w2v/cos.hh.

10.153 mln::fun::v2w_w2v::l1_norm< V, R > Struct Template Reference

L1-norm.

`#include <norm.hh>`

Inheritance diagram for mln::fun::v2w_w2v::l1_norm< V, R >:



10.153.1 Detailed Description

template<typename V, typename R> struct mln::fun::v2w_w2v::l1_norm< V, R >

L1-norm. `V` is the type of input values; `R` is the result type.

See also

mln::norm::l1.

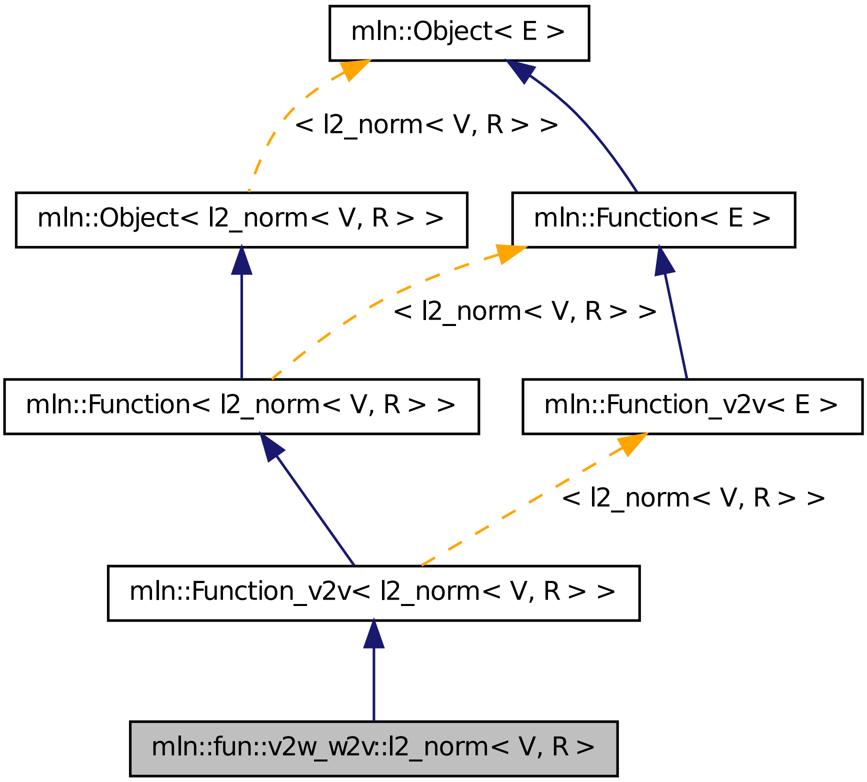
Definition at line 56 of file v2w_w2v/norm.hh.

10.154 mln::fun::v2w_w2v::l2_norm< V, R > Struct Template Reference

L2-norm.

`#include <norm.hh>`

Inheritance diagram for mln::fun::v2w_w2v::l2_norm< V, R >:



10.154.1 Detailed Description

template<typename V, typename R> struct mln::fun::v2w_w2v::l2_norm< V, R >

L2-norm. `V` is the type of input values; `R` is the result type.

See also

mln::norm::l2.

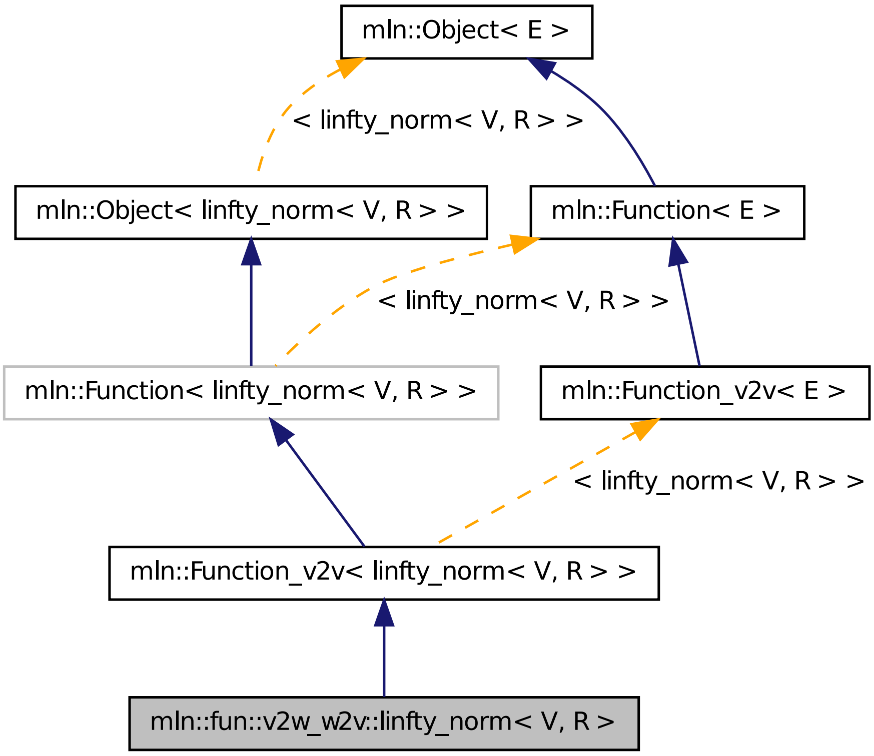
Definition at line 69 of file v2w_w2v/norm.hh.

10.155 mln::fun::v2w_w2v::linfty_norm< V, R > Struct Template Reference

L-infty norm.

`#include <norm.hh>`

Inheritance diagram for mln::fun::v2w_w2v::linfty_norm< V, R >:



10.155.1 Detailed Description

template<typename V, typename R> struct mln::fun::v2w_w2v::linfty_norm< V, R >

L-infty norm. `V` is the type of input values; `R` is the result type.

See also

mln::norm::linfty.

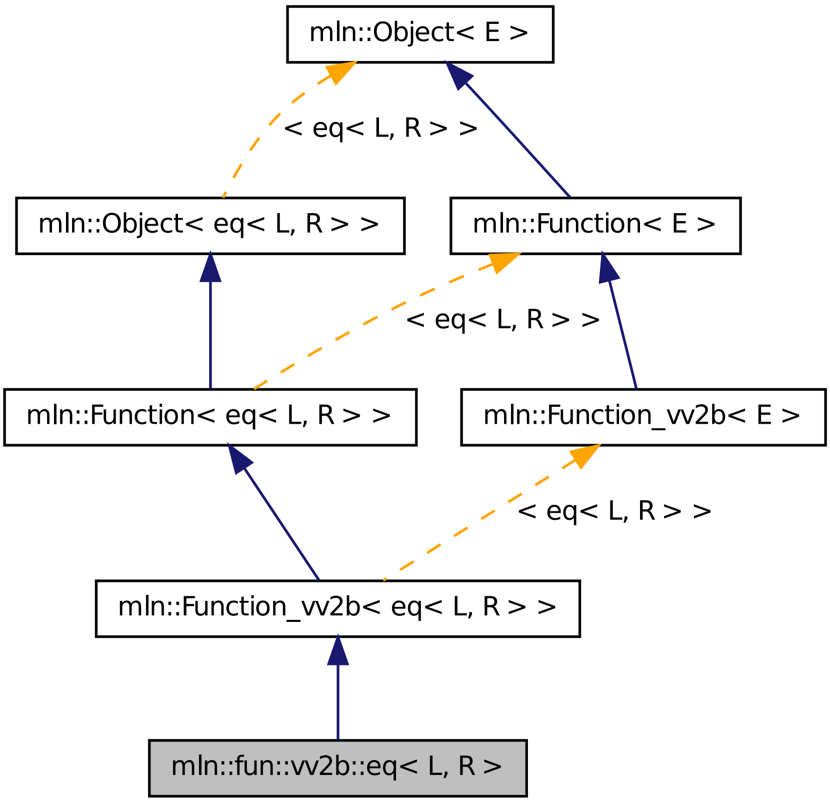
Definition at line 82 of file v2w_w2v/norm.hh.

10.156 mln::fun::vv2b::eq< L, R > Struct Template Reference

Functor computing equal between two values.

`#include <eq.hh>`

Inheritance diagram for mln::fun::vv2b::eq< L, R >:



10.156.1 Detailed Description

template<typename L, typename R = L> struct mln::fun::vv2b::eq< L, R >

Functor computing equal between two values.

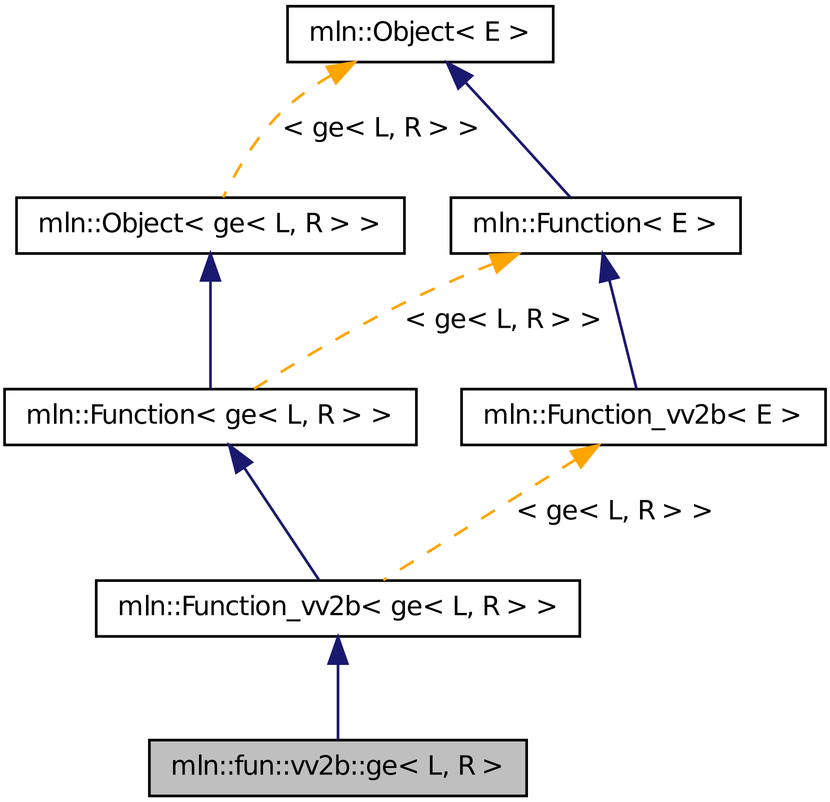
Definition at line 48 of file fun/vv2b/eq.hh.

10.157 mln::fun::vv2b::ge< L, R > Struct Template Reference

Functor computing "greater or equal than" between two values.

`#include <ge.hh>`

Inheritance diagram for mln::fun::vv2b::ge< L, R >:



10.157.1 Detailed Description

template<typename L, typename R = L> struct mln::fun::vv2b::ge< L, R >

Functor computing "greater or equal than" between two values.

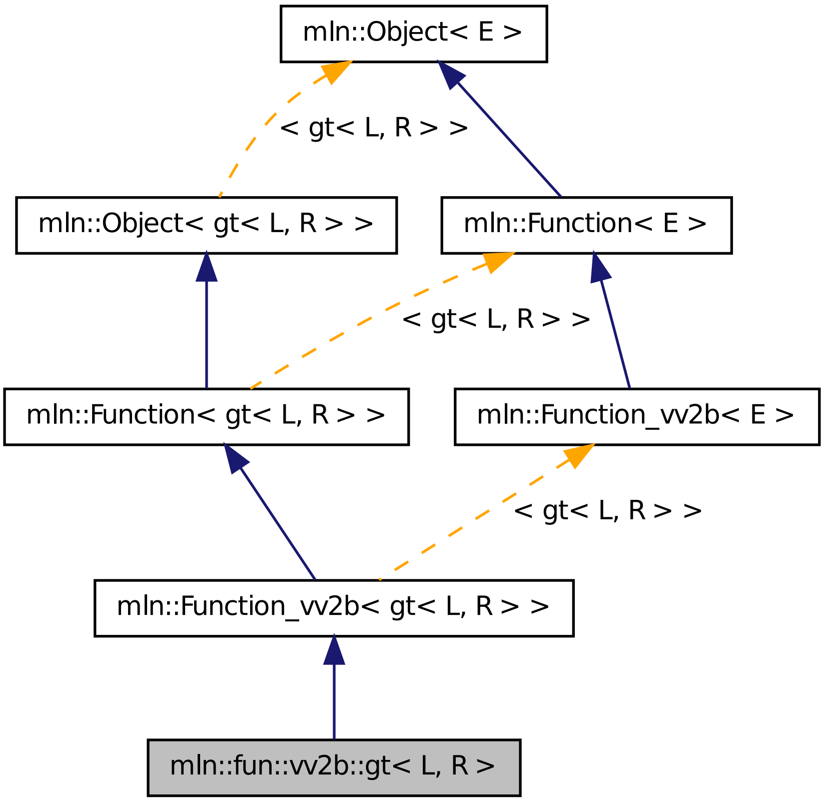
Definition at line 48 of file ge.hh.

10.158 mln::fun::vv2b::gt< L, R > Struct Template Reference

Functor computing "greater than" between two values.

`#include <gt.hh>`

Inheritance diagram for mln::fun::vv2b::gt< L, R >:



10.158.1 Detailed Description

template<typename L, typename R = L> struct mln::fun::vv2b::gt< L, R >

Functor computing "greater than" between two values.

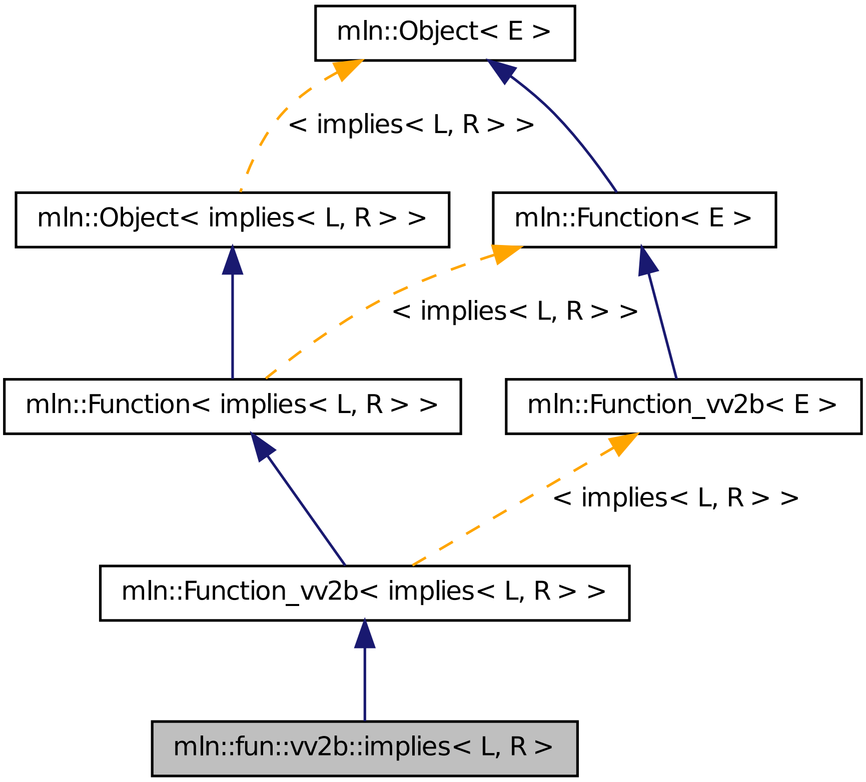
Definition at line 48 of file gt.hh.

10.159 mln::fun::vv2b::implies< L, R > Struct Template Reference

Functor computing logical-implies between two values.

```
#include <implies.hh>
```

Inheritance diagram for mln::fun::vv2b::implies< L, R >:



10.159.1 Detailed Description

template<typename L, typename R = L> struct mln::fun::vv2b::implies< L, R >

Functor computing logical-implies between two values.

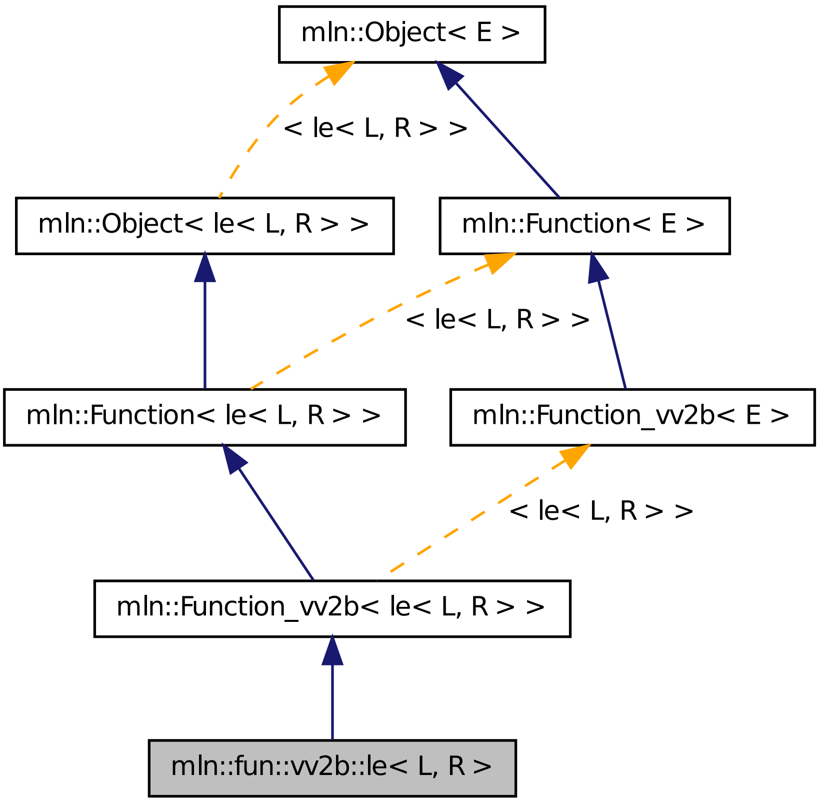
Definition at line 48 of file implies.hh.

10.160 mln::fun::vv2b::le< L, R > Struct Template Reference

Functor computing "lower or equal than" between two values.

`#include <le.hh>`

Inheritance diagram for mln::fun::vv2b::le< L, R >:



10.160.1 Detailed Description

template<typename L, typename R = L> struct mln::fun::vv2b::le< L, R >

Functor computing "lower or equal than" between two values.

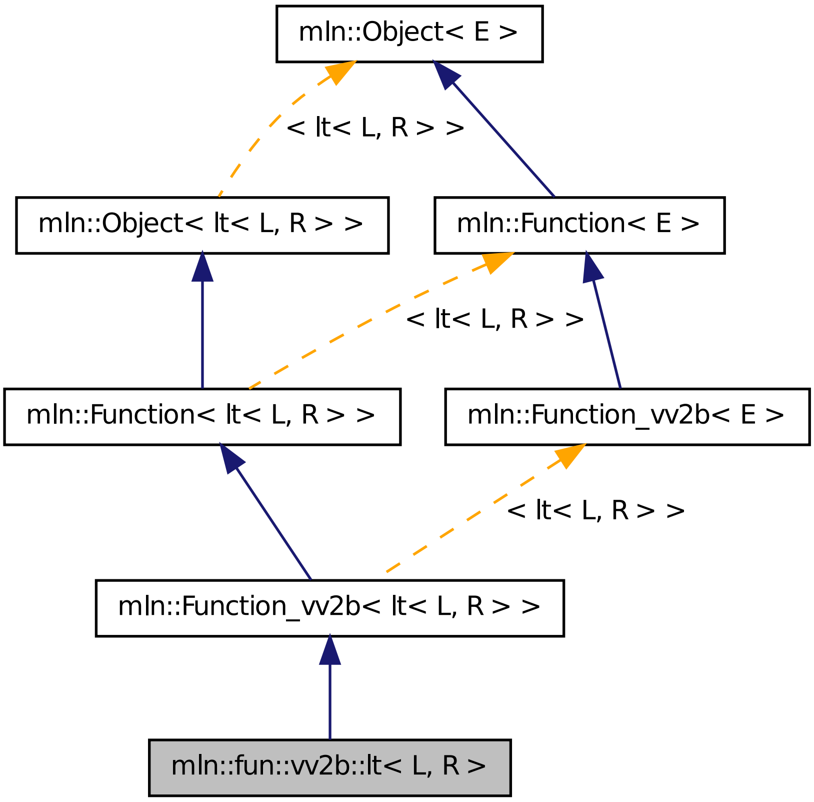
Definition at line 48 of file le.hh.

10.161 mln::fun::vv2b::lt< L, R > Struct Template Reference

Functor computing "lower than" between two values.

`#include <lt.hh>`

Inheritance diagram for mln::fun::vv2b::lt< L, R >:



10.161.1 Detailed Description

template<typename L, typename R = L> struct mln::fun::vv2b::lt< L, R >

Functor computing "lower than" between two values.

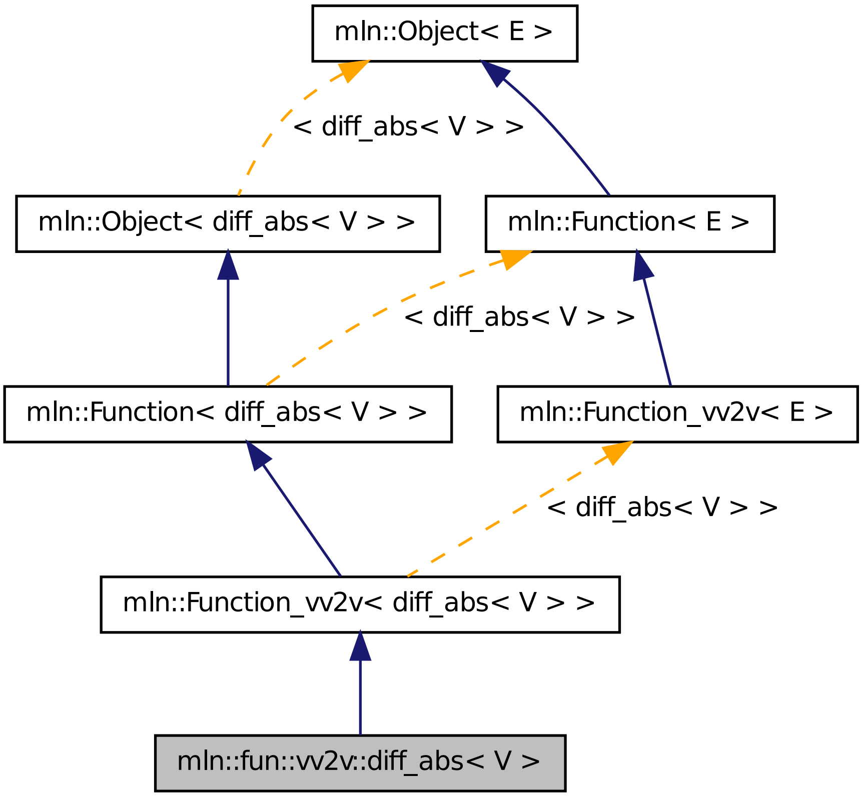
Definition at line 48 of file lt.hh.

10.162 mln::fun::vv2v::diff_abs< V > Struct Template Reference

A functor computing the diff_absimum of two values.

`#include <diff_abs.hh>`

Inheritance diagram for mln::fun::vv2v::diff_abs< V >:



10.162.1 Detailed Description

template<typename V> struct mln::fun::vv2v::diff_abs< V >

A functor computing the diff_absimum of two values.

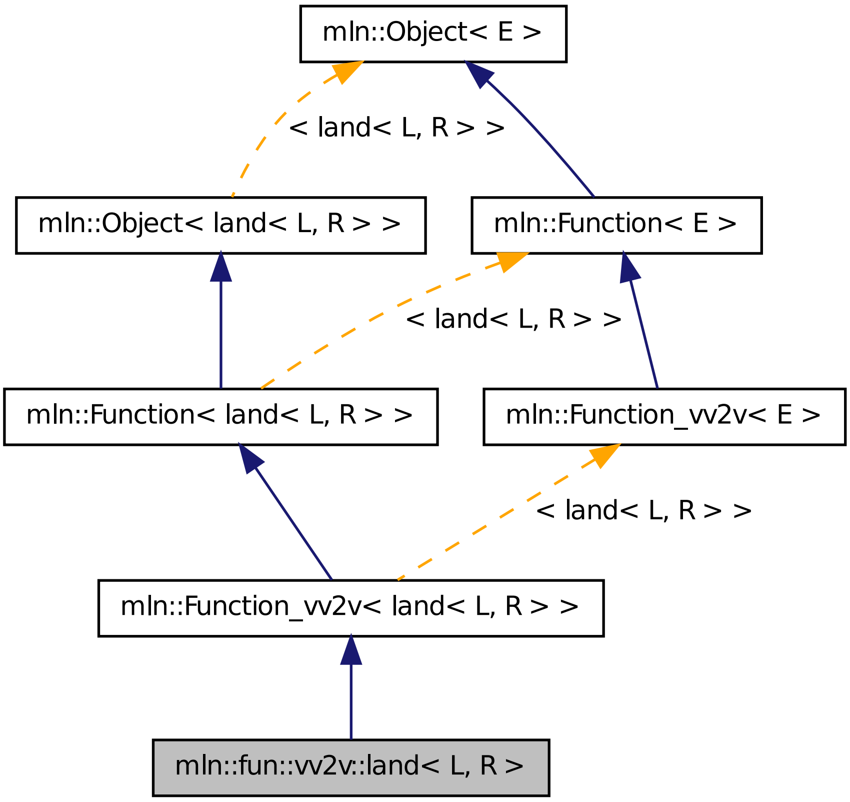
Definition at line 50 of file fun/vv2v/diff_abs.hh.

10.163 mln::fun::vv2v::land< L, R > Struct Template Reference

Functor computing logical-and between two values.

`#include <land.hh>`

Inheritance diagram for mln::fun::vv2v::land< L, R >:



10.163.1 Detailed Description

template<typename L, typename R = L> struct mln::fun::vv2v::land< L, R >

Functor computing logical-and between two values.

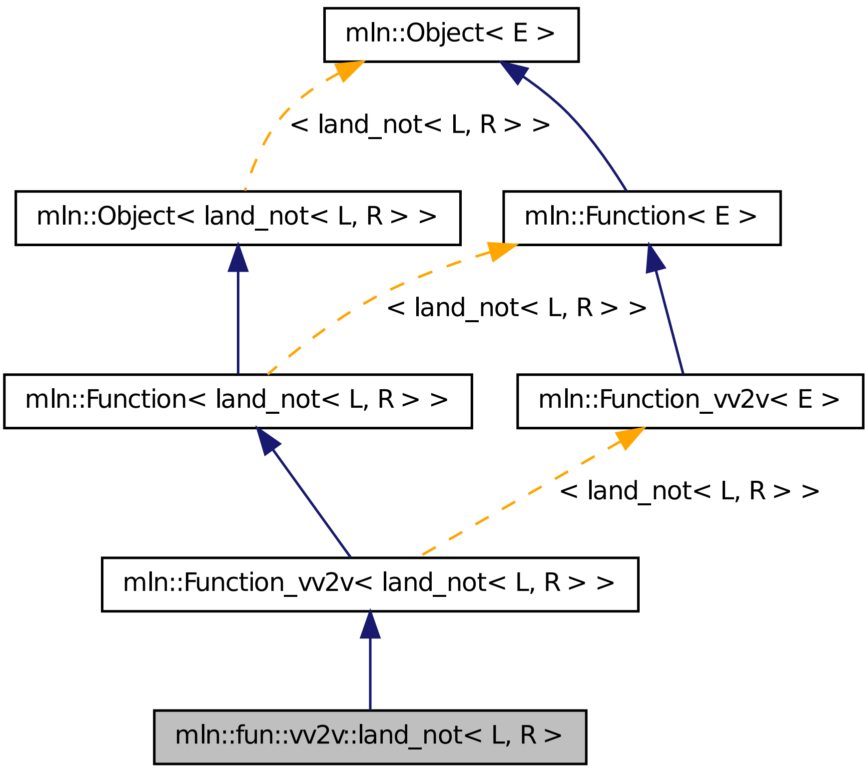
Definition at line 48 of file fun/vv2v/land.hh.

10.164 mln::fun::vv2v::land_not< L, R > Struct Template Reference

Functor computing logical and-not between two values.

`#include <land_not.hh>`

Inheritance diagram for mln::fun::vv2v::land_not< L, R >:



10.164.1 Detailed Description

template<typename L, typename R = L> struct mln::fun::vv2v::land_not< L, R >

Functor computing logical and-not between two values.

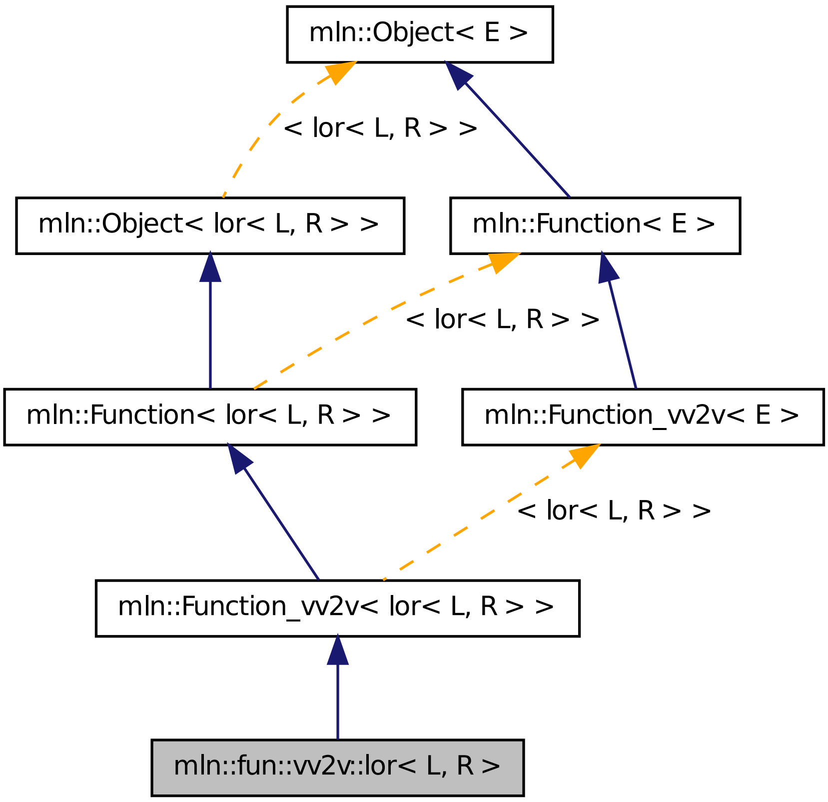
Definition at line 49 of file land_not.hh.

10.165 mln::fun::vv2v::lor< L, R > Struct Template Reference

Functor computing logical-or between two values.

```
#include <lor.hh>
```

Inheritance diagram for mln::fun::vv2v::lor< L, R >:



10.165.1 Detailed Description

template<typename L, typename R = L> struct mln::fun::vv2v::lor< L, R >

Functor computing logical-or between two values.

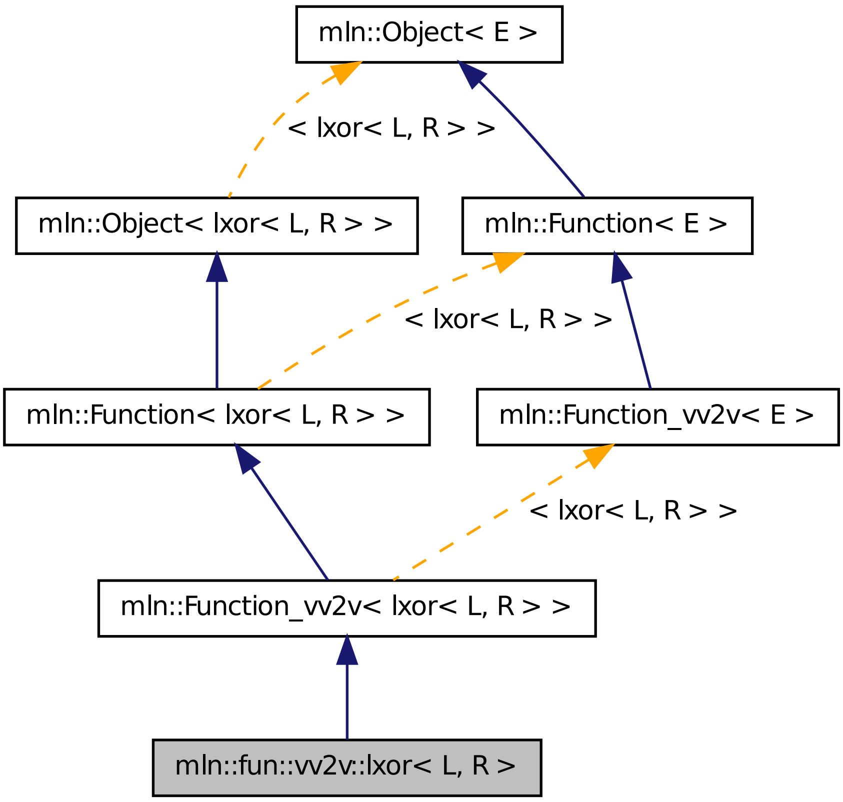
Definition at line 48 of file fun/vv2v/lor.hh.

10.166 mln::fun::vv2v::lxor< L, R > Struct Template Reference

Functor computing logical-xor between two values.

`#include <lxor.hh>`

Inheritance diagram for mln::fun::vv2v::lxor< L, R >:



10.166.1 Detailed Description

template<typename L, typename R = L> struct mln::fun::vv2v::lxor< L, R >

Functor computing logical-xor between two values.

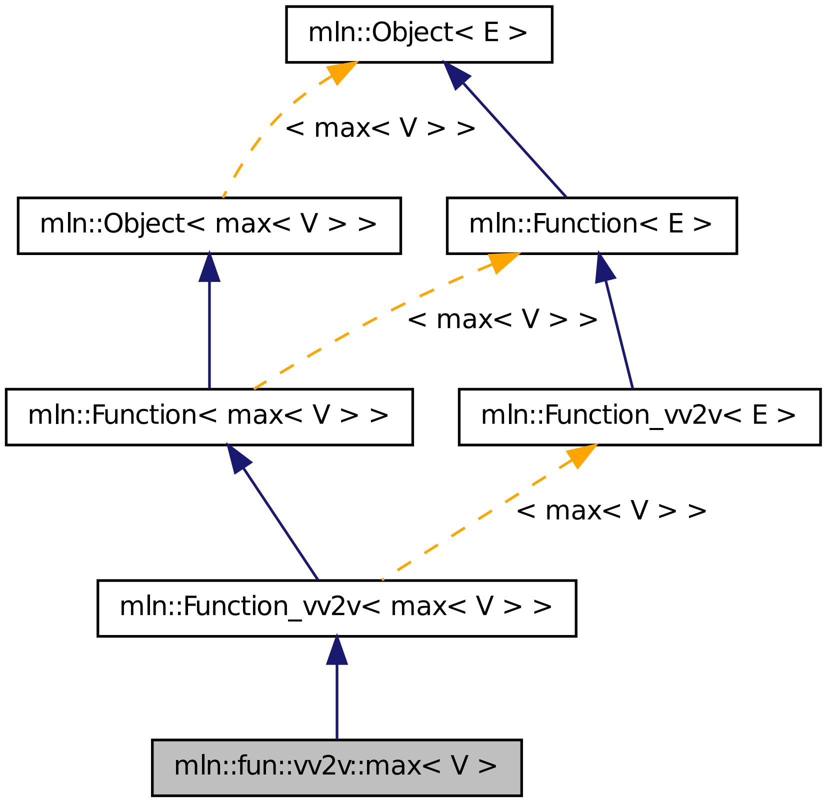
Definition at line 48 of file lxor.hh.

10.167 mln::fun::vv2v::max< V > Struct Template Reference

A functor computing the maximum of two values.

`#include <max.hh>`

Inheritance diagram for mln::fun::vv2v::max< V >:



10.167.1 Detailed Description

template<typename V> struct mln::fun::vv2v::max< V >

A functor computing the maximum of two values.

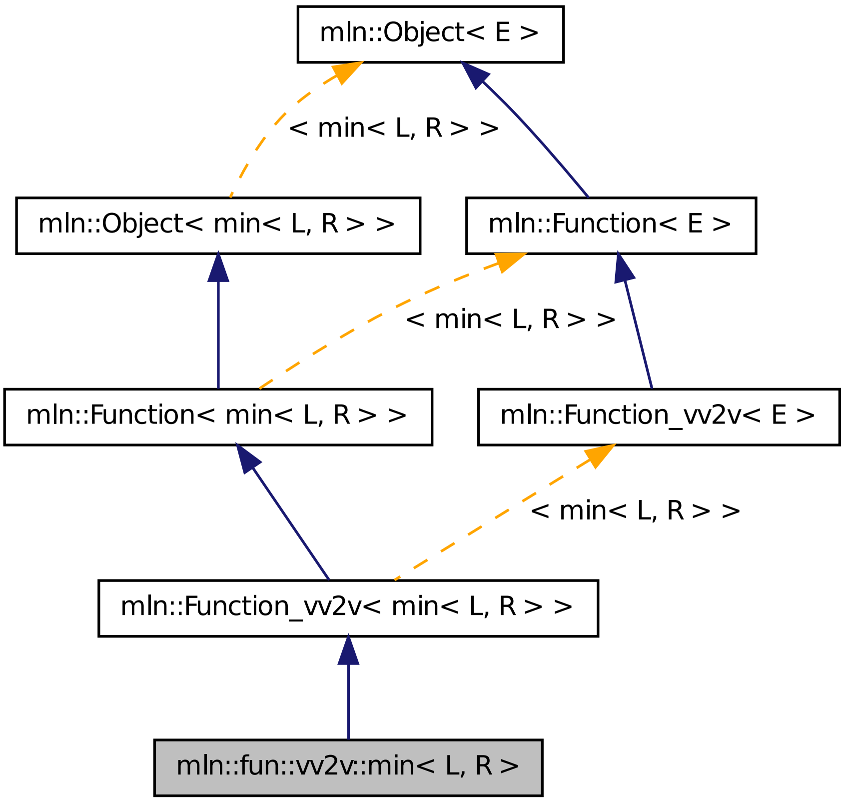
Definition at line 49 of file fun/vv2v/max.hh.

10.168 mln::fun::vv2v::min< L, R > Struct Template Reference

A functor computing the minimum of two values.

```
#include <min.hh>
```

Inheritance diagram for mln::fun::vv2v::min< L, R >:



10.168.1 Detailed Description

template<typename L, typename R = L> struct mln::fun::vv2v::min< L, R >

A functor computing the minimum of two values.

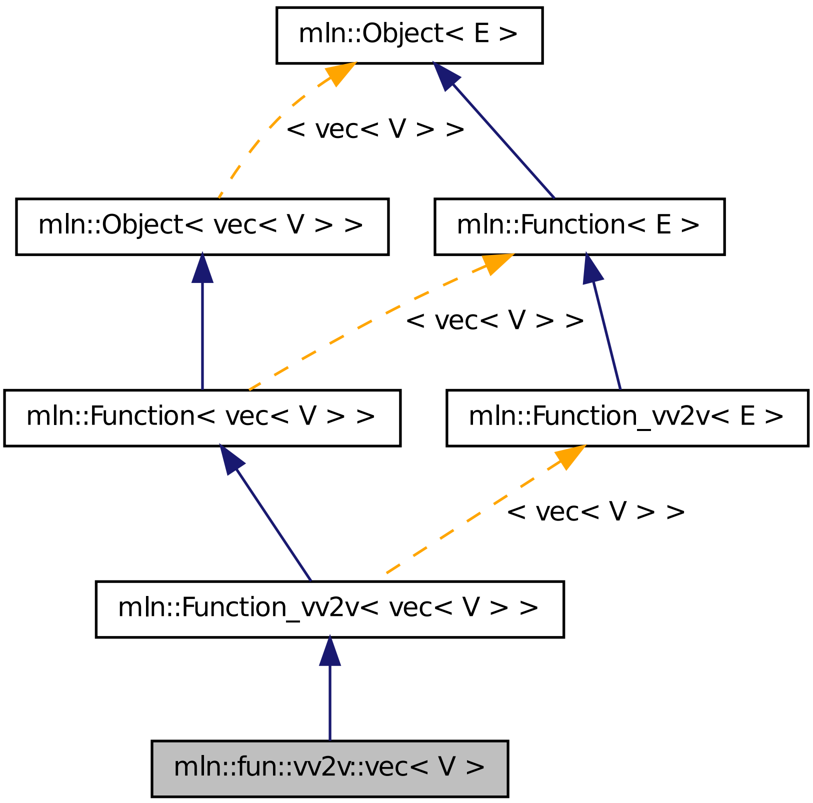
Definition at line 50 of file fun/vv2v/min.hh.

10.169 mln::fun::vv2v::vec< V > Struct Template Reference

A functor computing the vecimum of two values.

`#include <vec.hh>`

Inheritance diagram for mln::fun::vv2v::vec< V >:



10.169.1 Detailed Description

template<typename V> struct mln::fun::vv2v::vec< V >

A functor computing the vecimum of two values.

Definition at line 50 of file fun/vv2v/vec.hh.

10.170 mln::fun::x2p::closest_point< P > Struct Template Reference

FIXME: doxygen + concept checking.

`#include <closest_point.hh>`

10.170.1 Detailed Description

template<typename P> struct mln::fun::x2p::closest_point< P >

FIXME: doxygen + concept checking.

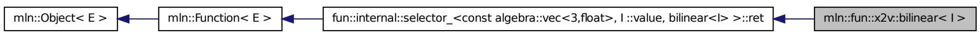
Definition at line 45 of file closest_point.hh.

10.171 mln::fun::x2v::bilinear< I > Struct Template Reference

Represent a bilinear interolation of values from an underlying image.

```
#include <bilinear.hh>
```

Inheritance diagram for mln::fun::x2v::bilinear< I >:



Public Member Functions

- template< typename T >
  I::value operator() (const algebra::vec< 3, T > &v) const

  Bilinear filtering on 3d images. Work on slices.

- template< typename T >
  I::value operator() (const algebra::vec< 2, T > &v) const

  Bilinear filtering on 2d images.

10.171.1 Detailed Description

template<typename I> struct mln::fun::x2v::bilinear< I >

Represent a bilinear interolation of values from an underlying image.

Definition at line 52 of file bilinear.hh.

10.171.2 Member Function Documentation

10.171.2.1 template< typename I > template< typename T > I::value mln::fun::x2v::bilinear< I >::operator() (const algebra::vec< 2, T > & *v*) const

Bilinear filtering on 2d images.

Definition at line 86 of file bilinear.hh.

10.171.2.2 template<typename I > template<typename T > I::value mln::fun::x2v::bilinear< I >::operator() (const algebra::vec< 3, T > & *v*) const

Bilinear filtering on 3d images. Work on slices.

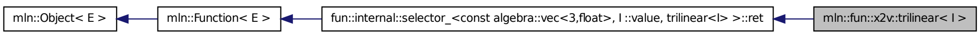
Definition at line 132 of file bilinear.hh.

10.172 mln::fun::x2v::trilinear< I > Struct Template Reference

Represent a trilinear interolation of values from an underlying image.

```
#include <trilinear.hh>
```

Inheritance diagram for mln::fun::x2v::trilinear< I >:



10.172.1 Detailed Description

template<typename I> struct mln::fun::x2v::trilinear< I >

Represent a trilinear interolation of values from an underlying image.

Definition at line 53 of file trilinear.hh.

10.173 mln::fun::x2x::composed< T2, T1 > Struct Template Reference

Represent a composition of two transformations.

```
#include <composed.hh>
```

Public Member Functions

- composed ()

  Constructor without argument.

- composed (const T2 &f, const T1 &g)

  Constructor with the two transformation to be composed.

10.173.1 Detailed Description

template<typename T2, typename T1> struct mln::fun::x2x::composed< T2, T1 >

Represent a composition of two transformations.

Definition at line 144 of file composed.hh.

10.173.2 Constructor & Destructor Documentation

10.173.2.1 template<typename T2, typename T1> mln::fun::x2x::composed< T2, T1 >::composed ( ) [inline]

Constructor without argument.

Definition at line 153 of file composed.hh.

10.173.2.2 template<typename T2, typename T1> mln::fun::x2x::composed< T2, T1 >::composed (const T2 & *f*, const T1 & *g*) [inline]

Constructor with the two transformation to be composed.

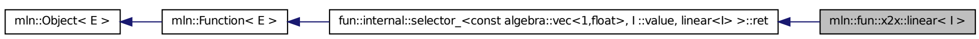
Definition at line 156 of file composed.hh.

10.174 mln::fun::x2x::linear< I > Struct Template Reference

Represent a linear interolation of values from an underlying image.

#include <linear.hh>

Inheritance diagram for mln::fun::x2x::linear< I >:



Public Member Functions

- linear (const I &ima)

  Constructor with the underlying image.

- template<typename C >
  I::value operator() (const algebra::vec< 1, C > &v) const

  Return the interpolated value in the underlying image at the given 'point' v.

Public Attributes

- const I & ima

  Underlying image.

10.174.1 Detailed Description

template<typename I> struct mln::fun::x2x::linear< I >

Represent a linear interolation of values from an underlying image.

Definition at line 53 of file x2v/linear.hh.

10.174.2 Constructor & Destructor Documentation

10.174.2.1 template<typename I > mln::fun::x2x::linear< I >::linear (const I & *ima*)

Constructor with the underlying image.

Definition at line 77 of file x2v/linear.hh.

10.174.3 Member Function Documentation

10.174.3.1 template<typename I > template<typename C > I::value mln::fun::x2x::linear< I >::operator() (const algebra::vec< 1, C > & *v*) const

Return the interpolated value in the underlying image at the given 'point' v.

Definition at line 85 of file x2v/linear.hh.

10.174.4 Member Data Documentation

10.174.4.1 template<typename I > const I& mln::fun::x2x::linear< I >::ima

Underlying image.

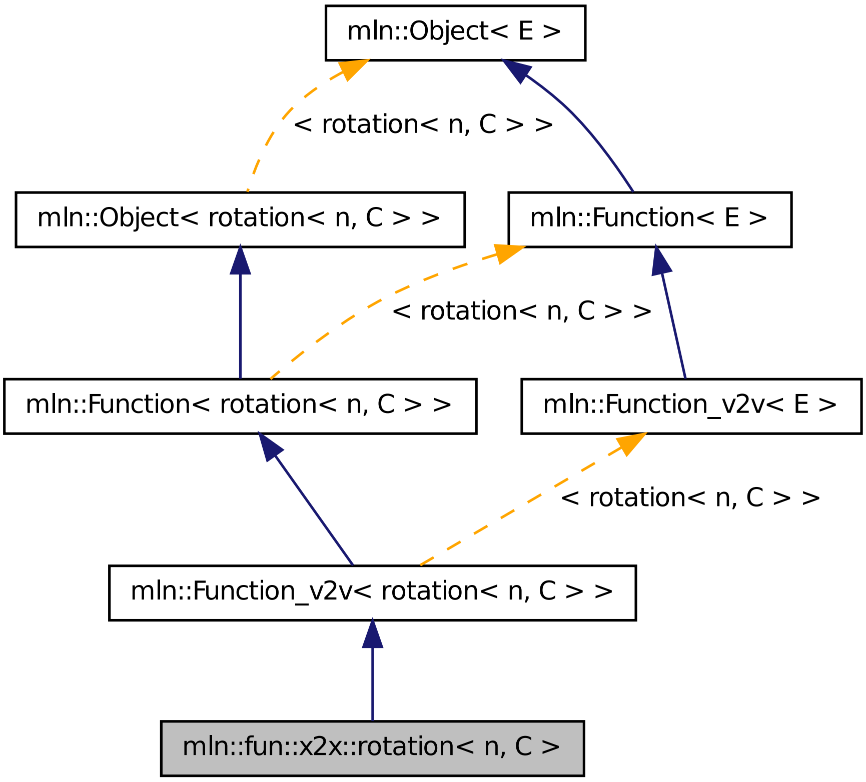
Definition at line 70 of file x2v/linear.hh.

10.175 mln::fun::x2x::rotation< n, C > Struct Template Reference

Represent a rotation function.

`#include <rotation.hh>`

Inheritance diagram for mln::fun::x2x::rotation< n, C >:



Public Types

- typedef C data_t

  Type of the underlying data stored in vectors and matrices.

- typedef rotation< n, C > invert

  Type of the inverse function.

Public Member Functions

- invert inv () const

  Return the inverse function.

- algebra::vec< n, C > operator() (const algebra::vec< n, C > &v) const

  Perform the rotation of the given vector.

- rotation ()

  Constructor without argument.

- rotation (const algebra::quat &q)

  Constructor with quaternion.

- rotation (const algebra::h_mat< n, C > &m)

  Constructor with h_mat.

- rotation (C alpha, const algebra::vec< n, C > &axis)

  Constructor with radian alpha and a facultative direction (rotation axis).

- void set_alpha (C alpha)

  Set a new grade alpha.

- void set_axis (const algebra::vec< n, C > &axis)

  Set a new rotation axis.

10.175.1 Detailed Description

template<unsigned n, typename C> struct mln::fun::x2x::rotation< n, C >

Represent a rotation function.

Definition at line 147 of file rotation.hh.

10.175.2 Member Typedef Documentation

10.175.2.1 template<unsigned n, typename C > typedef C mln::fun::x2x::rotation< n, C >::data_t

Type of the underlying data stored in vectors and matrices.

Definition at line 152 of file rotation.hh.

10.175.2.2 template<unsigned n, typename C > typedef rotation<n,C> mln::fun::x2x::rotation< n, C >::invert

Type of the inverse function.

Definition at line 155 of file rotation.hh.

10.175.3 Constructor & Destructor Documentation

10.175.3.1 template<unsigned n, typename C > mln::fun::x2x::rotation< n, C >::rotation ( ) [inline]

Constructor without argument.

Definition at line 192 of file rotation.hh.

10.175.3.2 template<unsigned n, typename C > mln::fun::x2x::rotation< n, C >::rotation (C *alpha*, const algebra::vec< n, C > & *axis*) [inline]

Constructor with radian alpha and a facultative direction (rotation axis).

Definition at line 198 of file rotation.hh.

10.175.3.3 template<unsigned n, typename C > mln::fun::x2x::rotation< n, C >::rotation (const algebra::quat & *q*) [inline]

Constructor with quaternion.

Definition at line 208 of file rotation.hh.

References mln::make::h_mat().

10.175.3.4 template<unsigned n, typename C > mln::fun::x2x::rotation< n, C >::rotation (const algebra::h_mat< n, C > & *m*) [inline]

Constructor with h_mat.

Definition at line 238 of file rotation.hh.

10.175.4 Member Function Documentation

10.175.4.1 template<unsigned n, typename C > rotation< n, C > mln::fun::x2x::rotation< n, C >::inv ( ) const [inline]

Return the inverse function.

Definition at line 265 of file rotation.hh.

10.175.4.2 template<unsigned n, typename C > algebra::vec< n, C > mln::fun::x2x::rotation< n, C >::operator() (const algebra::vec< n, C > & *v*) const [inline]

Perform the rotation of the given vector.

Definition at line 247 of file rotation.hh.

10.175.4.3 template<unsigned n, typename C > void mln::fun::x2x::rotation< n, C >::set_alpha (C *alpha*) [inline]

Set a new grade alpha.

Definition at line 274 of file rotation.hh.

10.175.4.4 template<unsigned n, typename C > void mln::fun::x2x::rotation< n, C >::set_axis (const algebra::vec< n, C > & *axis*) [inline]

Set a new rotation axis.

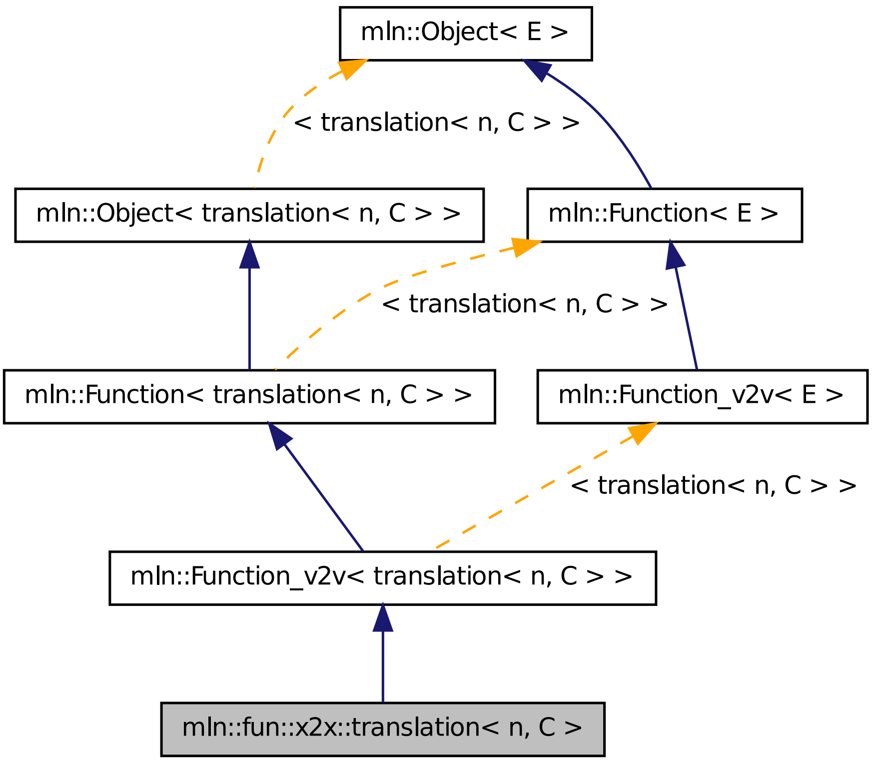
Definition at line 283 of file rotation.hh.

10.176 mln::fun::x2x::translation< n, C > Struct Template Reference

Translation function-object.

`#include <translation.hh>`

Inheritance diagram for mln::fun::x2x::translation< n, C >:



Public Types

- typedef C data_t

  Type of the underlying data stored in vectors and matrices.

- typedef translation< n, C > invert

  Type of the inverse function.

Public Member Functions

- invert inv () const

Return the inverse function.

- algebra::vec< n, C > operator() (const algebra::vec< n, C > &v) const

  Perform the translation of the given vector.

- void set_t (const algebra::vec< n, C > &t)

  Set a net translation vector.

- const algebra::vec< n, C > & t () const

  Return the translation vector.

- translation (const algebra::vec< n, C > &t)

  Constructor with the translation vector.

- translation ()

  Constructor without argument.

10.176.1 Detailed Description

template<unsigned n, typename C> struct mln::fun::x2x::translation< n, C >

Translation function-object.

Definition at line 52 of file x2x/translation.hh.

10.176.2 Member Typedef Documentation

10.176.2.1 template<unsigned n, typename C > typedef C mln::fun::x2x::translation< n, C >::data_t

Type of the underlying data stored in vectors and matrices.

Definition at line 59 of file x2x/translation.hh.

10.176.2.2 template<unsigned n, typename C > typedef translation<n,C> mln::fun::x2x::translation< n, C >::invert

Type of the inverse function.

Definition at line 62 of file x2x/translation.hh.

10.176.3 Constructor & Destructor Documentation

10.176.3.1 template<unsigned n, typename C > mln::fun::x2x::translation< n, C >::translation ( ) [inline]

Constructor without argument.

Definition at line 93 of file x2x/translation.hh.

10.176.3.2 template< unsigned n, typename C > mln::fun::x2x::translation< n, C >::translation (const algebra::vec< n, C > & *t*) [inline]

Constructor with the translation vector.

Definition at line 99 of file x2x/translation.hh.

10.176.4 Member Function Documentation

10.176.4.1 template< unsigned n, typename C > translation< n, C > mln::fun::x2x::translation< n, C >::inv ( ) const [inline]

Return the inverse function.

Definition at line 124 of file x2x/translation.hh.

10.176.4.2 template< unsigned n, typename C > algebra::vec< n, C > mln::fun::x2x::translation< n, C >::operator() (const algebra::vec< n, C > & *v*) const [inline]

Perform the translation of the given vector.

Definition at line 108 of file x2x/translation.hh.

10.176.4.3 template< unsigned n, typename C > void mln::fun::x2x::translation< n, C >::set_t (const algebra::vec< n, C > & *t*) [inline]

Set a net translation vector.

Definition at line 134 of file x2x/translation.hh.

10.176.4.4 template< unsigned n, typename C > const algebra::vec< n, C > & mln::fun::x2x::translation< n, C >::t ( ) const [inline]

Return the translation vector.

Definition at line 143 of file x2x/translation.hh.

10.177 mln::fun_image< F, I > Struct Template Reference

Image read through a function.

`#include <fun_image.hh>`

Inherits image_value_morpher< I, F::result, fun_image< F, I > >.

Public Types

- typedef F::result lvalue

  Return type of read-write access.

- typedef F::result rvalue

Return type of read-only access.

- typedef fun_image< tag::value_< typename F::result >, tag::image_< I > > skeleton

  Skeleton.

- typedef F::result value

  Value associated type.

Public Member Functions

- fun_image ()

  Constructor.

- fun_image (const Function_v2v< F > &f, const Image< I > &ima)

  Constructor.

- fun_image (const Image< I > &ima)

  Constructor.

- F::result operator() (const typename I::psite &p) const

  Read-only access of pixel value at point site p.

- F::result operator() (const typename I::psite &p)

  Mutable access is for reading only.

10.177.1 Detailed Description

template<typename F, typename I> struct mln::fun_image< F, I >

Image read through a function.

Definition at line 101 of file fun_image.hh.

10.177.2 Member Typedef Documentation

10.177.2.1 template<typename F, typename I> typedef F ::result mln::fun_image< F, I >::lvalue

Return type of read-write access.

Definition at line 111 of file fun_image.hh.

10.177.2.2 template<typename F, typename I> typedef F ::result mln::fun_image< F, I >::rvalue

Return type of read-only access.

Definition at line 108 of file fun_image.hh.

10.177.2.3 template<typename F, typename I> typedef fun_image< tag::value_<typename F ::result>, tag::image_<I> > mln::fun_image< F, I >::skeleton

Skeleton.

Definition at line 115 of file fun_image.hh.

10.177.2.4 template<typename F, typename I> typedef F ::result mln::fun_image< F, I >::value

Value associated type.

Definition at line 105 of file fun_image.hh.

10.177.3 Constructor & Destructor Documentation

10.177.3.1 template<typename F , typename I > mln::fun_image< F, I >::fun_image ( ) [inline]

Constructor.

Definition at line 177 of file fun_image.hh.

10.177.3.2 template<typename F , typename I > mln::fun_image< F, I >::fun_image (const Function_v2v< F > & *f*, const Image< I > & *ima*) [inline]

Constructor.

Definition at line 184 of file fun_image.hh.

10.177.3.3 template<typename F , typename I > mln::fun_image< F, I >::fun_image (const Image< I > & *ima*) [inline]

Constructor.

Definition at line 191 of file fun_image.hh.

10.177.4 Member Function Documentation

10.177.4.1 template<typename F , typename I > F::result mln::fun_image< F, I >::operator() (const typename I::psite & *p*) const [inline]

Read-only access of pixel value at point site p.

Definition at line 209 of file fun_image.hh.

10.177.4.2 template<typename F , typename I > F::result mln::fun_image< F, I >::operator() (const typename I::psite & *p*) [inline]

Mutable access is for reading only.

Definition at line 218 of file fun_image.hh.

10.178 mln::Function< E > Struct Template Reference

Base class for implementation of function-objects.

`#include <function.hh>`

Inherits mln::Object< E >.

Inherited by mln::Function_n2v< E >, mln::Function_v2v< E >, mln::Function_vv2b< E >, and mln::Function_vv2v< E >.

Protected Member Functions

- Function ()

  An operator() has to be provided.

10.178.1 Detailed Description

template<typename E> struct mln::Function< E >

Base class for implementation of function-objects. The parameter *E* is the exact type.

Definition at line 64 of file function.hh.

10.178.2 Constructor & Destructor Documentation

10.178.2.1 template<typename E > mln::Function< E >::Function ( ) [inline, protected]

An operator() has to be provided.

Its signature depends on the particular function-object one considers.

Definition at line 219 of file function.hh.

10.179 mln::Function< void > Struct Template Reference

Function category flag type.

`#include <function.hh>`

10.179.1 Detailed Description

template<> struct mln::Function< void >

Function category flag type.

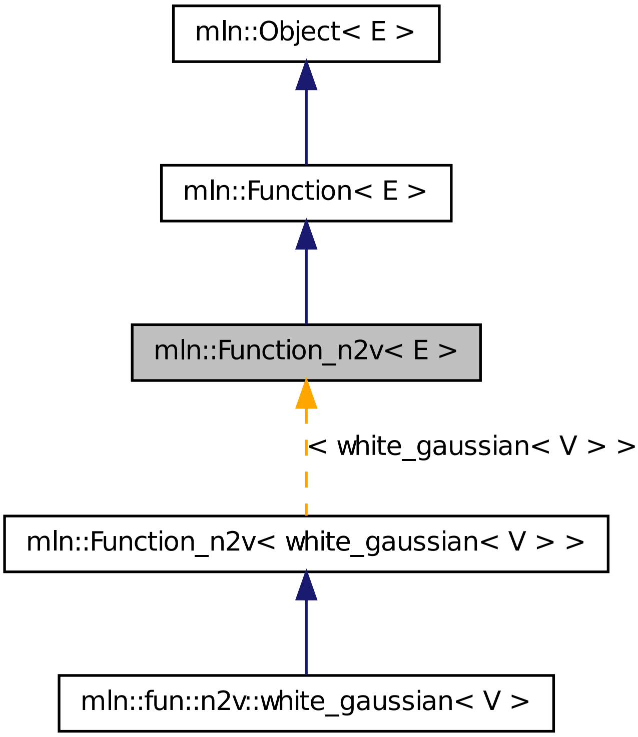
Definition at line 51 of file function.hh.

10.180 mln::Function_n2v< E > Struct Template Reference

Base class for implementation of function-objects from Nil to value.

`#include <function.hh>`

Inheritance diagram for mln::Function_n2v< E >:



10.180.1 Detailed Description

template<typename E> struct mln::Function_n2v< E >

Base class for implementation of function-objects from Nil to value. The parameter *E* is the exact type.

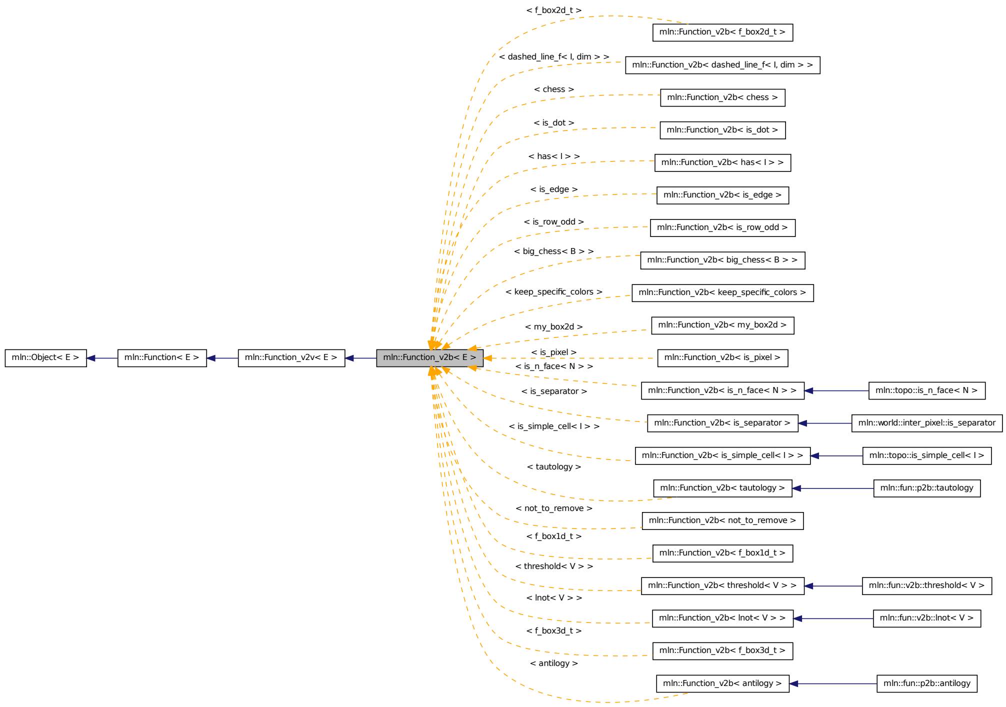
Definition at line 99 of file function.hh.

10.181 mln::Function_v2b< E > Struct Template Reference

Base class for implementation of function-objects from a value to a Boolean.

`#include <function.hh>`

Inheritance diagram for mln::Function_v2b< E >:



10.181.1 Detailed Description

template<typename E> struct mln::Function_v2b< E >

Base class for implementation of function-objects from a value to a Boolean. The parameter *E* is the exact type.

Definition at line 150 of file function.hh.

10.182 mln::Function_v2v< E > Struct Template Reference

Base class for implementation of function-objects from value to value.

`#include <function.hh>`

Inherits mln::Function< E >.

Inherited by mln::fun::C< R(∗)(A) >, mln::fun::v2v::dec< T >, mln::fun::v2v::id< T >, mln::fun::v2v::inc< T >, mln::fun::x2v::bilinear< I >, mln::fun::x2v::trilinear< I >, mln::fun::x2x::internal::helper_composed_< T2, T1, E, false >, mln::fun::x2x::internal::helper_composed_< T2, T1, E, true >, mln::fun::x2x::linear< I >, mln::fun::x2x::nneighbor< I >, and mln::Function_v2b< E > [virtual].

10.182.1 Detailed Description

template<typename E> struct mln::Function_v2v< E >

Base class for implementation of function-objects from value to value. The parameter *E* is the exact type.

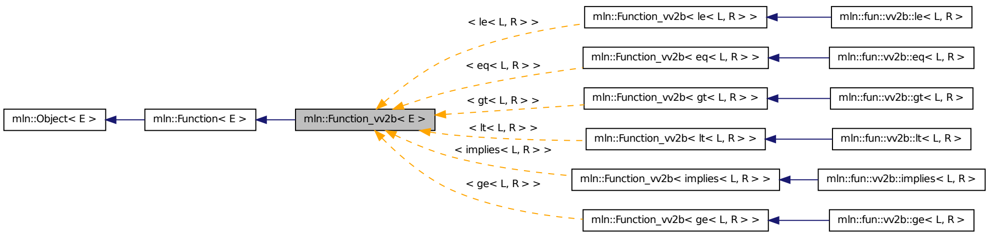
Definition at line 124 of file function.hh.

10.183 mln::Function_vv2b< E > Struct Template Reference

Base class for implementation of function-objects from a couple of values to a Boolean.

`#include <function.hh>`

Inheritance diagram for mln::Function_vv2b< E >:



10.183.1 Detailed Description

template<typename E> struct mln::Function_vv2b< E >

Base class for implementation of function-objects from a couple of values to a Boolean. The parameter *E* is the exact type.

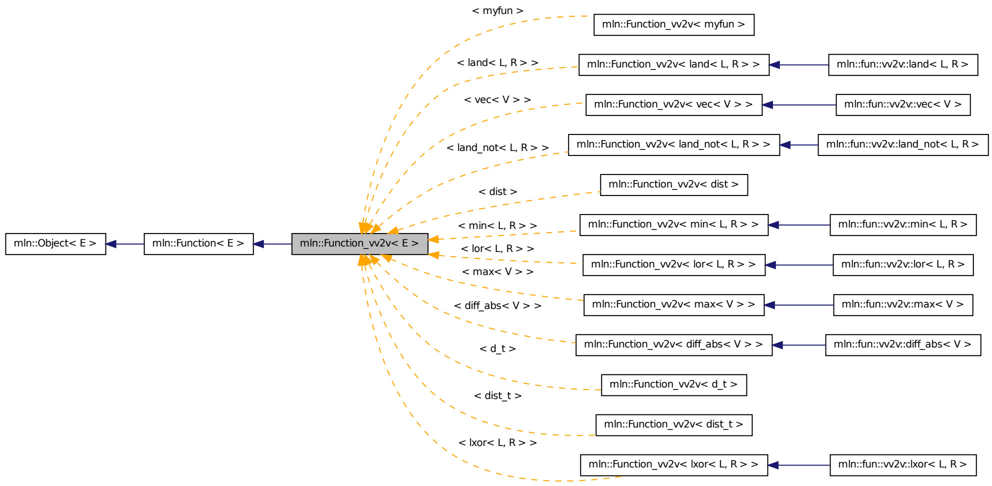
Definition at line 202 of file function.hh.

10.184 mln::Function_vv2v< E > Struct Template Reference

Base class for implementation of function-objects from a couple of values to a value.

`#include <function.hh>`

Inheritance diagram for mln::Function_vv2v< E >:



10.184.1 Detailed Description

template<typename E> struct mln::Function_vv2v< E >

Base class for implementation of function-objects from a couple of values to a value. The parameter *E* is the exact type.

Definition at line 177 of file function.hh.

10.185 mln::fwd_pixter1d< I > Class Template Reference

Forward pixel iterator on a 1-D image with border.

`#include <pixter1d.hh>`

Inherits forward_pixel_iterator_base_< I, fwd_pixter1d< I > >.

Public Types

- typedef I image

    Image type.

Public Member Functions

- fwd_pixter1d (I &image)

    Constructor.

- void next ()

Go to the next element.

10.185.1 Detailed Description

template<typename I> class mln::fwd_pixter1d< I >

Forward pixel iterator on a 1-D image with border.

Definition at line 45 of file pixter1d.hh.

10.185.2 Member Typedef Documentation

10.185.2.1 template<typename I > typedef I mln::fwd_pixter1d< I >::image

Image type.

Definition at line 52 of file pixter1d.hh.

10.185.3 Constructor & Destructor Documentation

10.185.3.1 template<typename I > mln::fwd_pixter1d< I >::fwd_pixter1d (I & *image*) [inline]

Constructor.

Parameters

[in] ***image*** The image this pixel iterator is bound to.

Definition at line 96 of file pixter1d.hh.

10.185.4 Member Function Documentation

10.185.4.1 void mln::Iterator< fwd_pixter1d< I > >::next ( ) [inherited]

Go to the next element.

Warning

This is a final method; iterator classes should not re-defined this method. The actual "next" operation has to be defined through the *next_* method.

Precondition

The iterator is valid.

10.186 mln::fwd_pixter2d< I > Class Template Reference

Forward pixel iterator on a 2-D image with border.

`#include <pixter2d.hh>`

Inherits forward_pixel_iterator_base_< I, fwd_pixter2d< I > >.

Public Types

- typedef I image

  Image type.

Public Member Functions

- fwd_pixter2d (I &image)

  Constructor.

- void next ()

  Go to the next element.

10.186.1 Detailed Description

template<typename I> class mln::fwd_pixter2d< I >

Forward pixel iterator on a 2-D image with border.

Definition at line 47 of file pixter2d.hh.

10.186.2 Member Typedef Documentation

10.186.2.1 template<typename I > typedef I mln::fwd_pixter2d< I >::image

Image type.

Definition at line 54 of file pixter2d.hh.

10.186.3 Constructor & Destructor Documentation

10.186.3.1 template<typename I > mln::fwd_pixter2d< I >::fwd_pixter2d (I & *image*) `[inline]`

Constructor.

Parameters

`[in]` ***image*** The image this pixel iterator is bound to.

Definition at line 130 of file pixter2d.hh.

10.186.4 Member Function Documentation

10.186.4.1 void mln::Iterator< fwd_pixter2d< I > >::next ( ) [inherited]

Go to the next element.

Warning

This is a final method; iterator classes should not re-defined this method. The actual "next" operation has to be defined through the *next_* method.

Precondition

The iterator is valid.

10.187 mln::fwd_pixter3d< I > Class Template Reference

Forward pixel iterator on a 3-D image with border.

`#include <pixter3d.hh>`

Inherits forward_pixel_iterator_base_< I, fwd_pixter3d< I > >.

Public Types

- typedef I image
  Image type.

Public Member Functions

- fwd_pixter3d (I &image)
  Constructor.
- void next ()
  Go to the next element.

10.187.1 Detailed Description

template<typename I> class mln::fwd_pixter3d< I >

Forward pixel iterator on a 3-D image with border.

Definition at line 48 of file pixter3d.hh.

10.187.2 Member Typedef Documentation

10.187.2.1 template<typename I > typedef I mln::fwd_pixter3d< I >::image

Image type.

Definition at line 55 of file pixter3d.hh.

10.187.3 Constructor & Destructor Documentation

10.187.3.1 template<typename I > mln::fwd_pixter3d< I >::fwd_pixter3d (I & *image*) `[inline]`

Constructor.

Parameters

`[in]` ***image*** The image this pixel iterator is bound to.

Definition at line 154 of file pixter3d.hh.

10.187.4 Member Function Documentation

10.187.4.1 void mln::Iterator< fwd_pixter3d< I > >::next ( ) `[inherited]`

Go to the next element.

Warning

This is a final method; iterator classes should not re-defined this method. The actual "next" operation has to be defined through the *next_* method.

Precondition

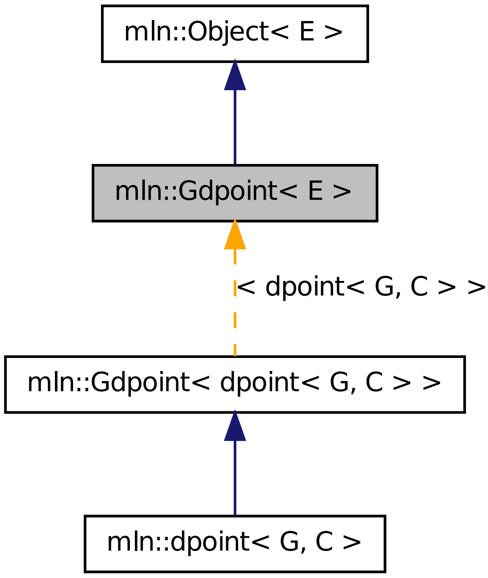
The iterator is valid.

10.188 mln::Gdpoint< E > Struct Template Reference

FIXME: Doc!

`#include <gdpoint.hh>`

Inheritance diagram for mln::Gdpoint< E >:



10.188.1 Detailed Description

template<typename E> struct mln::Gdpoint< E >

FIXME: Doc!

Definition at line 95 of file gdpoint.hh.

10.189 mln::Gdpoint< void > Struct Template Reference

Delta point site category flag type.

`#include <gdpoint.hh>`

10.189.1 Detailed Description

template<> struct mln::Gdpoint< void >

Delta point site category flag type.

Definition at line 87 of file gdpoint.hh.

10.190 mln::geom::complex_geometry< D, P > Class Template Reference

A functor returning the sites of the faces of a complex where the locations of each 0-face is stored.

`#include <complex_geometry.hh>`

Public Member Functions

- unsigned add_location (const P &p)

  Populate the set of locations.

- complex_geometry ()

  Build a complex geometry object.

- site operator() (const mln::topo::face< D > &f) const

  Retrieve the site associated to f.

10.190.1 Detailed Description

template<unsigned D, typename P> class mln::geom::complex_geometry< D, P >

A functor returning the sites of the faces of a complex where the locations of each 0-face is stored. Faces of higher dimensions are computed.

Template Parameters

D The dimension of the complex.

P The type of the location of a 0-face.

Locations of 0-face are usually points (hence the `P` above), but can possibly be any (default-constructible) values.

The functor returns a std::vector of locations: 0-faces are singletons, 1-faces are (usually) pairs, faces of higher dimensions are arrays of locations.

Note that for consistency reasons w.r.t. the return type of operator(), returned sites are always *arrays* of locations attached to 0-faces; hence the returned singletons (of locations) for 0-faces.

Definition at line 88 of file geom/complex_geometry.hh.

10.190.2 Constructor & Destructor Documentation

10.190.2.1 template<unsigned D, typename P > mln::geom::complex_geometry< D, P >::complex_geometry ( ) `[inline]`

Build a complex geometry object.

Definition at line 132 of file geom/complex_geometry.hh.

10.190.3 Member Function Documentation

10.190.3.1 template< unsigned D, typename P > unsigned mln::geom::complex_geometry< D, P >::add_location (const P & *p*) [inline]

Populate the set of locations.

Append a new location *p*. Return the index of the newly created location (which should semantically match the id of the corresonding 0-face in the complex).

Definition at line 140 of file geom/complex_geometry.hh.

10.190.3.2 template< unsigned D, typename P > util::multi_site< P > mln::geom::complex_-geometry< D, P >::operator() (const mln::topo::face< D > & *f*) const [inline]

Retrieve the site associated to *f*.

Definition at line 151 of file geom/complex_geometry.hh.

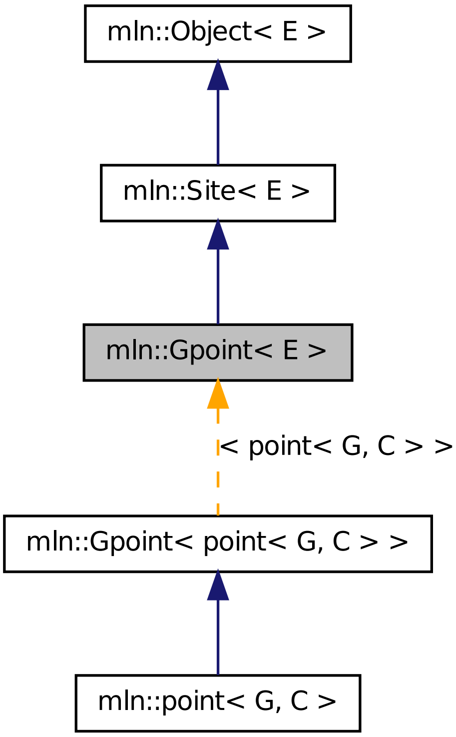
References mln::topo::face< D >::face_id(), and mln::topo::face< D >::n().

10.191 mln::Gpoint< E > Struct Template Reference

Base class for implementation of point classes.

`#include <gpoint.hh>`

Inheritance diagram for mln::Gpoint< E >:



Related Functions

(Note that these are not member functions.)

- template<typename P , typename D >
  P operator+ (const Gpoint< P > &p, const Gdpoint< D > &dp)

  Add a delta-point `rhs` to a grid point `lhs`.

- template<typename P , typename D >
  P & operator+= (Gpoint< P > &p, const Gdpoint< D > &dp)

  Shift a point `by` a delta-point `dp`.

- template<typename L , typename R >
  L::delta operator- (const Gpoint< L > &lhs, const Gpoint< R > &rhs)

  Difference between a couple of grid point `lhs` and `rhs`.

- template<typename P , typename D >
  P & operator-= (Gpoint< P > &p, const Gdpoint< D > &dp)

Shift a point by the negate of a delta-point dp.

- template< typename P , typename D >
  P operator/ (const Gpoint< P > &p, const value::scalar_< D > &dp)

  Divise a point by a scalar s.

- template< typename P >
  std::ostream & operator<< (std::ostream &ostr, const Gpoint< P > &p)

  Print a grid point p into the output stream ostr.

- template< typename L , typename R >
  bool operator== (const Gpoint< L > &lhs, const Gpoint< R > &rhs)

  Equality comparison between a couple of grid point lhs and rhs.

10.191.1 Detailed Description

template<typename E> struct mln::Gpoint< E >

Base class for implementation of point classes. A point is an element of a space.

For instance, mln::point2d is the type of elements defined on the discrete square grid of the 2D plane.

Definition at line 115 of file gpoint.hh.

10.191.2 Friends And Related Function Documentation

10.191.2.1 template<typename P , typename D > P operator+ (const Gpoint< P > & *p*, const Gdpoint< D > & *dp*) [related]

Add a delta-point rhs to a grid point lhs.

Parameters

[in] ***p*** A grid point.

[in] ***dp*** A delta-point.

The type of dp has to compatible with the type of p.

Returns

A point (temporary object).

See also

mln::Gdpoint

Definition at line 385 of file gpoint.hh.

10.191.2.2 template<typename P , typename D > P & operator+= (Gpoint< P > & *p*, const Gdpoint< D > & *dp*) [related]

Shift a point by a delta-point dp.

Parameters

[in,out] ***p*** The targeted point.

[in] ***dp*** A delta-point.

Returns

A reference to the point p once translated by dp.

Precondition

The type of dp has to be compatible with the type of p.

Definition at line 428 of file gpoint.hh.

10.191.2.3 template<typename L , typename R > L::delta operator- (const Gpoint< L > & *lhs*, const Gpoint< R > & *rhs*) [related]

Difference between a couple of grid point lhs and rhs.

Parameters

[in] ***lhs*** A first grid point.

[in] ***rhs*** A second grid point.

Warning

There is no type promotion in Milena so the client has to make sure that both points are defined with the same type of coordinates.

Precondition

Both lhs and rhs have to be defined on the same topology and with the same type of coordinates; otherwise this test does not compile.

Postcondition

The result, dp, is such as lhs == rhs + dp.

Returns

A delta point (temporary object).

See also

mln::Gdpoint

Definition at line 374 of file gpoint.hh.

10.191.2.4 template<typename P , typename D > P & operator-= (Gpoint< P > & *p*, const Gdpoint< D > & *dp*) [related]

Shift a point by the negate of a delta-point dp.

Parameters

[in,out] ***p*** The targeted point.

[in] ***dp*** A delta-point.

Returns

A reference to the point p once translated by - dp.

Precondition

The type of dp has to be compatible with the type of p.

Definition at line 436 of file gpoint.hh.

10.191.2.5 template<typename P , typename D > P operator/ (const Gpoint< P > & *p*, const value::scalar_< D > & *dp*) [related]

Divise a point by a scalar s.

Parameters

[in,out] ***p*** The targeted point.

[in] ***dp*** A scalar.

Returns

A reference to the point p once divised by s.

10.191.2.6 template<typename P > std::ostream & operator<< (std::ostream & *ostr*, const Gpoint< P > & *p*) [related]

Print a grid point p into the output stream ostr.

Parameters

[in,out] ***ostr*** An output stream.

[in] ***p*** A grid point.

Returns

The modified output stream ostr.

Definition at line 417 of file gpoint.hh.

References mln::debug::format().

10.191.2.7 template<typename L , typename R > bool operator== (const Gpoint< L > & *lhs*, const Gpoint< R > & *rhs*) [related]

Equality comparison between a couple of grid point `lhs` and `rhs`.

Parameters

`[in]` ***lhs*** A first grid point.
`[in]` ***rhs*** A second grid point.

Precondition

Both `lhs` and `rhs` have to be defined on the same topology; otherwise this test does not compile.

Returns

True if both grid points have the same coordinates, otherwise false.

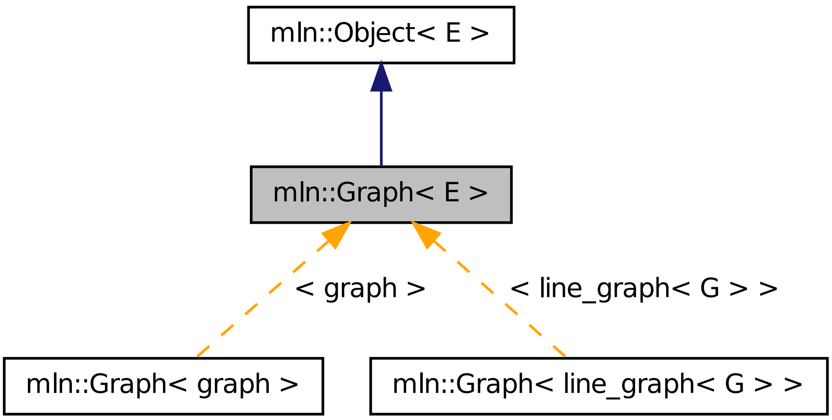
Definition at line 365 of file gpoint.hh.

10.192 mln::Graph< E > Struct Template Reference

Base class for implementation of graph classes.

`#include <graph.hh>`

Inheritance diagram for mln::Graph< E >:



10.192.1 Detailed Description

template<typename E> struct mln::Graph< E >

Base class for implementation of graph classes.

See also

mln::doc::Graph for a complete documentation of this class contents.

Definition at line 57 of file mln/core/concept/graph.hh.

10.193 mln::graph::attribute::card_t Struct Reference

Compute the cardinality of every component in a graph.

`#include <card.hh>`

Public Types

- typedef util::array< unsigned > result

    Type of the computed value.

10.193.1 Detailed Description

Compute the cardinality of every component in a graph.

Returns

An array with the cardinality for each component. Components are labeled from 0.

Definition at line 61 of file graph/attribute/card.hh.

10.193.2 Member Typedef Documentation

10.193.2.1 typedef util::array<unsigned> mln::graph::attribute::card_t::result

Type of the computed value.

Definition at line 64 of file graph/attribute/card.hh.

10.194 mln::graph::attribute::representative_t Struct Reference

Compute the representative vertex of every component in a graph.

`#include <representative.hh>`

Public Types

- typedef util::array< unsigned > result

    Type of the computed value.

10.194.1 Detailed Description

Compute the representative vertex of every component in a graph.

Returns

An array with the representative for each component. Components are labeled from 0.

Definition at line 63 of file representative.hh.

10.194.2 Member Typedef Documentation

10.194.2.1 typedef util::array<unsigned> mln::graph::attribute::representative_t::result

Type of the computed value.

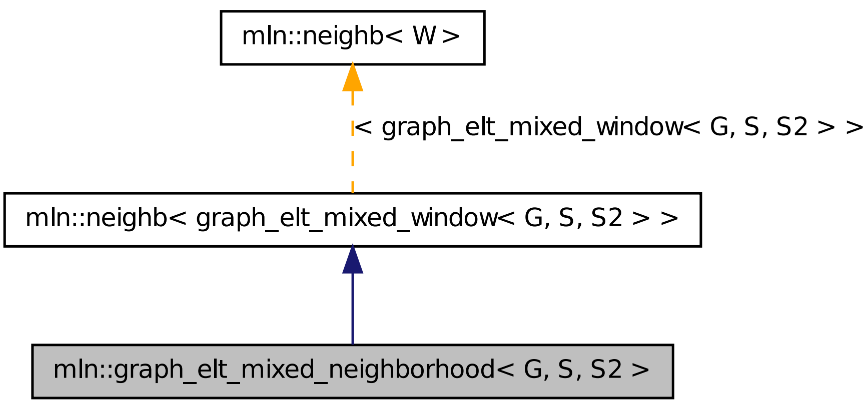
Definition at line 66 of file representative.hh.

10.195 mln::graph_elt_mixed_neighborhood< G, S, S2 > Struct Template Reference

Elementary neighborhood on graph class.

`#include <graph_elt_mixed_neighborhood.hh>`

Inheritance diagram for mln::graph_elt_mixed_neighborhood< G, S, S2 >:



Public Types

- typedef neighb_bkd_niter< graph_elt_mixed_window< G, S, S2 > > bkd_niter

  Backward site iterator associated type.

- typedef neighb_fwd_niter< graph_elt_mixed_window< G, S, S2 > > fwd_niter

  Forward site iterator associated type.

- typedef fwd_niter niter

  Site iterator associated type.

10.195.1 Detailed Description

template<typename G, typename S, typename S2> struct mln::graph_elt_mixed_neighborhood< G, S, S2 >

Elementary neighborhood on graph class.

Template Parameters

G is a graph type.

S is a site set type.

S2 is the site set type of the neighbors.

Definition at line 48 of file graph_elt_mixed_neighborhood.hh.

10.195.2 Member Typedef Documentation

10.195.2.1 typedef neighb_bkd_niter<graph_elt_mixed_window< G, S, S2 > > mln::neighb< graph_elt_mixed_window< G, S, S2 > >::bkd_niter [inherited]

Backward site iterator associated type.

Definition at line 87 of file mln/core/neighb.hh.

10.195.2.2 typedef neighb_fwd_niter<graph_elt_mixed_window< G, S, S2 > > mln::neighb< graph_elt_mixed_window< G, S, S2 > >::fwd_niter [inherited]

Forward site iterator associated type.

Definition at line 84 of file mln/core/neighb.hh.

10.195.2.3 typedef fwd_niter mln::neighb< graph_elt_mixed_window< G, S, S2 > >::niter [inherited]

Site iterator associated type.

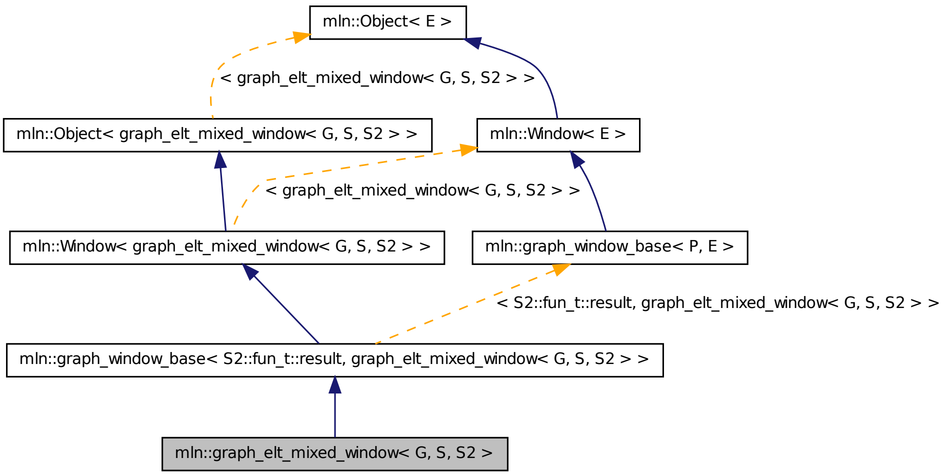
Definition at line 90 of file mln/core/neighb.hh.

10.196 mln::graph_elt_mixed_window< G, S, S2 > Class Template Reference

Elementary window on graph class.

`#include <graph_elt_mixed_window.hh>`

Inheritance diagram for mln::graph_elt_mixed_window< G, S, S2 >:



Public Types

- typedef super_::target target

  Associated types.

- typedef target::psite psite

  The type of psite corresponding to the window.

- typedef S::psite center_t

  Type of the window center element.

- typedef target::graph_element graph_element

  Type of the graph element pointed by this iterator.

- typedef graph_window_piter< target, self_, nbh_fwd_iter_ > fwd_qiter

  Site_Iterator type to browse the psites of the window w.r.t.

- typedef graph_window_piter< target, self_, nbh_bkd_iter_ > bkd_qiter

  Site_Iterator type to browse the psites of the window w.r.t.

- typedef fwd_qiter qiter

  The default qiter type.

- typedef S2::fun_t::result site

  Associated types.

Public Member Functions

- bool is_valid () const

  Return true by default.

- bool is_empty () const

  Interface of the concept Window.
- bool is_centered () const

  Is the window centered?
- bool is_symmetric () const

  Is the window symmetric?
- unsigned delta () const

  Return the maximum coordinate gap between the window center and a window point.
- self_ & sym ()

  Apply a central symmetry to the target window.

10.196.1 Detailed Description

template<typename G, typename S, typename S2> class mln::graph_elt_mixed_window< G, S, S2 >

Elementary window on graph class. `G` is the graph type. `S` is an image site set from where the center is extracted. `S2` is an image site set from where the neighbors are extracted.

Definition at line 109 of file graph_elt_mixed_window.hh.

10.196.2 Member Typedef Documentation

10.196.2.1 template<typename G , typename S , typename S2 > typedef graph_window_piter<target,self_,nbh_bkd_iter_> mln::graph_elt_mixed_window< G, S, S2 >::bkd_qiter

Site_Iterator type to browse the psites of the window w.r.t.

the reverse ordering of vertices.

Definition at line 139 of file graph_elt_mixed_window.hh.

10.196.2.2 template<typename G , typename S , typename S2 > typedef S ::psite mln::graph_elt_mixed_window< G, S, S2 >::center_t

Type of the window center element.

Definition at line 128 of file graph_elt_mixed_window.hh.

10.196.2.3 template<typename G , typename S , typename S2 > typedef graph_window_piter<target,self_,nbh_fwd_iter_> mln::graph_elt_mixed_window< G, S, S2 >::fwd_qiter

Site_Iterator type to browse the psites of the window w.r.t.

the ordering of vertices.

Definition at line 135 of file graph_elt_mixed_window.hh.

10.196.2.4 template<typename G , typename S , typename S2 > typedef target ::graph_element mln::graph_elt_mixed_window< G, S, S2 >::graph_element

Type of the graph element pointed by this iterator.

Definition at line 131 of file graph_elt_mixed_window.hh.

10.196.2.5 template<typename G , typename S , typename S2 > typedef target ::psite mln::graph_elt_mixed_window< G, S, S2 >::psite

The type of psite corresponding to the window.

Definition at line 125 of file graph_elt_mixed_window.hh.

10.196.2.6 template<typename G , typename S , typename S2 > typedef fwd_qiter mln::graph_elt_mixed_window< G, S, S2 >::qiter

The default qiter type.

Definition at line 142 of file graph_elt_mixed_window.hh.

10.196.2.7 typedef S2::fun_t::result mln::graph_window_base< S2::fun_t::result , graph_elt_mixed_window< G, S, S2 > >::site [inherited]

Associated types.

The type of site corresponding to the window.

Definition at line 48 of file graph_window_base.hh.

10.196.2.8 template<typename G , typename S , typename S2 > typedef super_::target mln::graph_elt_mixed_window< G, S, S2 >::target

Associated types.

Definition at line 123 of file graph_elt_mixed_window.hh.

10.196.3 Member Function Documentation

10.196.3.1 unsigned mln::graph_window_base< S2::fun_t::result , graph_elt_mixed_window< G, S, S2 > >::delta ( ) const [inherited]

Return the maximum coordinate gap between the window center and a window point.

10.196.3.2 bool mln::graph_window_base< S2::fun_t::result , graph_elt_mixed_window< G, S, S2 > >::is_centered ( ) const [inherited]

Is the window centered?

10.196.3.3 bool mln::graph_window_base< S2::fun_t::result , graph_elt_mixed_window< G, S, S2 > >::is_empty ( ) const [inherited]

Interface of the concept Window.

Is the window is empty?

10.196.3.4 bool mln::graph_window_base< S2::fun_t::result , graph_elt_mixed_window< G, S, S2 > >::is_symmetric ( ) const [inherited]

Is the window symmetric?

10.196.3.5 bool mln::graph_window_base< S2::fun_t::result , graph_elt_mixed_window< G, S, S2 > >::is_valid ( ) const [inherited]

Return true by default.

10.196.3.6 self_& mln::graph_window_base< S2::fun_t::result , graph_elt_mixed_window< G, S, S2 > >::sym ( ) [inherited]

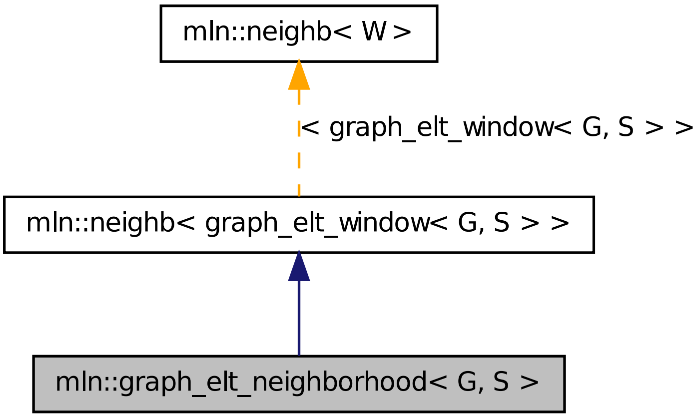
Apply a central symmetry to the target window.

10.197 mln::graph_elt_neighborhood< G, S > Struct Template Reference

Elementary neighborhood on graph class.

`#include <graph_elt_neighborhood.hh>`

Inheritance diagram for mln::graph_elt_neighborhood< G, S >:



Public Types

- typedef neighb_bkd_niter< graph_elt_window< G, S > > bkd_niter

  Backward site iterator associated type.

- typedef neighb_fwd_niter< graph_elt_window< G, S > > fwd_niter

  Forward site iterator associated type.

- typedef fwd_niter niter

  Site iterator associated type.

10.197.1 Detailed Description

template<typename G, typename S> struct mln::graph_elt_neighborhood< G, S >

Elementary neighborhood on graph class.

Template Parameters

G is a graph type.

S is a site set type.

Definition at line 47 of file graph_elt_neighborhood.hh.

10.197.2 Member Typedef Documentation

10.197.2.1 typedef neighb_bkd_niter<graph_elt_window< G, S > > mln::neighb< graph_elt_window< G, S > >::bkd_niter [inherited]

Backward site iterator associated type.

Definition at line 87 of file mln/core/neighb.hh.

10.197.2.2 typedef neighb_fwd_niter<graph_elt_window< G, S > > mln::neighb< graph_elt_window< G, S > >::fwd_niter [inherited]

Forward site iterator associated type.

Definition at line 84 of file mln/core/neighb.hh.

10.197.2.3 typedef fwd_niter mln::neighb< graph_elt_window< G, S > >::niter [inherited]

Site iterator associated type.

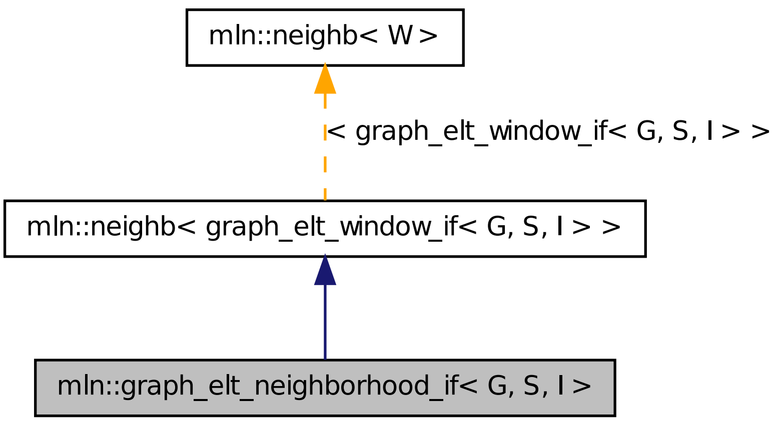
Definition at line 90 of file mln/core/neighb.hh.

10.198 mln::graph_elt_neighborhood_if< G, S, I > Struct Template Reference

Elementary neighborhood_if on graph class.

`#include <graph_elt_neighborhood_if.hh>`

Inheritance diagram for mln::graph_elt_neighborhood_if< G, S, I >:



Public Types

- typedef neighb_bkd_niter< graph_elt_window_if< G, S, I > > bkd_niter

    Backward site iterator associated type.

- typedef neighb_fwd_niter< graph_elt_window_if< G, S, I > > fwd_niter

    Forward site iterator associated type.

- typedef fwd_niter niter

    Site iterator associated type.

Public Member Functions

- graph_elt_neighborhood_if ()

    Constructors @{ Construct an invalid neighborhood.

- graph_elt_neighborhood_if (const Image< I > &mask)
- const I & mask () const

    @}

10.198.1 Detailed Description

template<typename G, typename S, typename I> struct mln::graph_elt_neighborhood_if< G, S, I >

Elementary neighborhood_if on graph class.

Definition at line 43 of file graph_elt_neighborhood_if.hh.

10.198.2 Member Typedef Documentation

10.198.2.1 typedef neighb_bkd_niter<graph_elt_window_if< G, S, I > > mln::neighb< graph_elt_window_if< G, S, I > >::bkd_niter [inherited]

Backward site iterator associated type.

Definition at line 87 of file mln/core/neighb.hh.

10.198.2.2 typedef neighb_fwd_niter<graph_elt_window_if< G, S, I > > mln::neighb< graph_elt_window_if< G, S, I > >::fwd_niter [inherited]

Forward site iterator associated type.

Definition at line 84 of file mln/core/neighb.hh.

10.198.2.3 typedef fwd_niter mln::neighb< graph_elt_window_if< G, S, I > >::niter [inherited]

Site iterator associated type.

Definition at line 90 of file mln/core/neighb.hh.

10.198.3 Constructor & Destructor Documentation

10.198.3.1 template<typename G , typename S , typename I > mln::graph_elt_neighborhood_if< G, S, I >::graph_elt_neighborhood_if ( ) [inline]

Constructors @{ Construct an invalid neighborhood.

Definition at line 67 of file graph_elt_neighborhood_if.hh.

10.198.3.2 template<typename G , typename S , typename I > mln::graph_elt_neighborhood_if< G, S, I >::graph_elt_neighborhood_if (const Image< I > & *mask*) [inline]

Parameters

[in] ***mask*** A graph image of Boolean.

Definition at line 74 of file graph_elt_neighborhood_if.hh.

10.198.4 Member Function Documentation

10.198.4.1 template<typename G , typename S , typename I > const I & mln::graph_elt_neighborhood_if< G, S, I >::mask ( ) const [inline]

@}

Return the graph image used as mask.

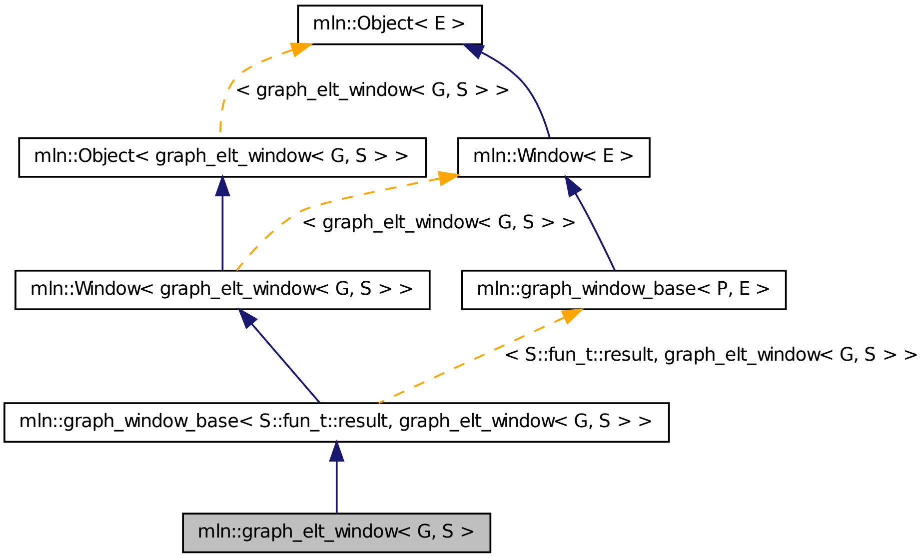
Definition at line 83 of file graph_elt_neighborhood_if.hh.

10.199 mln::graph_elt_window< G, S > Class Template Reference

Elementary window on graph class.

`#include <graph_elt_window.hh>`

Inheritance diagram for mln::graph_elt_window< G, S >:



Public Types

- typedef S target
  Associated types.
- typedef S::psite psite
  The type of psite corresponding to the window.
- typedef S::psite center_t
  Type of the window center element.
- typedef S::graph_element graph_element
  Type of the graph element pointed by this iterator.
- typedef graph_window_piter< S, self_, nbh_fwd_iter_ > fwd_qiter
  Site_Iterator type to browse the psites of the window w.r.t.
- typedef graph_window_piter< S, self_, nbh_bkd_iter_ > bkd_qiter
  Site_Iterator type to browse the psites of the window w.r.t.
- typedef fwd_qiter qiter
  The default qiter type.

- typedef S::fun_t::result site
  Associated types.

Public Member Functions

- bool is_valid () const

  Return true by default.

- bool is_empty () const

  Interface of the concept Window.

- bool is_centered () const

  Is the window centered?

- bool is_symmetric () const

  Is the window symmetric?

- unsigned delta () const

  Return the maximum coordinate gap between the window center and a window point.

- self_ & sym ()

  Apply a central symmetry to the target window.

10.199.1 Detailed Description

template<typename G, typename S> class mln::graph_elt_window< G, S >

Elementary window on graph class. `G` is the graph type. `S` is an image site set from where the center is extracted. `S2` is an image site set from where the neighbors are extracted.

Definition at line 111 of file graph_elt_window.hh.

10.199.2 Member Typedef Documentation

10.199.2.1 template<typename G , typename S > typedef graph_window_-piter<S,self_,nbh_bkd_iter_> mln::graph_elt_window< G, S >::bkd_qiter

Site_Iterator type to browse the psites of the window w.r.t.

the reverse ordering of vertices.

Definition at line 142 of file graph_elt_window.hh.

10.199.2.2 template<typename G , typename S > typedef S ::psite mln::graph_elt_window< G, S >::center_t

Type of the window center element.

Definition at line 131 of file graph_elt_window.hh.

10.199.2.3 template<typename G , typename S > typedef graph_window_-piter<S,self_,nbh_fwd_iter_> mln::graph_elt_window< G, S >::fwd_qiter

Site_Iterator type to browse the psites of the window w.r.t.

the ordering of vertices.

Definition at line 138 of file graph_elt_window.hh.

10.199.2.4 template<typename G , typename S > typedef S ::graph_element mln::graph_elt_window< G, S >::graph_element

Type of the graph element pointed by this iterator.

Definition at line 134 of file graph_elt_window.hh.

10.199.2.5 template<typename G , typename S > typedef S ::psite mln::graph_elt_window< G, S >::psite

The type of psite corresponding to the window.

Definition at line 128 of file graph_elt_window.hh.

10.199.2.6 template<typename G , typename S > typedef fwd_qiter mln::graph_elt_window< G, S >::qiter

The default qiter type.

Definition at line 145 of file graph_elt_window.hh.

10.199.2.7 typedef S::fun_t::result mln::graph_window_base< S::fun_t::result , graph_elt_window< G, S > >::site [inherited]

Associated types.

The type of site corresponding to the window.

Definition at line 48 of file graph_window_base.hh.

10.199.2.8 template<typename G , typename S > typedef S mln::graph_elt_window< G, S >::target

Associated types.

Definition at line 125 of file graph_elt_window.hh.

10.199.3 Member Function Documentation

10.199.3.1 unsigned mln::graph_window_base< S::fun_t::result , graph_elt_window< G, S > >::delta ( ) const [inherited]

Return the maximum coordinate gap between the window center and a window point.

10.199.3.2 bool mln::graph_window_base< S::fun_t::result , graph_elt_window< G, S > >::is_centered ( ) const [inherited]

Is the window centered?

10.199.3.3 bool mln::graph_window_base< S::fun_t::result , graph_elt_window< G, S > >::is_empty ( ) const [inherited]

Interface of the concept Window.

Is the window is empty?

10.199.3.4 bool mln::graph_window_base< S::fun_t::result , graph_elt_window< G, S > >::is_symmetric ( ) const [inherited]

Is the window symmetric?

10.199.3.5 bool mln::graph_window_base< S::fun_t::result , graph_elt_window< G, S > >::is_valid ( ) const [inherited]

Return true by default.

10.199.3.6 self_& mln::graph_window_base< S::fun_t::result , graph_elt_window< G, S > >::sym ( ) [inherited]

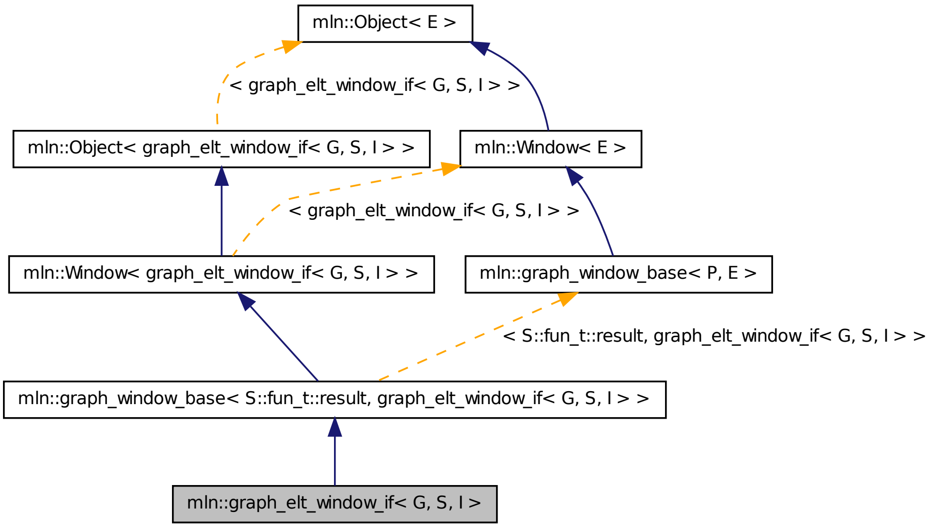
Apply a central symmetry to the target window.

10.200 mln::graph_elt_window_if< G, S, I > Class Template Reference

Custom window on graph class.

`#include <graph_elt_window_if.hh>`

Inheritance diagram for mln::graph_elt_window_if< G, S, I >:



Public Types

- typedef I mask_t

  The type of the image used as mask.

- typedef S target

  @}

- typedef target::psite psite

  The type of psite corresponding to the window.

- typedef graph_window_if_piter< target, self_, nbh_fwd_iter_ > fwd_qiter

  Site_Iterator type to browse the psites of the window w.r.t.

- typedef graph_window_if_piter< target, self_, nbh_bkd_iter_ > bkd_qiter

  Site_Iterator type to browse the psites of the window w.r.t.

- typedef fwd_qiter qiter

  The default qiter type.

- typedef S::fun_t::result site

  Associated types.

Public Member Functions

- void change_mask (const Image< I > &mask)

  Change mask image.

- graph_elt_window_if ()

  Constructor.

- graph_elt_window_if (const Image< I > &mask)
- bool is_valid () const

  Return true by default.

- const I & mask () const

  Return the graph image used as mask.

  - bool is_empty () const

    Interface of the concept Window.

  - bool is_centered () const

    Is the window centered?

  - bool is_symmetric () const

    Is the window symmetric?

  - unsigned delta () const

    Return the maximum coordinate gap between the window center and a window point.

  - self_ & sym ()

    Apply a central symmetry to the target window.

10.200.1 Detailed Description

template<typename G, typename S, typename I> class mln::graph_elt_window_if< G, S, I >

Custom window on graph class. It is defined thanks to a mask.

`G` is the graph type. `S` is the image site set. `I` is the graph image the type used as mask.

Definition at line 105 of file graph_elt_window_if.hh.

10.200.2 Member Typedef Documentation

10.200.2.1 template<typename G , typename S , typename I > typedef graph_window_-if_piter<target,self_,nbh_bkd_iter_> mln::graph_elt_window_if< G, S, I >::bkd_qiter

Site_Iterator type to browse the psites of the window w.r.t.

the reverse ordering of vertices.

Definition at line 147 of file graph_elt_window_if.hh.

10.200.2.2 template<typename G , typename S , typename I > typedef graph_window_-if_piter<target,self_,nbh_fwd_iter_> mln::graph_elt_window_if< G, S, I >::fwd_qiter

Site_Iterator type to browse the psites of the window w.r.t.

the ordering of vertices.

Definition at line 143 of file graph_elt_window_if.hh.

10.200.2.3 template<typename G , typename S , typename I > typedef I mln::graph_elt_window_if< G, S, I >::mask_t

The type of the image used as mask.

Definition at line 119 of file graph_elt_window_if.hh.

10.200.2.4 template<typename G , typename S , typename I > typedef target ::psite mln::graph_elt_window_if< G, S, I >::psite

The type of psite corresponding to the window.

Definition at line 139 of file graph_elt_window_if.hh.

10.200.2.5 template<typename G , typename S , typename I > typedef fwd_qiter mln::graph_elt_window_if< G, S, I >::qiter

The default qiter type.

Definition at line 150 of file graph_elt_window_if.hh.

10.200.2.6 typedef S::fun_t::result mln::graph_window_base< S::fun_t::result , graph_elt_window_if< G, S, I > >::site [inherited]

Associated types.

The type of site corresponding to the window.

Definition at line 48 of file graph_window_base.hh.

10.200.2.7 template<typename G , typename S , typename I > typedef S mln::graph_elt_window_if< G, S, I >::target

@}

Associated types. The image domain on which this window iterates on.

Definition at line 136 of file graph_elt_window_if.hh.

10.200.3 Constructor & Destructor Documentation

10.200.3.1 template<typename G , typename S , typename I > mln::graph_elt_window_if< G, S, I >::graph_elt_window_if ( ) [inline]

Constructor.

@{ Default. Construct an invalid window.

Definition at line 174 of file graph_elt_window_if.hh.

10.200.3.2 template<typename G , typename S , typename I > mln::graph_elt_window_if< G, S, I >::graph_elt_window_if (const Image< I > & *mask*) [inline]

Parameters

[in] ***mask*** A graph image of bool.

See also

vertex_image, edge_image.

Definition at line 181 of file graph_elt_window_if.hh.

10.200.4 Member Function Documentation

10.200.4.1 template<typename G , typename S , typename I > void mln::graph_elt_window_if< G, S, I >::change_mask (const Image< I > & *mask*) [inline]

Change mask image.

Definition at line 199 of file graph_elt_window_if.hh.

References mln::graph_elt_window_if< G, S, I >::is_valid().

10.200.4.2 unsigned mln::graph_window_base< S::fun_t::result , graph_elt_window_if< G, S, I > >::delta ( ) const [inherited]

Return the maximum coordinate gap between the window center and a window point.

10.200.4.3 bool mln::graph_window_base< S::fun_t::result , graph_elt_window_if< G, S, I > >::is_centered ( ) const [inherited]

Is the window centered?

10.200.4.4 bool mln::graph_window_base< S::fun_t::result , graph_elt_window_if< G, S, I > >::is_empty ( ) const [inherited]

Interface of the concept Window.

Is the window is empty?

10.200.4.5 bool mln::graph_window_base< S::fun_t::result , graph_elt_window_if< G, S, I > >::is_symmetric ( ) const [inherited]

Is the window symmetric?

10.200.4.6 template< typename G , typename S , typename I > bool mln::graph_elt_window_if< G, S, I >::is_valid ( ) const [inline]

Return true by default.

Reimplemented from mln::graph_window_base< S::fun_t::result, graph_elt_window_if< G, S, I > >.

Definition at line 208 of file graph_elt_window_if.hh.

Referenced by mln::graph_elt_window_if< G, S, I >::change_mask().

10.200.4.7 template< typename G , typename S , typename I > const I & mln::graph_elt_window_if< G, S, I >::mask ( ) const [inline]

Return the graph image used as mask.

Definition at line 190 of file graph_elt_window_if.hh.

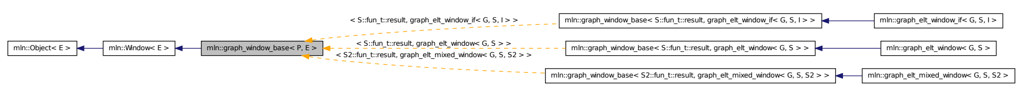
10.200.4.8 self_& mln::graph_window_base< S::fun_t::result , graph_elt_window_if< G, S, I > >::sym ( ) [inherited]

Apply a central symmetry to the target window.

10.201 mln::graph_window_base< P, E > Class Template Reference

```
#include <graph_window_base.hh>
```

Inheritance diagram for mln::graph_window_base< P, E >:



Public Types

- typedef P site
  Associated types.

Public Member Functions

- bool is_valid () const
  Return true by default.

- bool is_empty () const
  Interface of the concept Window.
- bool is_centered () const
  Is the window centered?
- bool is_symmetric () const
  Is the window symmetric?
- unsigned delta () const
  Return the maximum coordinate gap between the window center and a window point.
- self_ & sym ()
  Apply a central symmetry to the target window.

10.201.1 Detailed Description

template<typename P, typename E> class mln::graph_window_base< P, E >

Template Parameters

P Site type.

Definition at line 40 of file graph_window_base.hh.

10.201.2 Member Typedef Documentation

10.201.2.1 template<typename P, typename E> typedef P mln::graph_window_base< P, E >::site

Associated types.

The type of site corresponding to the window.

Definition at line 48 of file graph_window_base.hh.

10.201.3 Member Function Documentation

10.201.3.1 template<typename P , typename E > unsigned mln::graph_window_base< P, E >::delta ( ) const [inline]

Return the maximum coordinate gap between the window center and a window point.

Definition at line 128 of file graph_window_base.hh.

10.201.3.2 template<typename P , typename E > bool mln::graph_window_base< P, E >::is_centered ( ) const [inline]

Is the window centered?

Definition at line 112 of file graph_window_base.hh.

10.201.3.3 template<typename P , typename E > bool mln::graph_window_base< P, E >::is_empty ( ) const [inline]

Interface of the concept Window.

Is the window is empty?

Definition at line 104 of file graph_window_base.hh.

10.201.3.4 template<typename P , typename E > bool mln::graph_window_base< P, E >::is_symmetric ( ) const [inline]

Is the window symmetric?

Definition at line 120 of file graph_window_base.hh.

10.201.3.5 template<typename P , typename E > bool mln::graph_window_base< P, E >::is_valid ( ) const [inline]

Return true by default.

Reimplemented in mln::graph_elt_window_if< G, S, I >.

Definition at line 153 of file graph_window_base.hh.

10.201.3.6 template<typename P , typename E > graph_window_base< P, E > & mln::graph_window_base< P, E >::sym ( ) [inline]

Apply a central symmetry to the target window.

Definition at line 137 of file graph_window_base.hh.

10.202 mln::graph_window_if_piter< S, W, I > Class Template Reference

Forward iterator on line graph window.

`#include <graph_window_if_piter.hh>`

Inherits site_relative_iterator_base< W, graph_window_if_piter< S, W, I > >, and is_masked_impl_-selector< S, W::mask_t::domain_t, graph_window_if_piter< S, W, I > >.

Public Types

- typedef S::fun_t::result P
  Associated types.

Public Member Functions

- void next ()
  Go to the next element.

- graph_window_if_piter ()
  Construction.

- const S::graph_element & element () const
  Return the graph element pointed by this iterator.

- unsigned id () const
  Return the graph element id.

10.202.1 Detailed Description

template<typename S, typename W, typename I> class mln::graph_window_if_piter< S, W, I >

Forward iterator on line graph window.

Definition at line 47 of file graph_window_if_piter.hh.

10.202.2 Member Typedef Documentation

10.202.2.1 template<typename S , typename W , typename I > typedef S::fun_t ::result mln::graph_window_if_piter< S, W, I >::P

Associated types.

Definition at line 60 of file graph_window_if_piter.hh.

10.202.3 Constructor & Destructor Documentation

10.202.3.1 template<typename S , typename W , typename I > mln::graph_window_if_piter< S, W, I >::graph_window_if_piter ( ) [inline]

Construction.

Definition at line 122 of file graph_window_if_piter.hh.

10.202.4 Member Function Documentation

10.202.4.1 template<typename S , typename W , typename I > const S::graph_element & mln::graph_window_if_piter< S, W, I >::element ( ) const [inline]

Return the graph element pointed by this iterator.

Definition at line 213 of file graph_window_if_piter.hh.

10.202.4.2 template<typename S , typename W , typename I > unsigned mln::graph_window_if_piter< S, W, I >::id ( ) const [inline]

Return the graph element id.

FIXME: we do not want to have this member since there is an automatic conversion to the graph element. C++ does not seem to use this conversion operator.

Definition at line 221 of file graph_window_if_piter.hh.

10.202.4.3 void mln::Site_Iterator< graph_window_if_piter< S, W, I > >::next ( ) [inherited]

Go to the next element.

Warning

This is a final method; iterator classes should not re-defined this method. The actual "next" operation has to be defined through the *next_* method.

Precondition

The iterator is valid.

10.203 mln::graph_window_piter< S, W, I > Class Template Reference

Forward iterator on line graph window.

`#include <graph_window_piter.hh>`

Inherits site_relative_iterator_base< W, graph_window_piter< S, W, I >, W::center_t >, and impl_-selector< W::center_t, W::psite, graph_window_piter< S, W, I > >.

Public Types

- typedef S::fun_t::result P
  Associated types
  Type of the window elements.
- typedef W::center_t center_t
  Type of the window center.
- typedef W::graph_element graph_element
  Type of the graph element pointed by this iterator.

Public Member Functions

- void change_target_site_set (const S &s)
  Change the target site set.
- void next ()
  Go to the next element.
- const S & target_site_set () const

Return the target site set.

- graph_window_piter ()
  Construction.
- template<typename Pref >
  graph_window_piter (const Window< W > &win, const Pref &p_ref)
  To be used in case the center and neighbor sites have the same type and belong to the same site set.
- template<typename Pref >
  graph_window_piter (const Window< W > &win, const Site_Set< S > &target_site_set, const Pref &p_ref)
  To be used in case center and neighbors sites do not have the same type and do not belong to the same site set.

- const graph_element & element () const
  Return the graph element pointed by this iterator.
- unsigned id () const
  Return the graph element id.

10.203.1 Detailed Description

template<typename S, typename W, typename I> class mln::graph_window_piter< S, W, I >

Forward iterator on line graph window.

Template Parameters

S is the site set type.
W is the window type.
I is the underlying iterator type.

Definition at line 99 of file graph_window_piter.hh.

10.203.2 Member Typedef Documentation

10.203.2.1 template<typename S , typename W , typename I > typedef W::center_t mln::graph_window_piter< S, W, I >::center_t

Type of the window center.

Definition at line 120 of file graph_window_piter.hh.

10.203.2.2 template<typename S , typename W , typename I > typedef W::graph_element mln::graph_window_piter< S, W, I >::graph_element

Type of the graph element pointed by this iterator.

Definition at line 122 of file graph_window_piter.hh.

10.203.2.3 template<typename S , typename W , typename I > typedef S::fun_t ::result mln::graph_window_piter< S, W, I >::P

Associated types

Type of the window elements.

Definition at line 118 of file graph_window_piter.hh.

10.203.3 Constructor & Destructor Documentation

10.203.3.1 template<typename S , typename W , typename I > mln::graph_window_piter< S, W, I >::graph_window_piter ( ) [inline]

Construction.

Definition at line 226 of file graph_window_piter.hh.

10.203.3.2 template<typename S , typename W , typename I > template<typename Pref > mln::graph_window_piter< S, W, I >::graph_window_piter (const Window< W > & *win*, const Pref & *p_ref*) [inline]

To be used in case the center and neighbor sites have the same type and belong to the same site set.

Parameters

win The underlying window.

p_ref Window center.

Definition at line 235 of file graph_window_piter.hh.

10.203.3.3 template<typename S , typename W , typename I > template<typename Pref > mln::graph_window_piter< S, W, I >::graph_window_piter (const Window< W > & *win*, const Site_Set< S > & *target_site_set*, const Pref & *p_ref*) [inline]

To be used in case center and neighbors sites do not have the same type and do not belong to the same site set.

Parameters

win The underlying window.

target_site_set Site set in which neighbor sites are extracted.

p_ref Window center.

Definition at line 249 of file graph_window_piter.hh.

10.203.4 Member Function Documentation

10.203.4.1 template<typename S , typename W , typename I > void mln::graph_window_piter< S, W, I >::change_target_site_set (const S & *s*) [inline]

Change the target site set.

Window elements different from the center come from the target site set.

Definition at line 357 of file graph_window_piter.hh.

10.203.4.2 template<typename S , typename W , typename I > const graph_window_piter< S, W, I >::graph_element & mln::graph_window_piter< S, W, I >::element ( ) const [inline]

Return the graph element pointed by this iterator.

Definition at line 341 of file graph_window_piter.hh.

10.203.4.3 template<typename S , typename W , typename I > unsigned mln::graph_window_piter< S, W, I >::id ( ) const [inline]

Return the graph element id.

FIXME: we do not want to have this member since there is an automatic conversion to the graph element. C++ does not seem to use this conversion operator.

Definition at line 349 of file graph_window_piter.hh.

10.203.4.4 void mln::Site_Iterator< graph_window_piter< S, W, I > >::next ( ) [inherited]

Go to the next element.

Warning

This is a final method; iterator classes should not re-defined this method. The actual "next" operation has to be defined through the *next_* method.

Precondition

The iterator is valid.

10.203.4.5 template<typename S , typename W , typename I > const S & mln::graph_window_piter< S, W, I >::target_site_set ( ) const [inline]

Return the target site set.

Window elements different from the center come from the target site set.

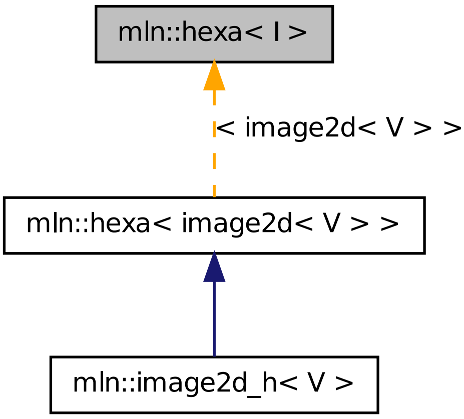
Definition at line 366 of file graph_window_piter.hh.

10.204 mln::hexa< I > Struct Template Reference

hexagonal image class.

```
#include <hexa.hh>
```

Inheritance diagram for mln::hexa< I >:



Public Types

- typedef hexa_bkd_piter_< box2d > bkd_piter
  FIXME : should it be in box2d_h? Backward Site_Iterator associated type.
- typedef hexa_fwd_piter_< box2d > fwd_piter
  FIXME : should it be in box2d_h? Forward Site_Iterator associated type.
- typedef I::lvalue lvalue
  Lvalue associated type.
- typedef point2d_h psite
  Point site type.
- typedef I::rvalue rvalue
  Return type of read-only access.
- typedef hexa< tag::image_< I > > skeleton
  Skeleton.
- typedef I::value value
  Value associated type.

Public Member Functions

- const box2d_h & domain () const

Give the definition domain.

- bool has (const psite &p) const

  Test if `p` *belongs to the image domain.*

- hexa (I &ima)

  Constructor with an base image.

- hexa ()

  Constructor without argument.

- lvalue operator() (const point2d_h &p)

  Read-write access of pixel value at hexa point site `p`*.*

- rvalue operator() (const point2d_h &p) const

  Read-only access of pixel value at hexa point site `p`*.*

10.204.1 Detailed Description

template<typename I> struct mln::hexa< I >

hexagonal image class. The parameter `I` is the type of the base image. This image class which handles hexagonal grid.

Ex : 1 3 5 7 9 11 0 2 4 6 8 10 ------------------- 0 XX| | | | | | |XX --------------------- 2 XX| | | | | | |XX --------------------- 4 XX| | | | | | |XX --------------------- 6 XX| | | | | | |XX --------------------- 8 XX| | | | | | |XX -------------------

Definition at line 116 of file hexa.hh.

10.204.2 Member Typedef Documentation

10.204.2.1 template<typename I> typedef hexa_bkd_piter_<box2d> mln::hexa< I >::bkd_piter

FIXME : should it be in box2d_h? Backward Site_Iterator associated type.

Definition at line 140 of file hexa.hh.

10.204.2.2 template<typename I> typedef hexa_fwd_piter_<box2d> mln::hexa< I >::fwd_piter

FIXME : should it be in box2d_h? Forward Site_Iterator associated type.

Definition at line 136 of file hexa.hh.

10.204.2.3 template<typename I> typedef I ::lvalue mln::hexa< I >::lvalue

Lvalue associated type.

Definition at line 126 of file hexa.hh.

10.204.2.4 template<typename I> typedef point2d_h mln::hexa< I >::psite

Point site type.

Reimplemented in mln::image2d_h< V >.

Definition at line 132 of file hexa.hh.

10.204.2.5 template<typename I> typedef I ::rvalue mln::hexa< I >::rvalue

Return type of read-only access.

Definition at line 129 of file hexa.hh.

10.204.2.6 template<typename I> typedef hexa< tag::image_<I> > mln::hexa< I >::skeleton

Skeleton.

Definition at line 120 of file hexa.hh.

10.204.2.7 template<typename I> typedef I ::value mln::hexa< I >::value

Value associated type.

Definition at line 123 of file hexa.hh.

10.204.3 Constructor & Destructor Documentation

10.204.3.1 template<typename I > mln::hexa< I >::hexa ( ) `[inline]`

Constructor without argument.

Definition at line 215 of file hexa.hh.

10.204.3.2 template<typename I> mln::hexa< I >::hexa (I & *ima*) `[inline]`

Constructor with an base image.

Definition at line 222 of file hexa.hh.

10.204.4 Member Function Documentation

10.204.4.1 template<typename I > const box2d_h & mln::hexa< I >::domain ( ) const `[inline]`

Give the definition domain.

Definition at line 250 of file hexa.hh.

10.204.4.2 template<typename I > bool mln::hexa< I >::has (const psite & *p*) const `[inline]`

Test if `p` belongs to the image domain.

Definition at line 259 of file hexa.hh.

Referenced by mln::hexa< I >::operator()().

10.204.4.3 template<typename I > hexa< I >::rvalue mln::hexa< I >::operator() (const point2d_h & *p*) const [inline]

Read-only access of pixel value at hexa point site `p`.

Definition at line 230 of file hexa.hh.

References mln::hexa< I >::has().

10.204.4.4 template<typename I > hexa< I >::lvalue mln::hexa< I >::operator() (const point2d_h & *p*) [inline]

Read-write access of pixel value at hexa point site `p`.

Definition at line 240 of file hexa.hh.

References mln::hexa< I >::has().

10.205 mln::histo::array< T > Struct Template Reference

Generic histogram class over a value set with type `T`.

`#include <array.hh>`

10.205.1 Detailed Description

template<typename T> struct mln::histo::array< T >

Generic histogram class over a value set with type `T`.

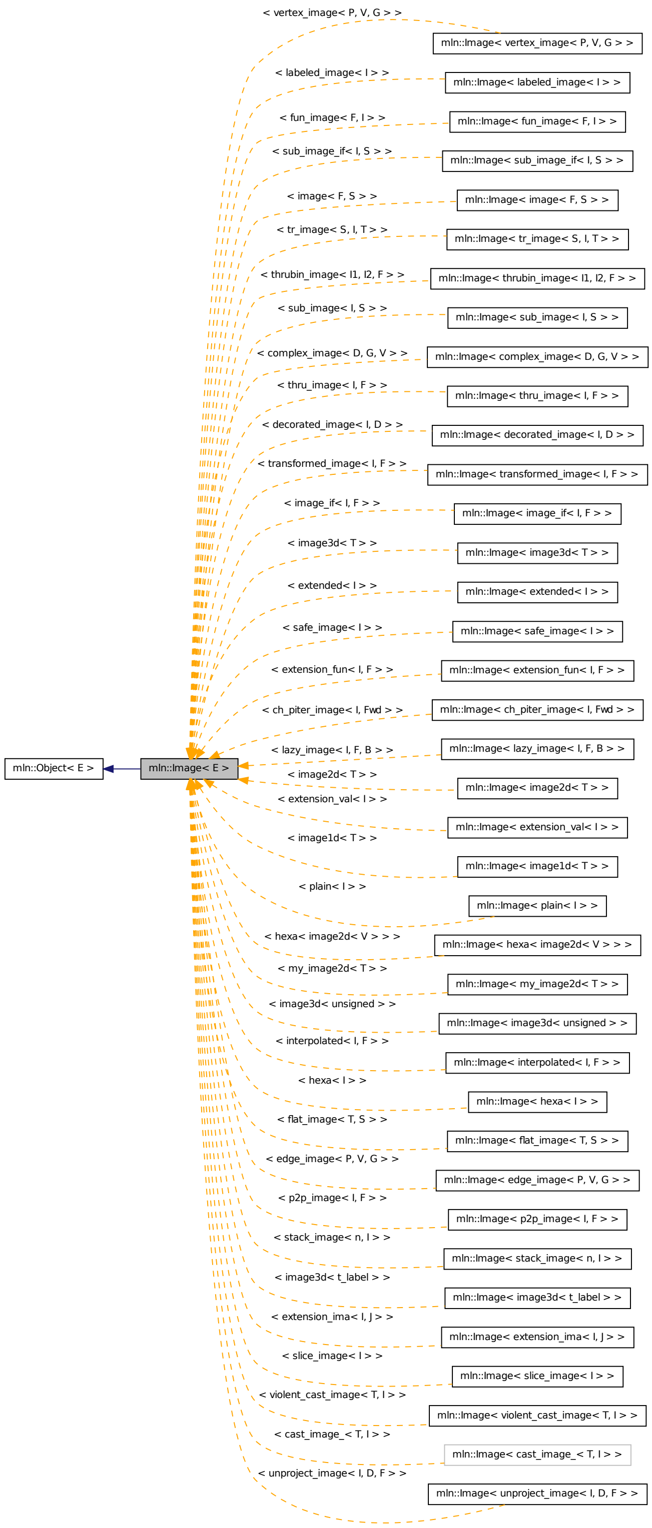
Definition at line 48 of file histo/array.hh.

10.206 mln::Image< E > Struct Template Reference

Base class for implementation of image classes.

`#include <image.hh>`

Inheritance diagram for mln::Image< E >:



10.206.1 Detailed Description

template<typename E> struct mln::Image< E >

Base class for implementation of image classes.

See also

mln::doc::Image for a complete documentation of this class contents.

Definition at line 73 of file core/concept/image.hh.

10.207 mln::image1d< T > Struct Template Reference

Basic 1D image class.

`#include <image1d.hh>`

Inherits image_primary< T, box1d, image1d< T > >.

Public Types

- typedef T & lvalue
  Return type of read-write access.
- typedef const T & rvalue
  Return type of read-only access.
- typedef image1d< tag::value_< T > > skeleton
  Skeleton.
- typedef T value
  Value associated type.

Public Member Functions

- const box1d & bbox () const
  Give the bounding box domain.
- unsigned border () const
  Give the border thickness.
- const T * buffer () const
  Give a hook to the value buffer.
- T * buffer ()
  Give a hook to the value buffer.
- int delta_index (const dpoint1d &dp) const

Give the offset corresponding to the delta-point `dp`.

- const box1d & domain () const

  Give the definition domain.

- const T & element (unsigned i) const

  Read-only access to the `i-th` *image value (including the border).*

- T & element (unsigned i)

  Read-write access to the `i-th` *image value (including the border).*

- bool has (const point1d &p) const

  Test if `p` *is valid.*

- image1d ()

  Constructor without argument.

- image1d (const box1d &b, unsigned bdr=border::thickness)

  Constructor with a box and the border thickness.

- image1d (unsigned ninds, unsigned bdr=border::thickness)

  Constructor with the number of indices and the border thickness.

- unsigned nelements () const

  Give the number of cells (points including border ones).

- unsigned ninds () const

  Give the number of indexes.

- T & operator() (const point1d &p)

  Read-write access to the image value located at point `p`.

- const T & operator() (const point1d &p) const

  Read-only access to the image value located at point `p`.

- point1d point_at_index (unsigned i) const

  Give the point corresponding to the offset `o`.

- const box1d & vbbox () const

  virtual box, i.e., box including the virtual border

10.207.1 Detailed Description

template<typename T> struct mln::image1d< T >

Basic 1D image class. The parameter `T` is the type of pixel values. This image class stores data in memory and has a virtual border with constant thickness before and after data.

Definition at line 155 of file image1d.hh.

10.207.2 Member Typedef Documentation

10.207.2.1 template<typename T> typedef T& mln::image1d< T >::lvalue

Return type of read-write access.

Definition at line 167 of file image1d.hh.

10.207.2.2 template<typename T> typedef const T& mln::image1d< T >::rvalue

Return type of read-only access.

Definition at line 164 of file image1d.hh.

10.207.2.3 template<typename T> typedef image1d< tag::value_<T> > mln::image1d< T >::skeleton

Skeleton.

Definition at line 170 of file image1d.hh.

10.207.2.4 template<typename T> typedef T mln::image1d< T >::value

Value associated type.

Definition at line 161 of file image1d.hh.

10.207.3 Constructor & Destructor Documentation

10.207.3.1 template<typename T > mln::image1d< T >::image1d ( ) `[inline]`

Constructor without argument.

Definition at line 371 of file image1d.hh.

10.207.3.2 template<typename T > mln::image1d< T >::image1d (unsigned *ninds*, unsigned *bdr* = `border::thickness`) `[inline]`

Constructor with the number of indices and the border thickness.

Definition at line 384 of file image1d.hh.

References mln::make::box1d().

10.207.3.3 template<typename T > mln::image1d< T >::image1d (const box1d & *b*, unsigned *bdr* = `border::thickness`) `[inline]`

Constructor with a box and the border thickness.

Definition at line 377 of file image1d.hh.

10.207.4 Member Function Documentation

10.207.4.1 template<typename T > const box1d & mln::image1d< T >::bbox ( ) const [inline]

Give the bounding box domain.

Definition at line 411 of file image1d.hh.

10.207.4.2 template<typename T > unsigned mln::image1d< T >::border ( ) const [inline]

Give the border thickness.

Definition at line 429 of file image1d.hh.

10.207.4.3 template<typename T > const T * mln::image1d< T >::buffer ( ) const [inline]

Give a hook to the value buffer.

Definition at line 520 of file image1d.hh.

10.207.4.4 template<typename T > T * mln::image1d< T >::buffer ( ) [inline]

Give a hook to the value buffer.

Definition at line 529 of file image1d.hh.

10.207.4.5 template<typename T > int mln::image1d< T >::delta_index (const dpoint1d & *dp*) const [inline]

Give the offset corresponding to the delta-point `dp`.

Definition at line 538 of file image1d.hh.

10.207.4.6 template<typename T > const box1d & mln::image1d< T >::domain ( ) const [inline]

Give the definition domain.

Definition at line 402 of file image1d.hh.

10.207.4.7 template<typename T > const T & mln::image1d< T >::element (unsigned *i*) const [inline]

Read-only access to the `i-th` image value (including the border).

Definition at line 502 of file image1d.hh.

References mln::image1d< T >::nelements().

10.207.4.8 template< typename T > T & mln::image1d< T >::element (unsigned *i*) [inline]

Read-write access to the i-th image value (including the border).

Definition at line 511 of file image1d.hh.

References mln::image1d< T >::nelements().

10.207.4.9 template< typename T > bool mln::image1d< T >::has (const point1d & *p*) const [inline]

Test if p is valid.

Definition at line 447 of file image1d.hh.

Referenced by mln::image1d< T >::operator()().

10.207.4.10 template< typename T > unsigned mln::image1d< T >::nelements ( ) const [inline]

Give the number of cells (points including border ones).

Definition at line 438 of file image1d.hh.

Referenced by mln::image1d< T >::element(), and mln::image1d< T >::point_at_index().

10.207.4.11 template< typename T > unsigned mln::image1d< T >::ninds ( ) const [inline]

Give the number of indexes.

Definition at line 483 of file image1d.hh.

10.207.4.12 template< typename T > const T & mln::image1d< T >::operator() (const point1d & *p*) const [inline]

Read-only access to the image value located at point p.

Definition at line 456 of file image1d.hh.

References mln::image1d< T >::has().

10.207.4.13 template< typename T > T & mln::image1d< T >::operator() (const point1d & *p*) [inline]

Read-write access to the image value located at point p.

Definition at line 465 of file image1d.hh.

References mln::image1d< T >::has().

10.207.4.14 template< typename T > point1d mln::image1d< T >::point_at_index (unsigned *i*) const [inline]

Give the point corresponding to the offset o.

Definition at line 548 of file image1d.hh.

References mln::image1d< T >::nelements().

10.207.4.15 template<typename T > const box1d & mln::image1d< T >::vbbox ( ) const [inline]

virtual box, i.e., box including the virtual border

Definition at line 420 of file image1d.hh.

10.208 mln::image2d< T > Class Template Reference

Basic 2D image class.

`#include <image2d.hh>`

Inherits image_primary< T, mln::box2d, image2d< T > >.

Public Types

- typedef T & lvalue

    Return type of read-write access.

- typedef const T & rvalue

    Return type of read-only access.

- typedef image2d< tag::value_< T > > skeleton

    Skeleton.

- typedef T value

    Value associated type.

Public Member Functions

- const box2d & bbox () const

    Give the bounding box domain.

- unsigned border () const

    Give the border thickness.

- const T ∗ buffer () const

    Give a hook to the value buffer.

- T ∗ buffer ()

    Give a hook to the value buffer.

- int delta_index (const dpoint2d &dp) const

    Give the delta-index corresponding to the delta-point `dp`*.*

- const box2d & domain () const

  Give the definition domain.

- T & element (unsigned i)

  Read-write access to the image value located at index `i`.

- const T & element (unsigned i) const

  Read-only access to the image value located at index `i`.

- bool has (const point2d &p) const

  Test if `p` *is valid.*

- image2d (int nrows, int ncols, unsigned bdr=border::thickness)

  Constructor with the numbers of rows and columns and the border thickness.

- image2d ()

  Constructor without argument.

- image2d (const box2d &b, unsigned bdr=border::thickness)

  Constructor with a box and the border thickness (default is 3).

- unsigned ncols () const

  Give the number of columns.

- unsigned nelements () const

  Give the number of elements (points including border ones).

- unsigned nrows () const

  Give the number of rows.

- const T & operator() (const point2d &p) const

  Read-only access to the image value located at point `p`.

- T & operator() (const point2d &p)

  Read-write access to the image value located at point `p`.

- point2d point_at_index (unsigned i) const

  Give the point corresponding to the index `i`.

10.208.1 Detailed Description

template<typename T> class mln::image2d< T >

Basic 2D image class. The parameter `T` is the type of pixel values. This image class stores data in memory and has a virtual border with constant thickness around data.

Definition at line 136 of file core/image/image2d.hh.

10.208.2 Member Typedef Documentation

10.208.2.1 template<typename T> typedef T& mln::image2d< T >::lvalue

Return type of read-write access.

Definition at line 148 of file core/image/image2d.hh.

10.208.2.2 template<typename T> typedef const T& mln::image2d< T >::rvalue

Return type of read-only access.

Definition at line 145 of file core/image/image2d.hh.

10.208.2.3 template<typename T> typedef image2d< tag::value_<T> > mln::image2d< T >::skeleton

Skeleton.

Definition at line 152 of file core/image/image2d.hh.

10.208.2.4 template<typename T> typedef T mln::image2d< T >::value

Value associated type.

Definition at line 142 of file core/image/image2d.hh.

10.208.3 Constructor & Destructor Documentation

10.208.3.1 template<typename T > mln::image2d< T >::image2d ( ) `[inline]`

Constructor without argument.

Definition at line 394 of file core/image/image2d.hh.

10.208.3.2 template<typename T > mln::image2d< T >::image2d (int *nrows*, int *ncols*, unsigned *bdr* = `border::thickness`) `[inline]`

Constructor with the numbers of rows and columns and the border thickness.

Definition at line 400 of file core/image/image2d.hh.

References mln::make::box2d().

10.208.3.3 template<typename T > mln::image2d< T >::image2d (const box2d & *b*, unsigned *bdr* = `border::thickness`) `[inline]`

Constructor with a box and the border thickness (default is 3).

Definition at line 407 of file core/image/image2d.hh.

10.208.4 Member Function Documentation

10.208.4.1 template< typename T > const box2d & mln::image2d< T >::bbox ( ) const [inline]

Give the bounding box domain.

Definition at line 433 of file core/image/image2d.hh.

10.208.4.2 template< typename T > unsigned mln::image2d< T >::border ( ) const [inline]

Give the border thickness.

Definition at line 520 of file core/image/image2d.hh.

10.208.4.3 template< typename T > const T * mln::image2d< T >::buffer ( ) const [inline]

Give a hook to the value buffer.

Definition at line 556 of file core/image/image2d.hh.

10.208.4.4 template< typename T > T * mln::image2d< T >::buffer ( ) [inline]

Give a hook to the value buffer.

Definition at line 565 of file core/image/image2d.hh.

10.208.4.5 template< typename T > int mln::image2d< T >::delta_index (const dpoint2d & *dp*) const [inline]

Give the delta-index corresponding to the delta-point `dp`.

Definition at line 574 of file core/image/image2d.hh.

10.208.4.6 template< typename T > const box2d & mln::image2d< T >::domain ( ) const [inline]

Give the definition domain.

Definition at line 424 of file core/image/image2d.hh.

Referenced by mln::morpho::line_gradient(), mln::make_debug_graph_image(), and mln::io::txt::save().

10.208.4.7 template< typename T > const T & mln::image2d< T >::element (unsigned *i*) const [inline]

Read-only access to the image value located at index `i`.

Definition at line 538 of file core/image/image2d.hh.

References mln::image2d< T >::nelements().

10.208.4.8 template<typename T > T & mln::image2d< T >::element (unsigned *i*) [inline]

Read-write access to the image value located at index i.

Definition at line 547 of file core/image/image2d.hh.

References mln::image2d< T >::nelements().

10.208.4.9 template<typename T > bool mln::image2d< T >::has (const point2d & *p*) const [inline]

Test if p is valid.

Definition at line 451 of file core/image/image2d.hh.

Referenced by mln::image2d< T >::operator()(), and mln::debug::put_word().

10.208.4.10 template<typename T > unsigned mln::image2d< T >::ncols ( ) const [inline]

Give the number of columns.

Definition at line 508 of file core/image/image2d.hh.

10.208.4.11 template<typename T > unsigned mln::image2d< T >::nelements ( ) const [inline]

Give the number of elements (points including border ones).

Definition at line 529 of file core/image/image2d.hh.

Referenced by mln::image2d< T >::element(), and mln::image2d< T >::point_at_index().

10.208.4.12 template<typename T > unsigned mln::image2d< T >::nrows ( ) const [inline]

Give the number of rows.

Definition at line 499 of file core/image/image2d.hh.

10.208.4.13 template<typename T > T & mln::image2d< T >::operator() (const point2d & *p*) [inline]

Read-write access to the image value located at point p.

Definition at line 469 of file core/image/image2d.hh.

References mln::image2d< T >::has().

10.208.4.14 template<typename T > const T & mln::image2d< T >::operator() (const point2d & *p*) const [inline]

Read-only access to the image value located at point p.

Definition at line 460 of file core/image/image2d.hh.

References mln::image2d< T >::has().

10.208.4.15 template< typename T > point2d mln::image2d< T >::point_at_index (unsigned i) const [inline]

Give the point corresponding to the index i.

Definition at line 584 of file core/image/image2d.hh.

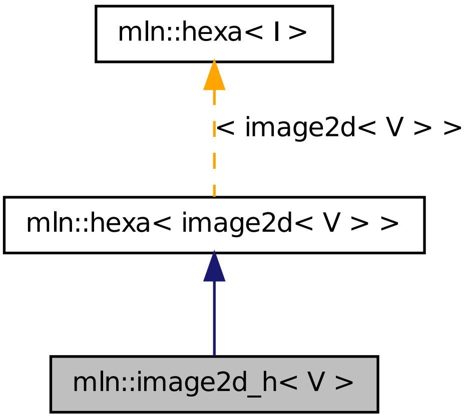
References mln::image2d< T >::nelements().

10.209 mln::image2d_h< V > Struct Template Reference

2d image based on an hexagonal mesh.

`#include <image2d_h.hh>`

Inheritance diagram for mln::image2d_h< V >:



Public Types

- typedef hexa_bkd_piter_< box2d > bkd_piter

    FIXME : should it be in box2d_h? Backward Site_Iterator associated type.

- typedef hexa_fwd_piter_< box2d > fwd_piter

    FIXME : should it be in box2d_h? Forward Site_Iterator associated type.

- typedef image2d< V >::lvalue lvalue

    Lvalue associated type.

- typedef point2d_h psite

    Point site type.

- typedef image2d< V >::rvalue rvalue

  Return type of read-only access.

- typedef hexa< tag::image_< image2d< V > > > skeleton

  Skeleton.

- typedef image2d< V >::value value

  Value associated type.

Public Member Functions

- const box2d_h & domain () const

  Give the definition domain.

- bool has (const psite &p) const

  Test if p belongs to the image domain.

- image2d_h (int nrows, int ncols, unsigned bdr=border::thickness)

  Constructor with the numbers of rows and columns border thickness.

- lvalue operator() (const point2d_h &p)

  Read-write access of pixel value at hexa point site p.

- rvalue operator() (const point2d_h &p) const

  Read-only access of pixel value at hexa point site p.

10.209.1 Detailed Description

template<typename V> struct mln::image2d_h< V >

2d image based on an hexagonal mesh.

Definition at line 50 of file image2d_h.hh.

10.209.2 Member Typedef Documentation

10.209.2.1 typedef hexa_bkd_piter_<box2d> mln::hexa< image2d< V > >::bkd_piter `[inherited]`

FIXME : should it be in box2d_h? Backward Site_Iterator associated type.

Definition at line 140 of file hexa.hh.

10.209.2.2 typedef hexa_fwd_piter_<box2d> mln::hexa< image2d< V > >::fwd_piter `[inherited]`

FIXME : should it be in box2d_h? Forward Site_Iterator associated type.

Definition at line 136 of file hexa.hh.

10.209.2.3 typedef image2d< V > ::lvalue mln::hexa< image2d< V > >::lvalue [inherited]

Lvalue associated type.

Definition at line 126 of file hexa.hh.

10.209.2.4 template<typename V > typedef point2d_h mln::image2d_h< V >::psite

Point site type.

Reimplemented from mln::hexa< image2d< V > >.

Definition at line 56 of file image2d_h.hh.

10.209.2.5 typedef image2d< V > ::rvalue mln::hexa< image2d< V > >::rvalue [inherited]

Return type of read-only access.

Definition at line 129 of file hexa.hh.

10.209.2.6 typedef hexa< tag::image_<image2d< V > > > mln::hexa< image2d< V > >::skeleton [inherited]

Skeleton.

Definition at line 120 of file hexa.hh.

10.209.2.7 typedef image2d< V > ::value mln::hexa< image2d< V > >::value [inherited]

Value associated type.

Definition at line 123 of file hexa.hh.

10.209.3 Constructor & Destructor Documentation

10.209.3.1 template<typename V > mln::image2d_h< V >::image2d_h (int *nrows*, int *ncols*, unsigned *bdr* = border::thickness) [inline]

Constructor with the numbers of rows and columns border thickness.

image2d_h(3,6) will build this hexa image :

1 3 5 0 2 4 -------------- 0| x x x | 2| x x x | 4| x x x

Definition at line 82 of file image2d_h.hh.

10.209.4 Member Function Documentation

10.209.4.1 const box2d_h& mln::hexa< image2d< V > >::domain ( ) const [inherited]

Give the definition domain.

10.209.4.2 bool mln::hexa< image2d< V > >::has (const psite & *p*) const [inherited]

Test if p belongs to the image domain.

10.209.4.3 rvalue mln::hexa< image2d< V > >::operator() (const point2d_h & *p*) const [inherited]

Read-only access of pixel value at hexa point site p.

10.209.4.4 lvalue mln::hexa< image2d< V > >::operator() (const point2d_h & *p*) [inherited]

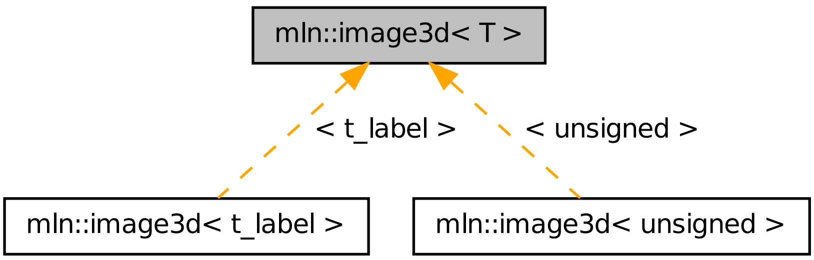
Read-write access of pixel value at hexa point site p.

10.210 mln::image3d< T > Struct Template Reference

Basic 3D image class.

`#include <image3d.hh>`

Inheritance diagram for mln::image3d< T >:



Public Types

- typedef T & lvalue

  Return type of read-write access.

- typedef const T & rvalue

  Return type of read-only access.

- typedef image3d< tag::value_< T > > skeleton

  Skeleton.

- typedef T value

Value associated type.

Public Member Functions

- const box3d & bbox () const

  Give the bounding box domain.

- unsigned border () const

  Give the border thickness.

- const T * buffer () const

  Give a hook to the value buffer.

- T * buffer ()

  Give a hook to the value buffer.

- int delta_index (const dpoint3d &dp) const

  Fast Image method.

- const box3d & domain () const

  Give the definition domain.

- const T & element (unsigned i) const

  Read-only access to the image value located at index `i`.

- T & element (unsigned i)

  Read-write access to the image value located at index `i`.

- bool has (const point3d &p) const

  Test if `p` is valid.

- image3d (const box3d &b, unsigned bdr=border::thickness)

  Constructor with a box and the border thickness (default is 3).

- image3d ()

  Constructor without argument.

- image3d (int nslis, int nrows, int ncols, unsigned bdr=border::thickness)

  Constructor with the numbers of indexes and the border thickness.

- unsigned ncols () const

  Give the number of columns.

- unsigned nelements () const

  Give the number of cells (points including border ones).

- unsigned nrows () const

  Give the number of rows.

- unsigned nslis () const

  Give the number of slices.

- const T & operator() (const point3d &p) const

  Read-only access to the image value located at point `p`*.*

- T & operator() (const point3d &p)

  Read-write access to the image value located at point `p`*.*

- point3d point_at_index (unsigned o) const

  Give the point corresponding to the offset `o`*.*

- const box3d & vbbox () const

  virtual box, i.e., box including the virtual border

10.210.1 Detailed Description

template<typename T> struct mln::image3d< T >

Basic 3D image class. The parameter `T` is the type of pixel values. This image class stores data in memory and has a virtual border with constant thickness around data.

Definition at line 130 of file core/image/image3d.hh.

10.210.2 Member Typedef Documentation

10.210.2.1 template<typename T> typedef T& mln::image3d< T >::lvalue

Return type of read-write access.

Definition at line 153 of file core/image/image3d.hh.

10.210.2.2 template<typename T> typedef const T& mln::image3d< T >::rvalue

Return type of read-only access.

Definition at line 150 of file core/image/image3d.hh.

10.210.2.3 template<typename T> typedef image3d< tag::value_<T> > mln::image3d< T >::skeleton

Skeleton.

Definition at line 157 of file core/image/image3d.hh.

10.210.2.4 template<typename T> typedef T mln::image3d< T >::value

Value associated type.

Definition at line 147 of file core/image/image3d.hh.

10.210.3 Constructor & Destructor Documentation

10.210.3.1 template<typename T > mln::image3d< T >::image3d ( ) [inline]

Constructor without argument.

Definition at line 389 of file core/image/image3d.hh.

10.210.3.2 template<typename T > mln::image3d< T >::image3d (const box3d & *b*, unsigned *bdr* = *border::thickness*) [inline]

Constructor with a box and the border thickness (default is 3).

Definition at line 395 of file core/image/image3d.hh.

10.210.3.3 template<typename T > mln::image3d< T >::image3d (int *nslis*, int *nrows*, int *ncols*, unsigned *bdr* = *border::thickness*) [inline]

Constructor with the numbers of indexes and the border thickness.

Definition at line 402 of file core/image/image3d.hh.

References mln::make::box3d().

10.210.4 Member Function Documentation

10.210.4.1 template<typename T > const box3d & mln::image3d< T >::bbox ( ) const [inline]

Give the bounding box domain.

Definition at line 428 of file core/image/image3d.hh.

10.210.4.2 template<typename T > unsigned mln::image3d< T >::border ( ) const [inline]

Give the border thickness.

Definition at line 446 of file core/image/image3d.hh.

10.210.4.3 template<typename T > const T * mln::image3d< T >::buffer ( ) const [inline]

Give a hook to the value buffer.

Definition at line 554 of file core/image/image3d.hh.

10.210.4.4 template<typename T > T * mln::image3d< T >::buffer ( ) [inline]

Give a hook to the value buffer.

Definition at line 563 of file core/image/image3d.hh.

10.210.4.5 template<typename T > int mln::image3d< T >::delta_index (const dpoint3d & *dp*) const [inline]

Fast Image method.

Give the offset corresponding to the delta-point `dp`.

Definition at line 572 of file core/image/image3d.hh.

10.210.4.6 template<typename T > const box3d & mln::image3d< T >::domain ( ) const [inline]

Give the definition domain.

Definition at line 419 of file core/image/image3d.hh.

Referenced by mln::accu::stat::operator==().

10.210.4.7 template<typename T > const T & mln::image3d< T >::element (unsigned *i*) const [inline]

Read-only access to the image value located at index `i`.

Definition at line 491 of file core/image/image3d.hh.

References mln::image3d< T >::nelements().

10.210.4.8 template<typename T > T & mln::image3d< T >::element (unsigned *i*) [inline]

Read-write access to the image value located at index `i`.

Definition at line 500 of file core/image/image3d.hh.

References mln::image3d< T >::nelements().

10.210.4.9 template<typename T > bool mln::image3d< T >::has (const point3d & *p*) const [inline]

Test if `p` is valid.

Definition at line 464 of file core/image/image3d.hh.

Referenced by mln::image3d< T >::operator()().

10.210.4.10 template<typename T > unsigned mln::image3d< T >::ncols ( ) const [inline]

Give the number of columns.

Definition at line 545 of file core/image/image3d.hh.

10.210.4.11 template<typename T > unsigned mln::image3d< T >::nelements ( ) const [inline]

Give the number of cells (points including border ones).

Definition at line 455 of file core/image/image3d.hh.

Referenced by mln::image3d< T >::element(), and mln::image3d< T >::point_at_index().

10.210.4.12 template<typename T > unsigned mln::image3d< T >::nrows ( ) const [inline]

Give the number of rows.

Definition at line 536 of file core/image/image3d.hh.

10.210.4.13 template<typename T > unsigned mln::image3d< T >::nslis ( ) const [inline]

Give the number of slices.

Definition at line 527 of file core/image/image3d.hh.

10.210.4.14 template<typename T > T & mln::image3d< T >::operator() (const point3d & *p*) [inline]

Read-write access to the image value located at point p.

Definition at line 482 of file core/image/image3d.hh.

References mln::image3d< T >::has().

10.210.4.15 template<typename T > const T & mln::image3d< T >::operator() (const point3d & *p*) const [inline]

Read-only access to the image value located at point p.

Definition at line 473 of file core/image/image3d.hh.

References mln::image3d< T >::has().

10.210.4.16 template<typename T > point3d mln::image3d< T >::point_at_index (unsigned *o*) const [inline]

Give the point corresponding to the offset o.

Definition at line 583 of file core/image/image3d.hh.

References mln::image3d< T >::nelements().

10.210.4.17 template<typename T > const box3d & mln::image3d< T >::vbbox ( ) const [inline]

virtual box, i.e., box including the virtual border

Definition at line 437 of file core/image/image3d.hh.

10.211 mln::image_if< I, F > Struct Template Reference

Image which domain is restricted by a function 'site -> Boolean'.

`#include <image_if.hh>`

Inherits image_domain_morpher< I, p_if< I::domain_t, F >, image_if< I, F > >.

Public Types

- typedef image_if< tag::image_< I >, tag::function_< F > > skeleton

  Skeleton.

Public Member Functions

- const p_if< typename I::domain_t, F > & domain () const

  Give the definition domain.

- image_if (I &ima, const F &f)

  Constructor from an image `ima` and a predicate `f`.

- image_if ()

  Constructor without argument.

- operator image_if< const I, F > () const

  Const promotion via conversion.

10.211.1 Detailed Description

template<typename I, typename F> struct mln::image_if< I, F >

Image which domain is restricted by a function 'site -> Boolean'.

Definition at line 93 of file image_if.hh.

10.211.2 Member Typedef Documentation

10.211.2.1 template<typename I, typename F> typedef image_if< tag::image_<I>, tag::function_<F> > mln::image_if< I, F >::skeleton

Skeleton.

Definition at line 98 of file image_if.hh.

10.211.3 Constructor & Destructor Documentation

10.211.3.1 template<typename I , typename F > mln::image_if< I, F >::image_if ( ) [inline]

Constructor without argument.

Definition at line 188 of file image_if.hh.

10.211.3.2 template<typename I , typename F > mln::image_if< I, F >::image_if (I & *ima*, const F & *f*) [inline]

Constructor from an image `ima` and a predicate `f`.

Definition at line 194 of file image_if.hh.

10.211.4 Member Function Documentation

10.211.4.1 template<typename I , typename F > const p_if< typename I::domain_t, F > & mln::image_if< I, F >::domain ( ) const [inline]

Give the definition domain.

Definition at line 211 of file image_if.hh.

10.211.4.2 template<typename I , typename F > mln::image_if< I, F >::operator image_if< const I, F > ( ) const [inline]

Const promotion via conversion.

Definition at line 219 of file image_if.hh.

10.212 mln::interpolated< I, F > Struct Template Reference

Makes the underlying image being accessed with floating coordinates.

`#include <interpolated.hh>`

Inherits image_identity< I, I::domain_t, interpolated< I, F > >.

Public Types

- typedef I::lvalue lvalue

  Return type of read-write access.

- typedef I::psite psite

  Point_Site associated type.

- typedef I::rvalue rvalue

  Return type of read-only access.

- typedef interpolated< tag::image_< I >, F > skeleton

  Skeleton.

- typedef I::value value

  Value associated type.

Public Member Functions

- template<typename C >
  bool has (const mln::algebra::vec< I::psite::dim, C > &v) const

  Test if a pixel value is accessible at v*.*

- interpolated (I &ima)

  Constructors.

- bool is_valid () const

  Test if this image has been initialized.

10.212.1 Detailed Description

template<typename I, template< class > class F> struct mln::interpolated< I, F >

Makes the underlying image being accessed with floating coordinates.

Definition at line 84 of file interpolated.hh.

10.212.2 Member Typedef Documentation

10.212.2.1 template<typename I , template< class > class F> typedef I ::lvalue mln::interpolated< I, F >::lvalue

Return type of read-write access.

Definition at line 98 of file interpolated.hh.

10.212.2.2 template<typename I , template< class > class F> typedef I ::psite mln::interpolated< I, F >::psite

Point_Site associated type.

Definition at line 92 of file interpolated.hh.

10.212.2.3 template<typename I , template< class > class F> typedef I ::rvalue mln::interpolated< I, F >::rvalue

Return type of read-only access.

Definition at line 101 of file interpolated.hh.

10.212.2.4 template<typename I , template< class > class F> typedef interpolated< tag::image_<I>, F > mln::interpolated< I, F >::skeleton

Skeleton.

Definition at line 104 of file interpolated.hh.

10.212.2.5 template<typename I , template< class > class F> typedef I ::value mln::interpolated< I, F >::value

Value associated type.

Definition at line 95 of file interpolated.hh.

10.212.3 Constructor & Destructor Documentation

10.212.3.1 template<typename I , template< class > class F> mln::interpolated< I, F >::interpolated (I & *ima*) [inline]

Constructors.

FIXME: don't we want a 'const' here?

Definition at line 156 of file interpolated.hh.

10.212.4 Member Function Documentation

10.212.4.1 template<typename I , template< class > class F> template<typename C > bool mln::interpolated< I, F >::has (const mln::algebra::vec< I::psite::dim, C > & *v*) const [inline]

Test if a pixel value is accessible at `v`.

Definition at line 189 of file interpolated.hh.

10.212.4.2 template<typename I , template< class > class F> bool mln::interpolated< I, F >::is_valid ( ) const [inline]

Test if this image has been initialized.

Definition at line 180 of file interpolated.hh.

10.213 mln::io::dicom::dicom_header Struct Reference

Store dicom file header.

`#include <get_header.hh>`

10.213.1 Detailed Description

Store dicom file header.

Definition at line 59 of file dicom/get_header.hh.

10.214 mln::io::dump::dump_header Struct Reference

Store dump file header.

```
#include <get_header.hh>
```

10.214.1 Detailed Description

Store dump file header.

Definition at line 53 of file dump/get_header.hh.

10.215 mln::io::fld::fld_header Struct Reference

Define the header structure of an AVS field data file.

```
#include <header.hh>
```

10.215.1 Detailed Description

Define the header structure of an AVS field data file.

Definition at line 45 of file header.hh.

10.216 mln::io::raw::raw_header Struct Reference

Store raw file header.

```
#include <get_header.hh>
```

10.216.1 Detailed Description

Store raw file header.

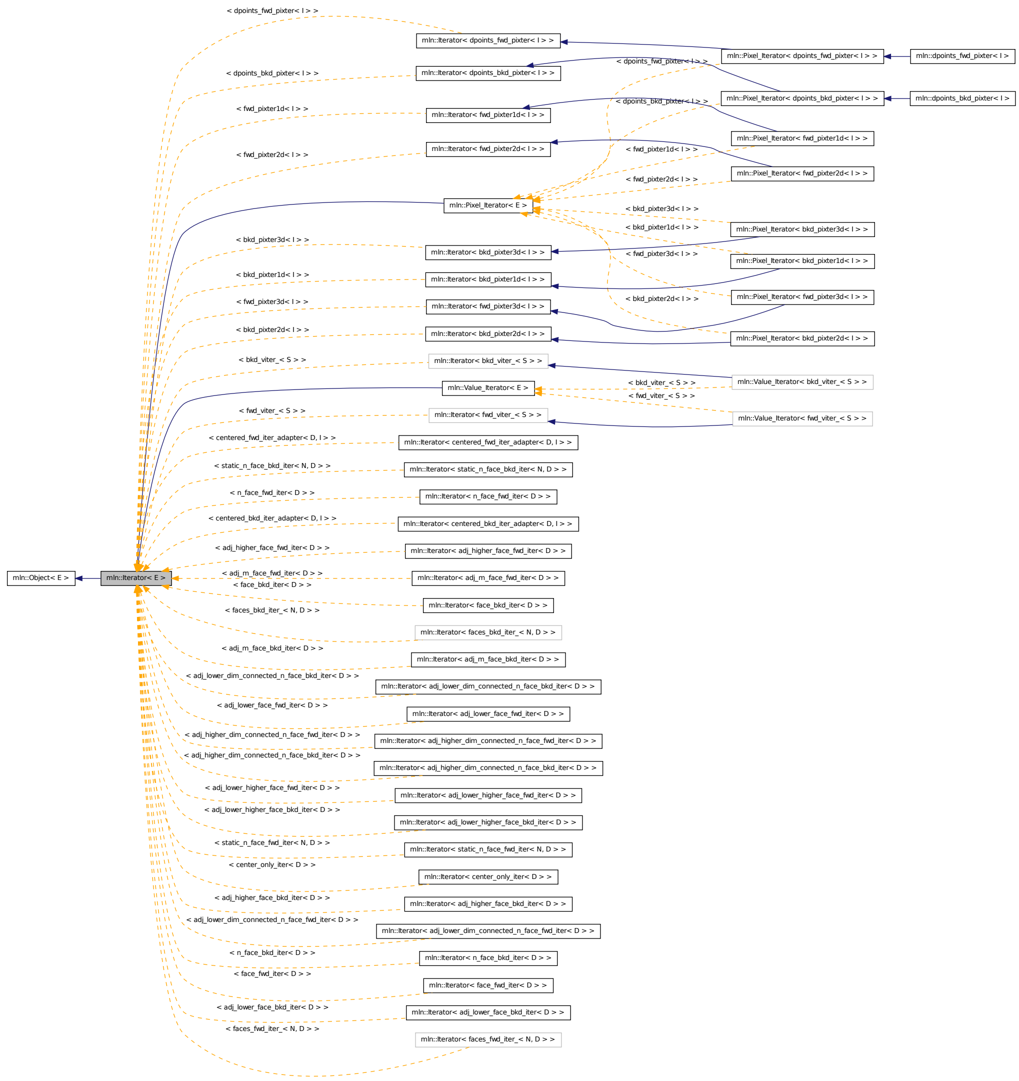
Definition at line 53 of file raw/get_header.hh.

10.217 mln::Iterator< E > Struct Template Reference

Base class for implementation classes that are iterators.

```
#include <iterator.hh>
```

Inheritance diagram for mln::Iterator< E >:



Public Member Functions

- void next ()

  Go to the next element.

10.217.1 Detailed Description

template<typename E> struct mln::Iterator< E >

Base class for implementation classes that are iterators.

See also

mln::doc::Iterator for a complete documentation of this class contents.

Definition at line 75 of file iterator.hh.

10.217.2 Member Function Documentation

10.217.2.1 template<typename E > void mln::Iterator< E >::next ( )

Go to the next element.

Warning

This is a final method; iterator classes should not re-defined this method. The actual "next" operation has to be defined through the *next_* method.

Precondition

The iterator is valid.

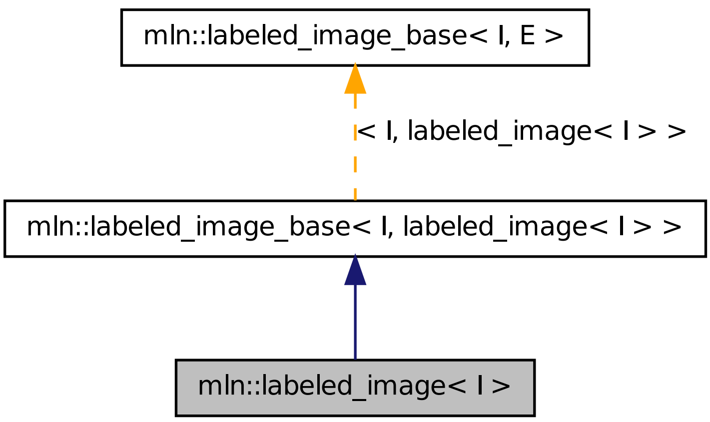
Definition at line 102 of file iterator.hh.

10.218 mln::labeled_image< I > Class Template Reference

Morpher providing an improved interface for labeled image.

`#include <labeled_image.hh>`

Inheritance diagram for mln::labeled_image< I >:



Public Types

- typedef accu::shape::bbox< typename I::psite >::result bbox_t

  Type of the bounding component bounding boxes.

- typedef labeled_image< tag::image_< I > > skeleton

  Skeleton.

Public Member Functions

- const bbox_t & bbox (const typename I::value &label) const

  Return the bounding box of the component `label`.

- const util::array< bbox_t > & bboxes () const

  Return the component bounding boxes.

- I::value nlabels () const

  Return the number of labels;.

- p_if< mln_box(I), fun::eq_v2b_expr_< pw::value_< I >, pw::cst_< typename I::value > > > subdomain (const typename I::value &label) const

  Return the domain of the component with label `label`.

  - labeled_image ()

    Constructors
    Constructor without argument.

  - labeled_image (const I &ima, const typename I::value &nlabels)

    Constructor from an image `ima` and the number of labels `nlabels`.

  - labeled_image (const I &ima, const typename I::value &nlabels, const util::array< mln_box(I)> &bboxes)

    Constructor from an image `ima`, the number of labels `nlabels` and the object bounding boxes.

  - void relabel (const Function_v2v< F > &f)

    Relabel according to a function.

  - void relabel (const Function_v2b< F > &f)

    Labels may be removed.

Protected Member Functions

- void update_data (const fun::i2v::array< typename I::value > &relabel_fun)

  Update bounding boxes information.

10.218.1 Detailed Description

template<typename I> class mln::labeled_image< I >

Morpher providing an improved interface for labeled image.

Template Parameters

I The label image type.

This image type allows to access every site set at a given label.

This image type guaranties that labels are contiguous (from 1 to n).

Definition at line 105 of file labeled_image.hh.

10.218.2 Member Typedef Documentation

10.218.2.1 typedef accu::shape::bbox<typename I ::psite>::result mln::labeled_image_base< I, labeled_image< I > >::bbox_t `[inherited]`

Type of the bounding component bounding boxes.

Definition at line 124 of file labeled_image_base.hh.

10.218.2.2 template<typename I> typedef labeled_image< tag::image_<I> > mln::labeled_image< I >::skeleton

Skeleton.

Definition at line 113 of file labeled_image.hh.

10.218.3 Constructor & Destructor Documentation

10.218.3.1 template<typename I > mln::labeled_image< I >::labeled_image ( ) `[inline]`

Constructors

Constructor without argument.

Definition at line 193 of file labeled_image.hh.

10.218.3.2 template<typename I > mln::labeled_image< I >::labeled_image (const I & *ima*, const typename I::value & *nlabels*) `[inline]`

Constructor from an image `ima` and the number of labels `nlabels`.

Definition at line 199 of file labeled_image.hh.

10.218.3.3 template<typename I > mln::labeled_image< I >::labeled_image (const I & *ima*, const typename I::value & *nlabels*, const util::array< mln_box(I)> & *bboxes*) `[inline]`

Constructor from an image `ima`, the number of labels `nlabels` and the object bounding boxes.

Definition at line 206 of file labeled_image.hh.

References mln::data::compute().

10.218.4 Member Function Documentation

10.218.4.1 const bbox_t& mln::labeled_image_base< I, labeled_image< I > >::bbox (const typename I::value & *label*) const [inherited]

Return the bounding box of the component `label`.

10.218.4.2 const util::array<bbox_t>& mln::labeled_image_base< I, labeled_image< I > >::bboxes ( ) const [inherited]

Return the component bounding boxes.

10.218.4.3 I ::value mln::labeled_image_base< I, labeled_image< I > >::nlabels ( ) const [inherited]

Return the number of labels;.

10.218.4.4 void mln::labeled_image_base< I, labeled_image< I > >::relabel (const Function_v2b< F > & *f*) [inherited]

Labels may be removed.

This overload make sure the labeling is still contiguous.

10.218.4.5 void mln::labeled_image_base< I, labeled_image< I > >::relabel (const Function_v2v< F > & *f*) [inherited]

Relabel according to a function.

Merge or delete labels according to the given function. This method ensures that the labeling remains contiguous.

10.218.4.6 p_if<mln_box(I), fun::eq_v2b_expr_<pw::value_<I>, pw::cst_<typename I ::value> > > mln::labeled_image_base< I, labeled_image< I > >::subdomain (const typename I::value & *label*) const [inherited]

Return the domain of the component with label `label`.

10.218.4.7 void mln::labeled_image_base< I, labeled_image< I > >::update_data (const fun::i2v::array< typename I::value > & *relabel_fun*) [protected, inherited]

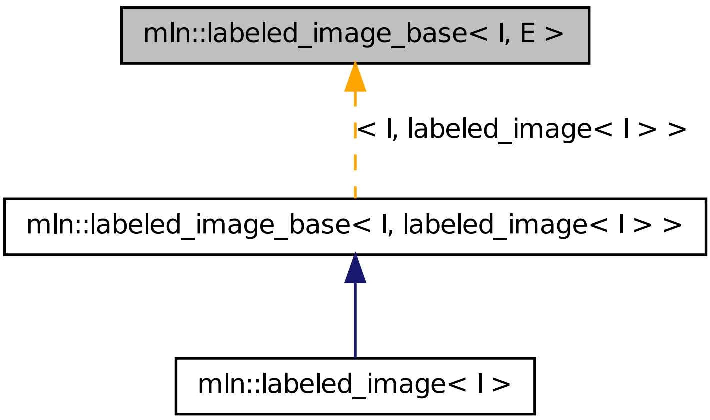
Update bounding boxes information.

10.219 mln::labeled_image_base< I, E > Class Template Reference

Base class Morpher providing an improved interface for labeled image.

#include <labeled_image_base.hh>

Inheritance diagram for mln::labeled_image_base< I, E >:



Public Types

- typedef accu::shape::bbox< typename I::psite >::result bbox_t

  Type of the bounding component bounding boxes.

Public Member Functions

- const bbox_t & bbox (const typename I::value &label) const

  Return the bounding box of the component `label`*.*

- const util::array< bbox_t > & bboxes () const

  Return the component bounding boxes.

- I::value nlabels () const

  Return the number of labels;.

- p_if< mln_box(I), fun::eq_v2b_expr_< pw::value_< I >, pw::cst_< typename I::value > > > subdomain (const typename I::value &label) const

  Return the domain of the component with label `label`*.*

  - labeled_image_base ()

Constructors
Constructor without argument.

- template<typename F >
  void relabel (const Function_v2v< F > &f)
  Relabel according to a function.
- template<typename F >
  void relabel (const Function_v2b< F > &f)
  Labels may be removed.

Protected Member Functions

- void update_data (const fun::i2v::array< typename I::value > &relabel_fun)
  Update bounding boxes information.

10.219.1 Detailed Description

template<typename I, typename E> class mln::labeled_image_base< I, E >

Base class Morpher providing an improved interface for labeled image.

Template Parameters

I The label image type.

This image type allows to access every site set at a given label.

This image type guaranties that labels are contiguous (from 1 to n).

Definition at line 116 of file labeled_image_base.hh.

10.219.2 Member Typedef Documentation

10.219.2.1 template<typename I, typename E> typedef accu::shape::bbox<typename I ::psite>::result mln::labeled_image_base< I, E >::bbox_t

Type of the bounding component bounding boxes.

Definition at line 124 of file labeled_image_base.hh.

10.219.3 Constructor & Destructor Documentation

10.219.3.1 template<typename I , typename E > mln::labeled_image_base< I, E >::labeled_image_base ( ) `[inline]`

Constructors

Constructor without argument.

Definition at line 217 of file labeled_image_base.hh.

10.219.4 Member Function Documentation

10.219.4.1 template<typename I, typename E > const labeled_image_base< I, E >::bbox_t & mln::labeled_image_base< I, E >::bbox (const typename I::value & *label*) const

Return the bounding box of the component `label`.

Definition at line 305 of file labeled_image_base.hh.

Referenced by mln::labeled_image_base< I, E >::subdomain().

10.219.4.2 template<typename I , typename E > const util::array< typename labeled_image_base< I, E >::bbox_t > & mln::labeled_image_base< I, E >::bboxes ( ) const

Return the component bounding boxes.

Definition at line 313 of file labeled_image_base.hh.

10.219.4.3 template<typename I , typename E > I::value mln::labeled_image_base< I, E >::nlabels ( ) const `[inline]`

Return the number of labels;.

Definition at line 273 of file labeled_image_base.hh.

10.219.4.4 template<typename I , typename E > template<typename F > void mln::labeled_image_base< I, E >::relabel (const Function_v2b< F > & *f*) `[inline]`

Labels may be removed.

This overload make sure the labeling is still contiguous.

Definition at line 252 of file labeled_image_base.hh.

References mln::labeling::relabel_inplace(), mln::make::relabelfun(), and mln::labeled_image_base< I, E >::update_data().

10.219.4.5 template<typename I , typename E > template<typename F > void mln::labeled_image_base< I, E >::relabel (const Function_v2v< F > & *f*) `[inline]`

Relabel according to a function.

Merge or delete labels according to the given function. This method ensures that the labeling remains contiguous.

Definition at line 226 of file labeled_image_base.hh.

References mln::labeling::relabel_inplace(), mln::make::relabelfun(), and mln::labeled_image_base< I, E >::update_data().

10.219.4.6 template<typename I, typename E > p_if< mln_box(I), fun::eq_v2b_expr_< pw::value_< I >, pw::cst_< typename I::value > > > mln::labeled_image_base< I, E >::subdomain (const typename I::value & *label*) const

Return the domain of the component with label `label`.

Definition at line 322 of file labeled_image_base.hh.

References mln::labeled_image_base< I, E >::bbox().

10.219.4.7 template<typename I, typename E > void mln::labeled_image_base< I, E >::update_data (const fun::i2v::array< typename I::value > & *relabel_fun*) `[protected]`

Update bounding boxes information.

Definition at line 281 of file labeled_image_base.hh.

References mln::util::array< T >::size().

Referenced by mln::labeled_image_base< I, E >::relabel().

10.220 mln::lazy_image< I, F, B > Struct Template Reference

Image values are computed on the fly.

`#include <lazy_image.hh>`

Inherits image_identity< mln::trait::ch_value< I, F::result >::ret, I::domain_t, lazy_image< I, F, B > >.

Public Types

- typedef F::result lvalue

  Return type of read-write access.

- typedef F::result rvalue

  Return type of read access.

- typedef lazy_image< tag::image_< I >, F, B > skeleton

  Skeleton.

Public Member Functions

- const box< typename I::psite > & domain () const

  Return domain of lazyd_image.

- bool has (const typename I::psite &) const

  Test if a pixel value is accessible at p*.*

- lazy_image (const F &fun, const B &box)

  Constructors.

- lazy_image ()

  Constructors.

- F::result operator() (const typename F::input &x) const

  Read-only access of pixel value at F::input x.

- lvalue operator() (const typename I::psite &p)

  Read and "write if possible" access of pixel value at point site p.

- F::result operator() (const typename F::input &x)

  Read and "write if possible" access of pixel value at F::input x.

- rvalue operator() (const typename I::psite &p) const

  Read-only access of pixel value at point site p.

10.220.1 Detailed Description

template<typename I, typename F, typename B> struct mln::lazy_image< I, F, B >

Image values are computed on the fly. The parameter `I` is the type of image. The parameter `F` is the type of function. The parameter `B` is the type of box.

This image class tage a functor `fun` and a box `box`. Access to ima(p) where `p` include `box` return fun(b) lazily.

Definition at line 92 of file lazy_image.hh.

10.220.2 Member Typedef Documentation

10.220.2.1 template<typename I, typename F, typename B> typedef F ::result mln::lazy_image< I, F, B >::lvalue

Return type of read-write access.

Definition at line 104 of file lazy_image.hh.

10.220.2.2 template<typename I, typename F, typename B> typedef F ::result mln::lazy_image< I, F, B >::rvalue

Return type of read access.

Definition at line 101 of file lazy_image.hh.

10.220.2.3 template<typename I, typename F, typename B> typedef lazy_image< tag::image_<I>, F, B > mln::lazy_image< I, F, B >::skeleton

Skeleton.

Definition at line 107 of file lazy_image.hh.

10.220.3 Constructor & Destructor Documentation

10.220.3.1 template<typename I, typename F, typename B> mln::lazy_image< I, F, B >::lazy_image ( )

Constructors.

10.220.3.2 template<typename I , typename F, typename B> mln::lazy_image< I, F, B >::lazy_image (const F & *fun*, const B & *box*) `[inline]`

Constructors.

Definition at line 161 of file lazy_image.hh.

10.220.4 Member Function Documentation

10.220.4.1 template<typename I , typename F , typename B > const box< typename I::psite > & mln::lazy_image< I, F, B >::domain ( ) const `[inline]`

Return domain of lazyd_image.

Definition at line 226 of file lazy_image.hh.

10.220.4.2 template<typename I, typename F , typename B > bool mln::lazy_image< I, F, B >::has (const typename I::psite & *p*) const `[inline]`

Test if a pixel value is accessible at `p`.

Definition at line 175 of file lazy_image.hh.

10.220.4.3 template<typename I, typename F, typename B > lazy_image< I, F, B >::rvalue mln::lazy_image< I, F, B >::operator() (const typename I::psite & *p*) const `[inline]`

Read-only access of pixel value at point site `p`.

Definition at line 210 of file lazy_image.hh.

10.220.4.4 template<typename I , typename F, typename B > F::result mln::lazy_image< I, F, B >::operator() (const typename F::input & *x*) `[inline]`

Read and "write if possible" access of pixel value at F::input `x`.

Definition at line 197 of file lazy_image.hh.

10.220.4.5 template<typename I , typename F, typename B > F::result mln::lazy_image< I, F, B >::operator() (const typename F::input & *x*) const `[inline]`

Read-only access of pixel value at F::input `x`.

Definition at line 183 of file lazy_image.hh.

10.220.4.6 template<typename I, typename F, typename B > lazy_image< I, F, B >::lvalue mln::lazy_image< I, F, B >::operator() (const typename I::psite & *p*) `[inline]`

Read and "write if possible" access of pixel value at point site `p`.

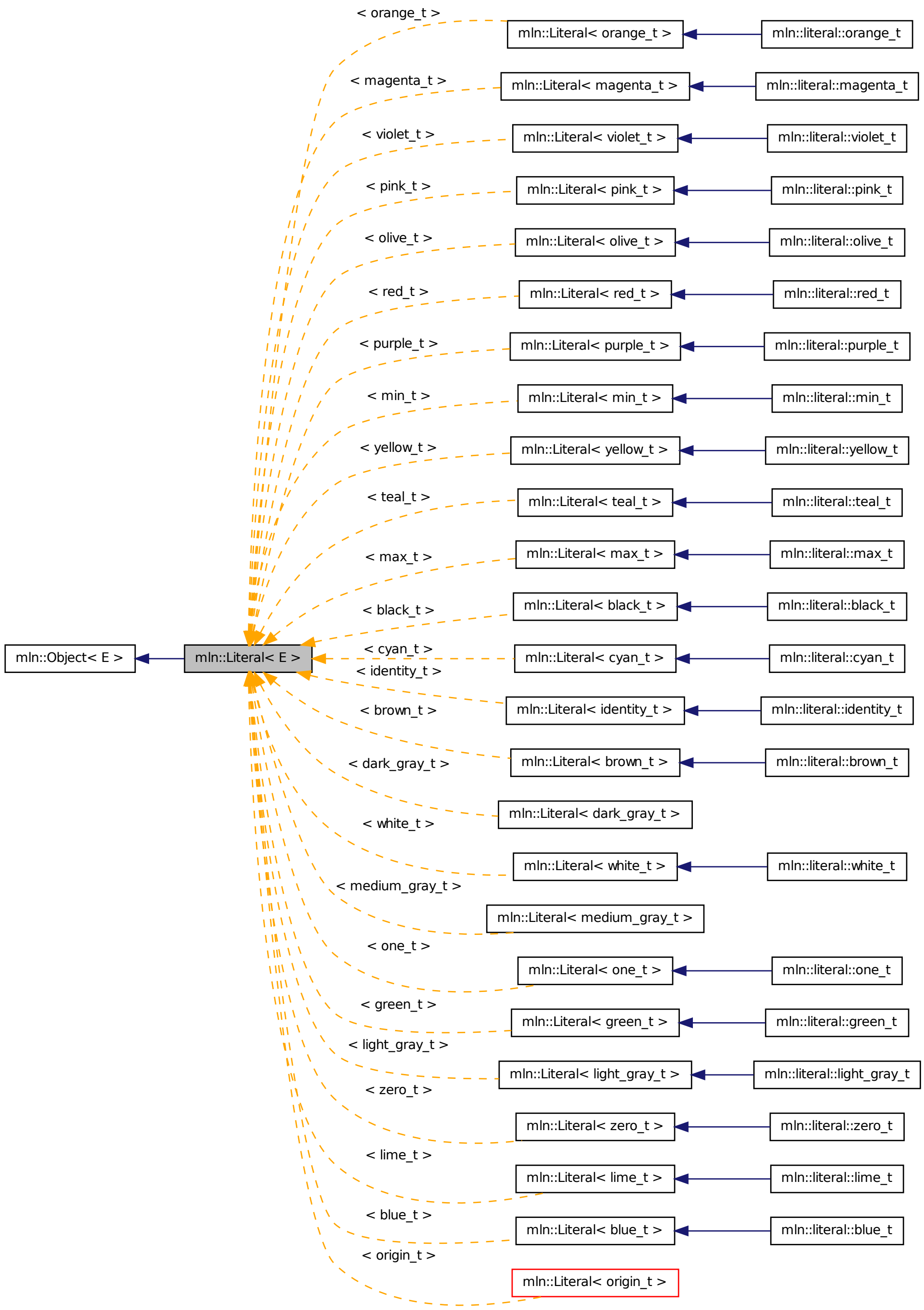
Definition at line 218 of file lazy_image.hh.

10.221 mln::Literal< E > Struct Template Reference

Base class for implementation classes of literals.

`#include <literal.hh>`

Inheritance diagram for mln::Literal< E >:



10.221.1 Detailed Description

template<typename E> struct mln::Literal< E >

Base class for implementation classes of literals.

See also

mln::doc::Literal for a complete documentation of this class contents.

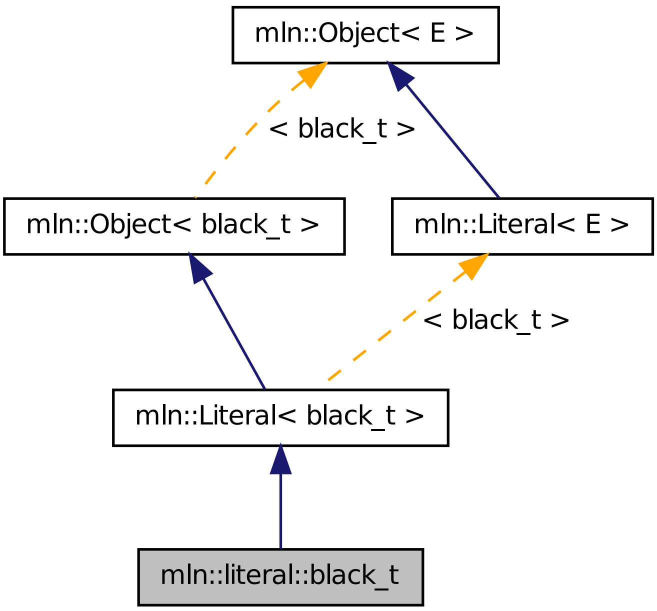
Definition at line 56 of file literal.hh.

10.222 mln::literal::black_t Struct Reference

Type of literal black.

`#include <black.hh>`

Inheritance diagram for mln::literal::black_t:



10.222.1 Detailed Description

Type of literal black.

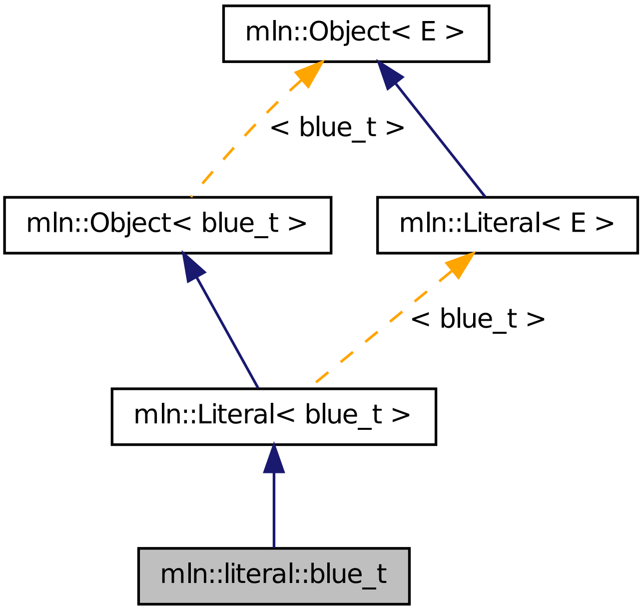
Definition at line 43 of file black.hh.

10.223 mln::literal::blue_t Struct Reference

Type of literal blue.

`#include <colors.hh>`

Inheritance diagram for mln::literal::blue_t:



10.223.1 Detailed Description

Type of literal blue.

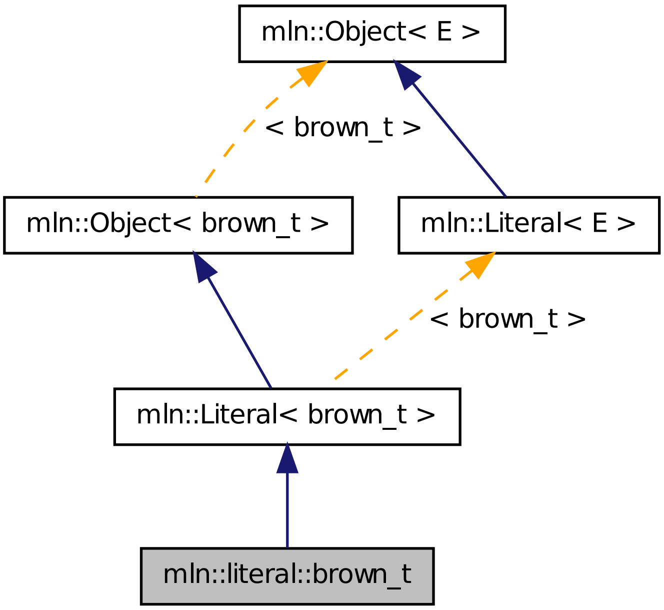
Definition at line 53 of file colors.hh.

10.224 mln::literal::brown_t Struct Reference

Type of literal brown.

`#include <colors.hh>`

Inheritance diagram for mln::literal::brown_t:



10.224.1 Detailed Description

Type of literal brown.

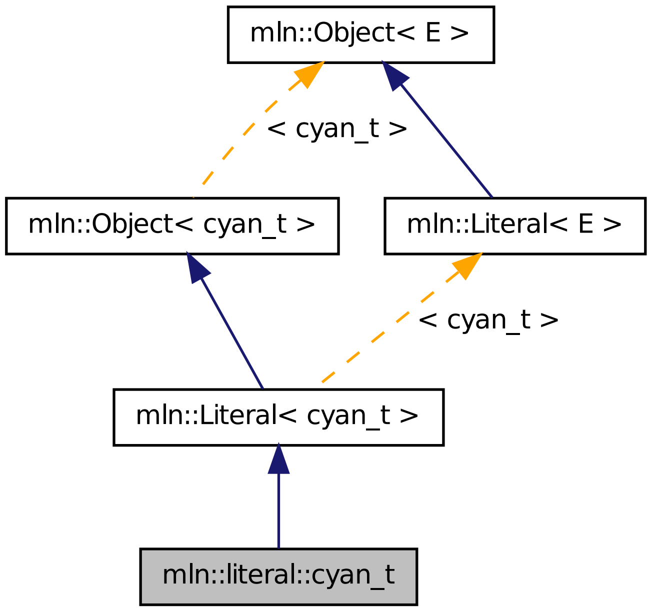
Definition at line 58 of file colors.hh.

10.225 mln::literal::cyan_t Struct Reference

Type of literal cyan.

`#include <colors.hh>`

Inheritance diagram for mln::literal::cyan_t:



10.225.1 Detailed Description

Type of literal cyan.

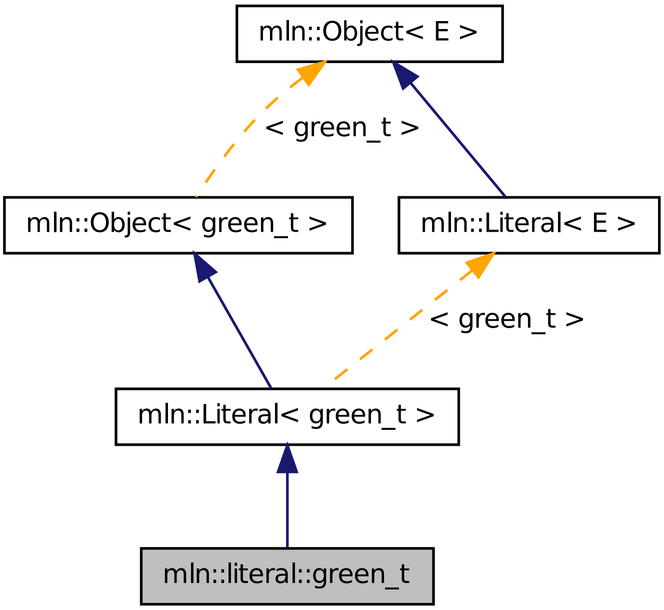
Definition at line 93 of file colors.hh.

10.226 mln::literal::green_t Struct Reference

Type of literal green.

`#include <colors.hh>`

Inheritance diagram for mln::literal::green_t:



10.226.1 Detailed Description

Type of literal green.

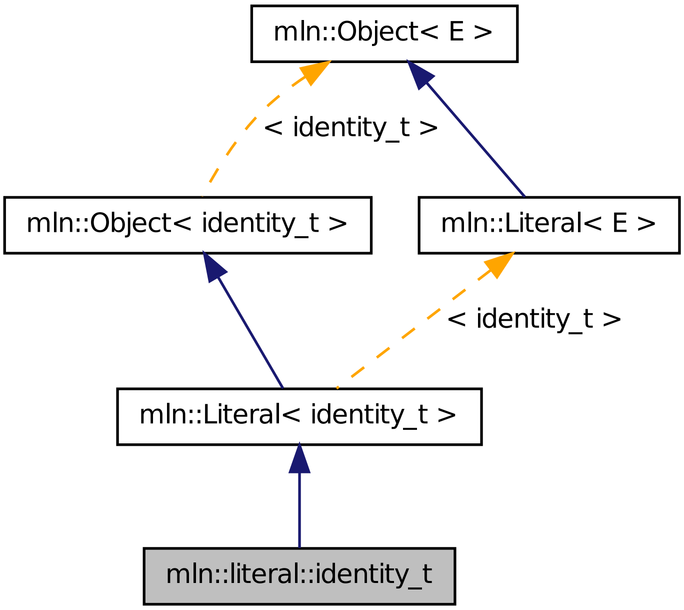
Definition at line 48 of file colors.hh.

10.227 mln::literal::identity_t Struct Reference

Type of literal identity.

```
#include <identity.hh>
```

Inheritance diagram for mln::literal::identity_t:



10.227.1 Detailed Description

Type of literal identity.

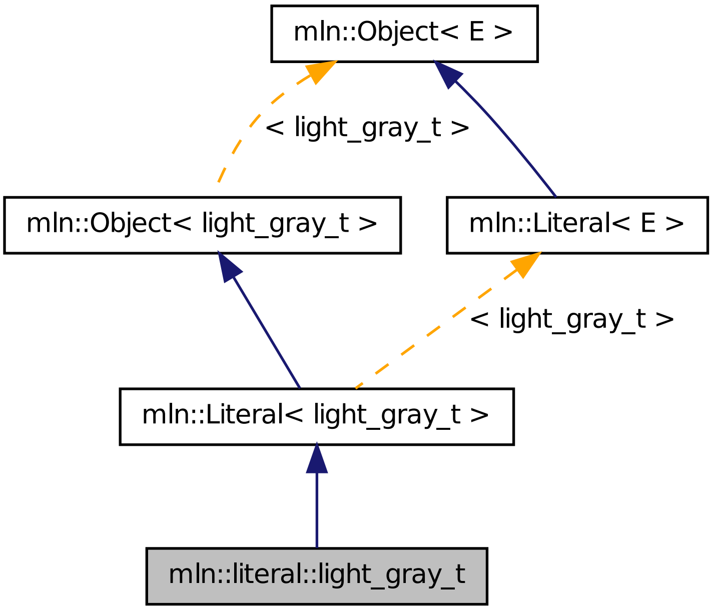
Definition at line 43 of file identity.hh.

10.228 mln::literal::light_gray_t Struct Reference

Type of literal grays.

`#include <grays.hh>`

Inheritance diagram for mln::literal::light_gray_t:



10.228.1 Detailed Description

Type of literal grays.

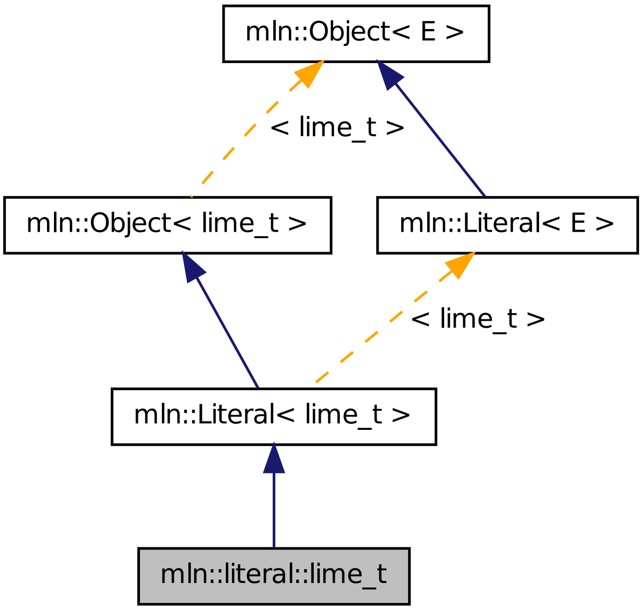
Definition at line 43 of file grays.hh.

10.229 mln::literal::lime_t Struct Reference

Type of literal lime.

`#include <colors.hh>`

Inheritance diagram for mln::literal::lime_t:



10.229.1 Detailed Description

Type of literal lime.

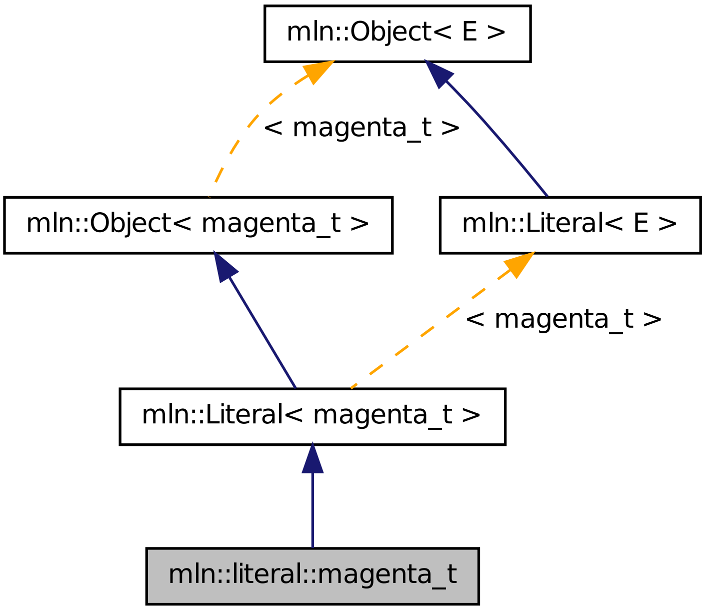
Definition at line 63 of file colors.hh.

10.230 mln::literal::magenta_t Struct Reference

Type of literal magenta.

`#include <colors.hh>`

Inheritance diagram for mln::literal::magenta_t:



10.230.1 Detailed Description

Type of literal magenta.

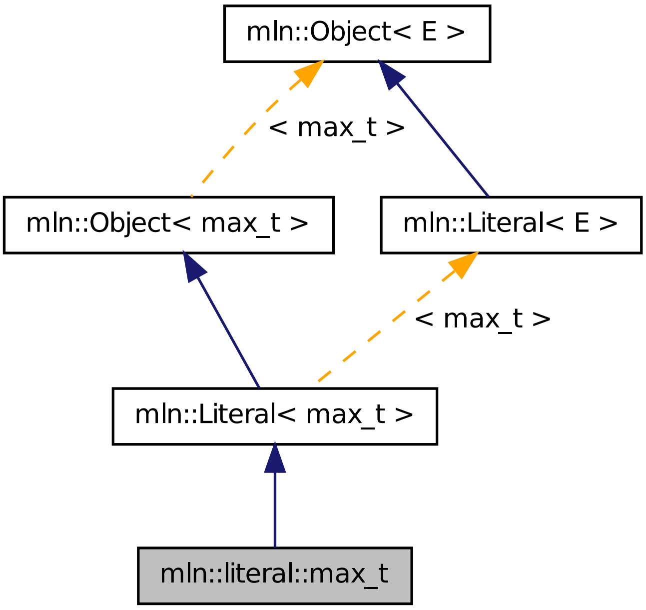
Definition at line 98 of file colors.hh.

10.231 mln::literal::max_t Struct Reference

Type of literal max.

`#include <max.hh>`

Inheritance diagram for mln::literal::max_t:



10.231.1 Detailed Description

Type of literal max.

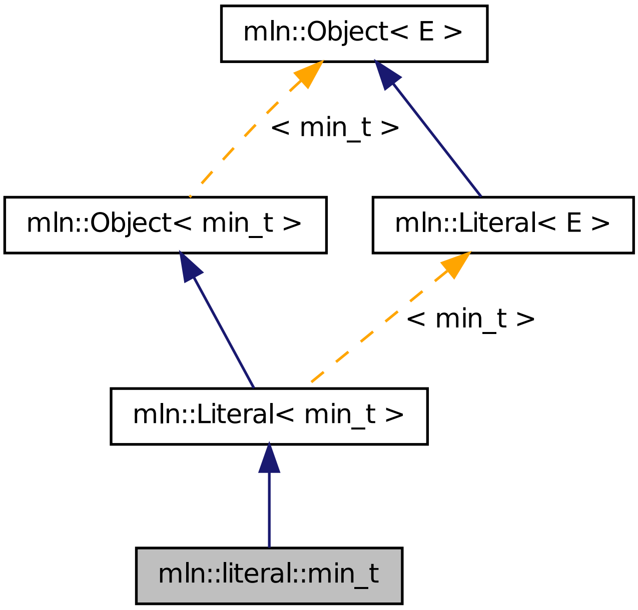
Definition at line 44 of file literal/max.hh.

10.232 mln::literal::min_t Struct Reference

Type of literal min.

```
#include <min.hh>
```

Inheritance diagram for mln::literal::min_t:



10.232.1 Detailed Description

Type of literal min.

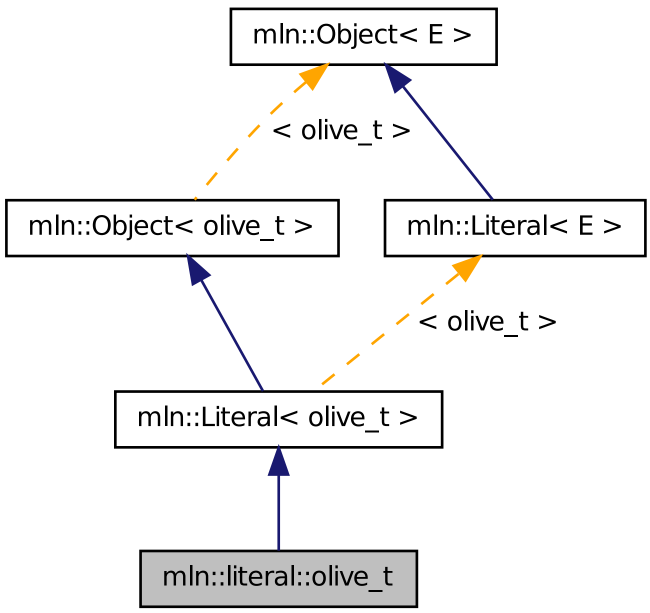
Definition at line 44 of file literal/min.hh.

10.233 mln::literal::olive_t Struct Reference

Type of literal olive.

`#include <colors.hh>`

Inheritance diagram for mln::literal::olive_t:



10.233.1 Detailed Description

Type of literal olive.

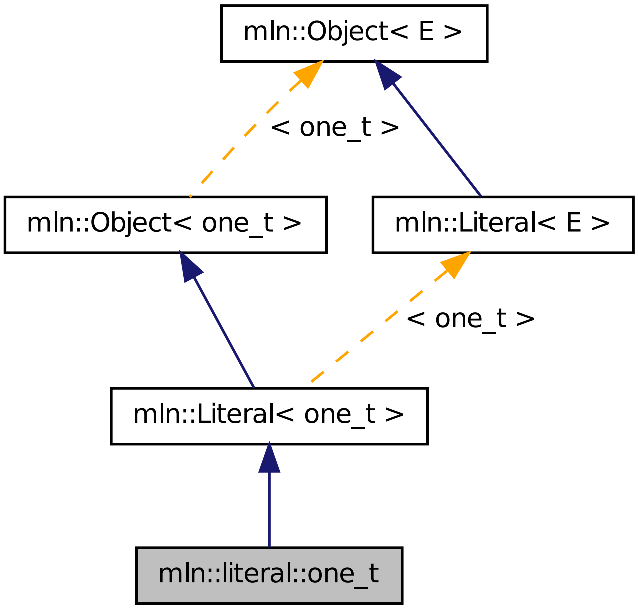
Definition at line 108 of file colors.hh.

10.234 mln::literal::one_t Struct Reference

Type of literal one.

```
#include <one.hh>
```

Inheritance diagram for mln::literal::one_t:



10.234.1 Detailed Description

Type of literal one.

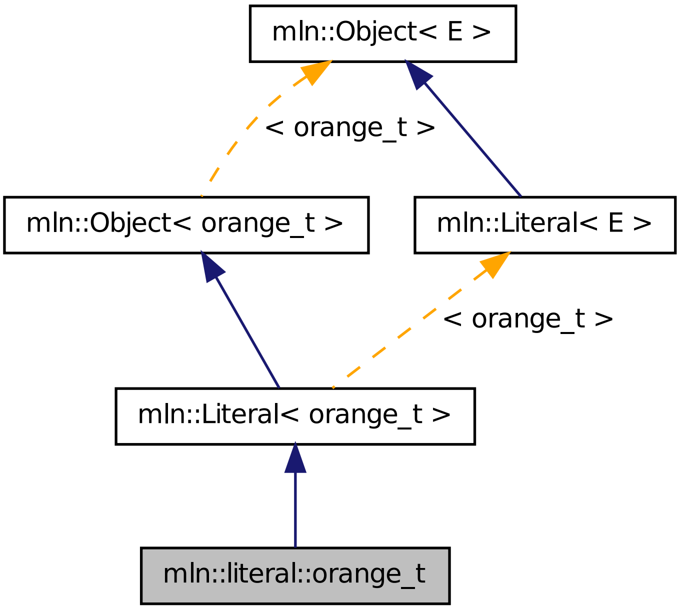
Definition at line 44 of file one.hh.

10.235 mln::literal::orange_t Struct Reference

Type of literal orange.

```
#include <colors.hh>
```

Inheritance diagram for mln::literal::orange_t:



10.235.1 Detailed Description

Type of literal orange.

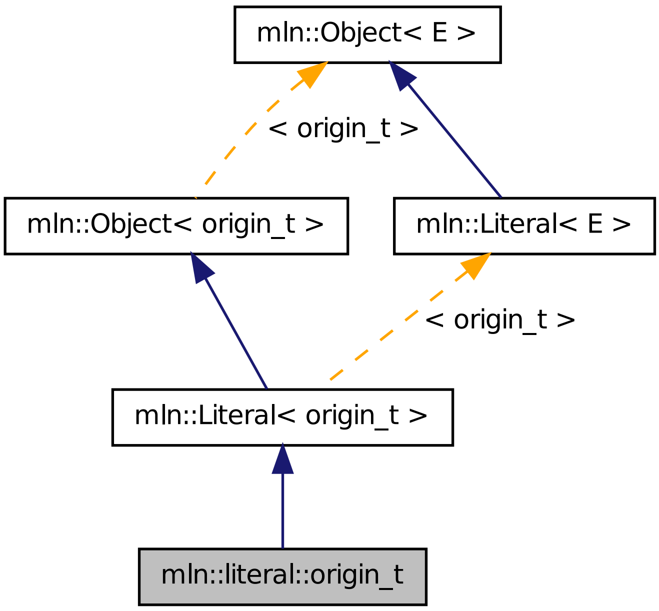
Definition at line 68 of file colors.hh.

10.236 mln::literal::origin_t Struct Reference

Type of literal origin.

```
#include <origin.hh>
```

Inheritance diagram for mln::literal::origin_t:



10.236.1 Detailed Description

Type of literal origin.

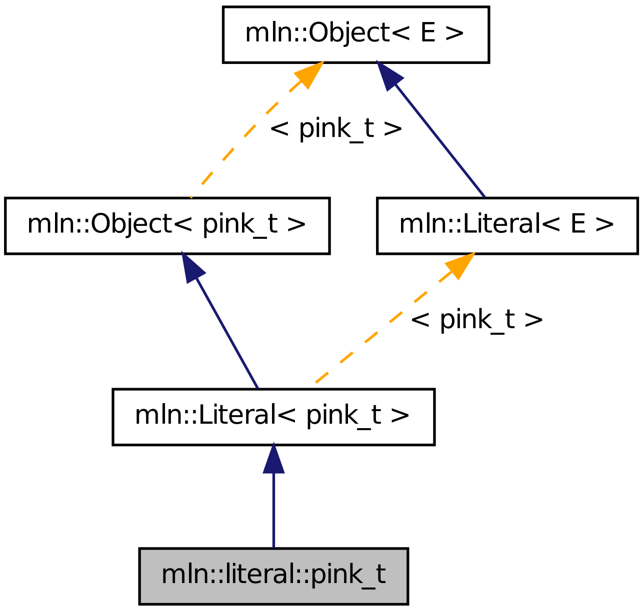
Definition at line 44 of file origin.hh.

10.237 mln::literal::pink_t Struct Reference

Type of literal pink.

```
#include <colors.hh>
```

Inheritance diagram for mln::literal::pink_t:



10.237.1 Detailed Description

Type of literal pink.

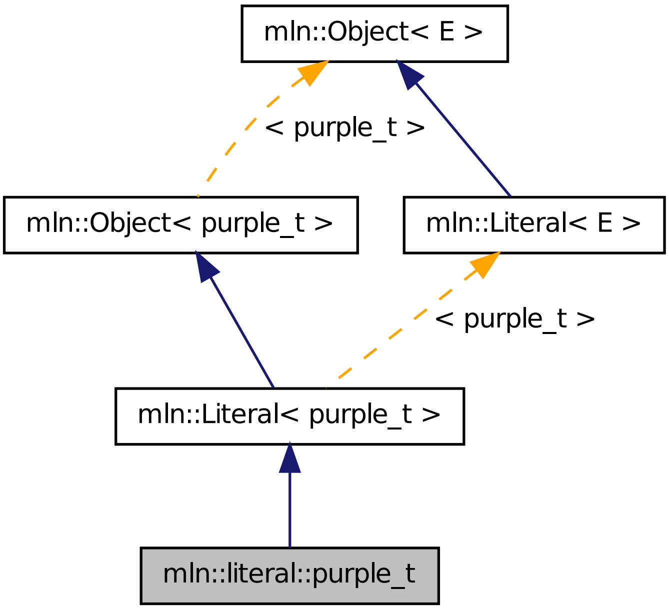
Definition at line 73 of file colors.hh.

10.238 mln::literal::purple_t Struct Reference

Type of literal purple.

`#include <colors.hh>`

Inheritance diagram for mln::literal::purple_t:



10.238.1 Detailed Description

Type of literal purple.

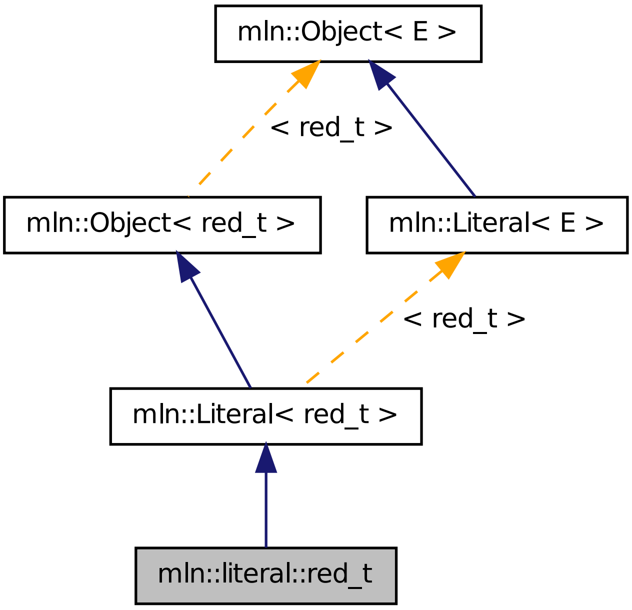
Definition at line 78 of file colors.hh.

10.239 mln::literal::red_t Struct Reference

Type of literal red.

```
#include <colors.hh>
```

Inheritance diagram for mln::literal::red_t:



10.239.1 Detailed Description

Type of literal red.

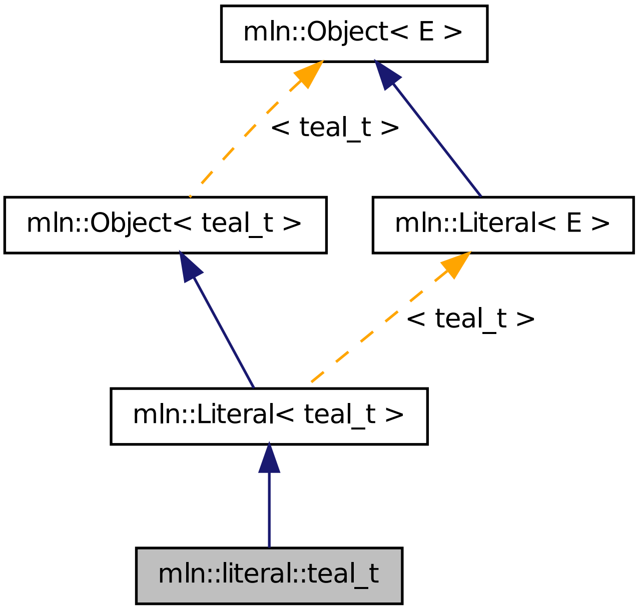
Definition at line 43 of file colors.hh.

10.240 mln::literal::teal_t Struct Reference

Type of literal teal.

```
#include <colors.hh>
```

Inheritance diagram for mln::literal::teal_t:



10.240.1 Detailed Description

Type of literal teal.

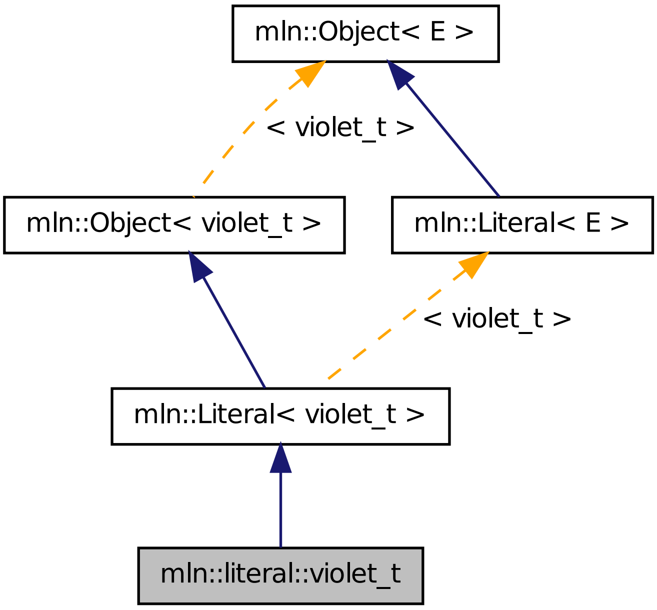
Definition at line 83 of file colors.hh.

10.241 mln::literal::violet_t Struct Reference

Type of literal violet.

`#include <colors.hh>`

Inheritance diagram for mln::literal::violet_t:



10.241.1 Detailed Description

Type of literal violet.

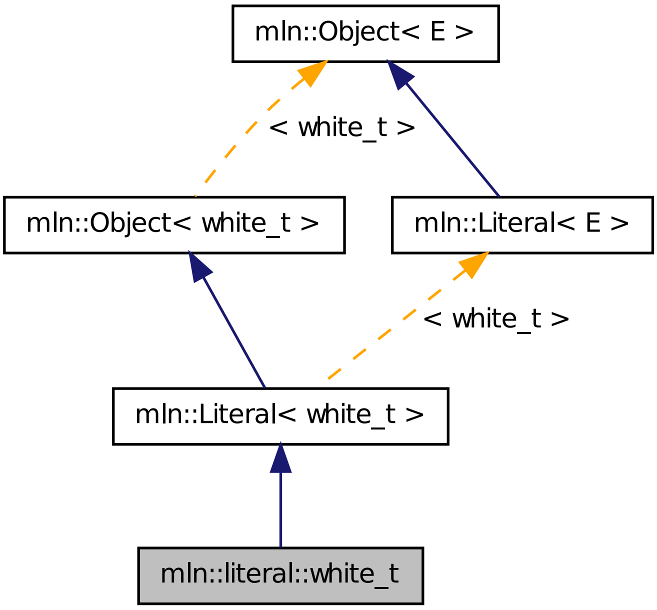
Definition at line 88 of file colors.hh.

10.242 mln::literal::white_t Struct Reference

Type of literal white.

```
#include <white.hh>
```

Inheritance diagram for mln::literal::white_t:



10.242.1 Detailed Description

Type of literal white.

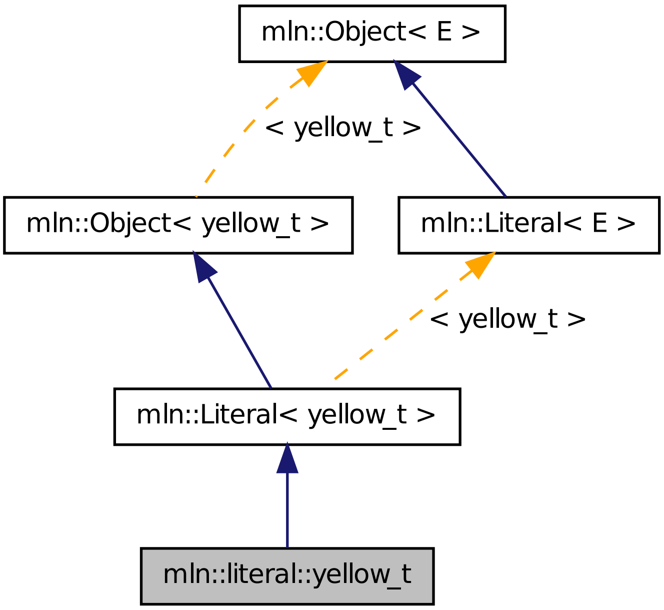
Definition at line 43 of file white.hh.

10.243 mln::literal::yellow_t Struct Reference

Type of literal yellow.

`#include <colors.hh>`

Inheritance diagram for mln::literal::yellow_t:



10.243.1 Detailed Description

Type of literal yellow.

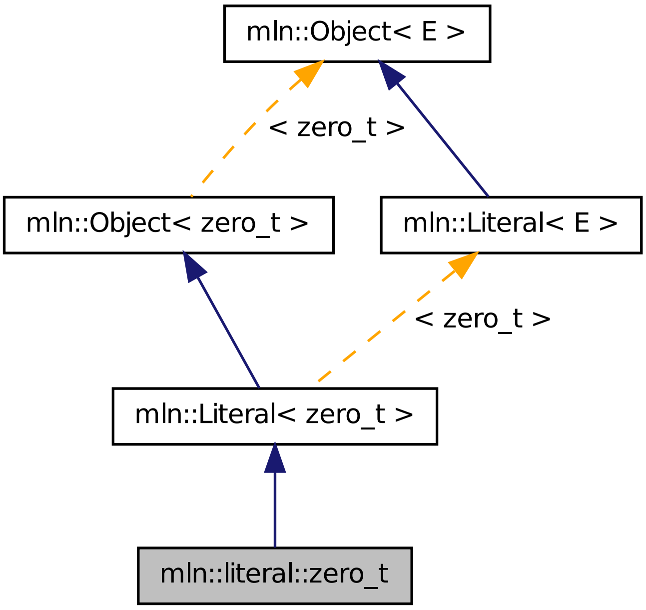
Definition at line 103 of file colors.hh.

10.244 mln::literal::zero_t Struct Reference

Type of literal zero.

`#include <zero.hh>`

Inheritance diagram for mln::literal::zero_t:



10.244.1 Detailed Description

Type of literal zero.

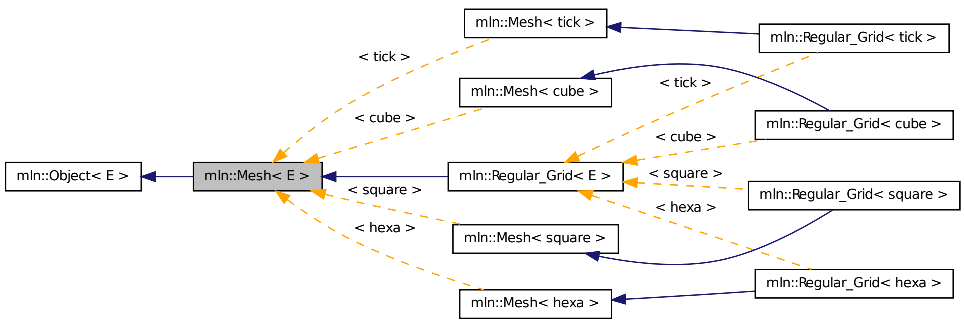
Definition at line 46 of file zero.hh.

10.245 mln::Mesh< E > Struct Template Reference

Base class for implementation classes of meshes.

`#include <mesh.hh>`

Inheritance diagram for mln::Mesh< E >:



10.245.1 Detailed Description

template<typename E> struct mln::Mesh< E >

Base class for implementation classes of meshes.

See also

mln::doc::Mesh for a complete documentation of this class contents.

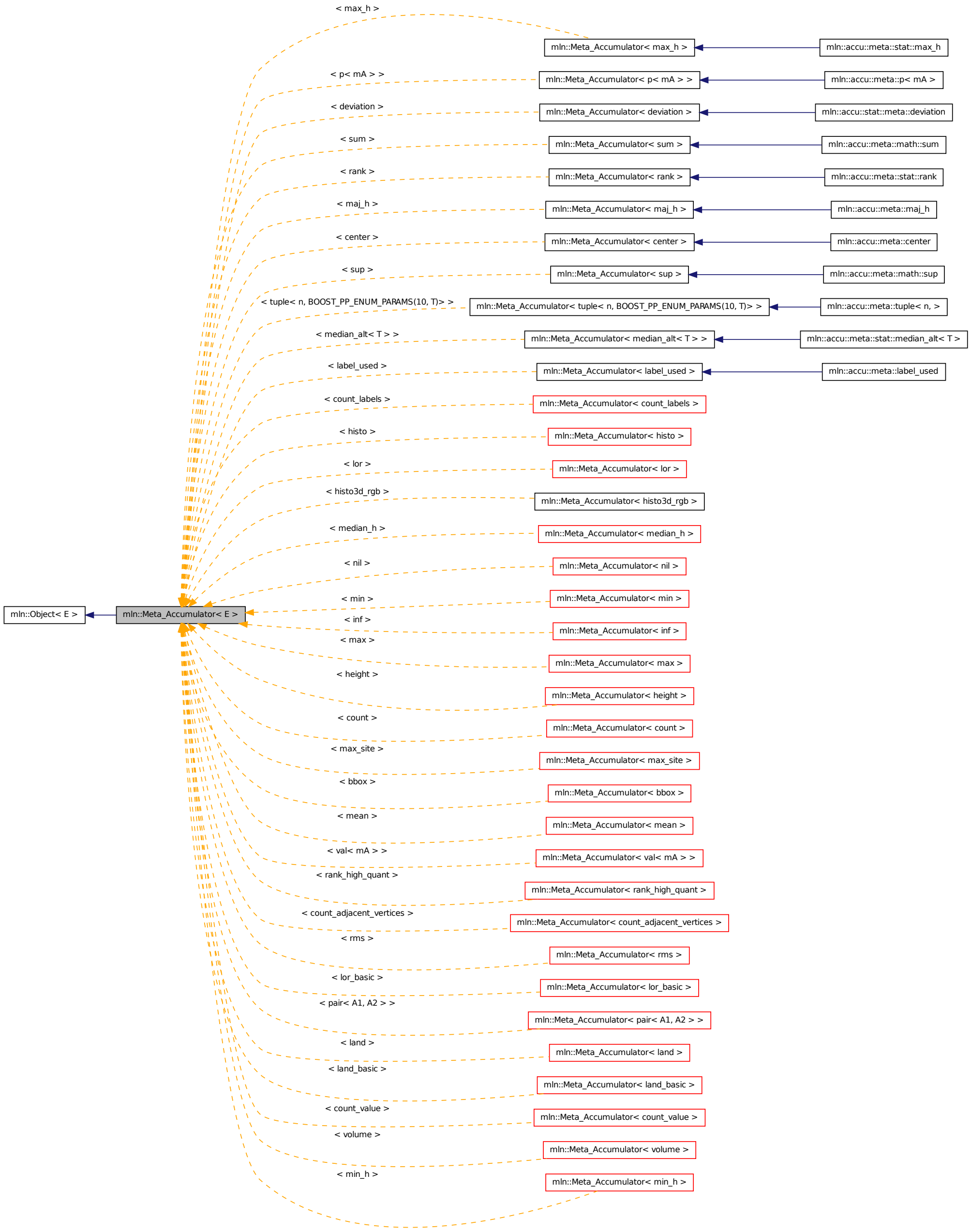
Definition at line 45 of file mesh.hh.

10.246 mln::Meta_Accumulator< E > Struct Template Reference

Base class for implementation of meta accumulators.

`#include <meta_accumulator.hh>`

Inheritance diagram for mln::Meta_Accumulator< E >:



10.246.1 Detailed Description

template<typename E> struct mln::Meta_Accumulator< E >

Base class for implementation of meta accumulators. The parameter *E* is the exact type.

See also

mln::doc::Meta_Accumulator for a complete documentation of this class contents.

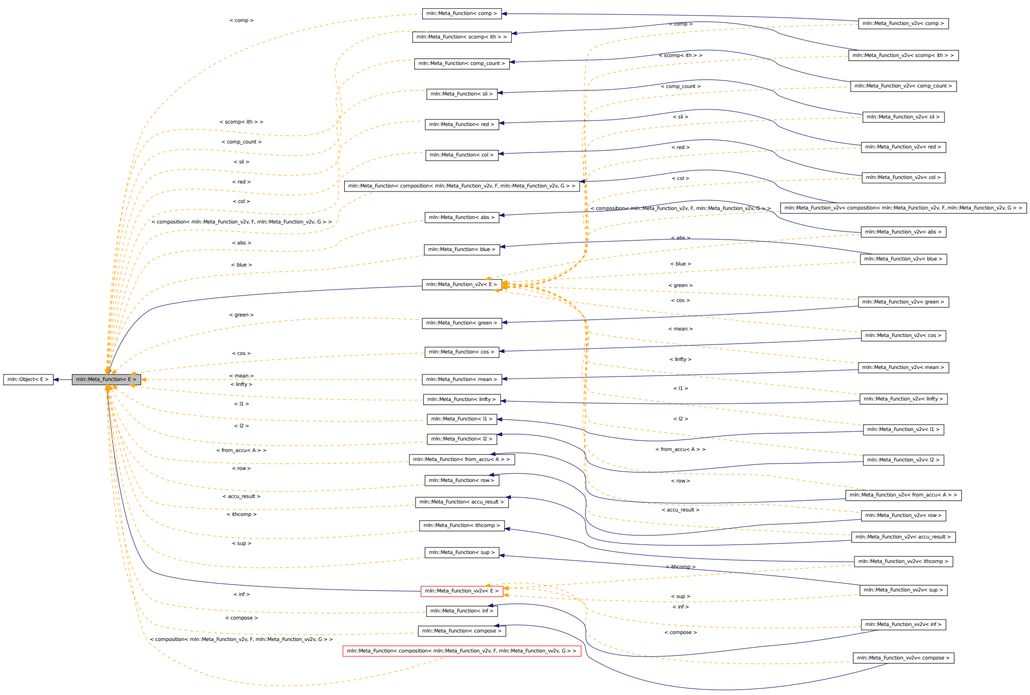
Definition at line 103 of file meta_accumulator.hh.

10.247 mln::Meta_Function< E > Struct Template Reference

Base class for implementation of meta functions.

`#include <meta_function.hh>`

Inheritance diagram for mln::Meta_Function< E >:



10.247.1 Detailed Description

template<typename E> struct mln::Meta_Function< E >

Base class for implementation of meta functions. The parameter *E* is the exact type.

See also

mln::doc::Meta_Function for a complete documentation of this class contents.

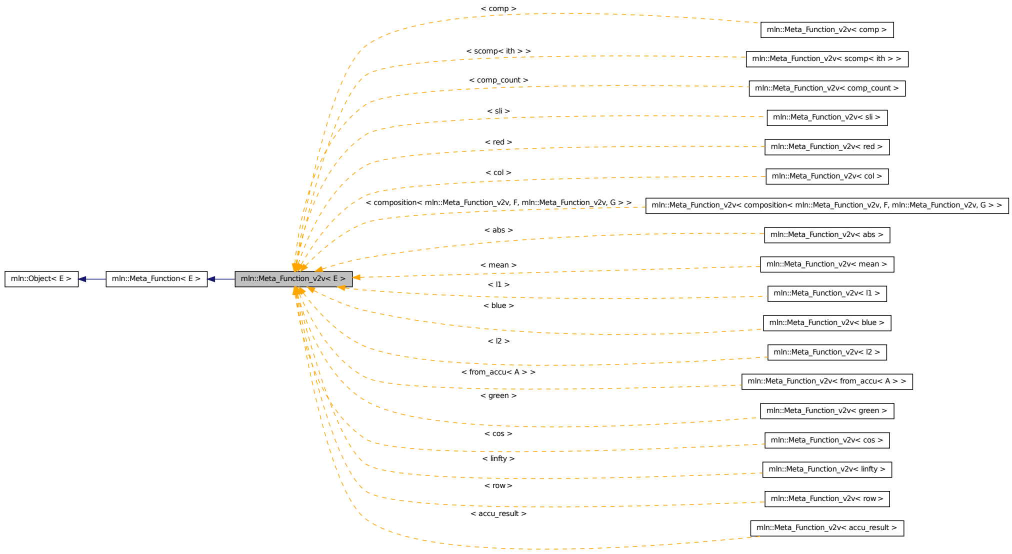
Definition at line 78 of file meta_function.hh.

10.248 mln::Meta_Function_v2v< E > Struct Template Reference

Base class for implementation of function-objects from value to value.

`#include <meta_function.hh>`

Inheritance diagram for mln::Meta_Function_v2v< E >:



10.248.1 Detailed Description

template<typename E> struct mln::Meta_Function_v2v< E >

Base class for implementation of function-objects from value to value. The parameter *E* is the exact type.

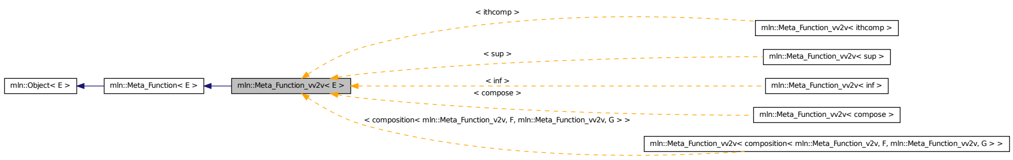
Definition at line 98 of file meta_function.hh.

10.249 mln::Meta_Function_vv2v< E > Struct Template Reference

Base class for implementation of function-objects from value to value.

`#include <meta_function.hh>`

Inheritance diagram for mln::Meta_Function_vv2v< E >:



10.249.1 Detailed Description

template< typename E > struct mln::Meta_Function_vv2v< E >

Base class for implementation of function-objects from value to value. The parameter *E* is the exact type.

Definition at line 120 of file meta_function.hh.

10.250 mln::metal::ands< E1, E2, E3, E4, E5, E6, E7, E8 > Struct Template Reference

Ands type.

`#include <ands.hh>`

10.250.1 Detailed Description

template< typename E1, typename E2, typename E3, typename E4 = true_, typename E5 = true_, typename E6 = true_, typename E7 = true_, typename E8 = true_> struct mln::metal::ands< E1, E2, E3, E4, E5, E6, E7, E8 >

Ands type.

Definition at line 51 of file ands.hh.

10.251 mln::metal::converts_to< T, U > Struct Template Reference

"converts-to" check.

`#include <converts_to.hh>`

Inherited by mln::metal::converts_to< T *, U * >.

10.251.1 Detailed Description

template< typename T, typename U > struct mln::metal::converts_to< T, U >

"converts-to" check.

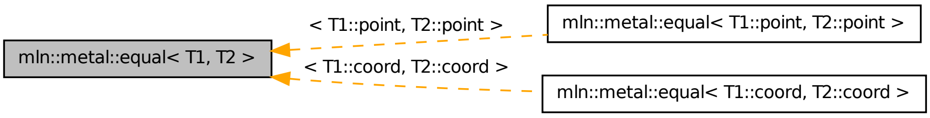
Definition at line 78 of file converts_to.hh.

10.252 mln::metal::equal< T1, T2 > Struct Template Reference

Definition of a static 'equal' test.

`#include <equal.hh>`

Inheritance diagram for mln::metal::equal< T1, T2 >:



10.252.1 Detailed Description

template<typename T1, typename T2> struct mln::metal::equal< T1, T2 >

Definition of a static 'equal' test. Check whether type T1 is exactly type T2.

Definition at line 49 of file equal.hh.

10.253 mln::metal::goes_to< T, U > Struct Template Reference

"goes-to" check.

`#include <goes_to.hh>`

10.253.1 Detailed Description

template<typename T, typename U> struct mln::metal::goes_to< T, U >

"goes-to" check. FIXME: Doc!

Definition at line 53 of file goes_to.hh.

10.254 mln::metal::is< T, U > Struct Template Reference

"is" check.

`#include <is.hh>`

10.254.1 Detailed Description

template<typename T, typename U> struct mln::metal::is< T, U >

"is" check. Check whether T inherits from U.

Definition at line 64 of file is.hh.

10.255 mln::metal::is_a< T, M > Struct Template Reference

"is_a" check.

`#include <is_a.hh>`

10.255.1 Detailed Description

template<typename T, template< class > class M> struct mln::metal::is_a< T, M >

"is_a" check. Check whether T inherits from _CONCEPT_ M.

Definition at line 95 of file is_a.hh.

10.256 mln::metal::is_not< T, U > Struct Template Reference

"is_not" check.

`#include <is_not.hh>`

10.256.1 Detailed Description

template<typename T, typename U> struct mln::metal::is_not< T, U >

"is_not" check. FIXME: Doc!

Definition at line 52 of file is_not.hh.

10.257 mln::metal::is_not_a< T, M > Struct Template Reference

"is_not_a" static Boolean expression.

`#include <is_not_a.hh>`

10.257.1 Detailed Description

template<typename T, template< class > class M> struct mln::metal::is_not_a< T, M >

"is_not_a" static Boolean expression.

Definition at line 48 of file is_not_a.hh.

10.258 mln::mixed_neighb< W > Class Template Reference

Adapter class from window to neighborhood.

`#include <mixed_neighb.hh>`

Inherits neighb_base< W, mixed_neighb< W > >, and mlc_is_aW.

Public Types

- typedef mixed_neighb_bkd_niter< W > bkd_niter

  Backward site iterator associated type.

- typedef mixed_neighb_fwd_niter< W > fwd_niter

  Forward site iterator associated type.

- typedef fwd_niter niter

  Site iterator associated type.

Public Member Functions

- mixed_neighb ()

  Constructor without argument.

- mixed_neighb (const W &win)

  Constructor from a window `win`.

10.258.1 Detailed Description

template<typename W> class mln::mixed_neighb< W >

Adapter class from window to neighborhood.

Definition at line 79 of file mixed_neighb.hh.

10.258.2 Member Typedef Documentation

10.258.2.1 template<typename W> typedef mixed_neighb_bkd_niter<W> mln::mixed_neighb< W >::bkd_niter

Backward site iterator associated type.

Definition at line 91 of file mixed_neighb.hh.

10.258.2.2 template<typename W> typedef mixed_neighb_fwd_niter<W> mln::mixed_neighb< W >::fwd_niter

Forward site iterator associated type.

Definition at line 88 of file mixed_neighb.hh.

10.258.2.3 template<typename W> typedef fwd_niter mln::mixed_neighb< W >::niter

Site iterator associated type.

Definition at line 94 of file mixed_neighb.hh.

10.258.3 Constructor & Destructor Documentation

10.258.3.1 template<typename W > mln::mixed_neighb< W >::mixed_neighb ( ) [inline]

Constructor without argument.

Definition at line 158 of file mixed_neighb.hh.

10.258.3.2 template<typename W > mln::mixed_neighb< W >::mixed_neighb (const W & *win*) [inline]

Constructor from a window `win`.

Definition at line 164 of file mixed_neighb.hh.

10.259 mln::morpho::attribute::card< I > Class Template Reference

Cardinality accumulator class.

`#include <card.hh>`

Inherits base< unsigned, card< I > >.

Public Member Functions

- bool is_valid () const

  Check whether this accu is able to return a result.

- void take_as_init (const T &t)

  Take as initialization the value `t`*.*

- void take_n_times (unsigned n, const T &t)

  Take `n` *times the value* `t`*.*

- unsigned to_result () const

  Get the value of the accumulator.

  - void init ()

    Manipulators.

10.259.1 Detailed Description

template<typename I> class mln::morpho::attribute::card< I >

Cardinality accumulator class.

Definition at line 80 of file morpho/attribute/card.hh.

10.259.2 Member Function Documentation

10.259.2.1 template<typename I > void mln::morpho::attribute::card< I >::init ( ) [inline]

Manipulators.

Definition at line 128 of file morpho/attribute/card.hh.

10.259.2.2 template<typename I > bool mln::morpho::attribute::card< I >::is_valid ( ) const [inline]

Check whether this accu is able to return a result.

Always true here.

Definition at line 197 of file morpho/attribute/card.hh.

10.259.2.3 void mln::Accumulator< card< I > >::take_as_init (const T & *t*) [inherited]

Take as initialization the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.259.2.4 void mln::Accumulator< card< I > >::take_n_times (unsigned *n*, const T & *t*) [inherited]

Take `n` times the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.259.2.5 template<typename I > unsigned mln::morpho::attribute::card< I >::to_result ( ) const [inline]

Get the value of the accumulator.

Definition at line 189 of file morpho/attribute/card.hh.

10.260 mln::morpho::attribute::count_adjacent_vertices< I > Struct Template Reference

Count_Adjacent_Vertices accumulator class.

`#include <count_adjacent_vertices.hh>`

Inherits base< unsigned, count_adjacent_vertices< I > >.

Public Member Functions

- bool is_valid () const

  Check whether this accu is able to return a result.

- void take_as_init (const T &t)
  Take as initialization the value `t`*.*
- void take_n_times (unsigned n, const T &t)
  Take `n` *times the value* `t`*.*
- unsigned to_result () const
  Get the value of the accumulator.

- void init ()
  Manipulators.

10.260.1 Detailed Description

template<typename I> struct mln::morpho::attribute::count_adjacent_vertices< I >

Count_Adjacent_Vertices accumulator class. The parameter `I` is the image type on which the accumulator of pixels is built.

Definition at line 83 of file morpho/attribute/count_adjacent_vertices.hh.

10.260.2 Member Function Documentation

10.260.2.1 template<typename I > void mln::morpho::attribute::count_adjacent_vertices< I >::init ( ) [inline]

Manipulators.

Definition at line 132 of file morpho/attribute/count_adjacent_vertices.hh.

10.260.2.2 template<typename I > bool mln::morpho::attribute::count_adjacent_vertices< I >::is_valid ( ) const [inline]

Check whether this accu is able to return a result.

Definition at line 185 of file morpho/attribute/count_adjacent_vertices.hh.

10.260.2.3 void mln::Accumulator< count_adjacent_vertices< I > >::take_as_init (const T & *t*) [inherited]

Take as initialization the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.260.2.4 void mln::Accumulator< count_adjacent_vertices< I > >::take_n_times (unsigned *n*, const T & *t*) [inherited]

Take `n` times the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.260.2.5 template<typename I > unsigned mln::morpho::attribute::count_adjacent_vertices< I >::to_result ( ) const [inline]

Get the value of the accumulator.

Definition at line 169 of file morpho/attribute/count_adjacent_vertices.hh.

10.261 mln::morpho::attribute::height< I > Struct Template Reference

Height accumulator class.

`#include <height.hh>`

Inherits base< unsigned, height< I > >.

Public Member Functions

- unsigned base_level () const

  Get base & current level of the accumulator.
- bool is_valid () const

  Check whether this accu is able to return a result.
- void take_as_init (const T &t)

  Take as initialization the value `t`*.*
- void take_n_times (unsigned n, const T &t)

  Take `n` *times the value* `t`*.*
- unsigned to_result () const

  Get the value of the accumulator.

  - void init ()

    Manipulators.

10.261.1 Detailed Description

template<typename I> struct mln::morpho::attribute::height< I >

Height accumulator class. The parameter `I` is the image type on which the accumulator of pixels is built.

Definition at line 80 of file morpho/attribute/height.hh.

10.261.2 Member Function Documentation

10.261.2.1 template< typename I > unsigned mln::morpho::attribute::height< I >::base_level ( ) const [inline]

Get base & current level of the accumulator.

Definition at line 214 of file morpho/attribute/height.hh.

10.261.2.2 template< typename I > void mln::morpho::attribute::height< I >::init ( ) [inline]

Manipulators.

Definition at line 131 of file morpho/attribute/height.hh.

10.261.2.3 template< typename I > bool mln::morpho::attribute::height< I >::is_valid ( ) const [inline]

Check whether this accu is able to return a result.

Always true here.

Definition at line 231 of file morpho/attribute/height.hh.

Referenced by mln::morpho::attribute::height< I >::to_result().

10.261.2.4 void mln::Accumulator< height< I > >::take_as_init (const T & *t*) [inherited]

Take as initialization the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.261.2.5 void mln::Accumulator< height< I > >::take_n_times (unsigned *n*, const T & *t*) [inherited]

Take `n` times the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.261.2.6 template< typename I > unsigned mln::morpho::attribute::height< I >::to_result ( ) const [inline]

Get the value of the accumulator.

Definition at line 204 of file morpho/attribute/height.hh.

References mln::morpho::attribute::height< I >::is_valid().

10.262 mln::morpho::attribute::sharpness< I > Struct Template Reference

Sharpness accumulator class.

`#include <sharpness.hh>`

Inherits base< double, sharpness< I > >.

Public Member Functions

- unsigned area () const

  Give the area of the component.

- unsigned height () const

  Give the height.

- bool is_valid () const

  Check whether this accu is able to return a result.

- void take_as_init (const T &t)

  Take as initialization the value `t`*.*

- void take_n_times (unsigned n, const T &t)

  Take `n` *times the value* `t`*.*

- double to_result () const

  Get the value of the accumulator.

- unsigned volume () const

  Give the volume of the component.

  - void init ()

    Manipulators.

10.262.1 Detailed Description

template<typename I> struct mln::morpho::attribute::sharpness< I >

Sharpness accumulator class. The parameter `I` is the image type on which the accumulator of pixels is built.

Definition at line 80 of file sharpness.hh.

10.262.2 Member Function Documentation

10.262.2.1 template<typename I > unsigned mln::morpho::attribute::sharpness< I >::area ( ) const [inline]

Give the area of the component.

Definition at line 190 of file sharpness.hh.

10.262.2.2 template< typename I > unsigned mln::morpho::attribute::sharpness< I >::height ( ) const [inline]

Give the height.

Definition at line 206 of file sharpness.hh.

10.262.2.3 template< typename I > void mln::morpho::attribute::sharpness< I >::init ( ) [inline]

Manipulators.

Definition at line 134 of file sharpness.hh.

10.262.2.4 template< typename I > bool mln::morpho::attribute::sharpness< I >::is_valid ( ) const [inline]

Check whether this accu is able to return a result.

Always true here.

Definition at line 214 of file sharpness.hh.

10.262.2.5 void mln::Accumulator< sharpness< I > >::take_as_init (const T & *t*) [inherited]

Take as initialization the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.262.2.6 void mln::Accumulator< sharpness< I > >::take_n_times (unsigned *n*, const T & *t*) [inherited]

Take `n` times the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.262.2.7 template< typename I > double mln::morpho::attribute::sharpness< I >::to_result ( ) const [inline]

Get the value of the accumulator.

Definition at line 175 of file sharpness.hh.

10.262.2.8 template< typename I > unsigned mln::morpho::attribute::sharpness< I >::volume ( ) const [inline]

Give the volume of the component.

Definition at line 198 of file sharpness.hh.

10.263 mln::morpho::attribute::sum< I, S > Class Template Reference

Suminality accumulator class.

`#include <sum.hh>`

Inherits base< S, sum< I, S > >.

Public Member Functions

- bool is_valid () const

  Check whether this accu is able to return a result.
- void set_value (const argument &v)

  Set the return value of the accumalator.
- void take_as_init (const T &t)

  Take as initialization the value `t`*.*
- void take_n_times (unsigned n, const T &t)

  Take `n` *times the value* `t`*.*
- S to_result () const

  Get the value of the accumulator.
- void untake (const argument &v)

  Untake a value from the accumulator.

- void init ()

  Manipulators.

10.263.1 Detailed Description

template<typename I, typename S = typename mln::value::props< typename I ::value >::sum> class mln::morpho::attribute::sum< I, S >

Suminality accumulator class.

Definition at line 80 of file morpho/attribute/sum.hh.

10.263.2 Member Function Documentation

10.263.2.1 template<typename I , typename S > void mln::morpho::attribute::sum< I, S >::init ( ) `[inline]`

Manipulators.

Definition at line 137 of file morpho/attribute/sum.hh.

References mln::literal::zero.

10.263.2.2 template< typename I , typename S > bool mln::morpho::attribute::sum< I, S >::is_valid ( ) const [inline]

Check whether this accu is able to return a result.

Return always true.

Definition at line 229 of file morpho/attribute/sum.hh.

10.263.2.3 template< typename I , typename S > void mln::morpho::attribute::sum< I, S >::set_value (const argument & *v*) [inline]

Set the return value of the accumalator.

Definition at line 205 of file morpho/attribute/sum.hh.

10.263.2.4 void mln::Accumulator< sum< I, S > >::take_as_init (const T & *t*) [inherited]

Take as initialization the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.263.2.5 void mln::Accumulator< sum< I, S > >::take_n_times (unsigned *n*, const T & *t*) [inherited]

Take `n` times the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.263.2.6 template< typename I , typename S > S mln::morpho::attribute::sum< I, S >::to_result ( ) const [inline]

Get the value of the accumulator.

Definition at line 221 of file morpho/attribute/sum.hh.

10.263.2.7 template< typename I , typename S > void mln::morpho::attribute::sum< I, S >::untake (const argument & *v*) [inline]

Untake a value from the accumulator.

Definition at line 189 of file morpho/attribute/sum.hh.

10.264 mln::morpho::attribute::volume< I > Struct Template Reference

Volume accumulator class.

`#include <volume.hh>`

Inherits base< unsigned, volume< I > >.

Public Member Functions

- unsigned area () const
  Give the area.
- bool is_valid () const
  Check whether this accu is able to return a result.
- void take_as_init (const T &t)
  Take as initialization the value `t`.
- void take_n_times (unsigned n, const T &t)
  Take `n` times the value `t`.
- unsigned to_result () const
  Get the value of the accumulator.

  - void init ()
    Manipulators.

10.264.1 Detailed Description

template<typename I> struct mln::morpho::attribute::volume< I >

Volume accumulator class. The parameter `I` is the image type on which the accumulator of pixels is built.

Definition at line 78 of file morpho/attribute/volume.hh.

10.264.2 Member Function Documentation

10.264.2.1 template<typename I > unsigned mln::morpho::attribute::volume< I >::area ( ) const [inline]

Give the area.

Definition at line 202 of file morpho/attribute/volume.hh.

10.264.2.2 template<typename I > void mln::morpho::attribute::volume< I >::init ( ) [inline]

Manipulators.

Definition at line 130 of file morpho/attribute/volume.hh.

10.264.2.3 template<typename I > bool mln::morpho::attribute::volume< I >::is_valid ( ) const [inline]

Check whether this accu is able to return a result.

Always true here.

Definition at line 210 of file morpho/attribute/volume.hh.

10.264.2.4 void mln::Accumulator< volume< I > >::take_as_init (const T & *t*) [inherited]

Take as initialization the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.264.2.5 void mln::Accumulator< volume< I > >::take_n_times (unsigned *n*, const T & *t*) [inherited]

Take `n` times the value `t`.

Dev note: this is a final method; override if needed by take_as_init_ (ending with '_').

10.264.2.6 template<typename I > unsigned mln::morpho::attribute::volume< I >::to_result ( ) const [inline]

Get the value of the accumulator.

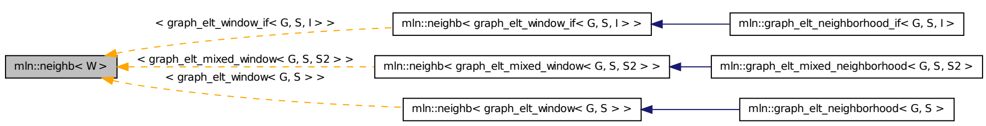
Definition at line 194 of file morpho/attribute/volume.hh.

10.265 mln::neighb< W > Class Template Reference

Adapter class from window to neighborhood.

`#include <neighb.hh>`

Inheritance diagram for mln::neighb< W >:



Public Types

- typedef neighb_bkd_niter< W > bkd_niter
  Backward site iterator associated type.
- typedef neighb_fwd_niter< W > fwd_niter
  Forward site iterator associated type.
- typedef fwd_niter niter
  Site iterator associated type.

Public Member Functions

- neighb ()
  Constructor without argument.
- neighb (const W &win)
  Constructor from a window `win`.

10.265.1 Detailed Description

template<typename W> class mln::neighb< W >

Adapter class from window to neighborhood.

Definition at line 76 of file mln/core/neighb.hh.

10.265.2 Member Typedef Documentation

10.265.2.1 template<typename W> typedef neighb_bkd_niter<W> mln::neighb< W >::bkd_niter

Backward site iterator associated type.

Definition at line 87 of file mln/core/neighb.hh.

10.265.2.2 template<typename W> typedef neighb_fwd_niter<W> mln::neighb< W >::fwd_niter

Forward site iterator associated type.

Definition at line 84 of file mln/core/neighb.hh.

10.265.2.3 template<typename W> typedef fwd_niter mln::neighb< W >::niter

Site iterator associated type.

Definition at line 90 of file mln/core/neighb.hh.

10.265.3 Constructor & Destructor Documentation

10.265.3.1 template<typename W > mln::neighb< W >::neighb ( ) `[inline]`

Constructor without argument.

Definition at line 150 of file mln/core/neighb.hh.

10.265.3.2 template<typename W> mln::neighb< W >::neighb (const W & *win*) `[inline]`

Constructor from a window `win`.

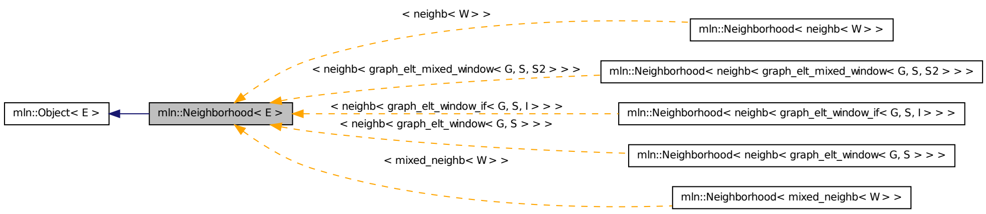
Definition at line 156 of file mln/core/neighb.hh.

10.266 mln::Neighborhood< E > Struct Template Reference

Base class for implementation classes that are neighborhoods.

`#include <neighborhood.hh>`

Inheritance diagram for mln::Neighborhood< E >:



10.266.1 Detailed Description

template<typename E> struct mln::Neighborhood< E >

Base class for implementation classes that are neighborhoods.

See also

mln::doc::Neighborhood for a complete documentation of this class contents.

Definition at line 66 of file core/concept/neighborhood.hh.

10.267 mln::Neighborhood< void > Struct Template Reference

Neighborhood category flag type.

`#include <neighborhood.hh>`

10.267.1 Detailed Description

template<> struct mln::Neighborhood< void >

Neighborhood category flag type.

Definition at line 54 of file core/concept/neighborhood.hh.

10.268 mln::Object< E > Struct Template Reference

Base class for almost every class defined in Milena.

`#include <object.hh>`

Inherited by mln::Base< E >, mln::Browsing< E >, mln::Delta_Point_Site< E >, mln::Function< E >, mln::Gdpoint< E >, mln::Graph< E >, mln::Image< E >, mln::io::off::internal::off_loader< I, E >, mln::io::off::internal::off_saver< I, E >, mln::Iterator< E >, mln::Literal< E >, mln::Mesh< E >, mln::Meta_Accumulator< E >, mln::Meta_Function< E >, mln::Neighborhood< E >, mln::Point_Site< E >, mln::Proxy< E >, mln::Site< E >, mln::Site_Set< E >, mln::Value< E >, mln::value::HSL< E >, mln::Value_Set< E >, mln::Weighted_Window< E >, and mln::Window< E >.

10.268.1 Detailed Description

template<typename E> struct mln::Object< E >

Base class for almost every class defined in Milena. The parameter *E* is the exact type.

Definition at line 171 of file object.hh.

10.269 mln::p2p_image< I, F > Struct Template Reference

FIXME: Doc!

`#include <p2p_image.hh>`

Inherits image_domain_morpher< I, I::domain_t, p2p_image< I, F > >.

Public Types

- typedef p2p_image< tag::image_< I >, tag::function_< F > > skeleton

  Skeleton.

Public Member Functions

- const I::domain_t & domain () const

  Give the definition domain.

- const F & fun () const

  Give the p2p function.

- I::rvalue operator() (const typename I::psite &p) const

  Read-only access to the image value located at point `p`.

- internal::morpher_lvalue_< I >::ret operator() (const typename I::psite &p)

  Read-write access to the image value located at point `p`.

- p2p_image (I &ima, const F &f)

  Constructor from an image `ima` *and a predicate* `f`.

- p2p_image ()

  Constructor without argument.

10.269.1 Detailed Description

template<typename I, typename F> struct mln::p2p_image< I, F >

FIXME: Doc!

Definition at line 90 of file p2p_image.hh.

10.269.2 Member Typedef Documentation

10.269.2.1 template<typename I, typename F> typedef p2p_image< tag::image_<I>, tag::function_<F> > mln::p2p_image< I, F >::skeleton

Skeleton.

Definition at line 95 of file p2p_image.hh.

10.269.3 Constructor & Destructor Documentation

10.269.3.1 template<typename I , typename F > mln::p2p_image< I, F >::p2p_image ( ) [inline]

Constructor without argument.

Definition at line 178 of file p2p_image.hh.

10.269.3.2 template<typename I , typename F > mln::p2p_image< I, F >::p2p_image (I & *ima*, const F & *f*) [inline]

Constructor from an image `ima` and a predicate `f`.

Definition at line 184 of file p2p_image.hh.

10.269.4 Member Function Documentation

10.269.4.1 template<typename I , typename F > const I::domain_t & mln::p2p_image< I, F >::domain ( ) const [inline]

Give the definition domain.

Definition at line 201 of file p2p_image.hh.

10.269.4.2 template<typename I , typename F > const F & mln::p2p_image< I, F >::fun ( ) const [inline]

Give the p2p function.

Definition at line 210 of file p2p_image.hh.

10.269.4.3 template<typename I , typename F > I::rvalue mln::p2p_image< I, F >::operator() (const typename I::psite & *p*) const [inline]

Read-only access to the image value located at point p.

Definition at line 219 of file p2p_image.hh.

10.269.4.4 template<typename I , typename F > internal::morpher_lvalue_< I >::ret mln::p2p_image< I, F >::operator() (const typename I::psite & *p*) [inline]

Read-write access to the image value located at point p.

Definition at line 229 of file p2p_image.hh.

10.270 mln::p_array< P > Class Template Reference

Multi-set of sites.

`#include <p_array.hh>`

Inherits site_set_base_< P, p_array< P > >.

Public Types

- typedef p_indexed_bkd_piter< self_ > bkd_piter

  Backward Site_Iterator associated type.

- typedef P element

  Element associated type.

- typedef p_indexed_fwd_piter< self_ > fwd_piter

  Forward Site_Iterator associated type.

- typedef P i_element

  Insertion element associated type.

- typedef fwd_piter piter

  Site_Iterator associated type.

- typedef p_indexed_psite< self_ > psite

  Psite associated type.

Public Member Functions

- p_array< P > & append (const P &p)

  Append a point p*.*

- p_array< P > & append (const p_array< P > &other)

  Append an array other *of points.*

- void change (const psite &p, const P &new_p)

  Change site p *into* new_p*.*

- void clear ()

  Clear this set.

- bool has (const util::index &i) const

  Test is index i *belongs to this site set.*

- bool has (const psite &p) const

  Test is p *belongs to this site set.*

- void insert (const P &p)

  Insert a point p *(equivalent as 'append').*

- bool is_valid () const

  Test this set validity so returns always true.

- std::size_t memory_size () const

  Return the size of this site set in memory.

- unsigned nsites () const

  Give the number of sites.

- const P & operator[ ] (const util::index &i) const

  Return the i-th element.

- P & operator[ ] (unsigned i)

  Return the i-th *site (mutable).*

- const P & operator[ ] (unsigned i) const

  Return the i-th *site (constant).*

- p_array ()

  Constructor.

- p_array (const std::vector< P > &vect)

  Constructor from a vector vect*.*

- void reserve (size_type n)

  Reserve n *cells.*

- void resize (size_t size)

  Update the size of this array.

- const std::vector< P > & std_vector () const

  Return the corresponding std::vector of points.

10.270.1 Detailed Description

template<typename P> class mln::p_array< P >

Multi-set of sites. Site set class based on std::vector.

Definition at line 84 of file p_array.hh.

10.270.2 Member Typedef Documentation

10.270.2.1 template<typename P> typedef p_indexed_bkd_piter<self_> mln::p_array< P >::bkd_piter

Backward Site_Iterator associated type.

Definition at line 100 of file p_array.hh.

10.270.2.2 template<typename P> typedef P mln::p_array< P >::element

Element associated type.

Definition at line 91 of file p_array.hh.

10.270.2.3 template<typename P> typedef p_indexed_fwd_piter<self_> mln::p_array< P >::fwd_piter

Forward Site_Iterator associated type.

Definition at line 97 of file p_array.hh.

10.270.2.4 template<typename P> typedef P mln::p_array< P >::i_element

Insertion element associated type.

Definition at line 141 of file p_array.hh.

10.270.2.5 template<typename P> typedef fwd_piter mln::p_array< P >::piter

Site_Iterator associated type.

Definition at line 103 of file p_array.hh.

10.270.2.6 template<typename P> typedef p_indexed_psite<self_> mln::p_array< P >::psite

Psite associated type.

Definition at line 94 of file p_array.hh.

10.270.3 Constructor & Destructor Documentation

10.270.3.1 template< typename P > mln::p_array< P >::p_array ( ) [inline]

Constructor.

Definition at line 340 of file p_array.hh.

10.270.3.2 template< typename P > mln::p_array< P >::p_array (const std::vector< P > & *vect*) [inline]

Constructor from a vector `vect`.

Definition at line 346 of file p_array.hh.

10.270.4 Member Function Documentation

10.270.4.1 template< typename P > p_array< P > & mln::p_array< P >::append (const P & *p*) [inline]

Append a point `p`.

Definition at line 408 of file p_array.hh.

Referenced by mln::convert::to_p_array().

10.270.4.2 template< typename P > p_array< P > & mln::p_array< P >::append (const p_array< P > & *other*) [inline]

Append an array `other` of points.

Definition at line 425 of file p_array.hh.

References mln::p_array< P >::std_vector().

10.270.4.3 template< typename P > void mln::p_array< P >::change (const psite & *p*, const P & *new_p*) [inline]

Change site `p` into `new_p`.

Definition at line 472 of file p_array.hh.

References mln::p_array< P >::has().

10.270.4.4 template< typename P > void mln::p_array< P >::clear ( ) [inline]

Clear this set.

Definition at line 436 of file p_array.hh.

10.270.4.5 template< typename P > bool mln::p_array< P >::has (const psite & *p*) const [inline]

Test is `p` belongs to this site set.

Definition at line 362 of file p_array.hh.

Referenced by mln::p_array< P >::change(), and mln::p_array< P >::operator[ ]().

10.270.4.6 template<typename P > bool mln::p_array< P >::has (const util::index & *i*) const `[inline]`

Test is index `i` belongs to this site set.

Definition at line 375 of file p_array.hh.

References mln::p_array< P >::nsites().

10.270.4.7 template<typename P > void mln::p_array< P >::insert (const P & *p*) `[inline]`

Insert a point `p` (equivalent as 'append').

Definition at line 417 of file p_array.hh.

10.270.4.8 template<typename P > bool mln::p_array< P >::is_valid ( ) const `[inline]`

Test this set validity so returns always true.

Definition at line 383 of file p_array.hh.

10.270.4.9 template<typename P > std::size_t mln::p_array< P >::memory_size ( ) const `[inline]`

Return the size of this site set in memory.

Definition at line 481 of file p_array.hh.

References mln::p_array< P >::nsites().

10.270.4.10 template<typename P > unsigned mln::p_array< P >::nsites ( ) const `[inline]`

Give the number of sites.

Definition at line 400 of file p_array.hh.

Referenced by mln::registration::get_rot(), mln::p_array< P >::has(), mln::p_array< P >::memory_size(), and mln::p_array< P >::operator[ ]().

10.270.4.11 template<typename P > P & mln::p_array< P >::operator[ ] (unsigned *i*) `[inline]`

Return the `i-th` site (mutable).

Definition at line 463 of file p_array.hh.

References mln::p_array< P >::nsites().

10.270.4.12 template<typename P > const P & mln::p_array< P >::operator[ ] (const util::index & *i*) const [inline]

Return the i-th element.

Definition at line 391 of file p_array.hh.

References mln::p_array< P >::has().

10.270.4.13 template<typename P > const P & mln::p_array< P >::operator[ ] (unsigned *i*) const [inline]

Return the `i-th` site (constant).

Definition at line 454 of file p_array.hh.

References mln::p_array< P >::nsites().

10.270.4.14 template<typename P > void mln::p_array< P >::reserve (size_type *n*) [inline]

Reserve `n` cells.

Definition at line 354 of file p_array.hh.

Referenced by mln::convert::to_p_array().

10.270.4.15 template<typename P > void mln::p_array< P >::resize (size_t *size*) [inline]

Update the size of this array.

Definition at line 445 of file p_array.hh.

10.270.4.16 template<typename P > const std::vector< P > & mln::p_array< P >::std_vector ( ) const [inline]

Return the corresponding std::vector of points.

Definition at line 489 of file p_array.hh.

Referenced by mln::p_array< P >::append().

10.271 mln::p_centered< W > Class Template Reference

Site set corresponding to a window centered on a site.

`#include <p_centered.hh>`

Inherits site_set_base_< W::psite, p_centered< W > >, and mlc_is_aW.

Public Types

- typedef p_centered_piter< W > bkd_piter

    Backward Site_Iterator associated type.

- typedef psite element

  Element associated type.

- typedef p_centered_piter< W > fwd_piter

  Forward Site_Iterator associated type.

- typedef fwd_piter piter

  Site_Iterator associated type.

- typedef W::psite psite

  Psite associated type.

- typedef W::site site

  Site associated type.

Public Member Functions

- const W::psite & center () const

  Give the center of this site set.

- template<typename P >
  bool has (const P &p) const

  Test if `p` belongs to the box.

- bool is_valid () const

  Test if this site set is initialized.

- std::size_t memory_size () const

  Return the size of this site set in memory.

- p_centered (const W &win, const typename W::psite &c)

  Constructor from a window `win` and a center `c`.

- p_centered ()

  Constructor without argument.

- const W & window () const

  Give the window this site set is defined upon.

10.271.1 Detailed Description

template<typename W> class mln::p_centered< W >

Site set corresponding to a window centered on a site.

Definition at line 77 of file p_centered.hh.

10.271.2 Member Typedef Documentation

10.271.2.1 template<typename W> typedef p_centered_piter<W> mln::p_centered< W >::bkd_piter

Backward Site_Iterator associated type.

Definition at line 97 of file p_centered.hh.

10.271.2.2 template<typename W> typedef psite mln::p_centered< W >::element

Element associated type.

Definition at line 90 of file p_centered.hh.

10.271.2.3 template<typename W> typedef p_centered_piter<W> mln::p_centered< W >::fwd_piter

Forward Site_Iterator associated type.

Definition at line 94 of file p_centered.hh.

10.271.2.4 template<typename W> typedef fwd_piter mln::p_centered< W >::piter

Site_Iterator associated type.

Definition at line 100 of file p_centered.hh.

10.271.2.5 template<typename W> typedef W ::psite mln::p_centered< W >::psite

Psite associated type.

Definition at line 83 of file p_centered.hh.

10.271.2.6 template<typename W> typedef W ::site mln::p_centered< W >::site

Site associated type.

Definition at line 86 of file p_centered.hh.

10.271.3 Constructor & Destructor Documentation

10.271.3.1 template<typename W > mln::p_centered< W >::p_centered ( ) `[inline]`

Constructor without argument.

Definition at line 182 of file p_centered.hh.

10.271.3.2 template<typename W > mln::p_centered< W >::p_centered (const W & *win*, const typename W::psite & *c*) `[inline]`

Constructor from a window `win` and a center `c`.

Definition at line 188 of file p_centered.hh.

References mln::p_centered< W >::is_valid().

10.271.4 Member Function Documentation

10.271.4.1 template<typename W > const W::psite & mln::p_centered< W >::center ( ) const [inline]

Give the center of this site set.

Definition at line 216 of file p_centered.hh.

10.271.4.2 template<typename W > template<typename P > bool mln::p_centered< W >::has (const P & *p*) const [inline]

Test if `p` belongs to the box.

Definition at line 199 of file p_centered.hh.

References mln::p_centered< W >::is_valid().

10.271.4.3 template<typename W > bool mln::p_centered< W >::is_valid ( ) const [inline]

Test if this site set is initialized.

Definition at line 175 of file p_centered.hh.

Referenced by mln::p_centered< W >::has(), and mln::p_centered< W >::p_centered().

10.271.4.4 template<typename W > std::size_t mln::p_centered< W >::memory_size ( ) const [inline]

Return the size of this site set in memory.

Definition at line 208 of file p_centered.hh.

10.271.4.5 template<typename W > const W & mln::p_centered< W >::window ( ) const [inline]

Give the window this site set is defined upon.

Definition at line 224 of file p_centered.hh.

10.272 mln::p_complex< D, G > Class Template Reference

A complex psite set based on the N-faces of a complex of dimension `D` (a `D-complex`).

`#include <p_complex.hh>`

Inherits site_set_base_< complex_psite< D, G >, p_complex< D, G > >.

Public Types

- typedef super_::site element
  Associated types.
- typedef complex_psite< D, G > psite
  Point_Site associated type.
- typedef p_complex_fwd_piter_< D, G > fwd_piter
  Forward Site_Iterator associated type.
- typedef p_complex_bkd_piter_< D, G > bkd_piter
  Backward Site_Iterator associated type.
- typedef fwd_piter piter
  Site_Iterator associated type.

Public Member Functions

- bool has (const psite &p) const
  Does this site set has p?
- bool is_valid () const
  Is this site set valid?
- unsigned nfaces () const
  Return the number of faces in the complex.
- unsigned nfaces_of_dim (unsigned n) const
  Return the number of n-faces in the complex.
- unsigned nsites () const
  Return The number of sites of the set, i.e., the number of faces.
- p_complex (const topo::complex< D > &cplx, const G &geom)
  Construct a complex psite set from a complex.

- topo::complex< D > & cplx () const
  Accessors.
- topo::complex< D > & cplx ()
  Return the complex associated to the p_complex domain (mutable version).
- const G & geom () const
  Return the geometry of the complex.

10.272.1 Detailed Description

template<unsigned D, typename G> class mln::p_complex< D, G >

A complex psite set based on the N-faces of a complex of dimension `D` (a `D-complex`).

Template Parameters

- ***D*** The dimension of the complex.
- ***G*** A function object type, associating localization information (geometry) to each face of the complex.

See also

mln::geom::complex_geometry. A complex psite set based on the N-faces of a complex.

Definition at line 116 of file p_complex.hh.

10.272.2 Member Typedef Documentation

10.272.2.1 template<unsigned D, typename G> typedef p_complex_bkd_piter_<D, G> mln::p_complex< D, G >::bkd_piter

Backward Site_Iterator associated type.

Definition at line 141 of file p_complex.hh.

10.272.2.2 template<unsigned D, typename G> typedef super_ ::site mln::p_complex< D, G >::element

Associated types.

Element associated type.

Definition at line 132 of file p_complex.hh.

10.272.2.3 template<unsigned D, typename G> typedef p_complex_fwd_piter_<D, G> mln::p_complex< D, G >::fwd_piter

Forward Site_Iterator associated type.

Definition at line 138 of file p_complex.hh.

10.272.2.4 template<unsigned D, typename G> typedef fwd_piter mln::p_complex< D, G >::piter

Site_Iterator associated type.

Definition at line 144 of file p_complex.hh.

10.272.2.5 template<unsigned D, typename G> typedef complex_psite<D, G> mln::p_complex< D, G >::psite

Point_Site associated type.

Definition at line 135 of file p_complex.hh.

10.272.3 Constructor & Destructor Documentation

10.272.3.1 template<unsigned D, typename G > mln::p_complex< D, G >::p_complex (const topo::complex< D > & *cplx*, const G & *geom*) [inline]

Construct a complex psite set from a complex.

Parameters

cplx The complex upon which the complex psite set is built.

geom FIXME

Definition at line 231 of file p_complex.hh.

10.272.4 Member Function Documentation

10.272.4.1 template<unsigned D, typename G > topo::complex< D > & mln::p_complex< D, G >::cplx ( ) const

Accessors.

Return the complex associated to the p_complex domain (const version)

Definition at line 293 of file p_complex.hh.

References mln::p_complex< D, G >::is_valid().

Referenced by mln::complex_psite< D, G >::change_target(), mln::complex_psite< D, G >::complex_-psite(), and mln::operator==().

10.272.4.2 template<unsigned D, typename G > topo::complex< D > & mln::p_complex< D, G >::cplx ( )

Return the complex associated to the p_complex domain (mutable version).

Definition at line 301 of file p_complex.hh.

References mln::p_complex< D, G >::is_valid().

10.272.4.3 template<unsigned D, typename G > const G & mln::p_complex< D, G >::geom ( ) const

Return the geometry of the complex.

Definition at line 309 of file p_complex.hh.

10.272.4.4 template<unsigned D, typename G > bool mln::p_complex< D, G >::has (const psite & *p*) const [inline]

Does this site set has *p*?

Definition at line 271 of file p_complex.hh.

References mln::complex_psite< D, G >::is_valid(), mln::p_complex< D, G >::is_valid(), and mln::complex_psite< D, G >::site_set().

10.272.4.5 template<unsigned D, typename G > bool mln::p_complex< D, G >::is_valid ( ) const [inline]

Is this site set valid?

Definition at line 263 of file p_complex.hh.

Referenced by mln::p_complex< D, G >::cplx(), and mln::p_complex< D, G >::has().

10.272.4.6 template<unsigned D, typename G > unsigned mln::p_complex< D, G >::nfaces ( ) const [inline]

Return the number of faces in the complex.

Definition at line 247 of file p_complex.hh.

Referenced by mln::p_complex< D, G >::nsites().

10.272.4.7 template<unsigned D, typename G > unsigned mln::p_complex< D, G >::nfaces_of_dim (unsigned *n*) const [inline]

Return the number of *n-faces* in the complex.

Definition at line 255 of file p_complex.hh.

10.272.4.8 template<unsigned D, typename G > unsigned mln::p_complex< D, G >::nsites ( ) const [inline]

Return The number of sites of the set, i.e., the number of *faces*.

(Required by the mln::Site_Set concept, since the property trait::site_set::nsites::known of this site set is set to 'known'.)

Definition at line 239 of file p_complex.hh.

References mln::p_complex< D, G >::nfaces().

10.273 mln::p_edges< G, F > Class Template Reference

Site set mapping graph edges and image sites.

`#include <p_edges.hh>`

Inherits site_set_base_< F::result, p_edges< G, F > >.

Public Types

- typedef util::edge< G > edge

    Type of graph edge.

- typedef F fun_t

  Function associated type.

- typedef util::edge< G > graph_element

  Type of graph element this site set focuses on.

- typedef G graph_t

  Graph associated type.

- typedef super_::site element

  Associated types.

- typedef p_edges_psite< G, F > psite

  Point_Site associated type.

- typedef p_graph_piter< self_, mln_edge_fwd_iter(G) > fwd_piter

  Forward Site_Iterator associated type.

- typedef p_graph_piter< self_, mln_edge_bkd_iter(G) > bkd_piter

  Backward Site_Iterator associated type.

- typedef fwd_piter piter

  Site_Iterator associated type.

Public Member Functions

- bool has (const psite &p) const

  Does this site set has site p?

- template<typename G2 >
  bool has (const util::edge< G2 > &e) const

  Does this site set has edge e?

- void invalidate ()

  Invalidate this site set.

- bool is_valid () const

  Is this site set valid?

- std::size_t memory_size () const

  Does this site set has vertex_id? FIXME: causes ambiguities while calling has(mln::neighb_fwd_niter<>); bool has(unsigned vertex_id) const;.

- unsigned nedges () const

  Return The number of edges in the graph.

- unsigned nsites () const

  Return The number of points (sites) of the set, i.e., the number of edges.

- p_edges ()
  Constructors
  Default constructor.
- p_edges (const Graph< G > &gr)
  Construct a graph edge psite set from a graph.
- p_edges (const Graph< G > &gr, const Function< F > &f)
  Construct a graph edge psite set from a graph and a function.
- template<typename F2 >
  p_edges (const Graph< G > &gr, const Function< F2 > &f)
  Construct a graph edge psite set from a graph and a function.

- const G & graph () const
  Accessors.
- const F & function () const
  Return the mapping function.

10.273.1 Detailed Description

template<typename G, typename F = util::internal::id2element<G,util::edge<G> >> class mln::p_edges< G, F >

Site set mapping graph edges and image sites.

Definition at line 70 of file p_edges.hh.

10.273.2 Member Typedef Documentation

10.273.2.1 template<typename G, typename F = util::internal::id2element<G,util::edge<G> >> typedef p_graph_piter< self_, mln_edge_bkd_iter(G) > mln::p_edges< G, F >::bkd_piter

Backward Site_Iterator associated type.

Definition at line 128 of file p_edges.hh.

10.273.2.2 template<typename G, typename F = util::internal::id2element<G,util::edge<G> >> typedef util::edge<G> mln::p_edges< G, F >::edge

Type of graph edge.

Definition at line 86 of file p_edges.hh.

10.273.2.3 template<typename G, typename F = util::internal::id2element<G,util::edge<G> >> typedef super_ ::site mln::p_edges< G, F >::element

Associated types.

Element associated type.

Definition at line 119 of file p_edges.hh.

10.273.2.4 template<typename G, typename F = util::internal::id2element<G,util::edge<G> >> typedef F mln::p_edges< G, F >::fun_t

Function associated type.

Definition at line 83 of file p_edges.hh.

10.273.2.5 template<typename G, typename F = util::internal::id2element<G,util::edge<G> >> typedef p_graph_piter< self_, mln_edge_fwd_iter(G) > mln::p_edges< G, F >::fwd_piter

Forward Site_Iterator associated type.

Definition at line 125 of file p_edges.hh.

10.273.2.6 template<typename G, typename F = util::internal::id2element<G,util::edge<G> >> typedef util::edge<G> mln::p_edges< G, F >::graph_element

Type of graph element this site set focuses on.

Definition at line 89 of file p_edges.hh.

10.273.2.7 template<typename G, typename F = util::internal::id2element<G,util::edge<G> >> typedef G mln::p_edges< G, F >::graph_t

Graph associated type.

Definition at line 80 of file p_edges.hh.

10.273.2.8 template<typename G, typename F = util::internal::id2element<G,util::edge<G> >> typedef fwd_piter mln::p_edges< G, F >::piter

Site_Iterator associated type.

Definition at line 131 of file p_edges.hh.

10.273.2.9 template<typename G, typename F = util::internal::id2element<G,util::edge<G> >> typedef p_edges_psite<G, F> mln::p_edges< G, F >::psite

Point_Site associated type.

Definition at line 122 of file p_edges.hh.

10.273.3 Constructor & Destructor Documentation

10.273.3.1 template<typename G , typename F > mln::p_edges< G, F >::p_edges ( ) [inline]

Constructors

Default constructor.

Definition at line 203 of file p_edges.hh.

10.273.3.2 template<typename G , typename F > mln::p_edges< G, F >::p_edges (const Graph< G > & *gr*) [inline]

Construct a graph edge psite set from a graph.

Parameters

- ***gr*** The graph upon which the graph edge psite set is built.

Definition at line 209 of file p_edges.hh.

References mln::p_edges< G, F >::is_valid().

10.273.3.3 template<typename G , typename F > mln::p_edges< G, F >::p_edges (const Graph< G > & *gr*, const Function< F > & *f*) [inline]

Construct a graph edge psite set from a graph and a function.

Parameters

- ***gr*** The graph upon which the graph edge psite set is built.
- ***f*** the function mapping edges and sites.

Definition at line 221 of file p_edges.hh.

References mln::p_edges< G, F >::is_valid().

10.273.3.4 template<typename G , typename F > template<typename F2 > mln::p_edges< G, F >::p_edges (const Graph< G > & *gr*, const Function< F2 > & *f*) [inline]

Construct a graph edge psite set from a graph and a function.

Parameters

- ***gr*** The graph upon which the graph edge psite set is built.
- ***f*** the function mapping edges and sites. It must be convertible towards the function type `F`.

Definition at line 231 of file p_edges.hh.

References mln::p_edges< G, F >::is_valid().

10.273.4 Member Function Documentation

10.273.4.1 template< typename G , typename F > const F & mln::p_edges< G, F >::function ( ) const [inline]

Return the mapping function.

Definition at line 324 of file p_edges.hh.

10.273.4.2 template< typename G , typename F > const G & mln::p_edges< G, F >::graph ( ) const [inline]

Accessors.

Return the graph associated to this site set

Definition at line 315 of file p_edges.hh.

References mln::p_edges< G, F >::is_valid().

Referenced by mln::operator==().

10.273.4.3 template< typename G , typename F > bool mln::p_edges< G, F >::has (const psite & *p*) const [inline]

Does this site set has site *p*?

Definition at line 276 of file p_edges.hh.

References mln::p_edges< G, F >::is_valid().

10.273.4.4 template< typename G , typename F > template< typename G2 > bool mln::p_edges< G, F >::has (const util::edge< G2 > & *e*) const [inline]

Does this site set has edge *e*?

Definition at line 286 of file p_edges.hh.

References mln::util::edge< G >::graph(), mln::util::edge< G >::is_valid(), and mln::p_edges< G, F >::is_valid().

10.273.4.5 template< typename G , typename F > void mln::p_edges< G, F >::invalidate ( ) [inline]

Invalidate this site set.

Definition at line 268 of file p_edges.hh.

10.273.4.6 template< typename G , typename F > bool mln::p_edges< G, F >::is_valid ( ) const [inline]

Is this site set valid?

Definition at line 260 of file p_edges.hh.

Referenced by mln::p_edges< G, F >::graph(), mln::p_edges< G, F >::has(), and mln::p_edges< G, F >::p_edges().

10.273.4.7 template<typename G , typename F > std::size_t mln::p_edges< G, F >::memory_size ( ) const [inline]

Does this site set has *vertex_id*? FIXME: causes ambiguities while calling has(mln::neighb_fwd_niter<>); bool has(unsigned vertex_id) const;.

Definition at line 305 of file p_edges.hh.

10.273.4.8 template<typename G , typename F > unsigned mln::p_edges< G, F >::nedges ( ) const [inline]

Return The number of edges in the graph.

Definition at line 252 of file p_edges.hh.

Referenced by mln::p_edges< G, F >::nsites().

10.273.4.9 template<typename G , typename F > unsigned mln::p_edges< G, F >::nsites ( ) const [inline]

Return The number of points (sites) of the set, i.e., the number of *edges*.

Definition at line 244 of file p_edges.hh.

References mln::p_edges< G, F >::nedges().

10.274 mln::p_faces< N, D, P > Struct Template Reference

A complex psite set based on a the N-faces of a complex of dimension D (a D-complex).

```
#include <p_faces.hh>
```

Inherits site_set_base_< faces_psite< N, D, P >, p_faces< N, D, P > >.

Public Types

- typedef super_::site element
  Associated types.
- typedef faces_psite< N, D, P > psite
  Point_Site associated type.
- typedef p_faces_fwd_piter_< N, D, P > fwd_piter
  Forward Site_Iterator associated type.
- typedef p_faces_bkd_piter_< N, D, P > bkd_piter
  Backward Site_Iterator associated type.
- typedef fwd_piter piter
  Site_Iterator associated type.

Public Member Functions

- bool is_valid () const

  Is this site set valid?

- unsigned nfaces () const

  Return The number of faces in the complex.

- unsigned nsites () const

  Return The number of sites of the set, i.e., the number of faces.

- p_faces (const topo::complex< D > &cplx)

  Construct a faces psite set from an mln::complex.

- p_faces (const p_complex< D, P > &pc)

  Construct a faces psite set from an mln::p_complex.

  - topo::complex< D > & cplx () const

    Accessors.

  - topo::complex< D > & cplx ()

    Return the complex associated to the p_faces domain (mutable version).

10.274.1 Detailed Description

template<unsigned N, unsigned D, typename P> struct mln::p_faces< N, D, P >

A complex psite set based on a the N-faces of a complex of dimension D (a D-complex).

Definition at line 77 of file p_faces.hh.

10.274.2 Member Typedef Documentation

10.274.2.1 template<unsigned N, unsigned D, typename P> typedef p_faces_bkd_piter_<N, D, P> mln::p_faces< N, D, P >::bkd_piter

Backward Site_Iterator associated type.

Definition at line 110 of file p_faces.hh.

10.274.2.2 template<unsigned N, unsigned D, typename P> typedef super_ ::site mln::p_faces< N, D, P >::element

Associated types.

Element associated type.

Definition at line 99 of file p_faces.hh.

10.274.2.3 template<unsigned N, unsigned D, typename P> typedef p_faces_fwd_piter_<N, D, P> mln::p_faces< N, D, P >::fwd_piter

Forward Site_Iterator associated type.

Definition at line 106 of file p_faces.hh.

10.274.2.4 template<unsigned N, unsigned D, typename P> typedef fwd_piter mln::p_faces< N, D, P >::piter

Site_Iterator associated type.

Definition at line 113 of file p_faces.hh.

10.274.2.5 template<unsigned N, unsigned D, typename P> typedef faces_psite<N, D, P> mln::p_faces< N, D, P >::psite

Point_Site associated type.

Definition at line 102 of file p_faces.hh.

10.274.3 Constructor & Destructor Documentation

10.274.3.1 template<unsigned N, unsigned D, typename P > mln::p_faces< N, D, P >::p_faces (const topo::complex< D > & *cplx*) `[inline]`

Construct a faces psite set from an mln::complex.

Parameters

cplx The complex upon which the complex psite set is built.

Definition at line 192 of file p_faces.hh.

10.274.3.2 template<unsigned N, unsigned D, typename P > mln::p_faces< N, D, P >::p_faces (const p_complex< D, P > & *pc*) `[inline]`

Construct a faces psite set from an mln::p_complex.

Parameters

pc The complex upon which the complex psite set is built.

Definition at line 201 of file p_faces.hh.

10.274.4 Member Function Documentation

10.274.4.1 template<unsigned N, unsigned D, typename P > topo::complex< D > & mln::p_faces< N, D, P >::cplx ( ) const

Accessors.

Return the complex associated to the p_faces domain (const version).

Definition at line 257 of file p_faces.hh.

References mln::p_faces< N, D, P >::is_valid().

Referenced by mln::faces_psite< N, D, P >::change_target(), and mln::operator==().

10.274.4.2 template<unsigned N, unsigned D, typename P > topo::complex< D > & mln::p_faces< N, D, P >::cplx ( )

Return the complex associated to the p_faces domain (mutable version).

Definition at line 265 of file p_faces.hh.

References mln::p_faces< N, D, P >::is_valid().

10.274.4.3 template<unsigned N, unsigned D, typename P > bool mln::p_faces< N, D, P >::is_valid ( ) const `[inline]`

Is this site set valid?

Definition at line 227 of file p_faces.hh.

Referenced by mln::p_faces< N, D, P >::cplx().

10.274.4.4 template<unsigned N, unsigned D, typename P > unsigned mln::p_faces< N, D, P >::nfaces ( ) const `[inline]`

Return The number of faces in the complex.

Definition at line 219 of file p_faces.hh.

Referenced by mln::p_faces< N, D, P >::nsites().

10.274.4.5 template<unsigned N, unsigned D, typename P > unsigned mln::p_faces< N, D, P >::nsites ( ) const `[inline]`

Return The number of sites of the set, i.e., the number of *faces*.

(Required by the mln::Site_Set concept, since the property trait::site_set::nsites::known of this site set is set to 'known'.)

Definition at line 211 of file p_faces.hh.

References mln::p_faces< N, D, P >::nfaces().

10.275 mln::p_graph_piter< S, I > Class Template Reference

Generic iterator on point sites of a mln::S.

`#include <p_graph_piter.hh>`

Inherits site_set_iterator_base< S, p_graph_piter< S, I > >.

Public Member Functions

- const S::graph_t & graph () const
  Return the graph associated to the target S.
- unsigned id () const
  Return the graph element id.
- mln_q_subject (iter) element()
  Return the underlying graph element.
- void next ()
  Go to the next element.

  - p_graph_piter ()
    Constructors.

10.275.1 Detailed Description

template<typename S, typename I> class mln::p_graph_piter< S, I >

Generic iterator on point sites of a mln::S.

Definition at line 55 of file p_graph_piter.hh.

10.275.2 Constructor & Destructor Documentation

10.275.2.1 template<typename S , typename I > mln::p_graph_piter< S, I >::p_graph_piter ( ) [inline]

Constructors.

Definition at line 151 of file p_graph_piter.hh.

10.275.3 Member Function Documentation

10.275.3.1 template<typename S , typename I > const S::graph_t & mln::p_graph_piter< S, I >::graph ( ) const [inline]

Return the graph associated to the target S.

Definition at line 212 of file p_graph_piter.hh.

10.275.3.2 template<typename S , typename I > unsigned mln::p_graph_piter< S, I >::id ( ) const [inline]

Return the graph element id.

Definition at line 228 of file p_graph_piter.hh.

10.275.3.3 template<typename S , typename I > mln::p_graph_piter< S, I >::mln_q_subject (iter)

Return the underlying graph element.

10.275.3.4 void mln::Site_Iterator< p_graph_piter< S, I > >::next ( ) [inherited]

Go to the next element.

Warning

This is a final method; iterator classes should not re-defined this method. The actual "next" operation has to be defined through the *next_* method.

Precondition

The iterator is valid.

10.276 mln::p_if< S, F > Class Template Reference

Site set restricted w.r.t.

`#include <p_if.hh>`

Inherits site_set_base_< S::psite, p_if< S, F > >.

Public Types

- typedef p_if_piter_< typename S::bkd_piter, S, F > bkd_piter

  Backward Site_Iterator associated type.

- typedef S::element element

  Element associated type.

- typedef p_if_piter_< typename S::fwd_piter, S, F > fwd_piter

  Forward Site_Iterator associated type.

- typedef fwd_piter piter

  Site_Iterator associated type.

- typedef S::psite psite

  Psite associated type.

Public Member Functions

- bool has (const psite &p) const

  Test if p *belongs to the subset.*

- bool is_valid () const

Test if this site set is valid.

- std::size_t memory_size () const

  Return the size of this site set in memory.

- const S & overset () const

  Give the primary overset.

- p_if ()

  Constructor without argument.

- p_if (const S &s, const F &f)

  Constructor with a site set `s` *and a predicate* `f`.

- bool pred (const psite &p) const

  Test predicate on point site `p`.

- const F & predicate () const

  Give the predicate function.

10.276.1 Detailed Description

template<typename S, typename F> class mln::p_if< S, F >

Site set restricted w.r.t. a predicate.

Parameter `S` is a site set type; parameter F is a function from point to Boolean.

Definition at line 83 of file p_if.hh.

10.276.2 Member Typedef Documentation

10.276.2.1 template<typename S, typename F> typedef p_if_piter_<typename S ::bkd_piter, S, F> mln::p_if< S, F >::bkd_piter

Backward Site_Iterator associated type.

Definition at line 100 of file p_if.hh.

10.276.2.2 template<typename S, typename F> typedef S ::element mln::p_if< S, F >::element

Element associated type.

Definition at line 90 of file p_if.hh.

10.276.2.3 template<typename S, typename F> typedef p_if_piter_<typename S ::fwd_piter, S, F> mln::p_if< S, F >::fwd_piter

Forward Site_Iterator associated type.

Definition at line 97 of file p_if.hh.

10.276.2.4 template<typename S, typename F> typedef fwd_piter mln::p_if< S, F >::piter

Site_Iterator associated type.

Definition at line 103 of file p_if.hh.

10.276.2.5 template<typename S, typename F> typedef S ::psite mln::p_if< S, F >::psite

Psite associated type.

Definition at line 94 of file p_if.hh.

10.276.3 Constructor & Destructor Documentation

10.276.3.1 template<typename S , typename F > mln::p_if< S, F >::p_if (const S & *s*, const F & *f*) `[inline]`

Constructor with a site set `s` and a predicate `f`.

Definition at line 190 of file p_if.hh.

10.276.3.2 template<typename S , typename F > mln::p_if< S, F >::p_if ( ) `[inline]`

Constructor without argument.

Definition at line 198 of file p_if.hh.

10.276.4 Member Function Documentation

10.276.4.1 template<typename S , typename F > bool mln::p_if< S, F >::has (const psite & *p*) const `[inline]`

Test if `p` belongs to the subset.

Definition at line 159 of file p_if.hh.

References mln::p_if< S, F >::has().

Referenced by mln::p_if< S, F >::has().

10.276.4.2 template<typename S , typename F > bool mln::p_if< S, F >::is_valid ( ) const `[inline]`

Test if this site set is valid.

Definition at line 167 of file p_if.hh.

10.276.4.3 template<typename S , typename F > std::size_t mln::p_if< S, F >::memory_size ( ) const `[inline]`

Return the size of this site set in memory.

Definition at line 213 of file p_if.hh.

10.276.4.4 template<typename S , typename F > const S & mln::p_if< S, F >::overset ( ) const [inline]

Give the primary overset.

Definition at line 175 of file p_if.hh.

10.276.4.5 template<typename S , typename F > bool mln::p_if< S, F >::pred (const psite & *p*) const [inline]

Test predicate on point site `p`.

Definition at line 183 of file p_if.hh.

10.276.4.6 template<typename S , typename F > const F & mln::p_if< S, F >::predicate ( ) const [inline]

Give the predicate function.

Definition at line 205 of file p_if.hh.

10.277 mln::p_image< I > Class Template Reference

Site set based on an image of Booleans.

`#include <p_image.hh>`

Inherits site_set_base_< I::psite, p_image< I > >.

Public Types

- typedef S::bkd_piter bkd_piter

  Backward Site_Iterator associated type.

- typedef I::psite element

  Element associated type.

- typedef S::fwd_piter fwd_piter

  Forward Site_Iterator associated type.

- typedef psite i_element

  Insertion element associated type.

- typedef S::piter piter

  Site_Iterator associated type.

- typedef I::psite psite

  Psite associated type.

- typedef psite r_element

  Removal element associated type.

- typedef internal::p_image_site_set< I >::ret S

  Equivalent site_set type.

Public Member Functions

- void clear ()

  Clear this set.

- bool has (const psite &) const

  Test is the psite p belongs to this site set.

- void insert (const psite &p)

  Insert a site p.

- bool is_valid () const

  Test if this site set is valid, i.e., initialized.

- std::size_t memory_size () const

  Return the size of this site set in memory.

- unsigned nsites () const

  Give the number of sites.

- operator typename internal::p_image_site_set< I >::ret () const

  Conversion towards the equivalent site set.

- p_image ()

  Constructor without argument.

- p_image (const I &ima)

  Constructor.

- void remove (const psite &p)

  Remove a site p.

- void toggle (const psite &p)

  Change the status in/out of a site p.

10.277.1 Detailed Description

template<typename I> class mln::p_image< I >

Site set based on an image of Booleans.

Definition at line 88 of file p_image.hh.

10.277.2 Member Typedef Documentation

10.277.2.1 template<typename I > typedef S ::bkd_piter mln::p_image< I >::bkd_piter

Backward Site_Iterator associated type.

Definition at line 110 of file p_image.hh.

10.277.2.2 template<typename I > typedef I ::psite mln::p_image< I >::element

Element associated type.

Definition at line 100 of file p_image.hh.

10.277.2.3 template<typename I > typedef S ::fwd_piter mln::p_image< I >::fwd_piter

Forward Site_Iterator associated type.

Definition at line 107 of file p_image.hh.

10.277.2.4 template<typename I > typedef psite mln::p_image< I >::i_element

Insertion element associated type.

Definition at line 136 of file p_image.hh.

10.277.2.5 template<typename I > typedef S ::piter mln::p_image< I >::piter

Site_Iterator associated type.

Definition at line 113 of file p_image.hh.

10.277.2.6 template<typename I > typedef I ::psite mln::p_image< I >::psite

Psite associated type.

Definition at line 104 of file p_image.hh.

10.277.2.7 template<typename I > typedef psite mln::p_image< I >::r_element

Removal element associated type.

Definition at line 142 of file p_image.hh.

10.277.2.8 template<typename I > typedef internal::p_image_site_set<I>::ret mln::p_image< I >::S

Equivalent site_set type.

Definition at line 93 of file p_image.hh.

10.277.3 Constructor & Destructor Documentation

10.277.3.1 template< typename I > mln::p_image< I >::p_image ( ) [inline]

Constructor without argument.

Definition at line 182 of file p_image.hh.

10.277.3.2 template< typename I > mln::p_image< I >::p_image (const I & *ima*) [inline]

Constructor.

Definition at line 189 of file p_image.hh.

References mln::p_image< I >::clear().

10.277.4 Member Function Documentation

10.277.4.1 template< typename I > void mln::p_image< I >::clear ( ) [inline]

Clear this set.

Definition at line 283 of file p_image.hh.

References mln::data::fill_with_value(), and mln::p_image< I >::is_valid().

Referenced by mln::p_image< I >::p_image().

10.277.4.2 template< typename I > bool mln::p_image< I >::has (const psite & *p*) const [inline]

Test is the psite `p` belongs to this site set.

Definition at line 199 of file p_image.hh.

References mln::p_image< I >::is_valid().

10.277.4.3 template< typename I > void mln::p_image< I >::insert (const psite & *p*) [inline]

Insert a site `p`.

Definition at line 224 of file p_image.hh.

References mln::p_image< I >::is_valid().

10.277.4.4 template< typename I > bool mln::p_image< I >::is_valid ( ) const [inline]

Test if this site set is valid, i.e., initialized.

Definition at line 208 of file p_image.hh.

Referenced by mln::p_image< I >::clear(), mln::p_image< I >::has(), mln::p_image< I >::insert(), mln::p_image< I >::memory_size(), mln::p_image< I >::remove(), and mln::p_image< I >::toggle().

10.277.4.5 template<typename I > std::size_t mln::p_image< I >::memory_size ( ) const [inline]

Return the size of this site set in memory.

Definition at line 273 of file p_image.hh.

References mln::p_image< I >::is_valid().

10.277.4.6 template<typename I > unsigned mln::p_image< I >::nsites ( ) const [inline]

Give the number of sites.

Definition at line 216 of file p_image.hh.

10.277.4.7 template<typename I > mln::p_image< I >::operator typename internal::p_image_site_set< I >::ret ( ) const [inline]

Conversion towards the equivalent site set.

Definition at line 174 of file p_image.hh.

10.277.4.8 template<typename I > void mln::p_image< I >::remove (const psite & *p*) [inline]

Remove a site `p`.

Definition at line 237 of file p_image.hh.

References mln::p_image< I >::is_valid().

10.277.4.9 template<typename I > void mln::p_image< I >::toggle (const psite & *p*) [inline]

Change the status in/out of a site `p`.

Definition at line 251 of file p_image.hh.

References mln::p_image< I >::is_valid().

10.278 mln::p_indexed_bkd_piter< S > Class Template Reference

Backward iterator on sites of an indexed site set.

`#include <p_array.hh>`

Inherits site_set_iterator_base< S, p_indexed_bkd_piter< S > >.

Public Member Functions

- int index () const

  Return the current index.

- void next ()

  Go to the next element.

- p_indexed_bkd_piter (const S &s)

  Constructor.

- p_indexed_bkd_piter ()

  Constructor with no argument.

10.278.1 Detailed Description

template<typename S> class mln::p_indexed_bkd_piter< S >

Backward iterator on sites of an indexed site set.

Definition at line 276 of file p_array.hh.

10.278.2 Constructor & Destructor Documentation

10.278.2.1 template<typename S > mln::p_indexed_bkd_piter< S >::p_indexed_bkd_piter ( ) [inline]

Constructor with no argument.

Definition at line 686 of file p_array.hh.

10.278.2.2 template<typename S > mln::p_indexed_bkd_piter< S >::p_indexed_bkd_piter (const S & *s*) [inline]

Constructor.

Definition at line 692 of file p_array.hh.

10.278.3 Member Function Documentation

10.278.3.1 template<typename S > int mln::p_indexed_bkd_piter< S >::index ( ) const [inline]

Return the current index.

Definition at line 733 of file p_array.hh.

10.278.3.2 void mln::Site_Iterator< p_indexed_bkd_piter< S > >::next ( ) [inherited]

Go to the next element.

Warning

This is a final method; iterator classes should not re-defined this method. The actual "next" operation has to be defined through the *next_* method.

Precondition

The iterator is valid.

10.279 mln::p_indexed_fwd_piter< S > Class Template Reference

Forward iterator on sites of an indexed site set.

`#include <p_array.hh>`

Inherits site_set_iterator_base< S, p_indexed_fwd_piter< S > >.

Public Member Functions

- int index () const

  Return the current index.

- void next ()

  Go to the next element.

- p_indexed_fwd_piter (const S &s)

  Constructor.

- p_indexed_fwd_piter ()

  Constructor with no argument.

10.279.1 Detailed Description

template<typename S> class mln::p_indexed_fwd_piter< S >

Forward iterator on sites of an indexed site set.

Definition at line 235 of file p_array.hh.

10.279.2 Constructor & Destructor Documentation

10.279.2.1 template<typename S > mln::p_indexed_fwd_piter< S >::p_indexed_fwd_piter ( ) `[inline]`

Constructor with no argument.

Definition at line 629 of file p_array.hh.

10.279.2.2 template<typename S > mln::p_indexed_fwd_piter< S >::p_indexed_fwd_piter (const S & *s*) `[inline]`

Constructor.

Definition at line 635 of file p_array.hh.

10.279.3 Member Function Documentation

10.279.3.1 template< typename S > int mln::p_indexed_fwd_piter< S >::index ( ) const [inline]

Return the current index.

Definition at line 676 of file p_array.hh.

10.279.3.2 void mln::Site_Iterator< p_indexed_fwd_piter< S > >::next ( ) [inherited]

Go to the next element.

Warning

This is a final method; iterator classes should not re-defined this method. The actual "next" operation has to be defined through the *next_* method.

Precondition

The iterator is valid.

10.280 mln::p_indexed_psite< S > Class Template Reference

Psite class for indexed site sets such as p_array.

`#include <p_array.hh>`

Inherits pseudo_site_base_< const S::element &, p_indexed_psite< S > >.

10.280.1 Detailed Description

template<typename S> class mln::p_indexed_psite< S >

Psite class for indexed site sets such as p_array. .

Definition at line 183 of file p_array.hh.

10.281 mln::p_key< K, P > Class Template Reference

Priority queue class.

`#include <p_key.hh>`

Inherits site_set_base_< P, p_key< K, P > >.

Public Types

- typedef p_double_piter< self_, mln_bkd_eiter(util::set< K >), typename p_set< P >::bkd_piter > bkd_piter

    Backward Site_Iterator associated type.

- typedef P element

  Element associated type.

- typedef p_double_piter< self_, mln_fwd_eiter(util::set< K >), typename p_set< P >::fwd_piter > fwd_piter

  Forward Site_Iterator associated type.

- typedef std::pair< K, P > i_element

  Insertion element associated type.

- typedef fwd_piter piter

  Site_Iterator associated type.

- typedef p_double_psite< self_, p_set< P > > psite

  Psite associated type.

- typedef P r_element

  Removal element associated type.

Public Member Functions

- void change_key (const K &k, const K &new_k)

  Change the key `k` into a new value `new_k`.

- template<typename F >
  void change_keys (const Function_v2v< F > &f)

  Change the keys by applying the function `f`.

- void clear ()

  Clear this site set.

- bool exists_key (const K &key) const

  Test if the `priority` exists.

- bool has (const psite &) const

  Test is the psite `p` belongs to this site set.

- bool has (const P &p) const

  Test is the psite `p` belongs to this site set.

- void insert (const i_element &k_p)

  Insert a pair `k_p` (key k, site p).

- void insert (const K &k, const P &p)

  Insert a pair (key `k`, site `p`).

- bool is_valid () const

  Test this set validity so returns always true.

- const K & key (const P &p) const

    Give the key associated with site `p`.

- const util::set< K > & keys () const

    Give the set of keys.

- std::size_t memory_size () const

    Return the size of this site set in memory.

- unsigned nsites () const

    Give the number of sites.

- const p_set< P > & operator() (const K &key) const

    Give the queue with the priority `priority`.

- p_key ()

    Constructor.

- void remove (const P &p)

    Remove a site `p`.

- void remove_key (const K &k)

    Remove all sites with key `k`.

10.281.1 Detailed Description

template<typename K, typename P> class mln::p_key< K, P >

Priority queue class.

Definition at line 72 of file p_key.hh.

10.281.2 Member Typedef Documentation

10.281.2.1 template<typename K , typename P > typedef p_double_piter<self_, mln_bkd_eiter(util::set<K>), typename p_set<P>::bkd_piter> mln::p_key< K, P >::bkd_piter

Backward Site_Iterator associated type.

Definition at line 93 of file p_key.hh.

10.281.2.2 template<typename K , typename P > typedef P mln::p_key< K, P >::element

Element associated type.

Definition at line 79 of file p_key.hh.

10.281.2.3 template<typename K , typename P > typedef p_double_piter<self_, mln_fwd_eiter(util::set<K>), typename p_set<P>::fwd_piter> mln::p_key< K, P >::fwd_piter

Forward Site_Iterator associated type.

Definition at line 88 of file p_key.hh.

10.281.2.4 template<typename K , typename P > typedef std::pair<K,P> mln::p_key< K, P >::i_element

Insertion element associated type.

Definition at line 118 of file p_key.hh.

10.281.2.5 template<typename K , typename P > typedef fwd_piter mln::p_key< K, P >::piter

Site_Iterator associated type.

Definition at line 96 of file p_key.hh.

10.281.2.6 template<typename K , typename P > typedef p_double_psite< self_, p_set<P> > mln::p_key< K, P >::psite

Psite associated type.

Definition at line 83 of file p_key.hh.

10.281.2.7 template<typename K , typename P > typedef P mln::p_key< K, P >::r_element

Removal element associated type.

Definition at line 132 of file p_key.hh.

10.281.3 Constructor & Destructor Documentation

10.281.3.1 template<typename K , typename P > mln::p_key< K, P >::p_key ( ) [inline]

Constructor.

Definition at line 208 of file p_key.hh.

10.281.4 Member Function Documentation

10.281.4.1 template<typename K , typename P > void mln::p_key< K, P >::change_key (const K & *k*, const K & *new_k*) [inline]

Change the key `k` into a new value `new_k`.

Definition at line 382 of file p_key.hh.

References mln::p_set< P >::nsites().

10.281.4.2 template<typename K , typename P > template<typename F > void mln::p_key< K, P >::change_keys (const Function_v2v< F > & *f*) [inline]

Change the keys by applying the function f.

Definition at line 428 of file p_key.hh.

References mln::util::set< T >::insert().

10.281.4.3 template<typename K , typename P > void mln::p_key< K, P >::clear ( ) [inline]

Clear this site set.

Definition at line 462 of file p_key.hh.

10.281.4.4 template<typename K , typename P > bool mln::p_key< K, P >::exists_key (const K & *key*) const [inline]

Test if the priority exists.

Definition at line 520 of file p_key.hh.

Referenced by mln::p_key< K, P >::operator()().

10.281.4.5 template<typename K , typename P > bool mln::p_key< K, P >::has (const P & *p*) const [inline]

Test is the psite p belongs to this site set.

Definition at line 227 of file p_key.hh.

10.281.4.6 template<typename K , typename P > bool mln::p_key< K, P >::has (const psite &) const [inline]

Test is the psite p belongs to this site set.

Definition at line 217 of file p_key.hh.

Referenced by mln::p_key< K, P >::insert().

10.281.4.7 template<typename K , typename P > void mln::p_key< K, P >::insert (const i_element & *k_p*) [inline]

Insert a pair k_p (key k, site p).

Definition at line 301 of file p_key.hh.

10.281.4.8 template<typename K , typename P > void mln::p_key< K, P >::insert (const K & *k*, const P & *p*) [inline]

Insert a pair (key k, site p).

Definition at line 268 of file p_key.hh.

References mln::p_key< K, P >::has().

10.281.4.9 template<typename K , typename P > bool mln::p_key< K, P >::is_valid ( ) const [inline]

Test this set validity so returns always true.

Definition at line 236 of file p_key.hh.

10.281.4.10 template<typename K , typename P > const K & mln::p_key< K, P >::key (const P & *p*) const [inline]

Give the key associated with site `p`.

Definition at line 501 of file p_key.hh.

10.281.4.11 template<typename K , typename P > const util::set< K > & mln::p_key< K, P >::keys ( ) const [inline]

Give the set of keys.

Definition at line 511 of file p_key.hh.

10.281.4.12 template<typename K , typename P > std::size_t mln::p_key< K, P >::memory_size ( ) const [inline]

Return the size of this site set in memory.

Definition at line 475 of file p_key.hh.

10.281.4.13 template<typename K , typename P > unsigned mln::p_key< K, P >::nsites ( ) const [inline]

Give the number of sites.

Definition at line 245 of file p_key.hh.

10.281.4.14 template<typename K , typename P > const p_set< P > & mln::p_key< K, P >::operator() (const K & *key*) const [inline]

Give the queue with the priority `priority`.

This method always works: if the priority is not in this set, an empty queue is returned.

Definition at line 489 of file p_key.hh.

References mln::p_key< K, P >::exists_key().

10.281.4.15 template<typename K , typename P > void mln::p_key< K, P >::remove (const P & *p*) [inline]

Remove a site `p`.

Definition at line 309 of file p_key.hh.

10.281.4.16 template<typename K , typename P > void mln::p_key< K, P >::remove_key (const K & *k*) [inline]

Remove all sites with key k.

Definition at line 351 of file p_key.hh.

References mln::p_set< P >::nsites().

10.282 mln::p_line2d Class Reference

2D discrete line of points.

`#include <p_line2d.hh>`

Inherits site_set_base_< point2d, p_line2d >.

Public Types

- typedef p_indexed_bkd_piter< self_ > bkd_piter
  Backward Site_Iterator associated type.
- typedef point2d element
  Element associated type.
- typedef p_indexed_fwd_piter< self_ > fwd_piter
  Forward Site_Iterator associated type.
- typedef p_indexed_fwd_piter< self_ > piter
  Site_Iterator associated type.
- typedef p_indexed_psite< self_ > psite
  Psite associated type.
- typedef const box2d & q_box
  Box (qualified) associated type.

Public Member Functions

- const box2d & bbox () const
  Give the exact bounding box.
- const point2d & begin () const
  Give the point that begins the line.
- const point2d & end () const
  Give the point that ends the line.
- bool has (const util::index &i) const

Test if index `i` *belongs to this point set.*

- bool has (const psite &p) const

  Test if `p` *belongs to this point set.*

- bool is_valid () const

  Test if this line is valid, i.e., initialized.

- std::size_t memory_size () const

  Return the size of this site set in memory.

- unsigned nsites () const

  Give the number of points.

- const point2d & operator[ ] (unsigned i) const

  Return the `i-th` *point of the line.*

- p_line2d (const point2d &beg, const point2d &end, bool is_end_excluded=false)

  Constructor from point `beg` *to point* `end`*.*

- p_line2d ()

  Constructor without argument.

- const std::vector< point2d > & std_vector () const

  Return the corresponding std::vector of points.

10.282.1 Detailed Description

2D discrete line of points. It is based on p_array.

Definition at line 79 of file p_line2d.hh.

10.282.2 Member Typedef Documentation

10.282.2.1 typedef p_indexed_bkd_piter<self_> mln::p_line2d::bkd_piter

Backward Site_Iterator associated type.

Definition at line 97 of file p_line2d.hh.

10.282.2.2 typedef point2d mln::p_line2d::element

Element associated type.

Definition at line 85 of file p_line2d.hh.

10.282.2.3 typedef p_indexed_fwd_piter<self_> mln::p_line2d::fwd_piter

Forward Site_Iterator associated type.

Definition at line 94 of file p_line2d.hh.

10.282.2.4 typedef p_indexed_fwd_piter<self_> mln::p_line2d::piter

Site_Iterator associated type.

Definition at line 91 of file p_line2d.hh.

10.282.2.5 typedef p_indexed_psite<self_> mln::p_line2d::psite

Psite associated type.

Definition at line 88 of file p_line2d.hh.

10.282.2.6 typedef const box2d& mln::p_line2d::q_box

Box (qualified) associated type.

Definition at line 132 of file p_line2d.hh.

10.282.3 Constructor & Destructor Documentation

10.282.3.1 mln::p_line2d::p_line2d ( ) [inline]

Constructor without argument.

Definition at line 161 of file p_line2d.hh.

References is_valid().

10.282.3.2 mln::p_line2d::p_line2d (const point2d & *beg*, const point2d & *end*, bool *is_end_excluded* = *false*) [inline]

Constructor from point `beg` to point `end`.

Definition at line 167 of file p_line2d.hh.

References is_valid().

10.282.4 Member Function Documentation

10.282.4.1 const box2d & mln::p_line2d::bbox ( ) const [inline]

Give the exact bounding box.

Definition at line 273 of file p_line2d.hh.

References is_valid().

10.282.4.2 const point2d & mln::p_line2d::begin ( ) const [inline]

Give the point that begins the line.

Definition at line 307 of file p_line2d.hh.

References is_valid().

Referenced by mln::debug::draw_graph().

10.282.4.3 const point2d & mln::p_line2d::end ( ) const [inline]

Give the point that ends the line.

Definition at line 315 of file p_line2d.hh.

References is_valid(), and nsites().

Referenced by mln::debug::draw_graph().

10.282.4.4 bool mln::p_line2d::has (const psite & *p*) const [inline]

Test if p belongs to this point set.

Definition at line 240 of file p_line2d.hh.

10.282.4.5 bool mln::p_line2d::has (const util::index & *i*) const [inline]

Test if index i belongs to this point set.

Definition at line 251 of file p_line2d.hh.

References nsites().

10.282.4.6 bool mln::p_line2d::is_valid ( ) const [inline]

Test if this line is valid, i.e., initialized.

Definition at line 258 of file p_line2d.hh.

References mln::implies().

Referenced by bbox(), begin(), end(), and p_line2d().

10.282.4.7 std::size_t mln::p_line2d::memory_size ( ) const [inline]

Return the size of this site set in memory.

Definition at line 323 of file p_line2d.hh.

10.282.4.8 unsigned mln::p_line2d::nsites ( ) const [inline]

Give the number of points.

Definition at line 266 of file p_line2d.hh.

Referenced by end(), has(), and operator[ ]().

10.282.4.9 const point2d & mln::p_line2d::operator[ ] (unsigned *i*) const [inline]

Return the i-th point of the line.

Definition at line 299 of file p_line2d.hh.

References nsites().

10.282.4.10 const std::vector< point2d > & mln::p_line2d::std_vector ( ) const [inline]

Return the corresponding std::vector of points.

Definition at line 281 of file p_line2d.hh.

10.283 mln::p_mutable_array_of< S > Class Template Reference

p_mutable_array_of is a mutable array of site sets.

`#include <p_mutable_array_of.hh>`

Inherits site_set_base_< S::site, p_mutable_array_of< S > >.

Public Types

- typedef p_double_piter< self_, mln_bkd_eiter(array_), typename S::bkd_piter > bkd_piter

  Backward Site_Iterator associated type.

- typedef S element

  Element associated type.

- typedef p_double_piter< self_, mln_fwd_eiter(array_), typename S::fwd_piter > fwd_piter

  Forward Site_Iterator associated type.

- typedef S i_element

  Insertion element associated type.

- typedef fwd_piter piter

  Site_Iterator associated type.

- typedef p_double_psite< self_, element > psite

  Psite associated type.

Public Member Functions

- void clear ()

  Clear this set.

- bool has (const psite &p) const

  Test if `p` *belongs to this point set.*

- void insert (const S &s)

  Insert a site set `s`.

- bool is_valid () const

Test this set validity so returns always true.

- std::size_t memory_size () const

  Return the size of this site set in memory.

- unsigned nelements () const

  Give the number of elements (site sets) of this composite.

- S & operator[ ] (unsigned i)

  Return the `i-th` site set (mutable version).

- const S & operator[ ] (unsigned i) const

  Return the `i-th` site set (const version).

- p_mutable_array_of ()

  Constructor without arguments.

- void reserve (unsigned n)

  Reserve memory for `n` elements.

10.283.1 Detailed Description

template<typename S> class mln::p_mutable_array_of< S >

p_mutable_array_of is a mutable array of site sets. Parameter `S` is the type of the contained site sets.

Definition at line 76 of file p_mutable_array_of.hh.

10.283.2 Member Typedef Documentation

10.283.2.1 template<typename S > typedef p_double_piter<self_, mln_bkd_eiter(array_), typename S ::bkd_piter> mln::p_mutable_array_of< S >::bkd_piter

Backward Site_Iterator associated type.

Definition at line 99 of file p_mutable_array_of.hh.

10.283.2.2 template<typename S > typedef S mln::p_mutable_array_of< S >::element

Element associated type.

Definition at line 85 of file p_mutable_array_of.hh.

10.283.2.3 template<typename S > typedef p_double_piter<self_, mln_fwd_eiter(array_), typename S ::fwd_piter> mln::p_mutable_array_of< S >::fwd_piter

Forward Site_Iterator associated type.

Definition at line 94 of file p_mutable_array_of.hh.

10.283.2.4 template< typename S > typedef S mln::p_mutable_array_of< S >::i_element

Insertion element associated type.

Definition at line 121 of file p_mutable_array_of.hh.

10.283.2.5 template< typename S > typedef fwd_piter mln::p_mutable_array_of< S >::piter

Site_Iterator associated type.

Definition at line 102 of file p_mutable_array_of.hh.

10.283.2.6 template< typename S > typedef p_double_psite<self_, element> mln::p_mutable_array_of< S >::psite

Psite associated type.

Definition at line 89 of file p_mutable_array_of.hh.

10.283.3 Constructor & Destructor Documentation

10.283.3.1 template< typename S > mln::p_mutable_array_of< S >::p_mutable_array_of ( ) `[inline]`

Constructor without arguments.

Definition at line 175 of file p_mutable_array_of.hh.

10.283.4 Member Function Documentation

10.283.4.1 template< typename S > void mln::p_mutable_array_of< S >::clear ( ) `[inline]`

Clear this set.

Definition at line 241 of file p_mutable_array_of.hh.

10.283.4.2 template< typename S > bool mln::p_mutable_array_of< S >::has (const psite & *p*) const `[inline]`

Test if `p` belongs to this point set.

Definition at line 190 of file p_mutable_array_of.hh.

10.283.4.3 template< typename S > void mln::p_mutable_array_of< S >::insert (const S & *s*) `[inline]`

Insert a site set `s`.

Precondition

`s` is valid.

Definition at line 206 of file p_mutable_array_of.hh.

10.283.4.4 template<typename S > bool mln::p_mutable_array_of< S >::is_valid ( ) const [inline]

Test this set validity so returns always true.

Definition at line 198 of file p_mutable_array_of.hh.

10.283.4.5 template<typename S > std::size_t mln::p_mutable_array_of< S >::memory_size ( ) const [inline]

Return the size of this site set in memory.

Definition at line 258 of file p_mutable_array_of.hh.

10.283.4.6 template<typename S > unsigned mln::p_mutable_array_of< S >::nelements ( ) const [inline]

Give the number of elements (site sets) of this composite.

Definition at line 233 of file p_mutable_array_of.hh.

10.283.4.7 template<typename S > S & mln::p_mutable_array_of< S >::operator[] (unsigned *i*) [inline]

Return the `i-th` site set (mutable version).

Definition at line 224 of file p_mutable_array_of.hh.

10.283.4.8 template<typename S > const S & mln::p_mutable_array_of< S >::operator[] (unsigned *i*) const [inline]

Return the `i-th` site set (const version).

Definition at line 215 of file p_mutable_array_of.hh.

10.283.4.9 template<typename S > void mln::p_mutable_array_of< S >::reserve (unsigned *n*) [inline]

Reserve memory for `n` elements.

Definition at line 182 of file p_mutable_array_of.hh.

10.284 mln::p_n_faces_bkd_piter< D, G > Class Template Reference

Backward iterator on the n-faces sites of an mln::p_complex<D, G>.

`#include <p_n_faces_piter.hh>`

Inherits p_complex_piter_base_< topo::n_face_bkd_iter< D >, p_complex< D, G >, G::site, p_n_faces_-bkd_piter< D, G > >.

Public Member Functions

- void next ()

  Go to the next element.

- p_n_faces_bkd_piter ()

  Construction and assignment.

- unsigned n () const

  Accessors.

10.284.1 Detailed Description

template<unsigned D, typename G> class mln::p_n_faces_bkd_piter< D, G >

Backward iterator on the n-faces sites of an mln::p_complex<D, G>.

Definition at line 92 of file p_n_faces_piter.hh.

10.284.2 Constructor & Destructor Documentation

10.284.2.1 template<unsigned D, typename G > mln::p_n_faces_bkd_piter< D, G >::p_n_faces_bkd_piter ( ) [inline]

Construction and assignment.

Definition at line 169 of file p_n_faces_piter.hh.

10.284.3 Member Function Documentation

10.284.3.1 template<unsigned D, typename G > unsigned mln::p_n_faces_bkd_piter< D, G >::n ( ) const [inline]

Accessors.

Shortcuts to face_'s accessors.

Definition at line 186 of file p_n_faces_piter.hh.

10.284.3.2 void mln::Site_Iterator< p_n_faces_bkd_piter< D, G > >::next ( ) [inherited]

Go to the next element.

Warning

This is a final method; iterator classes should not re-defined this method. The actual "next" operation has to be defined through the *next_* method.

Precondition

The iterator is valid.

10.285 mln::p_n_faces_fwd_piter< D, G > Class Template Reference

Forward iterator on the n-faces sites of an mln::p_complex<D, G>.

`#include <p_n_faces_piter.hh>`

Inherits p_complex_piter_base_< topo::n_face_fwd_iter< D >, p_complex< D, G >, G::site, p_n_faces_-fwd_piter< D, G > >.

Public Member Functions

- void next ()
  Go to the next element.

- p_n_faces_fwd_piter ()
  Construction and assignment.

- unsigned n () const
  Accessors.

10.285.1 Detailed Description

template<unsigned D, typename G> class mln::p_n_faces_fwd_piter< D, G >

Forward iterator on the n-faces sites of an mln::p_complex<D, G>.

Definition at line 56 of file p_n_faces_piter.hh.

10.285.2 Constructor & Destructor Documentation

10.285.2.1 template<unsigned D, typename G > mln::p_n_faces_fwd_piter< D, G >::p_n_faces_fwd_piter ( ) [inline]

Construction and assignment.

Definition at line 132 of file p_n_faces_piter.hh.

10.285.3 Member Function Documentation

10.285.3.1 template<unsigned D, typename G > unsigned mln::p_n_faces_fwd_piter< D, G >::n ( ) const [inline]

Accessors.

Shortcuts to face_'s accessors.

Definition at line 149 of file p_n_faces_piter.hh.

10.285.3.2 void mln::Site_Iterator< p_n_faces_fwd_piter< D, G > >::next ( ) [inherited]

Go to the next element.

Warning

This is a final method; iterator classes should not re-defined this method. The actual "next" operation has to be defined through the next_ method.

Precondition

The iterator is valid.

10.286 mln::p_priority< P, Q > Class Template Reference

Priority queue.

`#include <p_priority.hh>`

Inherits site_set_base_< Q::site, p_priority< P, Q > >.

Public Types

- typedef p_double_piter< self_, mln_fwd_eiter(util::set< P >), typename Q::bkd_piter > bkd_piter

    Backward Site_Iterator associated type.

- typedef Q::element element

    Element associated type.

- typedef p_double_piter< self_, mln_bkd_eiter(util::set< P >), typename Q::fwd_piter > fwd_piter

    Forward Site_Iterator associated type.

- typedef std::pair< P, element > i_element

    Insertion element associated type.

- typedef fwd_piter piter

    Site_Iterator associated type.

- typedef p_double_psite< self_, Q > psite

    Psite associated type.

Public Member Functions

- void clear ()

    Clear the queue.

- bool exists_priority (const P &priority) const

    Test if the `priority` exists.

- const Q::element & front () const

  Give an element with highest priority.

- bool has (const psite &) const

  Test is the psite `p` *belongs to this site set.*

- const P highest_priority () const

  Give the highest priority.

- void insert (const i_element &p_e)

  Insert a pair `p_e` *(priority p, element e).*

- void insert (const p_priority< P, Q > &other)

  Insert elements from another priority queue.

- bool is_valid () const

  Test this set validity so returns always true.

- const P lowest_priority () const

  Give the lowest priority.

- std::size_t memory_size () const

  Return the size of this site set in memory.

- unsigned nsites () const

  Give the number of sites.

- const Q & operator() (const P &priority) const

  Give the queue with the priority `priority`.

- p_priority ()

  Constructor.

- void pop ()

  Pop (remove) from the queue an element with highest priority.

- Q::element pop_front ()

  Return an element with highest priority and remove it from the set.

- const util::set< P > & priorities () const

  Give the set of priorities.

- void push (const P &priority, const element &e)

  Push in the queue with `priority` *the element* `e`.

10.286.1 Detailed Description

template<typename P, typename Q> class mln::p_priority< P, Q >

Priority queue. The parameter `P` is the type of the priorities (for instance unsigned).

The parameter `Q` is a type of queue (for instance p_queue<point2d>).

Definition at line 76 of file p_priority.hh.

10.286.2 Member Typedef Documentation

10.286.2.1 template<typename P, typename Q> typedef p_double_piter< self_, mln_fwd_eiter(util::set<P>), typename Q ::bkd_piter > mln::p_priority< P, Q >::bkd_piter

Backward Site_Iterator associated type.

Definition at line 98 of file p_priority.hh.

10.286.2.2 template<typename P, typename Q> typedef Q ::element mln::p_priority< P, Q >::element

Element associated type.

Definition at line 84 of file p_priority.hh.

10.286.2.3 template<typename P, typename Q> typedef p_double_piter< self_, mln_bkd_eiter(util::set<P>), typename Q ::fwd_piter > mln::p_priority< P, Q >::fwd_piter

Forward Site_Iterator associated type.

Definition at line 93 of file p_priority.hh.

10.286.2.4 template<typename P, typename Q> typedef std::pair<P, element> mln::p_priority< P, Q >::i_element

Insertion element associated type.

Definition at line 121 of file p_priority.hh.

10.286.2.5 template<typename P, typename Q> typedef fwd_piter mln::p_priority< P, Q >::piter

Site_Iterator associated type.

Definition at line 101 of file p_priority.hh.

10.286.2.6 template<typename P, typename Q> typedef p_double_psite<self_, Q> mln::p_priority< P, Q >::psite

Psite associated type.

Definition at line 88 of file p_priority.hh.

10.286.3 Constructor & Destructor Documentation

10.286.3.1 template<typename P , typename Q > mln::p_priority< P, Q >::p_priority ( ) [inline]

Constructor.

Definition at line 202 of file p_priority.hh.

10.286.4 Member Function Documentation

10.286.4.1 template<typename P , typename Q > void mln::p_priority< P, Q >::clear ( ) [inline]

Clear the queue.

Definition at line 316 of file p_priority.hh.

10.286.4.2 template<typename P , typename Q > bool mln::p_priority< P, Q >::exists_priority (const P & *priority*) const [inline]

Test if the `priority` exists.

Definition at line 366 of file p_priority.hh.

Referenced by mln::p_priority< P, Q >::operator()().

10.286.4.3 template<typename P , typename Q > const Q::element & mln::p_priority< P, Q >::front ( ) const [inline]

Give an element with highest priority.

If several elements have this priority, the least recently inserted is chosen.

Precondition

! is_empty()

Definition at line 294 of file p_priority.hh.

References mln::p_priority< P, Q >::highest_priority().

Referenced by mln::morpho::meyer_wst(), and mln::morpho::watershed::topological().

10.286.4.4 template<typename P , typename Q > bool mln::p_priority< P, Q >::has (const psite &) const [inline]

Test is the psite `p` belongs to this site set.

Definition at line 211 of file p_priority.hh.

10.286.4.5 template<typename P , typename Q > const P mln::p_priority< P, Q >::highest_priority ( ) const [inline]

Give the highest priority.

Precondition

! is_empty()

Definition at line 375 of file p_priority.hh.

Referenced by mln::p_priority< P, Q >::front(), and mln::p_priority< P, Q >::pop().

10.286.4.6 template<typename P , typename Q > void mln::p_priority< P, Q >::insert (const i_element & *p_e*) [inline]

Insert a pair `p_e` (priority p, element e).

Definition at line 251 of file p_priority.hh.

References mln::p_priority< P, Q >::push().

10.286.4.7 template<typename P , typename Q > void mln::p_priority< P, Q >::insert (const p_priority< P, Q > & *other*) [inline]

Insert elements from another priority queue.

Definition at line 259 of file p_priority.hh.

10.286.4.8 template<typename P , typename Q > bool mln::p_priority< P, Q >::is_valid ( ) const [inline]

Test this set validity so returns always true.

Definition at line 221 of file p_priority.hh.

10.286.4.9 template<typename P , typename Q > const P mln::p_priority< P, Q >::lowest_priority ( ) const [inline]

Give the lowest priority.

Precondition

! is_empty()

Definition at line 384 of file p_priority.hh.

10.286.4.10 template<typename P , typename Q > std::size_t mln::p_priority< P, Q >::memory_size ( ) const [inline]

Return the size of this site set in memory.

Definition at line 328 of file p_priority.hh.

10.286.4.11 template<typename P , typename Q > unsigned mln::p_priority< P, Q >::nsites ( ) const [inline]

Give the number of sites.

Definition at line 230 of file p_priority.hh.

Referenced by mln::p_priority< P, Q >::operator()().

10.286.4.12 template<typename P , typename Q > const Q & mln::p_priority< P, Q >::operator() (const P & *priority*) const [inline]

Give the queue with the priority `priority`.

This method always works: if the priority is not in this set, an empty queue is returned.

Definition at line 341 of file p_priority.hh.

References mln::p_priority< P, Q >::exists_priority(), and mln::p_priority< P, Q >::nsites().

10.286.4.13 template<typename P , typename Q > void mln::p_priority< P, Q >::pop ( ) [inline]

Pop (remove) from the queue an element with highest priority.

If several elements have this priority, the least recently inserted is chosen.

Precondition

! is_empty()

Definition at line 277 of file p_priority.hh.

References mln::p_priority< P, Q >::highest_priority().

Referenced by mln::morpho::meyer_wst(), and mln::morpho::watershed::topological().

10.286.4.14 template<typename P , typename Q > Q::element mln::p_priority< P, Q >::pop_front ( ) [inline]

Return an element with highest priority and remove it from the set.

If several elements have this priority, the least recently inserted is chosen.

Precondition

! is_empty()

Definition at line 304 of file p_priority.hh.

10.286.4.15 template<typename P , typename Q > const util::set< P > & mln::p_priority< P, Q >::priorities ( ) const [inline]

Give the set of priorities.

Definition at line 357 of file p_priority.hh.

10.286.4.16 template<typename P , typename Q > void mln::p_priority< P, Q >::push (const P & *priority*, const element & *e*) [inline]

Push in the queue with `priority` the element `e`.

Definition at line 239 of file p_priority.hh.

Referenced by mln::p_priority< P, Q >::insert(), mln::morpho::meyer_wst(), and mln::morpho::watershed::topological().

10.287 mln::p_queue< P > Class Template Reference

Queue of sites (based on std::deque).

`#include <p_queue.hh>`

Inherits site_set_base_< P, p_queue< P > >.

Public Types

- typedef p_indexed_bkd_piter< self_ > bkd_piter
  Backward Site_Iterator associated type.
- typedef P element
  Element associated type.
- typedef p_indexed_fwd_piter< self_ > fwd_piter
  Forward Site_Iterator associated type.
- typedef P i_element
  Insertion element associated type.
- typedef fwd_piter piter
  Site_Iterator associated type.
- typedef p_indexed_psite< self_ > psite
  Psite associated type.

Public Member Functions

- void clear ()
  Clear the queue.
- const P & front () const
  Give the front site `p` of the queue; `p` is the least recently inserted site.
- bool has (const psite &p) const
  Test if `p` belongs to this site set.
- bool has (const util::index &i) const
  Test if index `i` belongs to this site set.
- void insert (const P &p)
  Insert a site `p` (equivalent as 'push').

- bool is_valid () const

  This set is always valid so it returns true.

- std::size_t memory_size () const

  Return the size of this site set in memory.

- unsigned nsites () const

  Give the number of sites.

- const P & operator[ ] (unsigned i) const

  Return the `i-th` *site.*

- p_queue ()

  Constructor without argument.

- void pop ()

  Pop (remove) the front site `p` *from the queue;* `p` *is the least recently inserted site.*

- P pop_front ()

  Pop (remove) the front site `p` *from the queue;* `p` *is the least recently inserted site and give the front site* `p` *of the queue;* `p` *is the least recently inserted site.*

- void push (const P &p)

  Push a site `p` *in the queue.*

- const std::deque< P > & std_deque () const

  Return the corresponding std::deque of sites.

10.287.1 Detailed Description

template<typename P> class mln::p_queue< P >

Queue of sites (based on std::deque). The parameter `P` shall be a site or pseudo-site type.

Definition at line 74 of file p_queue.hh.

10.287.2 Member Typedef Documentation

10.287.2.1 template<typename P> typedef p_indexed_bkd_piter<self_> mln::p_queue< P >::bkd_piter

Backward Site_Iterator associated type.

Definition at line 90 of file p_queue.hh.

10.287.2.2 template<typename P> typedef P mln::p_queue< P >::element

Element associated type.

Definition at line 80 of file p_queue.hh.

10.287.2.3 template<typename P> typedef p_indexed_fwd_piter<self_> mln::p_queue< P >::fwd_piter

Forward Site_Iterator associated type.

Definition at line 87 of file p_queue.hh.

10.287.2.4 template<typename P> typedef P mln::p_queue< P >::i_element

Insertion element associated type.

Definition at line 118 of file p_queue.hh.

10.287.2.5 template<typename P> typedef fwd_piter mln::p_queue< P >::piter

Site_Iterator associated type.

Definition at line 93 of file p_queue.hh.

10.287.2.6 template<typename P> typedef p_indexed_psite<self_> mln::p_queue< P >::psite

Psite associated type.

Definition at line 84 of file p_queue.hh.

10.287.3 Constructor & Destructor Documentation

10.287.3.1 template<typename P > mln::p_queue< P >::p_queue ( ) [inline]

Constructor without argument.

Definition at line 163 of file p_queue.hh.

10.287.4 Member Function Documentation

10.287.4.1 template<typename P > void mln::p_queue< P >::clear ( ) [inline]

Clear the queue.

Definition at line 244 of file p_queue.hh.

10.287.4.2 template<typename P > const P & mln::p_queue< P >::front ( ) const [inline]

Give the front site `p` of the queue; `p` is the least recently inserted site.

Definition at line 224 of file p_queue.hh.

Referenced by mln::p_queue< P >::pop_front(), and mln::geom::impl::seeds2tiling().

10.287.4.3 template<typename P > bool mln::p_queue< P >::has (const util::index & *i*) const [inline]

Test if index `i` belongs to this site set.

Definition at line 183 of file p_queue.hh.

References mln::p_queue< P >::nsites().

10.287.4.4 template<typename P > bool mln::p_queue< P >::has (const psite & *p*) const [inline]

Test if p belongs to this site set.

Definition at line 170 of file p_queue.hh.

References mln::p_queue< P >::nsites().

10.287.4.5 template<typename P > void mln::p_queue< P >::insert (const P & *p*) [inline]

Insert a site p (equivalent as 'push').

Definition at line 261 of file p_queue.hh.

References mln::p_queue< P >::push().

10.287.4.6 template<typename P > bool mln::p_queue< P >::is_valid ( ) const [inline]

This set is always valid so it returns true.

Definition at line 191 of file p_queue.hh.

10.287.4.7 template<typename P > std::size_t mln::p_queue< P >::memory_size ( ) const [inline]

Return the size of this site set in memory.

Definition at line 277 of file p_queue.hh.

References mln::p_queue< P >::nsites().

10.287.4.8 template<typename P > unsigned mln::p_queue< P >::nsites ( ) const [inline]

Give the number of sites.

Definition at line 199 of file p_queue.hh.

Referenced by mln::p_queue< P >::has(), mln::p_queue< P >::memory_size(), and mln::p_queue< P >::operator[ ]().

10.287.4.9 template<typename P > const P & mln::p_queue< P >::operator[ ] (unsigned *i*) const [inline]

Return the i-th site.

Definition at line 252 of file p_queue.hh.

References mln::p_queue< P >::nsites().

10.287.4.10 template<typename P > void mln::p_queue< P >::pop ( ) [inline]

Pop (remove) the front site p from the queue; p is the least recently inserted site.

Definition at line 215 of file p_queue.hh.

Referenced by mln::p_queue< P >::pop_front(), and mln::geom::impl::seeds2tiling().

10.287.4.11 template<typename P > P mln::p_queue< P >::pop_front ( ) [inline]

Pop (remove) the front site p from the queue; p is the least recently inserted site and give the front site p of the queue; p is the least recently inserted site.

Definition at line 233 of file p_queue.hh.

References mln::p_queue< P >::front(), and mln::p_queue< P >::pop().

10.287.4.12 template<typename P > void mln::p_queue< P >::push (const P & *p*) [inline]

Push a site p in the queue.

Definition at line 207 of file p_queue.hh.

Referenced by mln::p_queue< P >::insert(), and mln::geom::impl::seeds2tiling().

10.287.4.13 template<typename P > const std::deque< P > & mln::p_queue< P >::std_deque ( ) const [inline]

Return the corresponding std::deque of sites.

Definition at line 269 of file p_queue.hh.

10.288 mln::p_queue_fast< P > Class Template Reference

Queue of sites class (based on p_array.

`#include <p_queue_fast.hh>`

Inherits site_set_base_< P, p_queue_fast< P > >.

Public Types

- typedef p_indexed_bkd_piter< self_ > bkd_piter

  Backward Site_Iterator associated type.

- typedef P element

  Element associated type.

- typedef p_indexed_fwd_piter< self_ > fwd_piter

  Forward Site_Iterator associated type.

- typedef P i_element

  Insertion element associated type.

- typedef fwd_piter piter

  Site_Iterator associated type.

- typedef p_indexed_psite< self_ > psite

  Psite associated type.

Public Member Functions

- void clear ()

  Clear the queue.

- bool compute_has (const P &p) const

  Test if p belongs to this site set.

- bool empty () const

  Test if the queue is empty.

- const P & front () const

  Give the front site p of the queue; p is the least recently inserted site.

- bool has (const util::index &i) const

  Test if index i belongs to this site set.

- bool has (const psite &p) const

  Test if p belongs to this site set.

- void insert (const P &p)

  Insert a site p (equivalent as 'push').

- bool is_valid () const

  This set is always valid so it returns true.

- std::size_t memory_size () const

  Return the size of this site set in memory.

- unsigned nsites () const

  Give the number of sites.

- const P & operator[ ] (unsigned i) const

  Return the i-th site.

- p_queue_fast ()

  Constructor without argument.

- void pop ()

  Pop (remove) the front site p from the queue; p is the least recently inserted site.

- const P & pop_front ()

  Pop (remove) the front site p from the queue; p is the least recently inserted site and give the front site p of the queue; p is the least recently inserted site.

- void purge ()

  Purge the queue to save (free) some memory.

- void push (const P &p)

  Push a site p in the queue.

- void reserve (typename p_array< P >::size_type n)

  Reserve n cells.

- const std::vector< P > & std_vector () const

  Return the corresponding std::vector of sites.

10.288.1 Detailed Description

template<typename P> class mln::p_queue_fast< P >

Queue of sites class (based on p_array.).

This container is efficient; FIXME: explain...

The parameter P shall be a site or pseudo-site type.

Definition at line 72 of file p_queue_fast.hh.

10.288.2 Member Typedef Documentation

10.288.2.1 template<typename P > typedef p_indexed_bkd_piter<self_> mln::p_queue_fast< P >::bkd_piter

Backward Site_Iterator associated type.

Definition at line 87 of file p_queue_fast.hh.

10.288.2.2 template<typename P > typedef P mln::p_queue_fast< P >::element

Element associated type.

Definition at line 78 of file p_queue_fast.hh.

10.288.2.3 template<typename P > typedef p_indexed_fwd_piter<self_> mln::p_queue_fast< P >::fwd_piter

Forward Site_Iterator associated type.

Definition at line 84 of file p_queue_fast.hh.

10.288.2.4 template<typename P > typedef P mln::p_queue_fast< P >::i_element

Insertion element associated type.

Definition at line 121 of file p_queue_fast.hh.

10.288.2.5 template<typename P > typedef fwd_piter mln::p_queue_fast< P >::piter

Site_Iterator associated type.

Definition at line 90 of file p_queue_fast.hh.

10.288.2.6 template<typename P > typedef p_indexed_psite<self_> mln::p_queue_fast< P >::psite

Psite associated type.

Definition at line 81 of file p_queue_fast.hh.

10.288.3 Constructor & Destructor Documentation

10.288.3.1 template<typename P > mln::p_queue_fast< P >::p_queue_fast ( ) [inline]

Constructor without argument.

Definition at line 170 of file p_queue_fast.hh.

10.288.4 Member Function Documentation

10.288.4.1 template<typename P > void mln::p_queue_fast< P >::clear ( ) [inline]

Clear the queue.

Definition at line 297 of file p_queue_fast.hh.

10.288.4.2 template<typename P > bool mln::p_queue_fast< P >::compute_has (const P & *p*) const [inline]

Test if p belongs to this site set.

Definition at line 222 of file p_queue_fast.hh.

10.288.4.3 template<typename P > bool mln::p_queue_fast< P >::empty ( ) const [inline]

Test if the queue is empty.

Definition at line 250 of file p_queue_fast.hh.

10.288.4.4 template<typename P > const P & mln::p_queue_fast< P >::front ( ) const [inline]

Give the front site p of the queue; p is the least recently inserted site.

Definition at line 277 of file p_queue_fast.hh.

Referenced by mln::p_queue_fast< P >::pop_front().

10.288.4.5 template<typename P > bool mln::p_queue_fast< P >::has (const psite & *p*) const [inline]

Test if `p` belongs to this site set.

Definition at line 201 of file p_queue_fast.hh.

References mln::p_queue_fast< P >::nsites().

10.288.4.6 template<typename P > bool mln::p_queue_fast< P >::has (const util::index & *i*) const [inline]

Test if index `i` belongs to this site set.

Definition at line 214 of file p_queue_fast.hh.

References mln::p_queue_fast< P >::nsites().

10.288.4.7 template<typename P > void mln::p_queue_fast< P >::insert (const P & *p*) [inline]

Insert a site `p` (equivalent as 'push').

Definition at line 314 of file p_queue_fast.hh.

References mln::p_queue_fast< P >::push().

10.288.4.8 template<typename P > bool mln::p_queue_fast< P >::is_valid ( ) const [inline]

This set is always valid so it returns true.

Definition at line 233 of file p_queue_fast.hh.

10.288.4.9 template<typename P > std::size_t mln::p_queue_fast< P >::memory_size ( ) const [inline]

Return the size of this site set in memory.

Definition at line 330 of file p_queue_fast.hh.

10.288.4.10 template<typename P > unsigned mln::p_queue_fast< P >::nsites ( ) const [inline]

Give the number of sites.

Definition at line 241 of file p_queue_fast.hh.

Referenced by mln::p_queue_fast< P >::has(), and mln::p_queue_fast< P >::operator[ ]().

10.288.4.11 template<typename P > const P & mln::p_queue_fast< P >::operator[ ] (unsigned *i*) const [inline]

Return the `i-th` site.

Definition at line 305 of file p_queue_fast.hh.

References mln::p_queue_fast< P >::nsites().

10.288.4.12 template<typename P > void mln::p_queue_fast< P >::pop ( ) [inline]

Pop (remove) the front site `p` from the queue; `p` is the least recently inserted site.

Definition at line 268 of file p_queue_fast.hh.

Referenced by mln::p_queue_fast< P >::pop_front().

10.288.4.13 template<typename P > const P & mln::p_queue_fast< P >::pop_front ( ) [inline]

Pop (remove) the front site `p` from the queue; `p` is the least recently inserted site and give the front site `p` of the queue; `p` is the least recently inserted site.

Definition at line 286 of file p_queue_fast.hh.

References mln::p_queue_fast< P >::front(), and mln::p_queue_fast< P >::pop().

10.288.4.14 template<typename P > void mln::p_queue_fast< P >::purge ( ) [inline]

Purge the queue to save (free) some memory.

Definition at line 187 of file p_queue_fast.hh.

10.288.4.15 template<typename P > void mln::p_queue_fast< P >::push (const P & *p*) [inline]

Push a site `p` in the queue.

Definition at line 259 of file p_queue_fast.hh.

Referenced by mln::p_queue_fast< P >::insert().

10.288.4.16 template<typename P > void mln::p_queue_fast< P >::reserve (typename p_array< P >::size_type *n*) [inline]

Reserve `n` cells.

Definition at line 179 of file p_queue_fast.hh.

10.288.4.17 template<typename P > const std::vector< P > & mln::p_queue_fast< P >::std_vector ( ) const [inline]

Return the corresponding std::vector of sites.

Definition at line 322 of file p_queue_fast.hh.

10.289 mln::p_run< P > Class Template Reference

Point set class in run.

`#include <p_run.hh>`

Inherits site_set_base_< P, p_run< P > >.

Public Types

- typedef p_run_bkd_piter_< P > bkd_piter

  Backward Site_Iterator associated type.

- typedef P element

  Element associated type.

- typedef p_run_fwd_piter_< P > fwd_piter

  Forward Site_Iterator associated type.

- typedef fwd_piter piter

  Site_Iterator associated type.

- typedef p_run_psite< P > psite

  Psite associated type.

- typedef mln::box< P > q_box

  Box associated type.

Public Member Functions

- mln::box< P > bbox () const

  Give the exact bounding box.

- P end () const

  Return (compute) the ending point.

- bool has (const P &p) const

  Test if `p` belongs to this point set.

- bool has (const psite &p) const

  Test if `p` belongs to this point set.

- bool has_index (unsigned short i) const

  Test if index `i` belongs to this point set.

- void init (const P &start, unsigned short len)

  Set the starting point.

- bool is_valid () const

Test if this run is valid, i.e., with length > 0.

- unsigned short length () const

  Give the length of the run.

- std::size_t memory_size () const

  Return the size of this site set in memory.

- unsigned nsites () const

  Give the number of sites.

- P operator[ ] (unsigned short i) const

  Return the `i-th` point.

- p_run ()

  Constructor without argument.

- p_run (const P &start, unsigned short len)

  Constructor.

- p_run (const P &start, const P &end)

  Constructor.

- const P & start () const

  Return the starting point.

10.289.1 Detailed Description

template<typename P> class mln::p_run< P >

Point set class in run. This is a mathematical set of points (not a multi-set). The parameter `P` shall be a Point type.

Definition at line 86 of file p_run.hh.

10.289.2 Member Typedef Documentation

10.289.2.1 template<typename P> typedef p_run_bkd_piter_<P> mln::p_run< P >::bkd_piter

Backward Site_Iterator associated type.

Definition at line 101 of file p_run.hh.

10.289.2.2 template<typename P> typedef P mln::p_run< P >::element

Element associated type.

Definition at line 91 of file p_run.hh.

10.289.2.3 template<typename P> typedef p_run_fwd_piter_<P> mln::p_run< P >::fwd_piter

Forward Site_Iterator associated type.

Definition at line 98 of file p_run.hh.

10.289.2.4 template<typename P> typedef fwd_piter mln::p_run< P >::piter

Site_Iterator associated type.

Definition at line 104 of file p_run.hh.

10.289.2.5 template<typename P> typedef p_run_psite<P> mln::p_run< P >::psite

Psite associated type.

Definition at line 95 of file p_run.hh.

10.289.2.6 template<typename P> typedef mln::box<P> mln::p_run< P >::q_box

Box associated type.

Definition at line 149 of file p_run.hh.

10.289.3 Constructor & Destructor Documentation

10.289.3.1 template<typename P > mln::p_run< P >::p_run ( ) `[inline]`

Constructor without argument.

Definition at line 223 of file p_run.hh.

10.289.3.2 template<typename P > mln::p_run< P >::p_run (const P & *start*, unsigned short *len*) `[inline]`

Constructor.

Definition at line 230 of file p_run.hh.

References mln::p_run< P >::init().

10.289.3.3 template<typename P > mln::p_run< P >::p_run (const P & *start*, const P & *end*) `[inline]`

Constructor.

Definition at line 238 of file p_run.hh.

10.289.4 Member Function Documentation

10.289.4.1 template<typename P > mln::box< P > mln::p_run< P >::bbox ( ) const [inline]

Give the exact bounding box.

Definition at line 267 of file p_run.hh.

References mln::p_run< P >::end().

10.289.4.2 template<typename P > P mln::p_run< P >::end ( ) const [inline]

Return (compute) the ending point.

Definition at line 348 of file p_run.hh.

References mln::point< G, C >::last_coord().

Referenced by mln::p_run< P >::bbox().

10.289.4.3 template<typename P > bool mln::p_run< P >::has (const psite & *p*) const [inline]

Test if `p` belongs to this point set.

Definition at line 276 of file p_run.hh.

10.289.4.4 template<typename P > bool mln::p_run< P >::has (const P & *p*) const [inline]

Test if `p` belongs to this point set.

Definition at line 289 of file p_run.hh.

References mln::p_run< P >::is_valid().

10.289.4.5 template<typename P > bool mln::p_run< P >::has_index (unsigned short *i*) const [inline]

Test if index `i` belongs to this point set.

Definition at line 302 of file p_run.hh.

10.289.4.6 template<typename P > void mln::p_run< P >::init (const P & *start*, unsigned short *len*) [inline]

Set the starting point.

Definition at line 249 of file p_run.hh.

Referenced by mln::p_run< P >::p_run().

10.289.4.7 template<typename P > bool mln::p_run< P >::is_valid ( ) const [inline]

Test if this run is valid, i.e., with length > 0.

Definition at line 259 of file p_run.hh.

Referenced by mln::p_run< P >::has(), mln::p_run< P >::length(), mln::p_run< P >::nsites(), and mln::p_run< P >::operator[ ]().

10.289.4.8 template<typename P > unsigned short mln::p_run< P >::length ( ) const [inline]

Give the length of the run.

Definition at line 319 of file p_run.hh.

References mln::p_run< P >::is_valid().

10.289.4.9 template<typename P > std::size_t mln::p_run< P >::memory_size ( ) const [inline]

Return the size of this site set in memory.

Definition at line 358 of file p_run.hh.

10.289.4.10 template<typename P > unsigned mln::p_run< P >::nsites ( ) const [inline]

Give the number of sites.

Definition at line 310 of file p_run.hh.

References mln::p_run< P >::is_valid().

10.289.4.11 template<typename P > P mln::p_run< P >::operator[ ] (unsigned short *i*) const [inline]

Return the `i-th` point.

Definition at line 328 of file p_run.hh.

References mln::p_run< P >::is_valid(), and mln::point< G, C >::last_coord().

10.289.4.12 template<typename P > const P & mln::p_run< P >::start ( ) const [inline]

Return the starting point.

Definition at line 340 of file p_run.hh.

10.290 mln::p_set< P > Class Template Reference

Mathematical set of sites (based on util::set).

`#include <p_set.hh>`

Inherits site_set_base_< P, p_set< P > >.

Public Types

- typedef p_indexed_bkd_piter< self_ > bkd_piter

  Backward Site_Iterator associated type.

- typedef P element

  Element associated type.

- typedef p_indexed_fwd_piter< self_ > fwd_piter

  Forward Site_Iterator associated type.

- typedef P i_element

  Insertion element associated type.

- typedef fwd_piter piter

  Site_Iterator associated type.

- typedef p_indexed_psite< self_ > psite

  Psite associated type.

- typedef P r_element

  Removal element associated type.

Public Member Functions

- void clear ()

  Clear this set.

- bool has (const psite &p) const

  Test if psite `p` *belongs to this point set.*

- bool has (const util::index &i) const

  Test if index `i` *belongs to this point set.*

- bool has (const P &p) const

  Test if `p` *belongs to this point set.*

- void insert (const P &p)

  Insert a site `p`*.*

- bool is_valid () const

  Test this set validity so returns always true.

- std::size_t memory_size () const

  Return the size of this site set in memory.

- unsigned nsites () const

  Give the number of sites.

- const P & operator[ ] (unsigned i) const

  Return the `i-th` site.

- p_set ()

  Constructor.

- void remove (const P &p)

  Remove a site `p`.

- const std::vector< P > & std_vector () const

  Return the corresponding std::vector of sites.

- const util::set< P > & util_set () const

  Return the corresponding util::set of sites.

10.290.1 Detailed Description

template<typename P> class mln::p_set< P >

Mathematical set of sites (based on util::set). This is a mathematical set of sites (not a multi-set).

The parameter `P` shall be a site or pseudo-site type.

Definition at line 70 of file p_set.hh.

10.290.2 Member Typedef Documentation

10.290.2.1 template<typename P> typedef p_indexed_bkd_piter<self_> mln::p_set< P >::bkd_piter

Backward Site_Iterator associated type.

Definition at line 85 of file p_set.hh.

10.290.2.2 template<typename P> typedef P mln::p_set< P >::element

Element associated type.

Definition at line 76 of file p_set.hh.

10.290.2.3 template<typename P> typedef p_indexed_fwd_piter<self_> mln::p_set< P >::fwd_piter

Forward Site_Iterator associated type.

Definition at line 82 of file p_set.hh.

10.290.2.4 template<typename P> typedef P mln::p_set< P >::i_element

Insertion element associated type.

Definition at line 113 of file p_set.hh.

10.290.2.5 template<typename P> typedef fwd_piter mln::p_set< P >::piter

Site_Iterator associated type.

Definition at line 88 of file p_set.hh.

10.290.2.6 template<typename P> typedef p_indexed_psite<self_> mln::p_set< P >::psite

Psite associated type.

Definition at line 79 of file p_set.hh.

10.290.2.7 template<typename P> typedef P mln::p_set< P >::r_element

Removal element associated type.

Definition at line 119 of file p_set.hh.

10.290.3 Constructor & Destructor Documentation

10.290.3.1 template<typename P > mln::p_set< P >::p_set ( ) [inline]

Constructor.

Definition at line 152 of file p_set.hh.

10.290.4 Member Function Documentation

10.290.4.1 template<typename P > void mln::p_set< P >::clear ( ) [inline]

Clear this set.

Definition at line 219 of file p_set.hh.

10.290.4.2 template<typename P > bool mln::p_set< P >::has (const psite & *p*) const [inline]

Test if psite `p` belongs to this point set.

Definition at line 167 of file p_set.hh.

10.290.4.3 template<typename P > bool mln::p_set< P >::has (const P & *p*) const [inline]

Test if `p` belongs to this point set.

Definition at line 159 of file p_set.hh.

10.290.4.4 template<typename P > bool mln::p_set< P >::has (const util::index & *i*) const [inline]

Test if index `i` belongs to this point set.

Definition at line 179 of file p_set.hh.

References mln::p_set< P >::nsites().

10.290.4.5 template<typename P > void mln::p_set< P >::insert (const P & *p*) [inline]

Insert a site p.

Definition at line 203 of file p_set.hh.

Referenced by mln::convert::to_p_set().

10.290.4.6 template<typename P > bool mln::p_set< P >::is_valid ( ) const [inline]

Test this set validity so returns always true.

Definition at line 187 of file p_set.hh.

10.290.4.7 template<typename P > std::size_t mln::p_set< P >::memory_size ( ) const [inline]

Return the size of this site set in memory.

Definition at line 236 of file p_set.hh.

10.290.4.8 template<typename P > unsigned mln::p_set< P >::nsites ( ) const [inline]

Give the number of sites.

Definition at line 195 of file p_set.hh.

Referenced by mln::p_key< K, P >::change_key(), mln::p_set< P >::has(), mln::p_set< P >::operator[ ](), and mln::p_key< K, P >::remove_key().

10.290.4.9 template<typename P > const P & mln::p_set< P >::operator[ ] (unsigned *i*) const [inline]

Return the i-th site.

Definition at line 227 of file p_set.hh.

References mln::p_set< P >::nsites().

10.290.4.10 template<typename P > void mln::p_set< P >::remove (const P & *p*) [inline]

Remove a site p.

Definition at line 211 of file p_set.hh.

10.290.4.11 template<typename P > const std::vector< P > & mln::p_set< P >::std_vector ( ) const [inline]

Return the corresponding std::vector of sites.

Definition at line 244 of file p_set.hh.

10.290.4.12 template<typename P > const util::set< P > & mln::p_set< P >::util_set ( ) const [inline]

Return the corresponding util::set of sites.

Definition at line 252 of file p_set.hh.

10.291 mln::p_set_of< S > Class Template Reference

p_set_of is a set of site sets.

`#include <p_set_of.hh>`

Inherits site_set_base_< S::site, p_set_of< S > >, and site_set_impl< S >.

Public Types

- typedef p_double_piter< self_, mln_bkd_eiter(set_), typename S::bkd_piter > bkd_piter

  Backward Site_Iterator associated type.

- typedef S element

  Element associated type.

- typedef p_double_piter< self_, mln_fwd_eiter(set_), typename S::fwd_piter > fwd_piter

  Forward Site_Iterator associated type.

- typedef S i_element

  Insertion element associated type.

- typedef fwd_piter piter

  Site_Iterator associated type.

- typedef p_double_psite< self_, element > psite

  Psite associated type.

Public Member Functions

- void clear ()

  Clear this set.

- bool has (const psite &p) const

  Test if `p` *belongs to this point set.*

- void insert (const S &s)

  Insert a site set `s`*.*

- bool is_valid () const

  Test if this set of runs is valid.

- std::size_t memory_size () const

  Return the size of this site set in memory.

- unsigned nelements () const

  Give the number of elements (site sets) of this composite.

- const S & operator[ ] (unsigned i) const

  Return the `i-th` *site set.*

- p_set_of ()

  Constructor without arguments.

10.291.1 Detailed Description

template< typename S> class mln::p_set_of< S >

p_set_of is a set of site sets. Parameter `S` is the type of the contained site sets.

Definition at line 71 of file p_set_of.hh.

10.291.2 Member Typedef Documentation

10.291.2.1 template< typename S > typedef p_double_piter< self_, mln_bkd_eiter(set_), typename S ::bkd_piter> mln::p_set_of< S >::bkd_piter

Backward Site_Iterator associated type.

Definition at line 95 of file p_set_of.hh.

10.291.2.2 template< typename S > typedef S mln::p_set_of< S >::element

Element associated type.

Definition at line 81 of file p_set_of.hh.

10.291.2.3 template< typename S > typedef p_double_piter< self_, mln_fwd_eiter(set_), typename S ::fwd_piter> mln::p_set_of< S >::fwd_piter

Forward Site_Iterator associated type.

Definition at line 90 of file p_set_of.hh.

10.291.2.4 template< typename S > typedef S mln::p_set_of< S >::i_element

Insertion element associated type.

Definition at line 113 of file p_set_of.hh.

10.291.2.5 template<typename S > typedef fwd_piter mln::p_set_of< S >::piter

Site_Iterator associated type.

Definition at line 98 of file p_set_of.hh.

10.291.2.6 template<typename S > typedef p_double_psite<self_, element> mln::p_set_of< S >::psite

Psite associated type.

Definition at line 85 of file p_set_of.hh.

10.291.3 Constructor & Destructor Documentation

10.291.3.1 template<typename S > mln::p_set_of< S >::p_set_of ( ) [inline]

Constructor without arguments.

Definition at line 160 of file p_set_of.hh.

10.291.4 Member Function Documentation

10.291.4.1 template<typename S > void mln::p_set_of< S >::clear ( ) [inline]

Clear this set.

Definition at line 211 of file p_set_of.hh.

10.291.4.2 template<typename S > bool mln::p_set_of< S >::has (const psite & *p*) const [inline]

Test if p belongs to this point set.

Definition at line 167 of file p_set_of.hh.

10.291.4.3 template<typename S > void mln::p_set_of< S >::insert (const S & *s*) [inline]

Insert a site set s.

Definition at line 183 of file p_set_of.hh.

10.291.4.4 template<typename S > bool mln::p_set_of< S >::is_valid ( ) const [inline]

Test if this set of runs is valid.

Definition at line 175 of file p_set_of.hh.

10.291.4.5 template<typename S > std::size_t mln::p_set_of< S >::memory_size ( ) const [inline]

Return the size of this site set in memory.

Definition at line 220 of file p_set_of.hh.

10.291.4.6 template< typename S > unsigned mln::p_set_of< S >::nelements ( ) const [inline]

Give the number of elements (site sets) of this composite.

Definition at line 203 of file p_set_of.hh.

10.291.4.7 template< typename S > const S & mln::p_set_of< S >::operator[] (unsigned *i*) const [inline]

Return the `i-th` site set.

Definition at line 194 of file p_set_of.hh.

10.292 mln::p_transformed< S, F > Class Template Reference

Site set transformed through a function.

`#include <p_transformed.hh>`

Inherits site_set_base_< S::psite, p_transformed< S, F > >.

Public Types

- typedef p_transformed_piter< typename S::bkd_piter, S, F > bkd_piter
  Backward Site_Iterator associated type.
- typedef S::element element
  Element associated type.
- typedef p_transformed_piter< typename S::fwd_piter, S, F > fwd_piter
  Forward Site_Iterator associated type.
- typedef fwd_piter piter
  Site_Iterator associated type.
- typedef S::psite psite
  Psite associated type.

Public Member Functions

- const F & function () const
  Return the transformation function.
- bool has (const psite &p) const
  Test if `p` *belongs to the subset.*

- bool is_valid () const

  Test if this site set is valid.

- std::size_t memory_size () const

  Return the size of this site set in memory.

- p_transformed ()

  Constructor without argument.

- p_transformed (const S &s, const F &f)

  Constructor with a site set `s` and a predicate `f`.

- const S & primary_set () const

  Return the primary set.

10.292.1 Detailed Description

template<typename S, typename F> class mln::p_transformed< S, F >

Site set transformed through a function. Parameter `S` is a site set type; parameter F is a function from site to site.

Definition at line 82 of file p_transformed.hh.

10.292.2 Member Typedef Documentation

10.292.2.1 template<typename S, typename F> typedef p_transformed_piter<typename S ::bkd_piter, S, F> mln::p_transformed< S, F >::bkd_piter

Backward Site_Iterator associated type.

Definition at line 101 of file p_transformed.hh.

10.292.2.2 template<typename S, typename F> typedef S ::element mln::p_transformed< S, F >::element

Element associated type.

Definition at line 91 of file p_transformed.hh.

10.292.2.3 template<typename S, typename F> typedef p_transformed_piter<typename S ::fwd_piter, S, F> mln::p_transformed< S, F >::fwd_piter

Forward Site_Iterator associated type.

Definition at line 98 of file p_transformed.hh.

10.292.2.4 template<typename S, typename F> typedef fwd_piter mln::p_transformed< S, F >::piter

Site_Iterator associated type.

Definition at line 104 of file p_transformed.hh.

10.292.2.5 template<typename S, typename F> typedef S ::psite mln::p_transformed< S, F >::psite

Psite associated type.

Definition at line 95 of file p_transformed.hh.

10.292.3 Constructor & Destructor Documentation

10.292.3.1 template<typename S , typename F > mln::p_transformed< S, F >::p_transformed (const S & *s*, const F & *f*) [inline]

Constructor with a site set `s` and a predicate `f`.

Definition at line 163 of file p_transformed.hh.

10.292.3.2 template<typename S , typename F > mln::p_transformed< S, F >::p_transformed ( ) [inline]

Constructor without argument.

Definition at line 157 of file p_transformed.hh.

10.292.4 Member Function Documentation

10.292.4.1 template<typename S , typename F > const F & mln::p_transformed< S, F >::function ( ) const [inline]

Return the transformation function.

Definition at line 206 of file p_transformed.hh.

10.292.4.2 template<typename S , typename F > bool mln::p_transformed< S, F >::has (const psite & *p*) const [inline]

Test if `p` belongs to the subset.

Definition at line 172 of file p_transformed.hh.

10.292.4.3 template<typename S , typename F > bool mln::p_transformed< S, F >::is_valid ( ) const [inline]

Test if this site set is valid.

Definition at line 182 of file p_transformed.hh.

10.292.4.4 template<typename S , typename F > std::size_t mln::p_transformed< S, F >::memory_size ( ) const [inline]

Return the size of this site set in memory.

Definition at line 190 of file p_transformed.hh.

10.292.4.5 template<typename S , typename F > const S & mln::p_transformed< S, F >::primary_set ( ) const [inline]

Return the primary set.

Definition at line 198 of file p_transformed.hh.

Referenced by mln::p_transformed_piter< Pi, S, F >::change_target().

10.293 mln::p_transformed_piter< Pi, S, F > Struct Template Reference

Iterator on p_transformed<S,F>.

`#include <p_transformed_piter.hh>`

Inherits mln::internal::site_set_iterator_base< p_transformed< S, F >,p_transformed_piter< Pi, S, F > >.

Public Member Functions

- void change_target (const p_transformed< S, F > &s)
  Change the set site targeted by this iterator.
- void next ()
  Go to the next element.
- p_transformed_piter (const p_transformed< S, F > &s)
  Constructor from a site set.
- p_transformed_piter ()
  Constructor without argument.

10.293.1 Detailed Description

template<typename Pi, typename S, typename F> struct mln::p_transformed_piter< Pi, S, F >

Iterator on p_transformed<S,F>. Parameter `S` is a site set type; parameter F is a function from point to Boolean.

See also

mln::p_transformed

Definition at line 50 of file p_transformed_piter.hh.

10.293.2 Constructor & Destructor Documentation

10.293.2.1 template<typename Pi , typename S , typename F > mln::p_transformed_piter< Pi, S, F >::p_transformed_piter ( ) [inline]

Constructor without argument.

Definition at line 93 of file p_transformed_piter.hh.

10.293.2.2 template<typename Pi , typename S , typename F > mln::p_transformed_piter< Pi, S, F >::p_transformed_piter (const p_transformed< S, F > & *s*) [inline]

Constructor from a site set.

Definition at line 99 of file p_transformed_piter.hh.

References mln::p_transformed_piter< Pi, S, F >::change_target().

10.293.3 Member Function Documentation

10.293.3.1 template<typename Pi , typename S , typename F > void mln::p_transformed_piter< Pi, S, F >::change_target (const p_transformed< S, F > & *s*) [inline]

Change the set site targeted by this iterator.

Definition at line 143 of file p_transformed_piter.hh.

References mln::p_transformed< S, F >::primary_set().

Referenced by mln::p_transformed_piter< Pi, S, F >::p_transformed_piter().

10.293.3.2 template<typename E > void mln::Site_Iterator< E >::next ( ) [inline, inherited]

Go to the next element.

Warning

This is a final method; iterator classes should not re-defined this method. The actual "next" operation has to be defined through the *next_* method.

Precondition

The iterator is valid.

Definition at line 92 of file site_iterator.hh.

10.294 mln::p_vaccess< V, S > Class Template Reference

Site set in which sites are grouped by their associated value.

`#include <p_vaccess.hh>`

Inherits site_set_base_< S::site, p_vaccess< V, S > >, and site_set_impl< S >.

Public Types

- typedef p_double_piter< self_, typename vset::bkd_viter, typename S::bkd_piter > bkd_piter

  Backward Site_Iterator associated type.

- typedef S::element element

  Element associated type.

- typedef p_double_piter< self_, typename vset::fwd_viter, typename S::fwd_piter > fwd_piter

  Forward Site_Iterator associated type.

- typedef std::pair< V, element > i_element

  Insertion element associated type.

- typedef fwd_piter piter

  Site_Iterator associated type.

- typedef S pset

  Inner site set associated type.

- typedef p_double_psite< self_, S > psite

  Psite associated type.

- typedef V value

  Value associated type.

- typedef mln::value::set< V > vset

  Value_Set associated type.

Public Member Functions

- bool has (const psite &p) const

  Test if p belongs to this site set.

- bool has (const V &v, const typename S::psite &p) const

  Test if the couple (value v, psite p) belongs to this site set.

- void insert (const i_element &v_e)

  Insert a pair v_e (value v, element e).

- void insert (const V &v, const element &e)

  Insert e at value v.

- bool is_valid () const

  Test if this site set is valid.

- std::size_t memory_size () const

  Return the size of this site set in memory.

- const S & operator() (const V &v) const

  Return the site set at value v.

- p_vaccess ()

  Constructor.

- const mln::value::set< V > & values () const

  Give the set of values.

10.294.1 Detailed Description

template<typename V, typename S> class mln::p_vaccess< V, S >

Site set in which sites are grouped by their associated value.

Definition at line 70 of file p_vaccess.hh.

10.294.2 Member Typedef Documentation

10.294.2.1 template<typename V , typename S > typedef p_double_piter<self_, typename vset ::bkd_viter, typename S ::bkd_piter> mln::p_vaccess< V, S >::bkd_piter

Backward Site_Iterator associated type.

Definition at line 94 of file p_vaccess.hh.

10.294.2.2 template<typename V , typename S > typedef S ::element mln::p_vaccess< V, S >::element

Element associated type.

Definition at line 117 of file p_vaccess.hh.

10.294.2.3 template<typename V , typename S > typedef p_double_piter<self_, typename vset ::fwd_viter, typename S ::fwd_piter> mln::p_vaccess< V, S >::fwd_piter

Forward Site_Iterator associated type.

Definition at line 91 of file p_vaccess.hh.

10.294.2.4 template<typename V , typename S > typedef std::pair<V, element> mln::p_vaccess< V, S >::i_element

Insertion element associated type.

Definition at line 120 of file p_vaccess.hh.

10.294.2.5 template<typename V , typename S > typedef fwd_piter mln::p_vaccess< V, S >::piter

Site_Iterator associated type.

Definition at line 97 of file p_vaccess.hh.

10.294.2.6 template<typename V , typename S > typedef S mln::p_vaccess< V, S >::pset

Inner site set associated type.

Definition at line 85 of file p_vaccess.hh.

10.294.2.7 template<typename V , typename S > typedef p_double_psite<self_, S> mln::p_vaccess< V, S >::psite

Psite associated type.

Definition at line 88 of file p_vaccess.hh.

10.294.2.8 template<typename V , typename S > typedef V mln::p_vaccess< V, S >::value

Value associated type.

Definition at line 78 of file p_vaccess.hh.

10.294.2.9 template<typename V , typename S > typedef mln::value::set<V> mln::p_vaccess< V, S >::vset

Value_Set associated type.

Definition at line 81 of file p_vaccess.hh.

10.294.3 Constructor & Destructor Documentation

10.294.3.1 template<typename V , typename S > mln::p_vaccess< V, S >::p_vaccess ( ) `[inline]`

Constructor.

Definition at line 163 of file p_vaccess.hh.

10.294.4 Member Function Documentation

10.294.4.1 template<typename V , typename S > bool mln::p_vaccess< V, S >::has (const V & *v*, const typename S::psite & *p*) const `[inline]`

Test if the couple (value `v`, psite `p`) belongs to this site set.

Definition at line 189 of file p_vaccess.hh.

10.294.4.2 template<typename V , typename S > bool mln::p_vaccess< V, S >::has (const psite & *p*) const `[inline]`

Test if `p` belongs to this site set.

Definition at line 180 of file p_vaccess.hh.

10.294.4.3 template<typename V , typename S > void mln::p_vaccess< V, S >::insert (const i_element & *v_e*) [inline]

Insert a pair `v_e` (value v, element e).

Definition at line 216 of file p_vaccess.hh.

10.294.4.4 template<typename V , typename S > void mln::p_vaccess< V, S >::insert (const V & *v*, const element & *e*) [inline]

Insert `e` at value `v`.

Definition at line 206 of file p_vaccess.hh.

10.294.4.5 template<typename V , typename S > bool mln::p_vaccess< V, S >::is_valid ( ) const [inline]

Test if this site set is valid.

Definition at line 197 of file p_vaccess.hh.

10.294.4.6 template<typename V , typename S > std::size_t mln::p_vaccess< V, S >::memory_size ( ) const [inline]

Return the size of this site set in memory.

Definition at line 242 of file p_vaccess.hh.

10.294.4.7 template<typename V , typename S > const S & mln::p_vaccess< V, S >::operator() (const V & *v*) const [inline]

Return the site set at value `v`.

Definition at line 234 of file p_vaccess.hh.

10.294.4.8 template<typename V , typename S > const mln::value::set< V > & mln::p_vaccess< V, S >::values ( ) const [inline]

Give the set of values.

Definition at line 254 of file p_vaccess.hh.

10.295 mln::p_vertices< G, F > Class Template Reference

Site set based mapping graph vertices to sites.

`#include <p_vertices.hh>`

Inherits site_set_base_< F::result, p_vertices< G, F > >.

Public Types

- typedef F fun_t

    Function associated type.

- typedef util::vertex< G > graph_element

    Type of graph element this site set focuses on.

- typedef G graph_t

    Graph associated type.

- typedef util::vertex< G > vertex

    Type of graph vertex.

    - typedef super_::site element

        Associated types.

    - typedef p_vertices_psite< G, F > psite

        Point_Site associated type.

    - typedef p_graph_piter< self_, mln_vertex_fwd_iter(G) > fwd_piter

        Forward Site_Iterator associated type.

    - typedef p_graph_piter< self_, mln_vertex_bkd_iter(G) > bkd_piter

        Backward Site_Iterator associated type.

    - typedef fwd_piter piter

        Site_Iterator associated type.

Public Member Functions

- bool has (const psite &p) const

    Does this site set has p?

- template<typename G2 >
  bool has (const util::vertex< G2 > &v) const

    Does this site set has v?

- void invalidate ()

    Invalidate this site set.

- bool is_valid () const

    Test this site set validity.

- std::size_t memory_size () const

    Does this site set has vertex_id? FIXME: causes ambiguities while calling has(mln::neighb_fwd_niter<>); bool has(unsigned vertex_id) const;.

- unsigned nsites () const

Return The number of points (sites) of the set, i.e., the number of vertices.

- unsigned nvertices () const

  Return The number of vertices in the graph.

- p_vertices (const Graph< G > &gr)

  Construct a graph psite set from a graph of points.

- p_vertices (const Graph< G > &gr, const Function< F > &f)

  Construct a graph psite set from a graph of points.

- template<typename F2 >
  p_vertices (const p_vertices< G, F2 > &other)

  Copy constructor.

- p_vertices ()

  Constructor without argument.

- template<typename F2 >
  p_vertices (const Graph< G > &gr, const Function< F2 > &f)

  Construct a graph psite set from a graph of points.

  - F::result operator() (const psite &p) const

    Return the value associated to an element of this site set.

  - const G & graph () const

    Accessors.

  - const F & function () const

    Return the association function.

10.295.1 Detailed Description

template<typename G, typename F = util::internal::id2element<G,util::vertex<G> >> class mln::p_vertices< G, F >

Site set based mapping graph vertices to sites.

Definition at line 71 of file p_vertices.hh.

10.295.2 Member Typedef Documentation

10.295.2.1 template<typename G, typename F = util::internal::id2element<G,util::vertex<G> >> typedef p_graph_piter< self_, mln_vertex_bkd_iter(G) > mln::p_vertices< G, F >::bkd_piter

Backward Site_Iterator associated type.

Definition at line 132 of file p_vertices.hh.

10.295.2.2 template<typename G, typename F = util::internal::id2element<G,util::vertex<G> >> typedef super_ ::site mln::p_vertices< G, F >::element

Associated types.

Element associated type.

Definition at line 123 of file p_vertices.hh.

10.295.2.3 template<typename G, typename F = util::internal::id2element<G,util::vertex<G> >> typedef F mln::p_vertices< G, F >::fun_t

Function associated type.

Definition at line 84 of file p_vertices.hh.

10.295.2.4 template<typename G, typename F = util::internal::id2element<G,util::vertex<G> >> typedef p_graph_piter< self_, mln_vertex_fwd_iter(G) > mln::p_vertices< G, F >::fwd_piter

Forward Site_Iterator associated type.

Definition at line 129 of file p_vertices.hh.

10.295.2.5 template<typename G, typename F = util::internal::id2element<G,util::vertex<G> >> typedef util::vertex<G> mln::p_vertices< G, F >::graph_element

Type of graph element this site set focuses on.

Definition at line 91 of file p_vertices.hh.

10.295.2.6 template<typename G, typename F = util::internal::id2element<G,util::vertex<G> >> typedef G mln::p_vertices< G, F >::graph_t

Graph associated type.

Definition at line 81 of file p_vertices.hh.

10.295.2.7 template<typename G, typename F = util::internal::id2element<G,util::vertex<G> >> typedef fwd_piter mln::p_vertices< G, F >::piter

Site_Iterator associated type.

Definition at line 135 of file p_vertices.hh.

10.295.2.8 template<typename G, typename F = util::internal::id2element<G,util::vertex<G> >> typedef p_vertices_psite<G,F> mln::p_vertices< G, F >::psite

Point_Site associated type.

Definition at line 126 of file p_vertices.hh.

10.295.2.9 template<typename G, typename F = util::internal::id2element<G,util::vertex<G> >> typedef util::vertex<G> mln::p_vertices< G, F >::vertex

Type of graph vertex.

Definition at line 87 of file p_vertices.hh.

10.295.3 Constructor & Destructor Documentation

10.295.3.1 template<typename G , typename F > mln::p_vertices< G, F >::p_vertices ( ) [inline]

Constructor without argument.

Definition at line 220 of file p_vertices.hh.

10.295.3.2 template<typename G , typename F > mln::p_vertices< G, F >::p_vertices (const Graph< G > & *gr*) [inline]

Construct a graph psite set from a graph of points.

Parameters

gr The graph upon which the graph psite set is built. The identity function is used.

Definition at line 226 of file p_vertices.hh.

References mln::p_vertices< G, F >::is_valid().

10.295.3.3 template<typename G , typename F > mln::p_vertices< G, F >::p_vertices (const Graph< G > & *gr*, const Function< F > & *f*) [inline]

Construct a graph psite set from a graph of points.

Parameters

gr The graph upon which the graph psite set is built.
f the function which maps a vertex to a site.

Definition at line 238 of file p_vertices.hh.

References mln::p_vertices< G, F >::is_valid().

10.295.3.4 template<typename G , typename F > template<typename F2 > mln::p_vertices< G, F >::p_vertices (const Graph< G > & *gr*, const Function< F2 > & *f*) [inline]

Construct a graph psite set from a graph of points.

Parameters

gr The graph upon which the graph psite set is built.
f the function which maps a vertex to a site. It must be convertible to the function type `F`.

Definition at line 248 of file p_vertices.hh.

References mln::p_vertices< G, F >::is_valid().

10.295.3.5 template<typename G , typename F > template<typename F2 > mln::p_vertices< G, F >::p_vertices (const p_vertices< G, F2 > & *other*) [inline]

Copy constructor.

Definition at line 260 of file p_vertices.hh.

References mln::p_vertices< G, F >::function(), mln::p_vertices< G, F >::graph(), and mln::p_vertices< G, F >::is_valid().

10.295.4 Member Function Documentation

10.295.4.1 template<typename G , typename F > const F & mln::p_vertices< G, F >::function ( ) const [inline]

Return the association function.

Definition at line 385 of file p_vertices.hh.

Referenced by mln::p_vertices< G, F >::p_vertices().

10.295.4.2 template<typename G , typename F > const G & mln::p_vertices< G, F >::graph ( ) const [inline]

Accessors.

Return the graph associated to this site set (const version)

Definition at line 376 of file p_vertices.hh.

References mln::p_vertices< G, F >::is_valid().

Referenced by mln::debug::draw_graph(), mln::operator==(), and mln::p_vertices< G, F >::p_vertices().

10.295.4.3 template<typename G , typename F > bool mln::p_vertices< G, F >::has (const psite & *p*) const [inline]

Does this site set has *p*?

Definition at line 304 of file p_vertices.hh.

References mln::p_vertices< G, F >::is_valid().

10.295.4.4 template<typename G , typename F > template<typename G2 > bool mln::p_vertices< G, F >::has (const util::vertex< G2 > & *v*) const [inline]

Does this site set has *v*?

Definition at line 314 of file p_vertices.hh.

References mln::util::vertex< G >::graph(), mln::util::vertex< G >::is_valid(), and mln::p_vertices< G, F >::is_valid().

10.295.4.5 template<typename G , typename F > void mln::p_vertices< G, F >::invalidate ( ) [inline]

Invalidate this site set.

Definition at line 296 of file p_vertices.hh.

10.295.4.6 template<typename G , typename F > bool mln::p_vertices< G, F >::is_valid ( ) const [inline]

Test this site set validity.

Definition at line 288 of file p_vertices.hh.

Referenced by mln::p_vertices< G, F >::graph(), mln::p_vertices< G, F >::has(), and mln::p_vertices< G, F >::p_vertices().

10.295.4.7 template<typename G , typename F > std::size_t mln::p_vertices< G, F >::memory_size ( ) const [inline]

Does this site set has *vertex_id*? FIXME: causes ambiguities while calling has(mln::neighb_fwd_niter<>); bool has(unsigned vertex_id) const;.

Definition at line 339 of file p_vertices.hh.

10.295.4.8 template<typename G , typename F > unsigned mln::p_vertices< G, F >::nsites ( ) const [inline]

Return The number of points (sites) of the set, i.e., the number of *vertices*.

Required by the mln::Point_Set concept.

Definition at line 272 of file p_vertices.hh.

References mln::p_vertices< G, F >::nvertices().

10.295.4.9 template<typename G , typename F > unsigned mln::p_vertices< G, F >::nvertices ( ) const [inline]

Return The number of vertices in the graph.

Definition at line 280 of file p_vertices.hh.

Referenced by mln::p_vertices< G, F >::nsites().

10.295.4.10 template<typename G , typename F > F::result mln::p_vertices< G, F >::operator() (const psite & *p*) const [inline]

Return the value associated to an element of this site set.

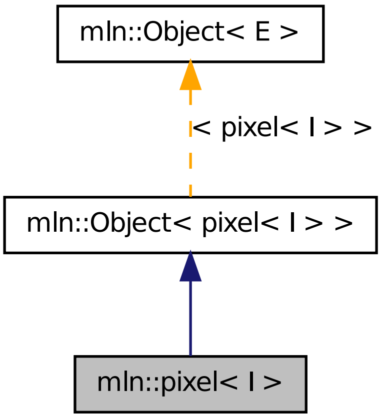
Definition at line 349 of file p_vertices.hh.

10.296 mln::pixel< I > Struct Template Reference

Generic pixel class.

`#include <pixel.hh>`

Inheritance diagram for mln::pixel< I >:



Public Member Functions

- void change_to (const typename I::psite &p)

  Change the pixel to the one at point p.

- bool is_valid () const

  Test if this pixel is valid.

- pixel (I &image)

  Constructor.

- pixel (I &image, const typename I::psite &p)

  Constructor.

10.296.1 Detailed Description

template<typename I> struct mln::pixel< I >

Generic pixel class. The parameter is `I` the type of the image it belongs to.

Definition at line 50 of file core/pixel.hh.

10.296.2 Constructor & Destructor Documentation

10.296.2.1 template< typename I > mln::pixel< I >::pixel (I & *image*) [inline]

Constructor.

Definition at line 75 of file core/pixel.hh.

10.296.2.2 template< typename I > mln::pixel< I >::pixel (I & *image*, const typename I::psite & *p*) [inline]

Constructor.

Definition at line 82 of file core/pixel.hh.

References mln::pixel< I >::change_to().

10.296.3 Member Function Documentation

10.296.3.1 template< typename I > void mln::pixel< I >::change_to (const typename I::psite & *p*) [inline]

Change the pixel to the one at point `p`.

Definition at line 92 of file core/pixel.hh.

Referenced by mln::pixel< I >::pixel().

10.296.3.2 template< typename I > bool mln::pixel< I >::is_valid ( ) const [inline]

Test if this pixel is valid.

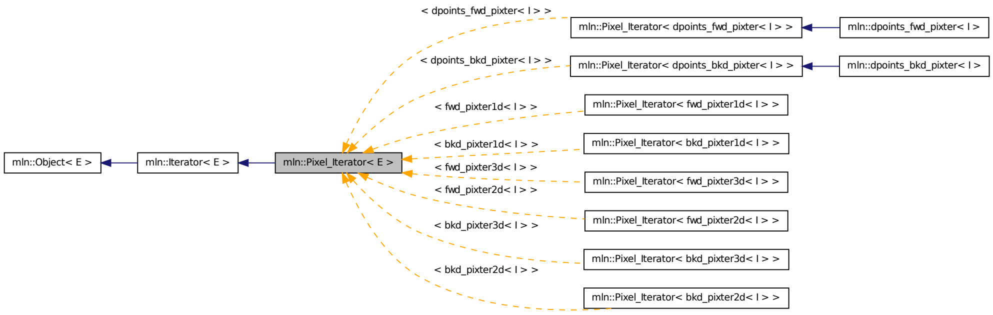
Definition at line 101 of file core/pixel.hh.

10.297 mln::Pixel_Iterator< E > Struct Template Reference

Base class for the implementation of pixel iterator classes.

`#include <pixel_iterator.hh>`

Inheritance diagram for mln::Pixel_Iterator< E >:



Public Member Functions

- void next ()

  Go to the next element.

10.297.1 Detailed Description

template<typename E> struct mln::Pixel_Iterator< E >

Base class for the implementation of pixel iterator classes. An iterator on pixels is an iterator that is bound to a particular image and that browses over a set of image pixels.

See also

mln::doc::Pixel_Iterator for a complete documentation of this class contents.

Definition at line 51 of file pixel_iterator.hh.

10.297.2 Member Function Documentation

10.297.2.1 template<typename E > void mln::Iterator< E >::next ( ) `[inherited]`

Go to the next element.

Warning

This is a final method; iterator classes should not re-defined this method. The actual "next" operation has to be defined through the *next_* method.

Precondition

The iterator is valid.

Definition at line 102 of file iterator.hh.

10.298 mln::plain< I > Class Template Reference

Prevents an image from sharing its data.

`#include <plain.hh>`

Inherits image_identity< I, I::domain_t, plain< I > >.

Public Types

- typedef plain< tag::image_< I > > skeleton

  Skeleton.

Public Member Functions

- operator I () const

  Conversion into an image with type `I`.

- plain< I > & operator= (const I &ima)

  Assignment operator from an image `ima`.

- plain< I > & operator= (const plain< I > &rhs)

  Assignment operator.

- plain (const plain< I > &rhs)

  Copy constructor.

- plain ()

  Constructor without argument.

- plain (const I &ima)

  Copy constructor from an image `ima`.

10.298.1 Detailed Description

template<typename I> class mln::plain< I >

Prevents an image from sharing its data. While assigned to another image, its data is duplicated.

Definition at line 82 of file plain.hh.

10.298.2 Member Typedef Documentation

10.298.2.1 template<typename I> typedef plain< tag::image_<I> > mln::plain< I >::skeleton

Skeleton.

Definition at line 93 of file plain.hh.

10.298.3 Constructor & Destructor Documentation

10.298.3.1 template<typename I > mln::plain< I >::plain ( ) [inline]

Constructor without argument.

Definition at line 141 of file plain.hh.

10.298.3.2 template<typename I > mln::plain< I >::plain (const plain< I > & *rhs*) [inline]

Copy constructor.

Definition at line 147 of file plain.hh.

10.298.3.3 template<typename I > mln::plain< I >::plain (const I & *ima*) [inline]

Copy constructor from an image `ima`.

Definition at line 156 of file plain.hh.

10.298.4 Member Function Documentation

10.298.4.1 template<typename I > mln::plain< I >::operator I ( ) const [inline]

Conversion into an image with type `I`.

Definition at line 197 of file plain.hh.

References mln::duplicate().

10.298.4.2 template<typename I > plain< I > & mln::plain< I >::operator= (const plain< I > & *rhs*) [inline]

Assignment operator.

Definition at line 174 of file plain.hh.

10.298.4.3 template<typename I > plain< I > & mln::plain< I >::operator= (const I & *ima*) [inline]

Assignment operator from an image `ima`.

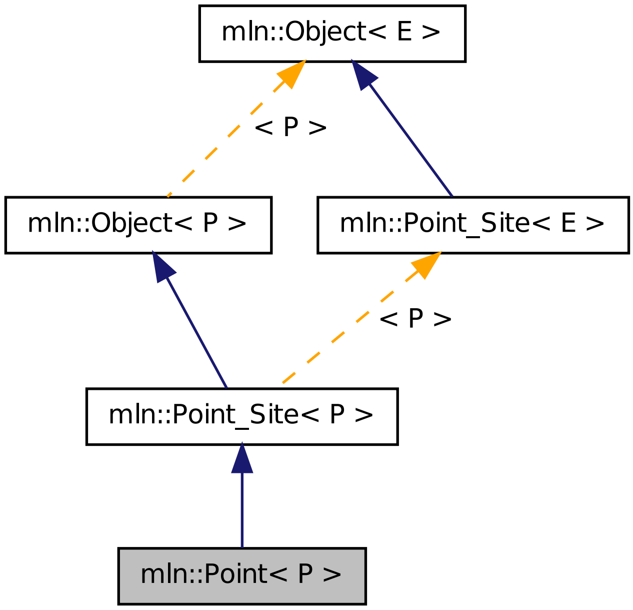
Definition at line 187 of file plain.hh.

10.299 mln::Point< P > Struct Template Reference

Base class for implementation of point classes.

`#include <point.hh>`

Inheritance diagram for mln::Point< P >:



Public Types

- typedef P point

  The associated point type is itself.

Public Member Functions

- const P & to_point () const

  It is a Point so it returns itself.

Related Functions

(Note that these are not member functions.)

- template<typename P , typename D >
  P & operator+= (Point< P > &p, const Dpoint< D > &dp)

  Shift a point `by` *a delta-point* `dp`.

- template<typename P , typename D >
  P & operator-= (Point< P > &p, const Dpoint< D > &dp)

  Shift a point by the negate of a delta-point dp.

- template<typename P , typename D >
  P & operator/ (Point< P > &p, const value::Scalar< D > &dp)

  Divise a point by a scalar s.

10.299.1 Detailed Description

template<typename P> struct mln::Point< P >

Base class for implementation of point classes. A point is an element of a space.

For instance, mln::point2d is the type of elements defined on the discrete square grid of the 2D plane.

Definition at line 62 of file concept/point.hh.

10.299.2 Member Typedef Documentation

10.299.2.1 template<typename P > typedef P mln::Point< P >::point

The associated point type is itself.

Definition at line 66 of file concept/point.hh.

10.299.3 Member Function Documentation

10.299.3.1 template<typename P > const P & mln::Point< P >::to_point ( ) const [inline]

It is a Point so it returns itself.

Definition at line 130 of file concept/point.hh.

10.299.4 Friends And Related Function Documentation

10.299.4.1 template<typename P , typename D > P & operator+= (Point< P > & *p*, const Dpoint< D > & *dp*) [related]

Shift a point by a delta-point dp.

Parameters

[in,out] ***p*** The targeted point.

[in] ***dp*** A delta-point.

Returns

A reference to the point p once translated by dp.

Precondition

The type of `dp` has to be compatible with the type of `p`.

Definition at line 137 of file concept/point.hh.

10.299.4.2 template<typename P , typename D > P & operator-= (Point< P > & *p*, const Dpoint< D > & *dp*) `[related]`

Shift a point `by` the negate of a delta-point `dp`.

Parameters

`[in,out]` ***p*** The targeted point.

`[in]` ***dp*** A delta-point.

Returns

A reference to the point `p` once translated by - `dp`.

Precondition

The type of `dp` has to be compatible with the type of `p`.

Definition at line 149 of file concept/point.hh.

10.299.4.3 template<typename P , typename D > P & operator/ (Point< P > & *p*, const value::Scalar< D > & *dp*) `[related]`

Divise a point `by` a scalar `s`.

Parameters

`[in,out]` ***p*** The targeted point.

`[in]` ***dp*** A scalar.

Returns

A reference to the point `p` once divised by `s`.

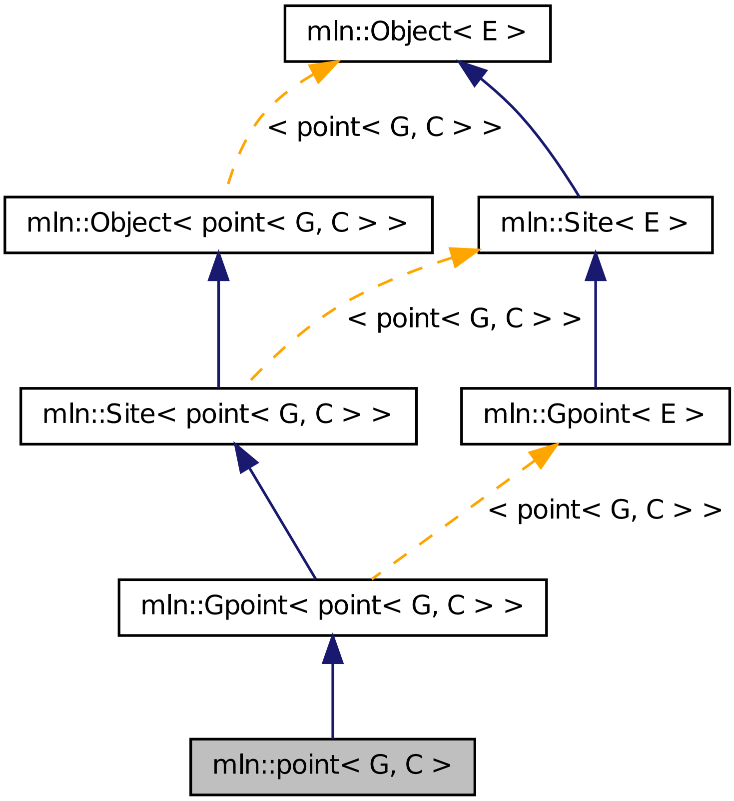
Definition at line 163 of file concept/point.hh.

10.300 mln::point< G, C > Struct Template Reference

Generic point class.

`#include <point.hh>`

Inheritance diagram for mln::point< G, C >:



Public Types

- enum { dim = G::dim }
- typedef C coord

    Coordinate associated type.

- typedef dpoint< G, C > delta

    Delta associated type.

- typedef dpoint< G, C > dpsite

    DPsite associated type.

- typedef G grid

    Grid associated type.

- typedef mln::algebra::h_vec< G::dim, float > h_vec

Algebra hexagonal vector (hvec) associated type.

- typedef mln::algebra::vec< G::dim, float > vec
  Algebra vector (vec) associated type.

Public Member Functions

- const C & last_coord () const
  Read-only access to the last coordinate.
- C & last_coord ()
  Read-write access to the last coordinate.
- point< G, C > & operator+= (const delta &dp)
  Shifting by `dp`*.*
- point< G, C > & operator-= (const delta &dp)
  Shifting by `the` *inverse of dp.*
- C & operator[ ] (unsigned i)
  Read-write access to the `i-th` *coordinate value.*
- const C & operator[ ] (unsigned i) const
  Read-only access to the `i-th` *coordinate value.*
- template<typename F >
  point (const Function_v2v< F > &f)
  Constructor; coordinates are set by function `f`*.*
- point ()
  Constructor without argument.
- template<typename C2 >
  point (const mln::algebra::vec< dim, C2 > &v)
  Constructor from an algebra vector.
- void set_all (C c)
  Set all coordinates to the value `c`*.*
- h_vec to_h_vec () const
  Transform to point in homogene coordinate system.
- vec to_vec () const
  Explicit conversion towards mln::algebra::vec.

  - point (C ind)
  - point (const literal::origin_t &)
    Constructors/assignments with literals.

Static Public Member Functions

- static const point< G, C > & minus_infty ()

  Point with all coordinates set to the mininum value.

- static const point< G, C > & plus_infty ()

  Point with all coordinates set to the maximum value.

Static Public Attributes

- static const point< G, C > origin = all_to(0)

  Origin point (all coordinates are 0).

10.300.1 Detailed Description

template<typename G, typename C> struct mln::point< G, C >

Generic point class. Parameters are `n` the dimension of the space and `C` the coordinate type in this space.

Definition at line 108 of file point.hh.

10.300.2 Member Typedef Documentation

10.300.2.1 template<typename G, typename C> typedef C mln::point< G, C >::coord

Coordinate associated type.

Definition at line 131 of file point.hh.

10.300.2.2 template<typename G, typename C> typedef dpoint<G,C> mln::point< G, C >::delta

Delta associated type.

Definition at line 125 of file point.hh.

10.300.2.3 template<typename G, typename C> typedef dpoint<G,C> mln::point< G, C >::dpsite

DPsite associated type.

Definition at line 128 of file point.hh.

10.300.2.4 template<typename G, typename C> typedef G mln::point< G, C >::grid

Grid associated type.

Definition at line 122 of file point.hh.

10.300.2.5 template<typename G, typename C> typedef mln::algebra::h_vec<G::dim, float> mln::point< G, C >::h_vec

Algebra hexagonal vector (hvec) associated type.

Definition at line 137 of file point.hh.

10.300.2.6 template<typename G, typename C> typedef mln::algebra::vec<G::dim, float> mln::point< G, C >::vec

Algebra vector (vec) associated type.

Definition at line 134 of file point.hh.

10.300.3 Member Enumeration Documentation

10.300.3.1 template<typename G, typename C> anonymous enum

Enumerator:

dim Dimension of the space.

Invariant

dim > 0

Definition at line 119 of file point.hh.

10.300.4 Constructor & Destructor Documentation

10.300.4.1 template<typename G , typename C > mln::point< G, C >::point ( ) `[inline]`

Constructor without argument.

Definition at line 420 of file point.hh.

10.300.4.2 template<typename G , typename C > template<typename C2 > mln::point< G, C >::point (const mln::algebra::vec< dim, C2 > & *v*) `[inline]`

Constructor from an algebra vector.

Definition at line 427 of file point.hh.

10.300.4.3 template<typename G , typename C> mln::point< G, C >::point (C *ind*) `[inline, explicit]`

Constructors with different numbers of arguments (coordinates) w.r.t. the dimension.

Definition at line 443 of file point.hh.

10.300.4.4 template<typename G , typename C> mln::point< G, C >::point (const literal::origin_t &) `[inline]`

Constructors/assignments with literals.

Definition at line 481 of file point.hh.

10.300.4.5 template<typename G , typename C > template<typename F > mln::point< G, C >::point (const Function_v2v< F > & *f*) [inline]

Constructor; coordinates are set by function `f`.

Definition at line 471 of file point.hh.

10.300.5 Member Function Documentation

10.300.5.1 template<typename G , typename C > const C & mln::point< G, C >::last_coord ( ) const [inline]

Read-only access to the last coordinate.

Definition at line 402 of file point.hh.

Referenced by mln::p_run< P >::end(), mln::p_run< P >::operator[ ](), and mln::debug::put_word().

10.300.5.2 template<typename G , typename C > C & mln::point< G, C >::last_coord ( ) [inline]

Read-write access to the last coordinate.

Definition at line 410 of file point.hh.

10.300.5.3 template<typename G , typename C > const point< G, C > & mln::point< G, C >::minus_infty ( ) [inline, static]

Point with all coordinates set to the mininum value.

Definition at line 627 of file point.hh.

10.300.5.4 template<typename G , typename C > point< G, C > & mln::point< G, C >::operator+= (const delta & *dp*) [inline]

Shifting by `dp`.

Definition at line 544 of file point.hh.

10.300.5.5 template<typename G , typename C > point< G, C > & mln::point< G, C >::operator-= (const delta & *dp*) [inline]

Shifting by `the` inverse of dp.

Definition at line 554 of file point.hh.

10.300.5.6 template<typename G , typename C > C & mln::point< G, C >::operator[ ] (unsigned *i*) [inline]

Read-write access to the `i-th` coordinate value.

Parameters

`[in]` ***i*** The coordinate index.

Precondition

`i < dim`

Definition at line 393 of file point.hh.

10.300.5.7 template<typename G , typename C > const C & mln::point< G, C >::operator[] (unsigned *i*) const `[inline]`

Read-only access to the `i-th` coordinate value.

Parameters

`[in]` ***i*** The coordinate index.

Precondition

`i < dim`

Definition at line 385 of file point.hh.

10.300.5.8 template<typename G , typename C > const point< G, C > & mln::point< G, C >::plus_infty ( ) `[inline, static]`

Point with all coordinates set to the maximum value.

Definition at line 618 of file point.hh.

10.300.5.9 template<typename G , typename C> void mln::point< G, C >::set_all (C *c*) `[inline]`

Set all coordinates to the value `c`.

Definition at line 533 of file point.hh.

10.300.5.10 template<typename G , typename C > point< G, C >::h_vec mln::point< G, C >::to_h_vec ( ) const `[inline]`

Transform to point in homogene coordinate system.

Definition at line 592 of file point.hh.

10.300.5.11 template<typename G , typename C > point< G, C >::vec mln::point< G, C >::to_vec ( ) const `[inline]`

Explicit conversion towards mln::algebra::vec.

Definition at line 571 of file point.hh.

10.300.6 Member Data Documentation

10.300.6.1 template<typename G, typename C> const point< G, C > mln::point< G, C >::origin = all_to(0) `[static]`

Origin point (all coordinates are 0).

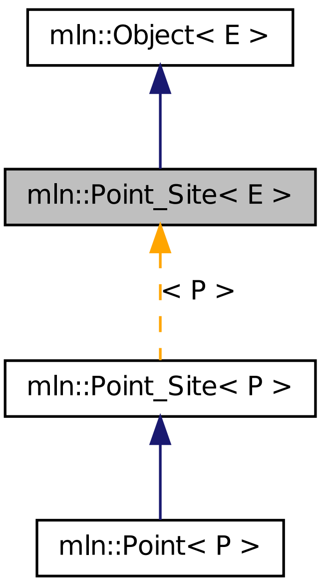
Definition at line 192 of file point.hh.

10.301 mln::Point_Site< E > Struct Template Reference

Base class for implementation classes of the notion of "point site".

`#include <point_site.hh>`

Inheritance diagram for mln::Point_Site< E >:



Related Functions

(Note that these are not member functions.)

- template<typename L , typename R >
  L::dpoint operator- (const Point_Site< L > &lhs, const Point_Site< R > &rhs)

  Difference between a couple of point site `lhs` *and* `rhs`*.*

- template<typename P >
  std::ostream & operator<< (std::ostream &ostr, const Point_Site< P > &p)

  Print a point site `p` *into the output stream* `ostr`.

- template<typename L , typename R >
  bool operator== (const Point_Site< L > &lhs, const Point_Site< R > &rhs)

  Equality comparison between a couple of point site `lhs` *and* `rhs`.

- template<typename P , typename D >
  P::point operator+ (const Point_Site< P > &p, const Delta_Point_Site< D > &dp)

  Add a delta-point `rhs` *to a point site* `lhs`.

- template<typename P , typename D >
  P::point operator- (const Point_Site< P > &p, const Delta_Point_Site< D > &dp)

  }

10.301.1 Detailed Description

template<typename E> struct mln::Point_Site< E >

Base class for implementation classes of the notion of "point site". A point site ("psite" for short) is an object that allows an efficient access to data associated with a point. A point site is either a point or designates a point.

When a point site is not really a point, it is automatically convertible to the point it designates.

Let us take the example of a 2D image encoded as an array of runs of values. With a point, a pair (row index, column index), retrieving the corresponding pixel value would mean to browse the array of runs to find the value location. That would not be efficient. Conversely, a point site dedicated to this image structure allows for value access in contant time; precisely the proper point site is a pair (index of run, index within the run).

Definition at line 106 of file point_site.hh.

10.301.2 Friends And Related Function Documentation

10.301.2.1 template<typename P , typename D > P::point operator+ (const Point_Site< P > & *p*, const Delta_Point_Site< D > & *dp*) `[related]`

Add a delta-point `rhs` to a point site `lhs`.

Parameters

`[in]` ***p*** A point site.

`[in]` ***dp*** A delta-point.

The type of `dp` has to compatible with the type of `p`.

Returns

A point (temporary object).

See also

mln::Delta_Point_Site

Definition at line 282 of file point_site.hh.

10.301.2.2 template<typename P , typename D > P::point operator- (const Point_Site< P > & *p*, const Delta_Point_Site< D > & *dp*) [related]

}

Substract a delta-point `dp` to a point site `p`.

Parameters

`[in]` ***p*** A point site.

`[in]` ***dp*** A delta-point.

The type of `dp` has to compatible with the type of `p`.

Returns

A point (temporary object).

See also

mln::Dpoint
mln::Delta_Point_Site

Definition at line 296 of file point_site.hh.

10.301.2.3 template<typename L , typename R > L::dpoint operator- (const Point_Site< L > & *lhs*, const Point_Site< R > & *rhs*) [related]

Difference between a couple of point site `lhs` and `rhs`.

Parameters

`[in]` ***lhs*** A first point site.

`[in]` ***rhs*** A second point site.

Warning

There is no type promotion in Milena so the client has to make sure that both points are defined with the same type of coordinates.

Precondition

Both `lhs` and `rhs` have to be defined on the same topology and with the same type of coordinates; otherwise this test does not compile.

Postcondition

The result, `dp`, is such as `lhs` == `rhs` + `dp`.

Returns

A delta point (temporary object).

See also

mln::Delta_Point_Site

Definition at line 267 of file point_site.hh.

10.301.2.4 template< typename P > std::ostream & operator<< (std::ostream & *ostr*, const Point_Site< P > & *p*) `[related]`

Print a point site `p` into the output stream `ostr`.

Parameters

`[in,out]` ***ostr*** An output stream.

`[in]` ***p*** A point site.

Returns

The modified output stream `ostr`.

Definition at line 311 of file point_site.hh.

10.301.2.5 template< typename L , typename R > bool operator== (const Point_Site< L > & *lhs*, const Point_Site< R > & *rhs*) `[related]`

Equality comparison between a couple of point site `lhs` and `rhs`.

Parameters

`[in]` ***lhs*** A first point site.

`[in]` ***rhs*** A second point site.

Precondition

Both `lhs` and `rhs` have to be defined on the same topology; otherwise this test does not compile.

Returns

True if both point sites have the same coordinates, otherwise false.

Definition at line 251 of file point_site.hh.

10.302 mln::Point_Site< void > Struct Template Reference

Point site category flag type.

```
#include <point_site.hh>
```

10.302.1 Detailed Description

template<> struct mln::Point_Site< void >

Point site category flag type.

Definition at line 80 of file point_site.hh.

10.303 mln::Proxy< E > Struct Template Reference

Base class for implementation classes of the notion of "proxy".

```
#include <proxy.hh>
```

Inherits mln::Object< E >.

Inherited by mln::Accumulator< E >, mln::internal::graph_iter_base< G, Elt, E >, mln::internal::nbh_iterator_base< G, C, Elt, E >, and mln::Site_Proxy< E >.

10.303.1 Detailed Description

template<typename E> struct mln::Proxy< E >

Base class for implementation classes of the notion of "proxy".

Definition at line 232 of file core/concept/proxy.hh.

10.304 mln::Proxy< void > Struct Template Reference

Proxy category flag type.

```
#include <proxy.hh>
```

10.304.1 Detailed Description

template<> struct mln::Proxy< void >

Proxy category flag type.

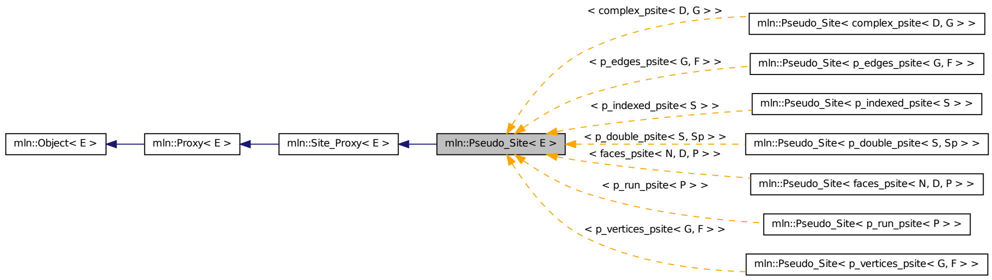
Definition at line 222 of file core/concept/proxy.hh.

10.305 mln::Pseudo_Site< E > Struct Template Reference

Base class for implementation classes of the notion of "pseudo site".

```
#include <pseudo_site.hh>
```

Inheritance diagram for mln::Pseudo_Site< E >:



10.305.1 Detailed Description

template<typename E> struct mln::Pseudo_Site< E >

Base class for implementation classes of the notion of "pseudo site". FIXME: Explain...

Definition at line 64 of file pseudo_site.hh.

10.306 mln::Pseudo_Site< void > Struct Template Reference

Pseudo_Site category flag type.

`#include <pseudo_site.hh>`

10.306.1 Detailed Description

template<> struct mln::Pseudo_Site< void >

Pseudo_Site category flag type.

Definition at line 52 of file pseudo_site.hh.

10.307 mln::pw::image< F, S > Class Template Reference

A generic point-wise image implementation.

`#include <image.hh>`

Inherits image_base< F, S, image< F, S > >.

Public Types

- typedef image< tag::function_< F >, tag::domain_< S > > skeleton

  Skeleton.

Public Member Functions

- image ()

  Constructor without argument.

- image (const Function_v2v< F > &f, const Site_Set< S > &ps)

  Constructor.

10.307.1 Detailed Description

template<typename F, typename S> class mln::pw::image< F, S >

A generic point-wise image implementation. Parameter `F` is a function restricting the domain. Parameter `S` is the domain type.

Definition at line 92 of file pw/image.hh.

10.307.2 Member Typedef Documentation

10.307.2.1 template<typename F, typename S> typedef image< tag::function_<F>, tag::domain_<S> > mln::pw::image< F, S >::skeleton

Skeleton.

Definition at line 99 of file pw/image.hh.

10.307.3 Constructor & Destructor Documentation

10.307.3.1 template<typename F , typename S > mln::pw::image< F, S >::image ( ) `[inline]`

Constructor without argument.

Definition at line 169 of file pw/image.hh.

10.307.3.2 template<typename F , typename S > mln::pw::image< F, S >::image (const Function_v2v< F > & *f*, const Site_Set< S > & *ps*) `[inline]`

Constructor.

Definition at line 175 of file pw/image.hh.

10.308 mln::registration::closest_point_basic< P > Class Template Reference

Closest point functor based on map distance.

`#include <icp.hh>`

10.308.1 Detailed Description

template<typename P> class mln::registration::closest_point_basic< P >

Closest point functor based on map distance.

Definition at line 240 of file icp.hh.

10.309 mln::registration::closest_point_with_map< P > Class Template Reference

Closest point functor based on map distance.

`#include <icp.hh>`

10.309.1 Detailed Description

template<typename P> class mln::registration::closest_point_with_map< P >

Closest point functor based on map distance.

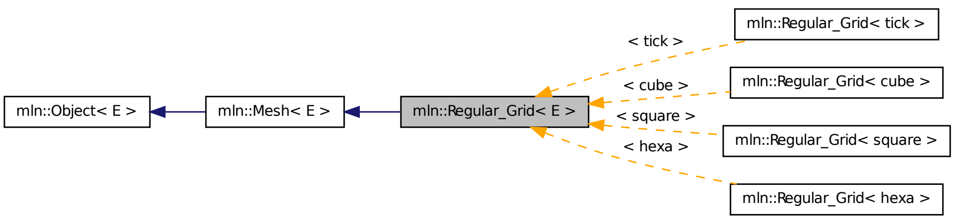
Definition at line 145 of file icp.hh.

10.310 mln::Regular_Grid< E > Struct Template Reference

Base class for implementation classes of regular grids.

`#include <regular_grid.hh>`

Inheritance diagram for mln::Regular_Grid< E >:



10.310.1 Detailed Description

template<typename E> struct mln::Regular_Grid< E >

Base class for implementation classes of regular grids.

Definition at line 42 of file regular_grid.hh.

10.311 mln::safe_image< I > Class Template Reference

Makes an image accessible at undefined location.

`#include <safe.hh>`

Inherits image_identity< I, I::domain_t, safe_image< I > >.

Public Types

- typedef safe_image< tag::image_< I > > skeleton
  Skeleton.

Public Member Functions

- operator safe_image< const I > () const
  Const promotion via conversion.

10.311.1 Detailed Description

template<typename I> class mln::safe_image< I >

Makes an image accessible at undefined location.

Definition at line 83 of file safe.hh.

10.311.2 Member Typedef Documentation

10.311.2.1 template<typename I> typedef safe_image< tag::image_<I> > mln::safe_image< I >::skeleton

Skeleton.

Definition at line 88 of file safe.hh.

10.311.3 Member Function Documentation

10.311.3.1 template<typename I > mln::safe_image< I >::operator safe_image< const I > ( ) const [inline]

Const promotion via conversion.

Definition at line 195 of file safe.hh.

10.312 mln::select::p_of< P > Struct Template Reference

Structure p_of.

`#include <pix.hh>`

10.312.1 Detailed Description

template<typename P> struct mln::select::p_of< P >

Structure p_of.

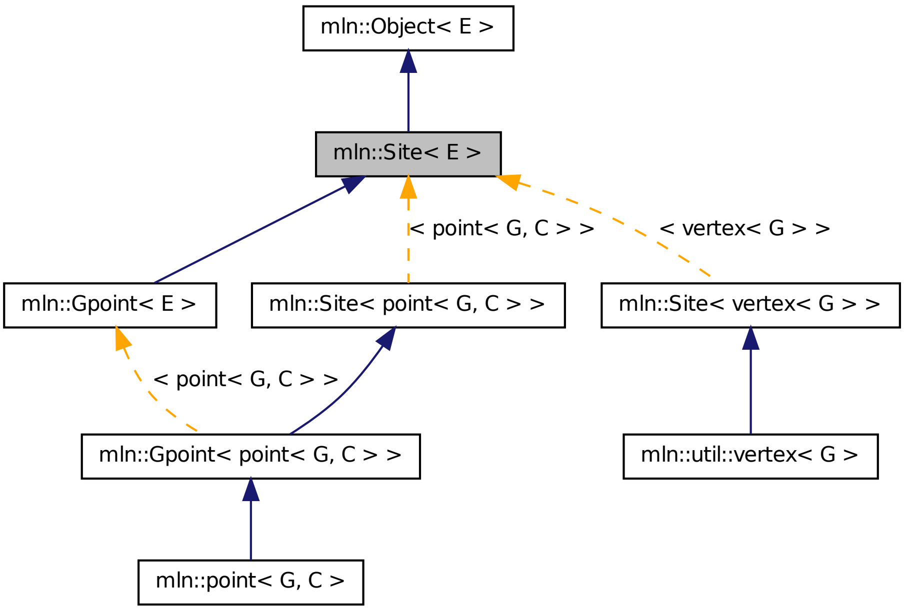
Definition at line 52 of file util/pix.hh.

10.313 mln::Site< E > Struct Template Reference

Base class for classes that are explicitly sites.

`#include <site.hh>`

Inheritance diagram for mln::Site< E >:



10.313.1 Detailed Description

template<typename E> struct mln::Site< E >

Base class for classes that are explicitly sites.

Definition at line 55 of file site.hh.

10.314 mln::Site< void > Struct Template Reference

Site category flag type.

`#include <site.hh>`

10.314.1 Detailed Description

template<> struct mln::Site< void >

Site category flag type.

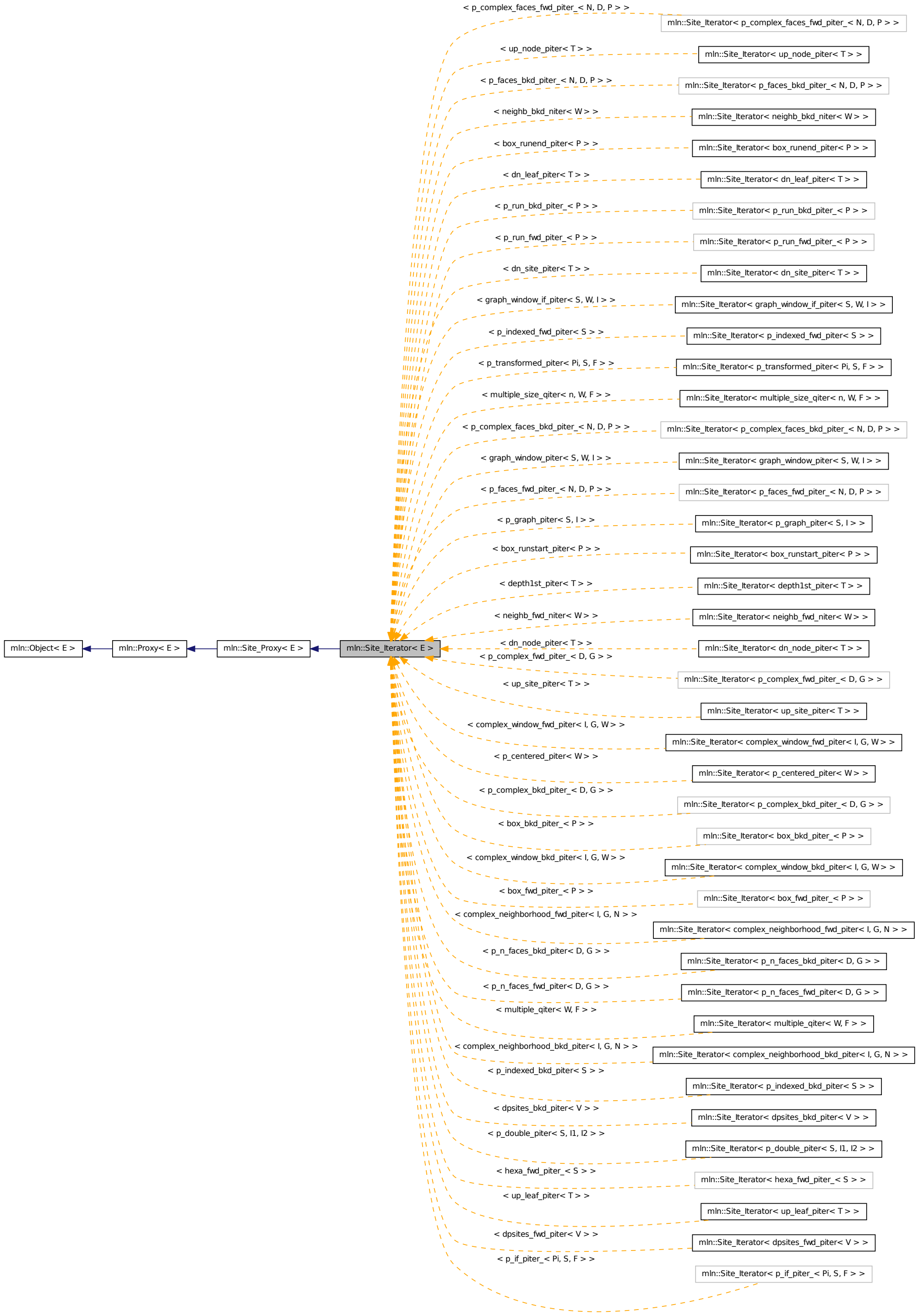
Definition at line 46 of file site.hh.

10.315 mln::Site_Iterator< E > Struct Template Reference

Base class for implementation of classes of iterator on points.

`#include <site_iterator.hh>`

Inheritance diagram for mln::Site_Iterator< E >:



Public Member Functions

- void next ()

  Go to the next element.

10.315.1 Detailed Description

template<typename E> struct mln::Site_Iterator< E >

Base class for implementation of classes of iterator on points. An iterator on points is an iterator that browse over a set of points.

See also

mln::doc::Site_Iterator for a complete documentation of this class contents.

Definition at line 53 of file site_iterator.hh.

10.315.2 Member Function Documentation

10.315.2.1 template<typename E > void mln::Site_Iterator< E >::next ( ) [inline]

Go to the next element.

Warning

This is a final method; iterator classes should not re-defined this method. The actual "next" operation has to be defined through the *next_* method.

Precondition

The iterator is valid.

Definition at line 92 of file site_iterator.hh.

10.316 mln::Site_Proxy< E > Struct Template Reference

Base class for implementation classes of the notion of "site proxy".

`#include <site_proxy.hh>`

Inherits mln::Proxy< E >.

Inherited by mln::Pseudo_Site< E >, and mln::Site_Iterator< E >.

10.316.1 Detailed Description

template<typename E> struct mln::Site_Proxy< E >

Base class for implementation classes of the notion of "site proxy". FIXME: Explain...

Definition at line 61 of file site_proxy.hh.

10.317 mln::Site_Proxy< void > Struct Template Reference

Site_Proxy category flag type.

`#include <site_proxy.hh>`

10.317.1 Detailed Description

template<> struct mln::Site_Proxy< void >

Site_Proxy category flag type.

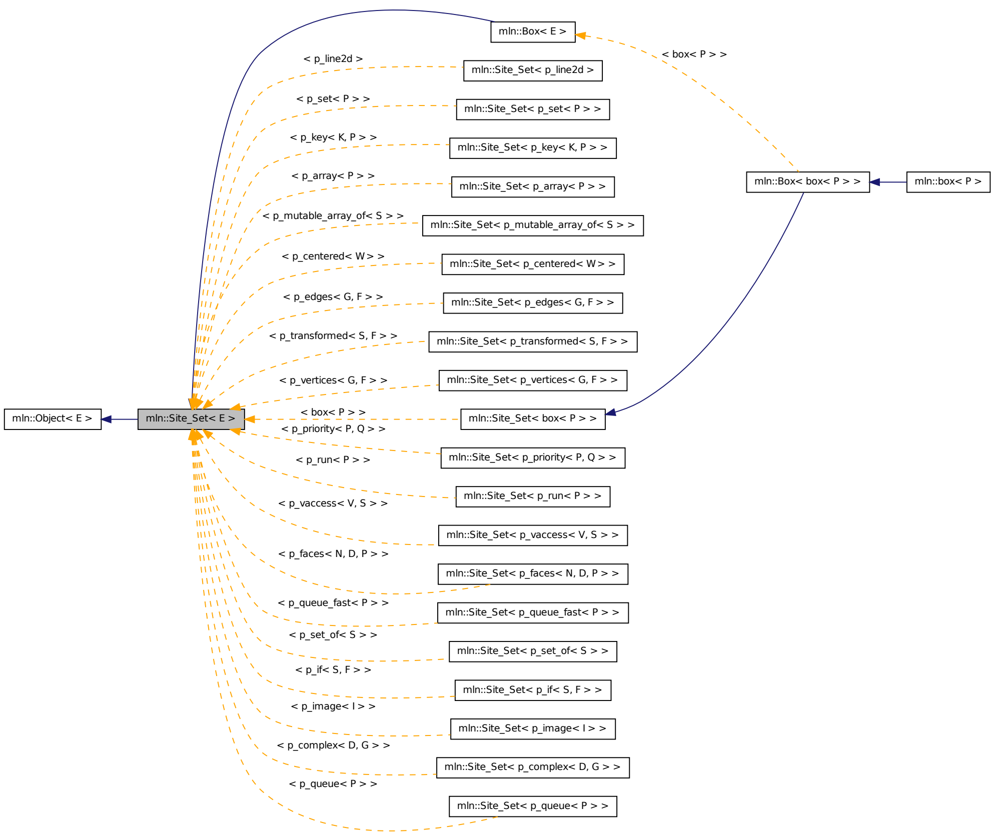
Definition at line 49 of file site_proxy.hh.

10.318 mln::Site_Set< E > Struct Template Reference

Base class for implementation classes of site sets.

`#include <site_set.hh>`

Inheritance diagram for mln::Site_Set< E >:



Related Functions

(Note that these are not member functions.)

- template<typename Sl , typename Sr >
  p_set< typename Sl::site > diff (const Site_Set< Sl > &lhs, const Site_Set< Sr > &rhs)

  Set theoretic difference of `lhs` *and* `rhs`*.*

- template<typename Sl , typename Sr >
  p_set< typename Sl::site > inter (const Site_Set< Sl > &lhs, const Site_Set< Sr > &rhs)

  Intersection between a couple of point sets.

- template<typename Sl , typename Sr >
  bool operator< (const Site_Set< Sl > &lhs, const Site_Set< Sr > &rhs)

  Strict inclusion test between site sets `lhs` *and* `rhs`*.*

- template<typename S >
  std::ostream & operator<< (std::ostream &ostr, const Site_Set< S > &set)

  Print a site set `set` *into the output stream* `ostr`*.*

- template<typename Sl , typename Sr >
  bool operator<= (const Site_Set< Sl > &lhs, const Site_Set< Sr > &rhs)

  Inclusion test between site sets `lhs` *and* `rhs`*.*

- template<typename Sl , typename Sr >
  bool operator== (const Site_Set< Sl > &lhs, const Site_Set< Sr > &rhs)

  Equality test between site sets `lhs` *and* `rhs`*.*

- template<typename Sl , typename Sr >
  p_set< typename Sl::site > sym_diff (const Site_Set< Sl > &lhs, const Site_Set< Sr > &rhs)

  Set theoretic symmetrical difference of `lhs` *and* `rhs`*.*

- template<typename Sl , typename Sr >
  p_set< typename Sl::site > uni (const Site_Set< Sl > &lhs, const Site_Set< Sr > &rhs)

  Union of a couple of point sets.

- template<typename S >
  p_set< typename S::site > unique (const Site_Set< S > &s)

  Give the unique set of `s`*.*

10.318.1 Detailed Description

template<typename E> struct mln::Site_Set< E >

Base class for implementation classes of site sets.

See also

mln::doc::Site_Set for a complete documentation of this class contents.

Definition at line 65 of file mln/core/concept/site_set.hh.

10.318.2 Friends And Related Function Documentation

10.318.2.1 template<typename Sl , typename Sr > p_set< typename Sl::site > diff (const Site_Set< Sl > & *lhs*, const Site_Set< Sr > & *rhs*) [related]

Set theoretic difference of `lhs` and `rhs`.

Definition at line 66 of file set/diff.hh.

10.318.2.2 template<typename Sl , typename Sr > p_set< typename Sl::site > inter (const Site_Set< Sl > & *lhs*, const Site_Set< Sr > & *rhs*) [related]

Intersection between a couple of point sets.

Definition at line 62 of file set/inter.hh.

10.318.2.3 template<typename Sl , typename Sr > bool operator< (const Site_Set< Sl > & *lhs*, const Site_Set< Sr > & *rhs*) [related]

Strict inclusion test between site sets `lhs` and `rhs`.

Parameters

`[in]` ***lhs*** A site set (strictly included?).
`[in]` ***rhs*** Another site set (includer?).

Definition at line 479 of file operators.hh.

10.318.2.4 template<typename S > std::ostream & operator<< (std::ostream & *ostr*, const Site_Set< S > & *set*) [related]

Print a site set `set` into the output stream `ostr`.

Parameters

`[in,out]` ***ostr*** An output stream.
`[in]` ***set*** A site set.

Returns

The modified output stream `ostr`.

Definition at line 505 of file operators.hh.

10.318.2.5 template<typename Sl , typename Sr > bool operator<= (const Site_Set< Sl > & *lhs*, const Site_Set< Sr > & *rhs*) [related]

Inclusion test between site sets `lhs` and `rhs`.

Parameters

`[in]` ***lhs*** A site set (included?).
`[in]` ***rhs*** Another site set (includer?).

Definition at line 491 of file operators.hh.

10.318.2.6 template<typename Sl , typename Sr > bool operator== (const Site_Set< Sl > & *lhs*, const Site_Set< Sr > & *rhs*) [related]

Equality test between site sets `lhs` and `rhs`.

Parameters

`[in]` ***lhs*** A site set.

`[in]` ***rhs*** Another site set.

Definition at line 467 of file operators.hh.

10.318.2.7 template<typename Sl , typename Sr > p_set< typename Sl::site > sym_diff (const Site_Set< Sl > & *lhs*, const Site_Set< Sr > & *rhs*) [related]

Set theoretic symmetrical difference of `lhs` and `rhs`.

Definition at line 65 of file sym_diff.hh.

10.318.2.8 template<typename Sl , typename Sr > p_set< typename Sl::site > uni (const Site_Set< Sl > & *lhs*, const Site_Set< Sr > & *rhs*) [related]

Union of a couple of point sets.

Definition at line 61 of file uni.hh.

10.318.2.9 template<typename S > p_set< typename S::site > unique (const Site_Set< S > & *s*) [related]

Give the unique set of `s`.

Definition at line 61 of file unique.hh.

10.319 mln::Site_Set< void > Struct Template Reference

Site_Set category flag type.

`#include <site_set.hh>`

10.319.1 Detailed Description

template<> struct mln::Site_Set< void >

Site_Set category flag type.

Definition at line 54 of file mln/core/concept/site_set.hh.

10.320 mln::slice_image< I > Struct Template Reference

2D image extracted from a slice of a 3D image.

`#include <slice_image.hh>`

Inherits image_domain_morpher< I, box2d, slice_image< I > >.

Public Types

- typedef slice_image< tag::image_< I > > skeleton

  Skeleton.

Public Member Functions

- const box2d & domain () const

  Give the definition domain.

- operator slice_image< const I > () const

  Const promotion via conversion.

- I::rvalue operator() (const point2d &p) const

  Read-only access to the image value located at point `p`*.*

- internal::morpher_lvalue_< I >::ret operator() (const point2d &p)

  Read-write access to the image value located at point `p`*.*

- def::coord sli () const

  Give the slice number.

- slice_image ()

  Constructor without argument.

- slice_image (I &ima, def::coord sli)

  Constructor from an image `ima` *and a predicate* `f`*.*

10.320.1 Detailed Description

template<typename I> struct mln::slice_image< I >

2D image extracted from a slice of a 3D image.

Definition at line 95 of file slice_image.hh.

10.320.2 Member Typedef Documentation

10.320.2.1 template<typename I> typedef slice_image< tag::image_<I> > mln::slice_image< I >::skeleton

Skeleton.

Definition at line 100 of file slice_image.hh.

10.320.3 Constructor & Destructor Documentation

10.320.3.1 template<typename I > mln::slice_image< I >::slice_image ( ) `[inline]`

Constructor without argument.

Definition at line 193 of file slice_image.hh.

10.320.3.2 template<typename I > mln::slice_image< I >::slice_image (I & *ima*, def::coord *sli*) `[inline]`

Constructor from an image `ima` and a predicate `f`.

Definition at line 199 of file slice_image.hh.

10.320.4 Member Function Documentation

10.320.4.1 template<typename I > const box2d & mln::slice_image< I >::domain ( ) const `[inline]`

Give the definition domain.

Definition at line 216 of file slice_image.hh.

10.320.4.2 template<typename I > mln::slice_image< I >::operator slice_image< const I > ( ) const `[inline]`

Const promotion via conversion.

Definition at line 255 of file slice_image.hh.

10.320.4.3 template<typename I > internal::morpher_lvalue_< I >::ret mln::slice_image< I >::operator() (const point2d & *p*) `[inline]`

Read-write access to the image value located at point `p`.

Definition at line 245 of file slice_image.hh.

10.320.4.4 template<typename I > I::rvalue mln::slice_image< I >::operator() (const point2d & *p*) const `[inline]`

Read-only access to the image value located at point `p`.

Definition at line 234 of file slice_image.hh.

10.320.4.5 template<typename I > def::coord mln::slice_image< I >::sli ( ) const `[inline]`

Give the slice number.

Definition at line 225 of file slice_image.hh.

10.321 mln::sub_image< I, S > Class Template Reference

Image having its domain restricted by a site set.

```
#include <sub_image.hh>
```

Inherits image_domain_morpher< I, S, sub_image< I, S > >.

Public Types

- typedef sub_image< tag::image_< I >, tag::domain_< S > > skeleton

  Skeleton.

Public Member Functions

- const S & domain () const

  Give the definition domain.

- operator sub_image< const I, S > () const

  Const promotion via conversion.

- sub_image ()

  Constructor without argument.

- sub_image (const I &ima, const S &pset)

  Constructor.

10.321.1 Detailed Description

template<typename I, typename S> class mln::sub_image< I, S >

Image having its domain restricted by a site set.

Definition at line 102 of file sub_image.hh.

10.321.2 Member Typedef Documentation

10.321.2.1 template<typename I, typename S> typedef sub_image< tag::image_<I>, tag::domain_<S> > mln::sub_image< I, S >::skeleton

Skeleton.

Definition at line 108 of file sub_image.hh.

10.321.3 Constructor & Destructor Documentation

10.321.3.1 template<typename I , typename S > mln::sub_image< I, S >::sub_image ( ) [inline]

Constructor without argument.

Definition at line 182 of file sub_image.hh.

10.321.3.2 template<typename I , typename S > mln::sub_image< I, S >::sub_image (const I & *ima*, const S & *pset*) [inline]

Constructor.

Definition at line 188 of file sub_image.hh.

10.321.4 Member Function Documentation

10.321.4.1 template<typename I , typename S > const S & mln::sub_image< I, S >::domain ( ) const [inline]

Give the definition domain.

Definition at line 205 of file sub_image.hh.

10.321.4.2 template<typename I , typename S > mln::sub_image< I, S >::operator sub_image< const I, S > ( ) const [inline]

Const promotion via conversion.

Definition at line 212 of file sub_image.hh.

10.322 mln::sub_image_if< I, S > Struct Template Reference

Image having its domain restricted by a site set and a function.

`#include <sub_image_if.hh>`

Inherits image_domain_morpher< I, p_if< S, fun::p2b::has< I > >, sub_image_if< I, S > >.

Public Types

- typedef sub_image_if< tag::image_< I >, tag::domain_< S > > skeleton

  Skeleton.

Public Member Functions

- const p_if< S, fun::p2b::has< I > > & domain () const

  Give the definition domain.

- sub_image_if ()

  Constructor without argument.

- sub_image_if (I &ima, const S &s)

  Constructor.

10.322.1 Detailed Description

template<typename I, typename S> struct mln::sub_image_if< I, S >

Image having its domain restricted by a site set and a function.

Definition at line 101 of file sub_image_if.hh.

10.322.2 Member Typedef Documentation

10.322.2.1 template<typename I, typename S> typedef sub_image_if< tag::image_<I>, tag::domain_<S> > mln::sub_image_if< I, S >::skeleton

Skeleton.

Definition at line 106 of file sub_image_if.hh.

10.322.3 Constructor & Destructor Documentation

10.322.3.1 template<typename I , typename S > mln::sub_image_if< I, S >::sub_image_if ( ) `[inline]`

Constructor without argument.

Definition at line 181 of file sub_image_if.hh.

10.322.3.2 template<typename I , typename S > mln::sub_image_if< I, S >::sub_image_if (I & *ima*, const S & *s*) `[inline]`

Constructor.

Definition at line 187 of file sub_image_if.hh.

10.322.4 Member Function Documentation

10.322.4.1 template<typename I , typename S > const p_if< S, fun::p2b::has< I > > & mln::sub_image_if< I, S >::domain ( ) const `[inline]`

Give the definition domain.

Definition at line 204 of file sub_image_if.hh.

10.323 mln::thru_image< I, F > Class Template Reference

Morph image values through a function.

`#include <thru_image.hh>`

Public Member Functions

- operator thru_image< const I, F > () const
  Const promotion via conversion.

10.323.1 Detailed Description

template<typename I, typename F> class mln::thru_image< I, F >

Morph image values through a function.

Definition at line 156 of file thru_image.hh.

10.323.2 Member Function Documentation

10.323.2.1 template<typename I , typename F > mln::thru_image< I, F >::operator thru_image< const I, F > ( ) const [inline]

Const promotion via conversion.

Definition at line 239 of file thru_image.hh.

10.324 mln::thrubin_image< I1, I2, F > Class Template Reference

Morphes values from two images through a binary function.

`#include <thrubin_image.hh>`

Inherits image_value_morpher< I1, F::result, thrubin_image< I1, I2, F > >.

Public Types

- typedef I1::psite psite
  Point_Site associated type.
- typedef value rvalue
  Return type of read-only access.
- typedef thrubin_image< tag::image_< I1 >, tag::image_< I2 >, F > skeleton
  Skeleton.
- typedef F::result value
  Value associated type.

Public Member Functions

- operator thrubin_image< const I1, const I2, F > () const

    Const promotion via conversion.

10.324.1 Detailed Description

template<typename I1, typename I2, typename F> class mln::thrubin_image< I1, I2, F >

Morphes values from two images through a binary function.

Definition at line 82 of file thrubin_image.hh.

10.324.2 Member Typedef Documentation

10.324.2.1 template<typename I1, typename I2, typename F> typedef I1 ::psite mln::thrubin_image< I1, I2, F >::psite

Point_Site associated type.

Definition at line 94 of file thrubin_image.hh.

10.324.2.2 template<typename I1, typename I2, typename F> typedef value mln::thrubin_image< I1, I2, F >::rvalue

Return type of read-only access.

Definition at line 100 of file thrubin_image.hh.

10.324.2.3 template<typename I1, typename I2, typename F> typedef thrubin_-image<tag::image_<I1>, tag::image_<I2>, F> mln::thrubin_image< I1, I2, F >::skeleton

Skeleton.

Definition at line 91 of file thrubin_image.hh.

10.324.2.4 template<typename I1, typename I2, typename F> typedef F ::result mln::thrubin_image< I1, I2, F >::value

Value associated type.

Definition at line 97 of file thrubin_image.hh.

10.324.3 Member Function Documentation

10.324.3.1 template<typename I1 , typename I2 , typename F > mln::thrubin_image< I1, I2, F >::operator thrubin_image< const I1, const I2, F > ( ) const [inline]

Const promotion via conversion.

Definition at line 186 of file thrubin_image.hh.

10.325 mln::topo::adj_higher_dim_connected_n_face_bkd_iter< D > Class Template Reference

Backward iterator on all the n-faces sharing an adjacent (n+1)-face with a (reference) n-face of an mln::complex<D>.

`#include <adj_higher_dim_connected_n_face_iter.hh>`

Inherits backward_complex_relative_iterator_base< topo::face< D >, algebraic_face< D >, adj_higher_-dim_connected_n_face_bkd_iter< D > >, and mln::topo::internal::adj_higher_dim_connected_n_face_-iterator< D >.

Public Member Functions

- void next ()

  Go to the next element.

- adj_higher_dim_connected_n_face_bkd_iter ()

  Construction.

10.325.1 Detailed Description

template<unsigned D> class mln::topo::adj_higher_dim_connected_n_face_bkd_iter< D >

Backward iterator on all the n-faces sharing an adjacent (n+1)-face with a (reference) n-face of an mln::complex<D>.

Template Parameters

D The dimension of the complex this iterator belongs to.

Definition at line 104 of file adj_higher_dim_connected_n_face_iter.hh.

10.325.2 Constructor & Destructor Documentation

10.325.2.1 template<unsigned D> mln::topo::adj_higher_dim_connected_n_face_bkd_iter< D >::adj_higher_dim_connected_n_face_bkd_iter ( ) [inline]

Construction.

Definition at line 196 of file adj_higher_dim_connected_n_face_iter.hh.

10.325.3 Member Function Documentation

10.325.3.1 void mln::Iterator< adj_higher_dim_connected_n_face_bkd_iter< D > >::next ( ) [inherited]

Go to the next element.

Warning

This is a final method; iterator classes should not re-defined this method. The actual "next" operation has to be defined through the *next_* method.

Precondition

The iterator is valid.

10.326 mln::topo::adj_higher_dim_connected_n_face_fwd_iter< D > Class Template Reference

Forward iterator on all the n-faces sharing an adjacent (n+1)-face with a (reference) n-face of an mln::complex<D>.

`#include <adj_higher_dim_connected_n_face_iter.hh>`

Inherits forward_complex_relative_iterator_base< topo::face< D >, algebraic_face< D >, adj_higher_dim_connected_n_face_fwd_iter< D > >, and mln::topo::internal::adj_higher_dim_connected_n_face_iterator< D >.

Public Member Functions

- void next ()

  Go to the next element.

- adj_higher_dim_connected_n_face_fwd_iter ()

  Construction.

10.326.1 Detailed Description

template<unsigned D> class mln::topo::adj_higher_dim_connected_n_face_fwd_iter< D >

Forward iterator on all the n-faces sharing an adjacent (n+1)-face with a (reference) n-face of an mln::complex<D>.

Template Parameters

D The dimension of the complex this iterator belongs to.

Definition at line 65 of file adj_higher_dim_connected_n_face_iter.hh.

10.326.2 Constructor & Destructor Documentation

10.326.2.1 template<unsigned D> mln::topo::adj_higher_dim_connected_n_face_fwd_iter< D >::adj_higher_dim_connected_n_face_fwd_iter ( ) [inline]

Construction.

Definition at line 162 of file adj_higher_dim_connected_n_face_iter.hh.

10.326.3 Member Function Documentation

10.326.3.1 void mln::Iterator< adj_higher_dim_connected_n_face_fwd_iter< D > >::next ( ) [inherited]

Go to the next element.

Warning

This is a final method; iterator classes should not re-defined this method. The actual "next" operation has to be defined through the *next_* method.

Precondition

The iterator is valid.

10.327 mln::topo::adj_higher_face_bkd_iter< D > Class Template Reference

Backward iterator on all the adjacent (n+1)-faces of the n-face of an mln::complex<D>.

`#include <adj_higher_face_iter.hh>`

Inherits backward_complex_relative_iterator_base< topo::face< D >, algebraic_face< D >, adj_higher_face_bkd_iter< D > >.

Public Member Functions

- void next ()
  Go to the next element.

- adj_higher_face_bkd_iter ()
  Construction.

10.327.1 Detailed Description

template<unsigned D> class mln::topo::adj_higher_face_bkd_iter< D >

Backward iterator on all the adjacent (n+1)-faces of the n-face of an mln::complex<D>.

Template Parameters

D The dimension of the complex this iterator belongs to.

Definition at line 106 of file adj_higher_face_iter.hh.

10.327.2 Constructor & Destructor Documentation

10.327.2.1 template<unsigned D> mln::topo::adj_higher_face_bkd_iter< D >::adj_higher_face_bkd_iter ( ) [inline]

Construction.

Definition at line 167 of file adj_higher_face_iter.hh.

10.327.3 Member Function Documentation

10.327.3.1 void mln::Iterator< adj_higher_face_bkd_iter< D > >::next ( ) [inherited]

Go to the next element.

Warning

This is a final method; iterator classes should not re-defined this method. The actual "next" operation has to be defined through the *next_* method.

Precondition

The iterator is valid.

10.328 mln::topo::adj_higher_face_fwd_iter< D > Class Template Reference

Forward iterator on all the adjacent (n+1)-faces of the n-face of an mln::complex<D>.

`#include <adj_higher_face_iter.hh>`

Inherits forward_complex_relative_iterator_base< topo::face< D >, algebraic_face< D >, adj_higher_face_fwd_iter< D > >.

Public Member Functions

- void next ()

  Go to the next element.

- adj_higher_face_fwd_iter ()

  Construction.

10.328.1 Detailed Description

template<unsigned D> class mln::topo::adj_higher_face_fwd_iter< D >

Forward iterator on all the adjacent (n+1)-faces of the n-face of an mln::complex<D>.

Template Parameters

D The dimension of the complex this iterator belongs to.

Definition at line 72 of file adj_higher_face_iter.hh.

10.328.2 Constructor & Destructor Documentation

10.328.2.1 template<unsigned D> mln::topo::adj_higher_face_fwd_iter< D >::adj_higher_face_fwd_iter ( ) `[inline]`

Construction.

Definition at line 139 of file adj_higher_face_iter.hh.

10.328.3 Member Function Documentation

10.328.3.1 void mln::Iterator< adj_higher_face_fwd_iter< D > >::next ( ) `[inherited]`

Go to the next element.

Warning

This is a final method; iterator classes should not re-defined this method. The actual "next" operation has to be defined through the *next_* method.

Precondition

The iterator is valid.

10.329 mln::topo::adj_lower_dim_connected_n_face_bkd_iter< D > Class Template Reference

Backward iterator on all the n-faces sharing an adjacent (n-1)-face with a (reference) n-face of an mln::complex<D>.

`#include <adj_lower_dim_connected_n_face_iter.hh>`

Inherits backward_complex_relative_iterator_base< topo::face< D >, algebraic_face< D >, adj_lower_-dim_connected_n_face_bkd_iter< D > >, and mln::topo::internal::adj_lower_dim_connected_n_face_-iterator< D >.

Public Member Functions

- void next ()

Go to the next element.

- adj_lower_dim_connected_n_face_bkd_iter ()
  Construction.

10.329.1 Detailed Description

template<unsigned D> class mln::topo::adj_lower_dim_connected_n_face_bkd_iter< D >

Backward iterator on all the n-faces sharing an adjacent (n-1)-face with a (reference) n-face of an mln::complex<D>.

Template Parameters

D The dimension of the complex this iterator belongs to.

Definition at line 104 of file adj_lower_dim_connected_n_face_iter.hh.

10.329.2 Constructor & Destructor Documentation

10.329.2.1 template<unsigned D> mln::topo::adj_lower_dim_connected_n_face_bkd_iter< D >::adj_lower_dim_connected_n_face_bkd_iter ( ) `[inline]`

Construction.

Definition at line 196 of file adj_lower_dim_connected_n_face_iter.hh.

10.329.3 Member Function Documentation

10.329.3.1 void mln::Iterator< adj_lower_dim_connected_n_face_bkd_iter< D > >::next ( ) `[inherited]`

Go to the next element.

Warning

This is a final method; iterator classes should not re-defined this method. The actual "next" operation has to be defined through the *next_* method.

Precondition

The iterator is valid.

10.330 mln::topo::adj_lower_dim_connected_n_face_fwd_iter< D > Class Template Reference

Forward iterator on all the n-faces sharing an adjacent (n-1)-face with a (reference) n-face of an mln::complex<D>.

`#include <adj_lower_dim_connected_n_face_iter.hh>`

Inherits forward_complex_relative_iterator_base< topo::face< D >, algebraic_face< D >, adj_lower_dim_connected_n_face_fwd_iter< D > >, and mln::topo::internal::adj_lower_dim_connected_n_face_iterator< D >.

Public Member Functions

- void next ()
  Go to the next element.

- adj_lower_dim_connected_n_face_fwd_iter ()
  Construction.

10.330.1 Detailed Description

template<unsigned D> class mln::topo::adj_lower_dim_connected_n_face_fwd_iter< D >

Forward iterator on all the n-faces sharing an adjacent (n-1)-face with a (reference) n-face of an mln::complex<D>.

Template Parameters

D The dimension of the complex this iterator belongs to.

Definition at line 65 of file adj_lower_dim_connected_n_face_iter.hh.

10.330.2 Constructor & Destructor Documentation

10.330.2.1 template<unsigned D> mln::topo::adj_lower_dim_connected_n_face_fwd_iter< D >::adj_lower_dim_connected_n_face_fwd_iter ( ) `[inline]`

Construction.

Definition at line 162 of file adj_lower_dim_connected_n_face_iter.hh.

10.330.3 Member Function Documentation

10.330.3.1 void mln::Iterator< adj_lower_dim_connected_n_face_fwd_iter< D > >::next ( ) `[inherited]`

Go to the next element.

Warning

This is a final method; iterator classes should not re-defined this method. The actual "next" operation has to be defined through the *next_* method.

Precondition

The iterator is valid.

10.331 mln::topo::adj_lower_face_bkd_iter< D > Class Template Reference

Backward iterator on all the adjacent (n-1)-faces of the n-face of an mln::complex<D>.

`#include <adj_lower_face_iter.hh>`

Inherits backward_complex_relative_iterator_base< topo::face< D >, algebraic_face< D >, adj_lower_-face_bkd_iter< D > >.

Public Member Functions

- void next ()
  Go to the next element.
- adj_lower_face_bkd_iter ()
  Construction.

10.331.1 Detailed Description

template<unsigned D> class mln::topo::adj_lower_face_bkd_iter< D >

Backward iterator on all the adjacent (n-1)-faces of the n-face of an mln::complex<D>.

Template Parameters

D The dimension of the complex this iterator belongs to.

Definition at line 108 of file adj_lower_face_iter.hh.

10.331.2 Constructor & Destructor Documentation

10.331.2.1 template<unsigned D> mln::topo::adj_lower_face_bkd_iter< D >::adj_lower_face_bkd_iter ( ) [inline]

Construction.

Definition at line 169 of file adj_lower_face_iter.hh.

10.331.3 Member Function Documentation

10.331.3.1 void mln::Iterator< adj_lower_face_bkd_iter< D > >::next ( ) [inherited]

Go to the next element.

Warning

This is a final method; iterator classes should not re-defined this method. The actual "next" operation has to be defined through the *next_* method.

Precondition

The iterator is valid.

10.332 mln::topo::adj_lower_face_fwd_iter< D > Class Template Reference

Forward iterator on all the adjacent (n-1)-faces of the n-face of an mln::complex<D>.

`#include <adj_lower_face_iter.hh>`

Inherits forward_complex_relative_iterator_base< topo::face< D >, algebraic_face< D >, adj_lower_-face_fwd_iter< D > >.

Public Member Functions

- void next ()

  Go to the next element.

- adj_lower_face_fwd_iter ()

  Construction.

10.332.1 Detailed Description

template<unsigned D> class mln::topo::adj_lower_face_fwd_iter< D >

Forward iterator on all the adjacent (n-1)-faces of the n-face of an mln::complex<D>.

Template Parameters

D The dimension of the complex this iterator belongs to.

Definition at line 73 of file adj_lower_face_iter.hh.

10.332.2 Constructor & Destructor Documentation

10.332.2.1 template<unsigned D> mln::topo::adj_lower_face_fwd_iter< D >::adj_lower_face_fwd_iter ( ) [inline]

Construction.

Definition at line 141 of file adj_lower_face_iter.hh.

10.332.3 Member Function Documentation

10.332.3.1 void mln::Iterator< adj_lower_face_fwd_iter< D > >::next ( ) [inherited]

Go to the next element.

Warning

This is a final method; iterator classes should not re-defined this method. The actual "next" operation has to be defined through the *next_* method.

Precondition

The iterator is valid.

10.333 mln::topo::adj_lower_higher_face_bkd_iter< D > Class Template Reference

Forward iterator on all the adjacent (n-1)-faces and (n+1)-faces of the n-face of an mln::complex<D>.

`#include <adj_lower_higher_face_iter.hh>`

Inherits complex_relative_iterator_sequence< adj_higher_face_bkd_iter< D >, adj_lower_face_bkd_-iter< D >, adj_lower_higher_face_bkd_iter< D > >.

Public Member Functions

- void next ()

  Go to the next element.

- adj_lower_higher_face_bkd_iter ()

  Construction.

10.333.1 Detailed Description

template<unsigned D> class mln::topo::adj_lower_higher_face_bkd_iter< D >

Forward iterator on all the adjacent (n-1)-faces and (n+1)-faces of the n-face of an mln::complex<D>.

Template Parameters

D The dimension of the complex this iterator belongs to.

Definition at line 102 of file adj_lower_higher_face_iter.hh.

10.333.2 Constructor & Destructor Documentation

10.333.2.1 template<unsigned D> mln::topo::adj_lower_higher_face_bkd_iter< D >::adj_lower_higher_face_bkd_iter ( ) `[inline]`

Construction.

Definition at line 152 of file adj_lower_higher_face_iter.hh.

10.333.3 Member Function Documentation

10.333.3.1 void mln::Iterator< adj_lower_higher_face_bkd_iter< D > >::next ( ) [inherited]

Go to the next element.

Warning

This is a final method; iterator classes should not re-defined this method. The actual "next" operation has to be defined through the *next_* method.

Precondition

The iterator is valid.

10.334 mln::topo::adj_lower_higher_face_fwd_iter< D > Class Template Reference

Forward iterator on all the adjacent (n-1)-faces and (n+1)-faces of the n-face of an mln::complex<D>.

`#include <adj_lower_higher_face_iter.hh>`

Inherits complex_relative_iterator_sequence< adj_lower_face_fwd_iter< D >, adj_higher_face_fwd_iter< D >, adj_lower_higher_face_fwd_iter< D > >.

Public Member Functions

- void next ()

  Go to the next element.

- adj_lower_higher_face_fwd_iter ()

  Construction.

10.334.1 Detailed Description

template<unsigned D> class mln::topo::adj_lower_higher_face_fwd_iter< D >

Forward iterator on all the adjacent (n-1)-faces and (n+1)-faces of the n-face of an mln::complex<D>.

Template Parameters

D The dimension of the complex this iterator belongs to.

Definition at line 71 of file adj_lower_higher_face_iter.hh.

10.334.2 Constructor & Destructor Documentation

10.334.2.1 template<unsigned D> mln::topo::adj_lower_higher_face_fwd_iter< D >::adj_lower_higher_face_fwd_iter ( ) [inline]

Construction.

Definition at line 133 of file adj_lower_higher_face_iter.hh.

10.334.3 Member Function Documentation

10.334.3.1 void mln::Iterator< adj_lower_higher_face_fwd_iter< D > >::next ( ) [inherited]

Go to the next element.

Warning

This is a final method; iterator classes should not re-defined this method. The actual "next" operation has to be defined through the *next_* method.

Precondition

The iterator is valid.

10.335 mln::topo::adj_m_face_bkd_iter< D > Class Template Reference

Backward iterator on all the m-faces transitively adjacent to a (reference) n-face in a complex.

```
#include <adj_m_face_iter.hh>
```

Inherits backward_complex_relative_iterator_base< topo::face< D >, algebraic_face< D >, adj_m_face_bkd_iter< D > >, and mln::topo::internal::adj_m_face_iterator< D >.

Public Member Functions

- void next ()

  Go to the next element.

- adj_m_face_bkd_iter ()

  Construction.

- template<typename Fref >
  adj_m_face_bkd_iter (const Fref &f_ref, unsigned m)

  Constructs an iterator, with f_ref as reference face, and a target dimension equal to m.

10.335.1 Detailed Description

template<unsigned D> class mln::topo::adj_m_face_bkd_iter< D >

Backward iterator on all the m-faces transitively adjacent to a (reference) n-face in a complex.

Template Parameters

D The dimension of the complex this iterator belongs to.

The dimension parameter (*m_*) must be lower or equal to D.

If *m_* is equal to the dimension of the reference face, then the iterated set is empty.

Definition at line 118 of file adj_m_face_iter.hh.

10.335.2 Constructor & Destructor Documentation

10.335.2.1 template<unsigned D> mln::topo::adj_m_face_bkd_iter< D >::adj_m_face_bkd_iter ( ) [inline]

Construction.

Construct an iterator, with an invalid reference face, and a target dimension equal to 0.

Definition at line 223 of file adj_m_face_iter.hh.

10.335.2.2 template<unsigned D> template<typename Fref > mln::topo::adj_m_face_bkd_iter< D >::adj_m_face_bkd_iter (const Fref & *f_ref*, unsigned *m*) [inline]

Constructs an iterator, with *f_ref* as reference face, and a target dimension equal to *m*.

Definition at line 230 of file adj_m_face_iter.hh.

10.335.3 Member Function Documentation

10.335.3.1 void mln::Iterator< adj_m_face_bkd_iter< D > >::next ( ) [inherited]

Go to the next element.

Warning

This is a final method; iterator classes should not re-defined this method. The actual "next" operation has to be defined through the *next_* method.

Precondition

The iterator is valid.

10.336 mln::topo::adj_m_face_fwd_iter< D > Class Template Reference

Forward iterator on all the m-faces transitively adjacent to a (reference) n-face in a complex.

`#include <adj_m_face_iter.hh>`

Inherits forward_complex_relative_iterator_base< topo::face< D >, algebraic_face< D >, adj_m_face_fwd_iter< D > >, and mln::topo::internal::adj_m_face_iterator< D >.

Public Member Functions

- void next ()
  Go to the next element.

- adj_m_face_fwd_iter ()
  Construction.
- template<typename Fref >
  adj_m_face_fwd_iter (const Fref &f_ref, unsigned m)
  Constructs an iterator, with f_ref as reference face, and a target dimension equal to m.

10.336.1 Detailed Description

template<unsigned D> class mln::topo::adj_m_face_fwd_iter< D >

Forward iterator on all the m-faces transitively adjacent to a (reference) n-face in a complex.

Template Parameters

D The dimension of the complex this iterator belongs to.

The dimension parameter (*m_*) must be lower or equal to D.

If *m_* is equal to the dimension of the reference face, then the iterated set is empty.

Definition at line 70 of file adj_m_face_iter.hh.

10.336.2 Constructor & Destructor Documentation

10.336.2.1 template<unsigned D> mln::topo::adj_m_face_fwd_iter< D >::adj_m_face_fwd_iter ( ) `[inline]`

Construction.

Construct an iterator, with an invalid reference face, and a target dimension equal to 0.

Definition at line 194 of file adj_m_face_iter.hh.

10.336.2.2 template<unsigned D> template<typename Fref > mln::topo::adj_m_face_fwd_iter< D >::adj_m_face_fwd_iter (const Fref & *f_ref*, unsigned *m*) `[inline]`

Constructs an iterator, with *f_ref* as reference face, and a target dimension equal to *m*.

Definition at line 201 of file adj_m_face_iter.hh.

10.336.3 Member Function Documentation

10.336.3.1 void mln::Iterator< adj_m_face_fwd_iter< D > >::next ( ) [inherited]

Go to the next element.

Warning

This is a final method; iterator classes should not re-defined this method. The actual "next" operation has to be defined through the *next_* method.

Precondition

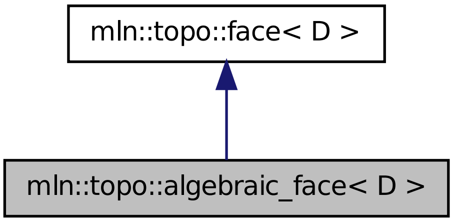
The iterator is valid.

10.337 mln::topo::algebraic_face< D > Class Template Reference

Algebraic face handle in a complex; the face dimension is dynamic.

```
#include <algebraic_face.hh>
```

Inheritance diagram for mln::topo::algebraic_face< D >:



Public Member Functions

- algebraic_face ()

  Build a non-initialized algebraic face handle.

- algebraic_face (complex< D > &complex, unsigned n, unsigned face_id, bool sign)

  Build an algebraic face handle from complex and face_id.

- template<unsigned N>
  algebraic_face (const algebraic_n_face< N, D > &f)

  Build a face handle from an mln::topo::algebraic_n_face.

- algebraic_face (const face< D > &f, bool sign)

  Build an algebraic face handle from an mln::face.

- void invalidate ()
  Invalidate this handle.
- bool is_valid () const
  Is this handle valid?

  - bool sign () const
    Accessors.
  - void set_sign (bool sign)
    Set the sign of this face.

  - complex< D > cplx () const
    Accessors.
  - unsigned n () const
    Return the dimension of the face.
  - unsigned face_id () const
    Return the id of the face.
  - void set_cplx (const complex< D > &cplx)
    Set the complex the face belongs to.
  - void set_n (unsigned n)
    Set the dimension of the face.
  - void inc_n ()
    Increment the dimension of the face.
  - void dec_n ()
    Decrement the dimension of the face.
  - void set_face_id (unsigned face_id)
    Set the id of the face.
  - void inc_face_id ()
    Increment the id of the face.
  - void dec_face_id ()
    Decrement the id of the face.
  - template<unsigned N>
    face_data< N, D > & data () const
    Return the mln::topo::face_data pointed by this handle.
  - std::vector< algebraic_face< D > > lower_dim_adj_faces () const
    Return an array of face handles pointing to adjacent (n-1)-faces.
  - std::vector< algebraic_face< D > > higher_dim_adj_faces () const
    Return an array of face handles pointing to adjacent (n+1)-faces.

10.337.1 Detailed Description

template<unsigned D> class mln::topo::algebraic_face< D >

Algebraic face handle in a complex; the face dimension is dynamic. Contrary to an mln::topo::algebraic_-n_face, the dimension of an mln::topo::algebraic_face is not fixed.

Definition at line 60 of file algebraic_face.hh.

10.337.2 Constructor & Destructor Documentation

10.337.2.1 template<unsigned D> mln::topo::algebraic_face< D >::algebraic_face ( ) [inline]

Build a non-initialized algebraic face handle.

Definition at line 157 of file algebraic_face.hh.

10.337.2.2 template<unsigned D> mln::topo::algebraic_face< D >::algebraic_face (complex< D > & *complex*, unsigned *n*, unsigned *face_id*, bool *sign*) [inline]

Build an algebraic face handle from *complex* and *face_id*.

Definition at line 164 of file algebraic_face.hh.

10.337.2.3 template<unsigned D> mln::topo::algebraic_face< D >::algebraic_face (const face< D > & *f*, bool *sign*) [inline]

Build an algebraic face handle from an mln::face.

Definition at line 174 of file algebraic_face.hh.

References mln::topo::face< D >::n().

10.337.2.4 template<unsigned D> template<unsigned N> mln::topo::algebraic_face< D >::algebraic_face (const algebraic_n_face< N, D > & *f*) [inline]

Build a face handle from an mln::topo::algebraic_n_face.

Definition at line 184 of file algebraic_face.hh.

10.337.3 Member Function Documentation

10.337.3.1 template<unsigned D> complex< D > mln::topo::face< D >::cplx ( ) const [inline, inherited]

Accessors.

Return the complex the face belongs to.

Definition at line 224 of file face.hh.

Referenced by mln::complex_psite< D, G >::complex_psite(), mln::topo::operator!=(), and mln::topo::operator==().

10.337.3.2 template<unsigned D> template<unsigned N> face_data< N, D > & mln::topo::face< D >::data ( ) const [inline, inherited]

Return the mln::topo::face_data pointed by this handle.

Definition at line 305 of file face.hh.

References mln::topo::face< D >::is_valid().

10.337.3.3 template<unsigned D> void mln::topo::face< D >::dec_face_id ( ) [inline, inherited]

Decrement the id of the face.

Definition at line 296 of file face.hh.

10.337.3.4 template<unsigned D> void mln::topo::face< D >::dec_n ( ) [inline, inherited]

Decrement the dimension of the face.

Definition at line 272 of file face.hh.

10.337.3.5 template<unsigned D> unsigned mln::topo::face< D >::face_id ( ) const [inline, inherited]

Return the id of the face.

Definition at line 240 of file face.hh.

Referenced by mln::geom::complex_geometry< D, P >::operator()(), and mln::topo::operator==().

10.337.3.6 template<unsigned D> std::vector< algebraic_face< D > > mln::topo::face< D >::higher_dim_adj_faces ( ) const [inline, inherited]

Return an array of face handles pointing to adjacent (n+1)-faces.

Definition at line 370 of file face.hh.

10.337.3.7 template<unsigned D> void mln::topo::face< D >::inc_face_id ( ) [inline, inherited]

Increment the id of the face.

Definition at line 288 of file face.hh.

10.337.3.8 template<unsigned D> void mln::topo::face< D >::inc_n ( ) [inline, inherited]

Increment the dimension of the face.

Definition at line 264 of file face.hh.

10.337.3.9 template<unsigned D> void mln::topo::face< D >::invalidate ( ) [inline, inherited]

Invalidate this handle.

Definition at line 215 of file face.hh.

References mln::topo::face< D >::set_face_id(), and mln::topo::face< D >::set_n().

10.337.3.10 template<unsigned D> bool mln::topo::face< D >::is_valid ( ) const [inline, inherited]

Is this handle valid?

Definition at line 207 of file face.hh.

Referenced by mln::topo::face< D >::data().

10.337.3.11 template<unsigned D> std::vector< algebraic_face< D > > mln::topo::face< D >::lower_dim_adj_faces ( ) const [inline, inherited]

Return an array of face handles pointing to adjacent (n-1)-faces.

Definition at line 357 of file face.hh.

10.337.3.12 template<unsigned D> unsigned mln::topo::face< D >::n ( ) const [inline, inherited]

Return the dimension of the face.

Definition at line 232 of file face.hh.

Referenced by mln::topo::algebraic_face< D >::algebraic_face(), mln::geom::complex_geometry< D, P >::operator()(), and mln::topo::operator==().

10.337.3.13 template<unsigned D> void mln::topo::face< D >::set_cplx (const complex< D > & *cplx*) [inline, inherited]

Set the complex the face belongs to.

Definition at line 248 of file face.hh.

10.337.3.14 template<unsigned D> void mln::topo::face< D >::set_face_id (unsigned *face_id*) [inline, inherited]

Set the id of the face.

Definition at line 280 of file face.hh.

Referenced by mln::topo::face< D >::invalidate().

10.337.3.15 template<unsigned D> void mln::topo::face< D >::set_n (unsigned *n*) [inline, inherited]

Set the dimension of the face.

Definition at line 256 of file face.hh.

Referenced by mln::topo::face< D >::invalidate().

10.337.3.16 template<unsigned D> void mln::topo::algebraic_face< D >::set_sign (bool *sign*) `[inline]`

Set the sign of this face.

Definition at line 203 of file algebraic_face.hh.

10.337.3.17 template<unsigned D> bool mln::topo::algebraic_face< D >::sign ( ) const `[inline]`

Accessors.

Return the sign of this face.

Definition at line 195 of file algebraic_face.hh.

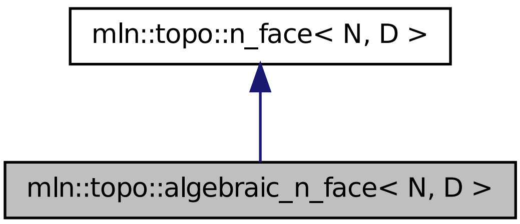
Referenced by mln::topo::operator==().

10.338 mln::topo::algebraic_n_face< N, D > Class Template Reference

Algebraic `N-face` handle in a complex.

#include <algebraic_n_face.hh>

Inheritance diagram for mln::topo::algebraic_n_face< N, D >:



Public Member Functions

- algebraic_n_face ()

  Build a non-initialized algebraic face handle.

- algebraic_n_face (complex< D > &complex, unsigned face_id, bool sign)

Build an algebraic face handle from complex and face_id.

- algebraic_n_face (const n_face< N, D > &f, bool sign)

  Build an algebraic face handle from an mln::n_face.

- void invalidate ()

  Invalidate this handle.

- bool is_valid () const

  Is this handle valid?

  - bool sign () const

    Accessors.

  - void set_sign (bool sign)

    Set the sign of this face.

  - complex< D > cplx () const

    Accessors.

  - unsigned face_id () const

    Return the id of the face.

  - void set_cplx (const complex< D > &cplx)

    Set the complex the face belongs to.

  - unsigned n () const

    Return the dimension of the face.

  - void set_face_id (unsigned face_id)

    Set the id of the face.

  - void inc_face_id ()

    Increment the id of the face.

  - void dec_face_id ()

    Decrement the id of the face.

  - face_data< N, D > & data () const

    Return the mln::topo::face_data pointed by this handle.

  - std::vector< algebraic_n_face< N-1, D > > lower_dim_adj_faces () const

    Return an array of face handles pointing to adjacent (n-1)-faces.

  - std::vector< algebraic_n_face< N+1, D > > higher_dim_adj_faces () const

    Return an array of face handles pointing to adjacent (n+1)-faces.

10.338.1 Detailed Description

template< unsigned N, unsigned D > class mln::topo::algebraic_n_face< N, D >

Algebraic `N-face` handle in a complex. Contrary to an mln::topo::algebraic_face, the dimension of an mln::topo::algebraic_n_face is fixed.

Definition at line 50 of file algebraic_n_face.hh.

10.338.2 Constructor & Destructor Documentation

10.338.2.1 template< unsigned N, unsigned D > mln::topo::algebraic_n_face< N, D >::algebraic_n_face ( ) `[inline]`

Build a non-initialized algebraic face handle.

Definition at line 166 of file algebraic_n_face.hh.

References mln::topo::n_face< N, D >::is_valid().

10.338.2.2 template< unsigned N, unsigned D > mln::topo::algebraic_n_face< N, D >::algebraic_n_face (complex< D > & *complex*, unsigned *face_id*, bool *sign*) `[inline]`

Build an algebraic face handle from *complex* and *face_id*.

Definition at line 176 of file algebraic_n_face.hh.

10.338.2.3 template< unsigned N, unsigned D > mln::topo::algebraic_n_face< N, D >::algebraic_n_face (const n_face< N, D > & *f*, bool *sign*) `[inline]`

Build an algebraic face handle from an mln::n_face.

Definition at line 186 of file algebraic_n_face.hh.

10.338.3 Member Function Documentation

10.338.3.1 template< unsigned N, unsigned D > complex< D > mln::topo::n_face< N, D >::cplx ( ) const `[inline, inherited]`

Accessors.

Return the complex the face belongs to.

Definition at line 195 of file n_face.hh.

Referenced by mln::topo::n_faces_set< N, D >::add(), mln::topo::operator!=(), and mln::topo::operator==().

10.338.3.2 template< unsigned N, unsigned D > face_data< N, D > & mln::topo::n_face< N, D >::data ( ) const `[inline, inherited]`

Return the mln::topo::face_data pointed by this handle.

Definition at line 251 of file n_face.hh.

References mln::topo::n_face< N, D >::is_valid().

10.338.3.3 template<unsigned N, unsigned D> void mln::topo::n_face< N, D >::dec_face_id ( ) [inline, inherited]

Decrement the id of the face.

Definition at line 243 of file n_face.hh.

10.338.3.4 template<unsigned N, unsigned D> unsigned mln::topo::n_face< N, D >::face_id ( ) const [inline, inherited]

Return the id of the face.

Definition at line 211 of file n_face.hh.

Referenced by mln::topo::operator==().

10.338.3.5 template<unsigned N, unsigned D> std::vector< algebraic_n_face< N+1, D > > mln::topo::n_face< N, D >::higher_dim_adj_faces ( ) const [inline, inherited]

Return an array of face handles pointing to adjacent (n+1)-faces.

Definition at line 270 of file n_face.hh.

References mln::topo::n_face< N, D >::is_valid().

Referenced by mln::topo::edge().

10.338.3.6 template<unsigned N, unsigned D> void mln::topo::n_face< N, D >::inc_face_id ( ) [inline, inherited]

Increment the id of the face.

Definition at line 235 of file n_face.hh.

10.338.3.7 template<unsigned N, unsigned D> void mln::topo::n_face< N, D >::invalidate ( ) [inline, inherited]

Invalidate this handle.

Definition at line 187 of file n_face.hh.

References mln::topo::n_face< N, D >::set_face_id().

10.338.3.8 template<unsigned N, unsigned D> bool mln::topo::n_face< N, D >::is_valid ( ) const [inline, inherited]

Is this handle valid?

Definition at line 179 of file n_face.hh.

Referenced by mln::topo::algebraic_n_face< N, D >::algebraic_n_face(), mln::topo::n_face< N, D >::data(), mln::topo::n_face< N, D >::higher_dim_adj_faces(), mln::topo::n_face< N, D >::lower_dim_-adj_faces(), and mln::topo::n_face< N, D >::n_face().

10.338.3.9 template<unsigned N, unsigned D> std::vector< algebraic_n_face< N-1, D > > mln::topo::n_face< N, D >::lower_dim_adj_faces ( ) const `[inline, inherited]`

Return an array of face handles pointing to adjacent (n-1)-faces.

Definition at line 260 of file n_face.hh.

References mln::topo::n_face< N, D >::is_valid().

10.338.3.10 template<unsigned N, unsigned D> unsigned mln::topo::n_face< N, D >::n ( ) const `[inline, inherited]`

Return the dimension of the face.

Definition at line 203 of file n_face.hh.

10.338.3.11 template<unsigned N, unsigned D> void mln::topo::n_face< N, D >::set_cplx (const complex< D > & *cplx*) `[inline, inherited]`

Set the complex the face belongs to.

Definition at line 219 of file n_face.hh.

10.338.3.12 template<unsigned N, unsigned D> void mln::topo::n_face< N, D >::set_face_id (unsigned *face_id*) `[inline, inherited]`

Set the id of the face.

Definition at line 227 of file n_face.hh.

Referenced by mln::topo::n_face< N, D >::invalidate().

10.338.3.13 template<unsigned N, unsigned D> void mln::topo::algebraic_n_face< N, D >::set_sign (bool *sign*) `[inline]`

Set the sign of this face.

Definition at line 205 of file algebraic_n_face.hh.

10.338.3.14 template<unsigned N, unsigned D> bool mln::topo::algebraic_n_face< N, D >::sign ( ) const `[inline]`

Accessors.

Return the sign of this face.

Definition at line 197 of file algebraic_n_face.hh.

Referenced by mln::topo::operator==().

10.339 mln::topo::center_only_iter< D > Class Template Reference

Iterator on all the adjacent (n-1)-faces of the n-face of an mln::complex<D>.

`#include <center_only_iter.hh>`

Inherits forward_complex_relative_iterator_base< topo::face< D >, algebraic_face< D >, center_only_iter< D > >.

Public Member Functions

- void next ()

  Go to the next element.

  - center_only_iter ()

    Construction.

10.339.1 Detailed Description

template<unsigned D> class mln::topo::center_only_iter< D >

Iterator on all the adjacent (n-1)-faces of the n-face of an mln::complex<D>.

Template Parameters

D The dimension of the complex this iterator belongs to.

mln::topo::center_only_iter inherits from mln::topo::internal::forward_complex_relative_iterator_base, but it could inherit from mln::topo::internal::backward_complex_relative_iterator_base as well, since it always contains a single element, the center/reference face (and the traversal order is meaningless).

This iterator is essentially used to implement other iterators.

See also

mln::topo::centered_iter_adapter
mln::complex_lower_window
mln::complex_higher_window
mln::complex_lower_higher_window

Definition at line 73 of file center_only_iter.hh.

10.339.2 Constructor & Destructor Documentation

10.339.2.1 template<unsigned D> mln::topo::center_only_iter< D >::center_only_iter ( ) [inline]

Construction.

Definition at line 107 of file center_only_iter.hh.

10.339.3 Member Function Documentation

10.339.3.1 void mln::Iterator< center_only_iter< D > >::next ( ) `[inherited]`

Go to the next element.

Warning

This is a final method; iterator classes should not re-defined this method. The actual "next" operation has to be defined through the *next_* method.

Precondition

The iterator is valid.

10.340 mln::topo::centered_bkd_iter_adapter< D, I > Class Template Reference

Forward complex relative iterator adapters adding the central (reference) point to the set of iterated faces.

`#include <centered_iter_adapter.hh>`

Inherits complex_relative_iterator_sequence< I, center_only_iter< D >, centered_bkd_iter_adapter< D, I > >.

Public Member Functions

- void next ()

  Go to the next element.

- centered_bkd_iter_adapter ()

  Construction.

10.340.1 Detailed Description

template<unsigned D, typename I> class mln::topo::centered_bkd_iter_adapter< D, I >

Forward complex relative iterator adapters adding the central (reference) point to the set of iterated faces.

Template Parameters

D The dimension of the complex this iterator belongs to.

I The adapated complex relative iterator.

Definition at line 91 of file centered_iter_adapter.hh.

10.340.2 Constructor & Destructor Documentation

10.340.2.1 template<unsigned D, typename I > mln::topo::centered_bkd_iter_adapter< D, I >::centered_bkd_iter_adapter ( ) [inline]

Construction.

Definition at line 141 of file centered_iter_adapter.hh.

10.340.3 Member Function Documentation

10.340.3.1 void mln::Iterator< centered_bkd_iter_adapter< D, I > >::next ( ) [inherited]

Go to the next element.

Warning

This is a final method; iterator classes should not re-defined this method. The actual "next" operation has to be defined through the *next_* method.

Precondition

The iterator is valid.

10.341 mln::topo::centered_fwd_iter_adapter< D, I > Class Template Reference

Backward complex relative iterator adapters adding the central (reference) point to the set of iterated faces.

`#include <centered_iter_adapter.hh>`

Inherits complex_relative_iterator_sequence< center_only_iter< D >, I, centered_fwd_iter_adapter< D, I > >.

Public Member Functions

- void next ()

  Go to the next element.

- centered_fwd_iter_adapter ()

  Construction.

10.341.1 Detailed Description

template<unsigned D, typename I> class mln::topo::centered_fwd_iter_adapter< D, I >

Backward complex relative iterator adapters adding the central (reference) point to the set of iterated faces.

Template Parameters

D The dimension of the complex this iterator belongs to.

I The adapated complex relative iterator.

Definition at line 57 of file centered_iter_adapter.hh.

10.341.2 Constructor & Destructor Documentation

10.341.2.1 template<unsigned D, typename I > mln::topo::centered_fwd_iter_adapter< D, I >::centered_fwd_iter_adapter ( ) `[inline]`

Construction.

Definition at line 122 of file centered_iter_adapter.hh.

10.341.3 Member Function Documentation

10.341.3.1 void mln::Iterator< centered_fwd_iter_adapter< D, I > >::next ( ) `[inherited]`

Go to the next element.

Warning

This is a final method; iterator classes should not re-defined this method. The actual "next" operation has to be defined through the *next_* method.

Precondition

The iterator is valid.

10.342 mln::topo::complex< D > Class Template Reference

General complex of dimension `D`.

`#include <complex.hh>`

Public Types

- typedef face_bkd_iter< D > bkd_citer

  Backward mln::Iterator type iterating on all faces.

- typedef face_fwd_iter< D > fwd_citer

  Forward mln::Iterator type iterating on all faces.

Public Member Functions

- const void * addr () const

  Get the address of the data of this complex.

- complex ()

  Complex construction.

- n_face< 0u, D > add_face ()

  Add a 0-face to the complex.

- template<unsigned N>
  n_face< N+1, D > add_face (const n_faces_set< N, D > &adjacent_faces)

  Add a (N+1)-face to the complex (with `N` >= 0).

- unsigned nfaces () const

  Static manipulators.

- template<unsigned N>
  unsigned nfaces_of_static_dim () const

  Return the number of `N-faces`.

- unsigned nfaces_of_dim (unsigned n) const

  Dynamic manipulators.

- void print (std::ostream &ostr) const

  Pretty-printing.

- template<unsigned N>
  void print_faces (std::ostream &ostr) const

  Print the faces of dimension `N`.

10.342.1 Detailed Description

template<unsigned D> class mln::topo::complex< D >

General complex of dimension `D`.

Definition at line 87 of file complex.hh.

10.342.2 Member Typedef Documentation

10.342.2.1 template<unsigned D> typedef face_bkd_iter<D> mln::topo::complex< D >::bkd_citer

Backward mln::Iterator type iterating on all faces.

Definition at line 93 of file complex.hh.

10.342.2.2 template<unsigned D> typedef face_fwd_iter<D> mln::topo::complex< D >::fwd_citer

Forward mln::Iterator type iterating on all faces.

Definition at line 91 of file complex.hh.

10.342.3 Constructor & Destructor Documentation

10.342.3.1 template<unsigned D> mln::topo::complex< D >::complex ( ) [inline]

Complex construction.

Create a new `D-complex`.

Definition at line 471 of file complex.hh.

10.342.4 Member Function Documentation

10.342.4.1 template<unsigned D> n_face< 0u, D > mln::topo::complex< D >::add_face ( ) [inline]

Add a 0-face to the complex.

Definition at line 480 of file complex.hh.

10.342.4.2 template<unsigned D> template<unsigned N> n_face< N+1, D > mln::topo::complex< D >::add_face (const n_faces_set< N, D > & *adjacent_faces*) [inline]

Add a (N+1)-face to the complex (with `N` >= 0).

Parameters

adjacent_faces The (`N-1`)-faces adjacent to the new `N-face`.

Definition at line 493 of file complex.hh.

References mln::topo::n_faces_set< N, D >::faces().

10.342.4.3 template<unsigned D> const void * mln::topo::complex< D >::addr ( ) const [inline]

Get the address of the data of this complex.

This address is a concise and useful information to print and track the actual content of this complex.

Definition at line 699 of file complex.hh.

10.342.4.4 template<unsigned D> unsigned mln::topo::complex< D >::nfaces ( ) const [inline]

Static manipulators.

These methods use statically-known input.

Return the total number of faces, whatever their dimension.

Definition at line 579 of file complex.hh.

10.342.4.5 template<unsigned D> unsigned mln::topo::complex< D >::nfaces_of_dim (unsigned *n*) const [inline]

Dynamic manipulators.

These methods use input know as run time.

Return the number of *n-faces*.

Warning, this function has a complexity linear in term of N, since each n_faces_set is checked (the present implementation does not provide a direct access to n_faces_set through a dynamic value of the dimension).

Definition at line 601 of file complex.hh.

10.342.4.6 template<unsigned D> template<unsigned N> unsigned mln::topo::complex< D >::nfaces_of_static_dim ( ) const [inline]

Return the number of `N-faces`.

Definition at line 588 of file complex.hh.

10.342.4.7 template<unsigned D> void mln::topo::complex< D >::print (std::ostream & *ostr*) const [inline]

Pretty-printing.

Print the complex.

Definition at line 679 of file complex.hh.

Referenced by mln::topo::operator<<().

10.342.4.8 template<unsigned D> template<unsigned N> void mln::topo::complex< D >::print_faces (std::ostream & *ostr*) const [inline]

Print the faces of dimension `N`.

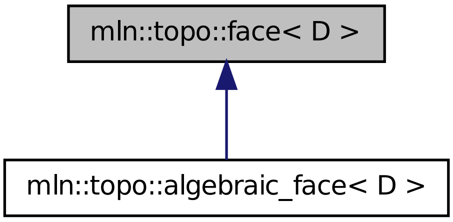
Definition at line 688 of file complex.hh.

10.343 mln::topo::face< D > Class Template Reference

Face handle in a complex; the face dimension is dynamic.

`#include <face.hh>`

Inheritance diagram for mln::topo::face< D >:



Public Member Functions

- face ()

  Build a non-initialized face handle.

- face (complex< D > &complex, unsigned n, unsigned face_id)

  Build a face handle from complex and face_id.

- template<unsigned N>
  face (const n_face< N, D > &f)

  Build a face handle from an mln::topo::n_face.

- void invalidate ()

  Invalidate this handle.

- bool is_valid () const

  Is this handle valid?

  - complex< D > cplx () const

    Accessors.

  - unsigned n () const

    Return the dimension of the face.

  - unsigned face_id () const

    Return the id of the face.

  - void set_cplx (const complex< D > &cplx)

    Set the complex the face belongs to.

  - void set_n (unsigned n)

    Set the dimension of the face.

  - void inc_n ()

Increment the dimension of the face.

- void dec_n ()

  Decrement the dimension of the face.

- void set_face_id (unsigned face_id)

  Set the id of the face.

- void inc_face_id ()

  Increment the id of the face.

- void dec_face_id ()

  Decrement the id of the face.

- template<unsigned N>
  face_data< N, D > & data () const

  Return the mln::topo::face_data pointed by this handle.

- std::vector< algebraic_face< D > > lower_dim_adj_faces () const

  Return an array of face handles pointing to adjacent (n-1)-faces.

- std::vector< algebraic_face< D > > higher_dim_adj_faces () const

  Return an array of face handles pointing to adjacent (n+1)-faces.

10.343.1 Detailed Description

template<unsigned D> class mln::topo::face< D >

Face handle in a complex; the face dimension is dynamic. Contrary to an mln::topo::n_face, the dimension of an mln::topo::face is not fixed.

Definition at line 64 of file face.hh.

10.343.2 Constructor & Destructor Documentation

10.343.2.1 template<unsigned D> mln::topo::face< D >::face ( ) [inline]

Build a non-initialized face handle.

Definition at line 178 of file face.hh.

10.343.2.2 template<unsigned D> mln::topo::face< D >::face (complex< D > & *complex*, unsigned *n*, unsigned *face_id*) [inline]

Build a face handle from *complex* and *face_id*.

Definition at line 187 of file face.hh.

10.343.2.3 template<unsigned D> template<unsigned N> mln::topo::face< D >::face (const n_face< N, D > & *f*) [inline]

Build a face handle from an mln::topo::n_face.

Definition at line 197 of file face.hh.

10.343.3 Member Function Documentation

10.343.3.1 template<unsigned D> complex< D > mln::topo::face< D >::cplx ( ) const [inline]

Accessors.

Return the complex the face belongs to.

Definition at line 224 of file face.hh.

Referenced by mln::complex_psite< D, G >::complex_psite(), mln::topo::operator!=(), and mln::topo::operator==().

10.343.3.2 template<unsigned D> template<unsigned N> face_data< N, D > & mln::topo::face< D >::data ( ) const [inline]

Return the mln::topo::face_data pointed by this handle.

Definition at line 305 of file face.hh.

References mln::topo::face< D >::is_valid().

10.343.3.3 template<unsigned D> void mln::topo::face< D >::dec_face_id ( ) [inline]

Decrement the id of the face.

Definition at line 296 of file face.hh.

10.343.3.4 template<unsigned D> void mln::topo::face< D >::dec_n ( ) [inline]

Decrement the dimension of the face.

Definition at line 272 of file face.hh.

10.343.3.5 template<unsigned D> unsigned mln::topo::face< D >::face_id ( ) const [inline]

Return the id of the face.

Definition at line 240 of file face.hh.

Referenced by mln::geom::complex_geometry< D, P >::operator()(), and mln::topo::operator==().

10.343.3.6 template<unsigned D> std::vector< algebraic_face< D > > mln::topo::face< D >::higher_dim_adj_faces ( ) const [inline]

Return an array of face handles pointing to adjacent (n+1)-faces.

Definition at line 370 of file face.hh.

10.343.3.7 template<unsigned D> void mln::topo::face< D >::inc_face_id ( ) [inline]

Increment the id of the face.

Definition at line 288 of file face.hh.

10.343.3.8 template<unsigned D> void mln::topo::face< D >::inc_n ( ) [inline]

Increment the dimension of the face.

Definition at line 264 of file face.hh.

10.343.3.9 template<unsigned D> void mln::topo::face< D >::invalidate ( ) [inline]

Invalidate this handle.

Definition at line 215 of file face.hh.

References mln::topo::face< D >::set_face_id(), and mln::topo::face< D >::set_n().

10.343.3.10 template<unsigned D> bool mln::topo::face< D >::is_valid ( ) const [inline]

Is this handle valid?

Definition at line 207 of file face.hh.

Referenced by mln::topo::face< D >::data().

10.343.3.11 template<unsigned D> std::vector< algebraic_face< D > > mln::topo::face< D >::lower_dim_adj_faces ( ) const [inline]

Return an array of face handles pointing to adjacent (n-1)-faces.

Definition at line 357 of file face.hh.

10.343.3.12 template<unsigned D> unsigned mln::topo::face< D >::n ( ) const [inline]

Return the dimension of the face.

Definition at line 232 of file face.hh.

Referenced by mln::topo::algebraic_face< D >::algebraic_face(), mln::geom::complex_geometry< D, P >::operator()(), and mln::topo::operator==().

10.343.3.13 template<unsigned D> void mln::topo::face< D >::set_cplx (const complex< D > & *cplx*) [inline]

Set the complex the face belongs to.

Definition at line 248 of file face.hh.

10.343.3.14 template< unsigned D > void mln::topo::face< D >::set_face_id (unsigned *face_id*) [inline]

Set the id of the face.

Definition at line 280 of file face.hh.

Referenced by mln::topo::face< D >::invalidate().

10.343.3.15 template< unsigned D > void mln::topo::face< D >::set_n (unsigned *n*) [inline]

Set the dimension of the face.

Definition at line 256 of file face.hh.

Referenced by mln::topo::face< D >::invalidate().

10.344 mln::topo::face_bkd_iter< D > Class Template Reference

Backward iterator on all the faces of an mln::complex<D>.

`#include <face_iter.hh>`

Inherits complex_set_iterator_base< topo::face< D >, face_bkd_iter< D > >.

Public Member Functions

- void next ()
  Go to the next element.

- face_bkd_iter ()
  Construction and assignment.

- void start ()
  Manipulation.

10.344.1 Detailed Description

template< unsigned D > class mln::topo::face_bkd_iter< D >

Backward iterator on all the faces of an mln::complex<D>.

Template Parameters

D The dimension of the complex this iterator belongs to.

Definition at line 112 of file face_iter.hh.

10.344.2 Constructor & Destructor Documentation

10.344.2.1 template<unsigned D> mln::topo::face_bkd_iter< D >::face_bkd_iter ( ) [inline]

Construction and assignment.

Definition at line 207 of file face_iter.hh.

10.344.3 Member Function Documentation

10.344.3.1 void mln::Iterator< face_bkd_iter< D > >::next ( ) [inherited]

Go to the next element.

Warning

This is a final method; iterator classes should not re-defined this method. The actual "next" operation has to be defined through the *next_* method.

Precondition

The iterator is valid.

10.344.3.2 template<unsigned D> void mln::topo::face_bkd_iter< D >::start ( ) [inline]

Manipulation.

Start an iteration.

Definition at line 224 of file face_iter.hh.

10.345 mln::topo::face_fwd_iter< D > Class Template Reference

Forward iterator on all the faces of an mln::complex<D>.

`#include <face_iter.hh>`

Inherits complex_set_iterator_base< topo::face< D >, face_fwd_iter< D > >.

Public Member Functions

- void next ()
  Go to the next element.
  - face_fwd_iter ()
    Construction and assignment.
  - void start ()
    Manipulation.

10.345.1 Detailed Description

template<unsigned D> class mln::topo::face_fwd_iter< D >

Forward iterator on all the faces of an mln::complex<D>.

Template Parameters

D The dimension of the complex this iterator belongs to.

Definition at line 69 of file face_iter.hh.

10.345.2 Constructor & Destructor Documentation

10.345.2.1 template<unsigned D> mln::topo::face_fwd_iter< D >::face_fwd_iter ( ) [inline]

Construction and assignment.

Definition at line 155 of file face_iter.hh.

10.345.3 Member Function Documentation

10.345.3.1 void mln::Iterator< face_fwd_iter< D > >::next ( ) [inherited]

Go to the next element.

Warning

This is a final method; iterator classes should not re-defined this method. The actual "next" operation has to be defined through the *next_* method.

Precondition

The iterator is valid.

10.345.3.2 template<unsigned D> void mln::topo::face_fwd_iter< D >::start ( ) [inline]

Manipulation.

Test if the iterator is valid.

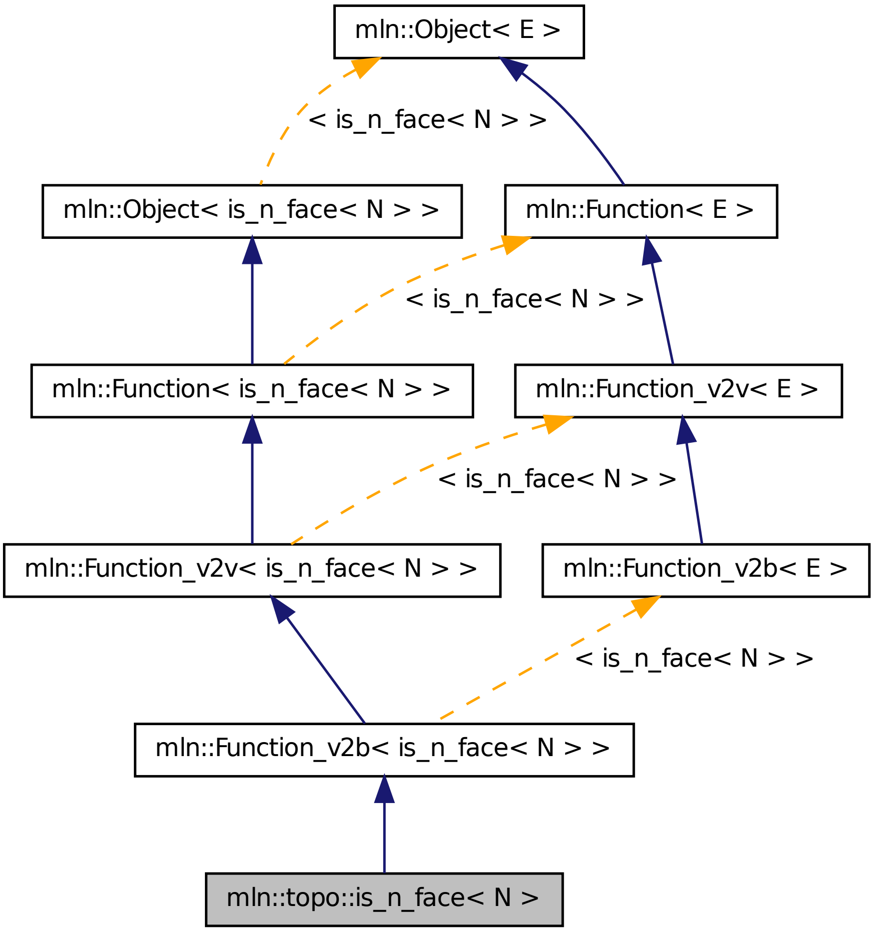
Definition at line 172 of file face_iter.hh.

10.346 mln::topo::is_n_face< N > Struct Template Reference

A functor testing wheter a mln::complex_psite is an `N` -face.

`#include <is_n_face.hh>`

Inheritance diagram for mln::topo::is_n_face< N >:



10.346.1 Detailed Description

template<unsigned N> struct mln::topo::is_n_face< N >

A functor testing wheter a mln::complex_psite is an `N` -face.

Definition at line 48 of file is_n_face.hh.

10.347 mln::topo::is_simple_2d_t< N > Struct Template Reference

Test if a point is simple or not.

```
#include <is_simple_2d.hh>
```

10.347.1 Detailed Description

template<typename N> struct mln::topo::is_simple_2d_t< N >

Test if a point is simple or not. A point of an object is simple if in its c8 neiborhood, there is exactly one connected component of the object, and only one connected component of the background Examples : (| == object, - = background)

- - | | P | Here p is simple in the c4 and c8 case. | | |

- | - | P | Here p is never simple. | | |

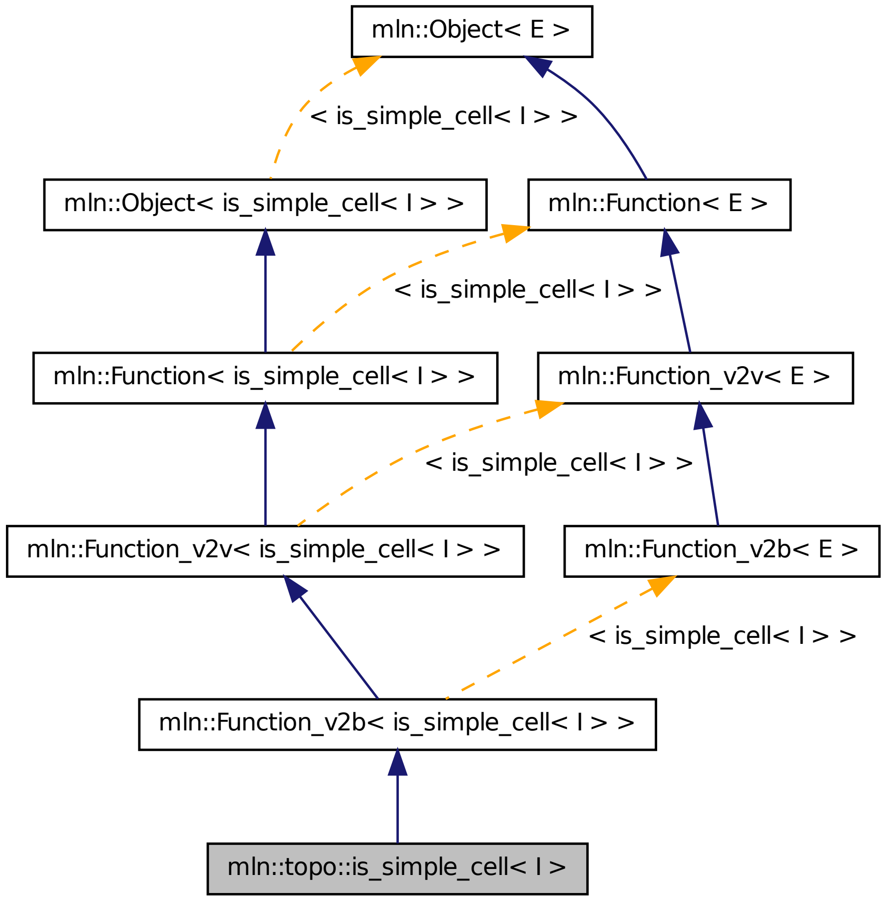
Definition at line 66 of file is_simple_2d.hh.

10.348 mln::topo::is_simple_cell< I > Class Template Reference

A predicate for the simplicity of a point based on the collapse property of the attachment.

`#include <is_simple_cell.hh>`

Inheritance diagram for mln::topo::is_simple_cell< I >:



Public Types

- typedef mln::complex_psite< D, G > psite

  Psite type.

- typedef bool result

  Result type of the functor.

Public Member Functions

- typedef mln_geom (I) G

  Geometry of the image.

- bool operator() (const mln::complex_psite< I::dim, mln_geom(I)> &p) const

  Based on the algorithm A2 from couprie.08.pami.

- void set_image (const mln::Image< I > &ima)

  Set the underlying image.

Static Public Attributes

- static const unsigned D = I::dim

  Dimension of the image (and therefore of the complex).

10.348.1 Detailed Description

template<typename I> class mln::topo::is_simple_cell< I >

A predicate for the simplicity of a point based on the collapse property of the attachment. The functor does not actually take a cell as input, but a face that is expected to be a D-facet.

Definition at line 57 of file is_simple_cell.hh.

10.348.2 Member Typedef Documentation

10.348.2.1 template<typename I > typedef mln::complex_psite<D, G> mln::topo::is_simple_cell< I >::psite

Psite type.

Definition at line 65 of file is_simple_cell.hh.

10.348.2.2 template<typename I > typedef bool mln::topo::is_simple_cell< I >::result

Result type of the functor.

Reimplemented from mln::Function_v2b< is_simple_cell< I > >.

Definition at line 68 of file is_simple_cell.hh.

10.348.3 Member Function Documentation

10.348.3.1 template<typename I > typedef mln::topo::is_simple_cell< I >::mln_geom (I)

Geometry of the image.

10.348.3.2 template<typename I > bool mln::topo::is_simple_cell< I >::operator() (const mln::complex_psite< I::dim, mln_geom(I)> & *p*) const [inline]

Based on the algorithm A2 from couprie.08.pami.

Definition at line 115 of file is_simple_cell.hh.

References mln::make::attachment().

10.348.3.3 template<typename I > void mln::topo::is_simple_cell< I >::set_image (const mln::Image< I > & *ima*) [inline]

Set the underlying image.

Definition at line 107 of file is_simple_cell.hh.

10.348.4 Member Data Documentation

10.348.4.1 template<typename I > const unsigned mln::topo::is_simple_cell< I >::D = I::dim [static]

Dimension of the image (and therefore of the complex).

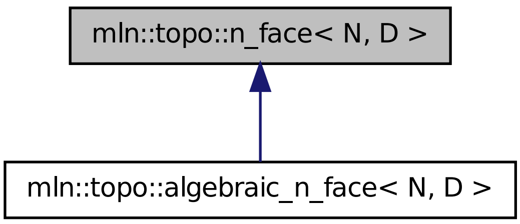
Definition at line 61 of file is_simple_cell.hh.

10.349 mln::topo::n_face< N, D > Class Template Reference

`N-face` handle in a complex.

`#include <n_face.hh>`

Inheritance diagram for mln::topo::n_face< N, D >:



Public Member Functions

- void invalidate ()

  Invalidate this handle.

- bool is_valid () const

  Is this handle valid?

- n_face ()

  Build a non-initialized face handle.

- n_face (complex< D > &complex, unsigned face_id)
  Build a face handle from complex and face_id.

  - complex< D > cplx () const
    Accessors.
  - unsigned face_id () const
    Return the id of the face.
  - void set_cplx (const complex< D > &cplx)
    Set the complex the face belongs to.
  - unsigned n () const
    Return the dimension of the face.
  - void set_face_id (unsigned face_id)
    Set the id of the face.
  - void inc_face_id ()
    Increment the id of the face.
  - void dec_face_id ()
    Decrement the id of the face.
  - face_data< N, D > & data () const
    Return the mln::topo::face_data pointed by this handle.
  - std::vector< algebraic_n_face< N-1, D > > lower_dim_adj_faces () const
    Return an array of face handles pointing to adjacent (n-1)-faces.
  - std::vector< algebraic_n_face< N+1, D > > higher_dim_adj_faces () const
    Return an array of face handles pointing to adjacent (n+1)-faces.

10.349.1 Detailed Description

template<unsigned N, unsigned D> class mln::topo::n_face< N, D >

`N-face` handle in a complex. Contrary to an mln::topo::face, the dimension of an mln::topo::n_face is fixed.

Definition at line 61 of file n_face.hh.

10.349.2 Constructor & Destructor Documentation

10.349.2.1 template<unsigned N, unsigned D> mln::topo::n_face< N, D >::n_face ( ) `[inline]`

Build a non-initialized face handle.

Definition at line 159 of file n_face.hh.

References mln::topo::n_face< N, D >::is_valid().

10.349.2.2 template<unsigned N, unsigned D> mln::topo::n_face< N, D >::n_face (complex< D > & *complex*, unsigned *face_id*) [inline]

Build a face handle from *complex* and *face_id*.

Definition at line 169 of file n_face.hh.

10.349.3 Member Function Documentation

10.349.3.1 template<unsigned N, unsigned D> complex< D > mln::topo::n_face< N, D >::cplx ( ) const [inline]

Accessors.

Return the complex the face belongs to.

Definition at line 195 of file n_face.hh.

Referenced by mln::topo::n_faces_set< N, D >::add(), mln::topo::operator!=(), and mln::topo::operator==().

10.349.3.2 template<unsigned N, unsigned D> face_data< N, D > & mln::topo::n_face< N, D >::data ( ) const [inline]

Return the mln::topo::face_data pointed by this handle.

Definition at line 251 of file n_face.hh.

References mln::topo::n_face< N, D >::is_valid().

10.349.3.3 template<unsigned N, unsigned D> void mln::topo::n_face< N, D >::dec_face_id ( ) [inline]

Decrement the id of the face.

Definition at line 243 of file n_face.hh.

10.349.3.4 template<unsigned N, unsigned D> unsigned mln::topo::n_face< N, D >::face_id ( ) const [inline]

Return the id of the face.

Definition at line 211 of file n_face.hh.

Referenced by mln::topo::operator==().

10.349.3.5 template<unsigned N, unsigned D> std::vector< algebraic_n_face< N+1, D > > mln::topo::n_face< N, D >::higher_dim_adj_faces ( ) const [inline]

Return an array of face handles pointing to adjacent (n+1)-faces.

Definition at line 270 of file n_face.hh.

References mln::topo::n_face< N, D >::is_valid().

Referenced by mln::topo::edge().

10.349.3.6 template<unsigned N, unsigned D> void mln::topo::n_face< N, D >::inc_face_id ( ) [inline]

Increment the id of the face.

Definition at line 235 of file n_face.hh.

10.349.3.7 template<unsigned N, unsigned D> void mln::topo::n_face< N, D >::invalidate ( ) [inline]

Invalidate this handle.

Definition at line 187 of file n_face.hh.

References mln::topo::n_face< N, D >::set_face_id().

10.349.3.8 template<unsigned N, unsigned D> bool mln::topo::n_face< N, D >::is_valid ( ) const [inline]

Is this handle valid?

Definition at line 179 of file n_face.hh.

Referenced by mln::topo::algebraic_n_face< N, D >::algebraic_n_face(), mln::topo::n_face< N, D >::data(), mln::topo::n_face< N, D >::higher_dim_adj_faces(), mln::topo::n_face< N, D >::lower_dim_adj_faces(), and mln::topo::n_face< N, D >::n_face().

10.349.3.9 template<unsigned N, unsigned D> std::vector< algebraic_n_face< N-1, D > > mln::topo::n_face< N, D >::lower_dim_adj_faces ( ) const [inline]

Return an array of face handles pointing to adjacent (n-1)-faces.

Definition at line 260 of file n_face.hh.

References mln::topo::n_face< N, D >::is_valid().

10.349.3.10 template<unsigned N, unsigned D> unsigned mln::topo::n_face< N, D >::n ( ) const [inline]

Return the dimension of the face.

Definition at line 203 of file n_face.hh.

10.349.3.11 template<unsigned N, unsigned D> void mln::topo::n_face< N, D >::set_cplx (const complex< D > & *cplx*) [inline]

Set the complex the face belongs to.

Definition at line 219 of file n_face.hh.

10.349.3.12 template<unsigned N, unsigned D> void mln::topo::n_face< N, D >::set_face_id (unsigned *face_id*) [inline]

Set the id of the face.

Definition at line 227 of file n_face.hh.

Referenced by mln::topo::n_face< N, D >::invalidate().

10.350 mln::topo::n_face_bkd_iter< D > Class Template Reference

Backward iterator on all the faces of an mln::complex<D>.

`#include <n_face_iter.hh>`

Inherits complex_set_iterator_base< topo::face< D >, n_face_bkd_iter< D > >.

Public Member Functions

- void next ()
  Go to the next element.
- n_face_bkd_iter ()
  Construction and assignment.
- void start ()
  Manipulation.
- unsigned n () const
  Accessors.

10.350.1 Detailed Description

template<unsigned D> class mln::topo::n_face_bkd_iter< D >

Backward iterator on all the faces of an mln::complex<D>.

Template Parameters

D The dimension of the complex this iterator belongs to.

Definition at line 127 of file n_face_iter.hh.

10.350.2 Constructor & Destructor Documentation

10.350.2.1 template<unsigned D> mln::topo::n_face_bkd_iter< D >::n_face_bkd_iter ( ) [inline]

Construction and assignment.

Definition at line 256 of file n_face_iter.hh.

10.350.3 Member Function Documentation

10.350.3.1 template<unsigned D> unsigned mln::topo::n_face_bkd_iter< D >::n ( ) const [inline]

Accessors.

Shortcuts to face_'s accessors.

Definition at line 308 of file n_face_iter.hh.

Referenced by mln::topo::n_face_bkd_iter< D >::start().

10.350.3.2 void mln::Iterator< n_face_bkd_iter< D > >::next ( ) [inherited]

Go to the next element.

Warning

This is a final method; iterator classes should not re-defined this method. The actual "next" operation has to be defined through the *next_* method.

Precondition

The iterator is valid.

10.350.3.3 template<unsigned D> void mln::topo::n_face_bkd_iter< D >::start ( ) [inline]

Manipulation.

Start an iteration.

Definition at line 275 of file n_face_iter.hh.

References mln::topo::n_face_bkd_iter< D >::n().

10.351 mln::topo::n_face_fwd_iter< D > Class Template Reference

Forward iterator on all the faces of an mln::complex<D>.

`#include <n_face_iter.hh>`

Inherits complex_set_iterator_base< topo::face< D >, n_face_fwd_iter< D > >.

Public Member Functions

- void next ()
  Go to the next element.

- n_face_fwd_iter ()
  Construction and assignment.

- void start ()
  Manipulation.

- unsigned n () const
  Accessors.

10.351.1 Detailed Description

template<unsigned D> class mln::topo::n_face_fwd_iter< D >

Forward iterator on all the faces of an mln::complex<D>.

Template Parameters

D The dimension of the complex this iterator belongs to.

Definition at line 72 of file n_face_iter.hh.

10.351.2 Constructor & Destructor Documentation

10.351.2.1 template<unsigned D> mln::topo::n_face_fwd_iter< D >::n_face_fwd_iter ( ) [inline]

Construction and assignment.

Definition at line 183 of file n_face_iter.hh.

10.351.3 Member Function Documentation

10.351.3.1 template<unsigned D> unsigned mln::topo::n_face_fwd_iter< D >::n ( ) const [inline]

Accessors.

Shortcuts to face_'s accessors.

Definition at line 235 of file n_face_iter.hh.

10.351.3.2 void mln::Iterator< n_face_fwd_iter< D > >::next ( ) [inherited]

Go to the next element.

Warning

This is a final method; iterator classes should not re-defined this method. The actual "next" operation has to be defined through the *next_* method.

Precondition

The iterator is valid.

10.351.3.3 template<unsigned D> void mln::topo::n_face_fwd_iter< D >::start ( ) [inline]

Manipulation.

Test if the iterator is valid.

Definition at line 202 of file n_face_iter.hh.

10.352 mln::topo::n_faces_set< N, D > Class Template Reference

Set of face handles of dimension N.

`#include <n_faces_set.hh>`

Public Types

- typedef std::vector< algebraic_n_face< N, D > > faces_type

    The type of the set of face handles.

Public Member Functions

- void add (const algebraic_n_face< N, D > &f)

    Append an algebraic face f to the set.

- void reserve (size_t n)

    Reserve n cells in the set.

    - const faces_type & faces () const

        Accessors.

10.352.1 Detailed Description

template<unsigned N, unsigned D> class mln::topo::n_faces_set< N, D >

Set of face handles of dimension N.

Definition at line 56 of file n_faces_set.hh.

10.352.2 Member Typedef Documentation

10.352.2.1 template<unsigned N, unsigned D> typedef std::vector< algebraic_n_face<N, D> > mln::topo::n_faces_set< N, D >::faces_type

The type of the set of face handles.

Definition at line 70 of file n_faces_set.hh.

10.352.3 Member Function Documentation

10.352.3.1 template<unsigned N, unsigned D> void mln::topo::n_faces_set< N, D >::add (const algebraic_n_face< N, D > & *f*) [inline]

Append an algebraic face *f* to the set.

Definition at line 171 of file n_faces_set.hh.

References mln::topo::n_face< N, D >::cplx().

Referenced by mln::topo::operator+(), and mln::topo::operator-().

10.352.3.2 template<unsigned N, unsigned D> const std::vector< algebraic_n_face< N, D > > & mln::topo::n_faces_set< N, D >::faces ( ) const [inline]

Accessors.

Return the set of handles.

Definition at line 190 of file n_faces_set.hh.

Referenced by mln::topo::complex< D >::add_face().

10.352.3.3 template<unsigned N, unsigned D> void mln::topo::n_faces_set< N, D >::reserve (size_t *n*) [inline]

Reserve *n* cells in the set.

This methods does not change the content of *faces_*; it only pre-allocate memory. Method reserve is provided for efficiency purpose, and its use is completely optional.

Definition at line 182 of file n_faces_set.hh.

10.353 mln::topo::skeleton::is_simple_point< N > Struct Template Reference

`#include <is_simple_point.hh>`

10.353.1 Detailed Description

template<typename N> struct mln::topo::skeleton::is_simple_point< N >

Tell if a point is simple or not. A point of an object is simple if in its c8 neiborhood, there is exactly one connected component of the object, and only one connected component of the background Examples : (| == object, - = background)

```
- - |
| P | Here p is simple in the c4 and c8 case.
| | |

- | -
| P | Here p is never simple.
| | |
```

Definition at line 68 of file is_simple_point.hh.

10.354 mln::topo::static_n_face_bkd_iter< N, D > Class Template Reference

Backward iterator on all the `N-faces` of a mln::complex<D>.

`#include <static_n_face_iter.hh>`

Inherits complex_set_iterator_base< topo::face< D >, static_n_face_bkd_iter< N, D > >.

Public Member Functions

- void next ()
  Go to the next element.

- static_n_face_bkd_iter ()
  Construction and assignment.

- void start ()
  Manipulation.

10.354.1 Detailed Description

template<unsigned N, unsigned D> class mln::topo::static_n_face_bkd_iter< N, D >

Backward iterator on all the `N-faces` of a mln::complex<D>.

Template Parameters

N The dimension of the face associated to this iterator.

D The dimension of the complex this iterator belongs to.

Definition at line 101 of file static_n_face_iter.hh.

10.354.2 Constructor & Destructor Documentation

10.354.2.1 template<unsigned N, unsigned D> mln::topo::static_n_face_bkd_iter< N, D >::static_n_face_bkd_iter ( ) `[inline]`

Construction and assignment.

Definition at line 194 of file static_n_face_iter.hh.

10.354.3 Member Function Documentation

10.354.3.1 void mln::Iterator< static_n_face_bkd_iter< N, D > >::next ( ) [inherited]

Go to the next element.

Warning

This is a final method; iterator classes should not re-defined this method. The actual "next" operation has to be defined through the *next_* method.

Precondition

The iterator is valid.

10.354.3.2 template<unsigned N, unsigned D> void mln::topo::static_n_face_bkd_iter< N, D >::start ( ) [inline]

Manipulation.

Start an iteration.

Definition at line 217 of file static_n_face_iter.hh.

10.355 mln::topo::static_n_face_fwd_iter< N, D > Class Template Reference

Forward iterator on all the `N-faces` of a mln::complex<D>.

`#include <static_n_face_iter.hh>`

Inherits complex_set_iterator_base< topo::face< D >, static_n_face_fwd_iter< N, D > >.

Public Member Functions

- void next ()
  Go to the next element.

  - static_n_face_fwd_iter ()
    Construction and assignment.

  - void start ()
    Manipulation.

10.355.1 Detailed Description

template<unsigned N, unsigned D> class mln::topo::static_n_face_fwd_iter< N, D >

Forward iterator on all the `N-faces` of a mln::complex<D>.

Template Parameters

N The dimension of the face associated to this iterator.

D The dimension of the complex this iterator belongs to.

Definition at line 55 of file static_n_face_iter.hh.

10.355.2 Constructor & Destructor Documentation

10.355.2.1 template<unsigned N, unsigned D> mln::topo::static_n_face_fwd_iter< N, D >::static_n_face_fwd_iter ( ) [inline]

Construction and assignment.

Definition at line 145 of file static_n_face_iter.hh.

10.355.3 Member Function Documentation

10.355.3.1 void mln::Iterator< static_n_face_fwd_iter< N, D > >::next ( ) [inherited]

Go to the next element.

Warning

This is a final method; iterator classes should not re-defined this method. The actual "next" operation has to be defined through the *next_* method.

Precondition

The iterator is valid.

10.355.3.2 template<unsigned N, unsigned D> void mln::topo::static_n_face_fwd_iter< N, D >::start ( ) [inline]

Manipulation.

Test if the iterator is valid.

Definition at line 168 of file static_n_face_iter.hh.

10.356 mln::tr_image< S, I, T > Struct Template Reference

Transform an image by a given transformation.

`#include <tr_image.hh>`

Inherits image_identity< I, S, tr_image< S, I, T > >.

Public Types

- typedef I::value lvalue

Return type of read-write access.

- typedef I::psite psite

  Point_Site associated type.

- typedef I::value rvalue

  Return type of read-only access.

- typedef I::site site

  Site associated type.

- typedef tr_image< S, tag::image_< I >, T > skeleton

  Skeleton.

- typedef I::value value

  Value associated type.

Public Member Functions

- const S & domain () const

  Return the domain morpher.

- bool has (const vec_t &v) const

  Test if a pixel value is accessible at v.

- bool is_valid () const

  Test if this image has been initialized.

- I::value operator() (const psite &p) const

  Read-only access of pixel value at point site p.

- void set_tr (T &tr)

  Set the transformation.

- const T & tr () const

  Return the underlying transformation.

- tr_image (const S &s, const I &ima, const T &tr)

  Constructors.

10.356.1 Detailed Description

template<typename S, typename I, typename T> struct mln::tr_image< S, I, T >

Transform an image by a given transformation.

Definition at line 83 of file tr_image.hh.

10.356.2 Member Typedef Documentation

10.356.2.1 template<typename S, typename I, typename T> typedef I ::value mln::tr_image< S, I, T >::lvalue

Return type of read-write access.

Definition at line 101 of file tr_image.hh.

10.356.2.2 template<typename S, typename I, typename T> typedef I ::psite mln::tr_image< S, I, T >::psite

Point_Site associated type.

Definition at line 92 of file tr_image.hh.

10.356.2.3 template<typename S, typename I, typename T> typedef I ::value mln::tr_image< S, I, T >::rvalue

Return type of read-only access.

Definition at line 104 of file tr_image.hh.

10.356.2.4 template<typename S, typename I, typename T> typedef I ::site mln::tr_image< S, I, T >::site

Site associated type.

Definition at line 95 of file tr_image.hh.

10.356.2.5 template<typename S, typename I, typename T> typedef tr_image< S, tag::image_<I>, T> mln::tr_image< S, I, T >::skeleton

Skeleton.

Definition at line 107 of file tr_image.hh.

10.356.2.6 template<typename S, typename I, typename T> typedef I ::value mln::tr_image< S, I, T >::value

Value associated type.

Definition at line 98 of file tr_image.hh.

10.356.3 Constructor & Destructor Documentation

10.356.3.1 template<typename S , typename I , typename T > mln::tr_image< S, I, T >::tr_image (const S & *s*, const I & *ima*, const T & *tr*) `[inline]`

Constructors.

Definition at line 174 of file tr_image.hh.

10.356.4 Member Function Documentation

10.356.4.1 template<typename S , typename I , typename T > const S & mln::tr_image< S, I, T >::domain ( ) const [inline]

Return the domain morpher.

Definition at line 247 of file tr_image.hh.

10.356.4.2 template<typename S , typename I , typename T > bool mln::tr_image< S, I, T >::has (const vec_t & *v*) const [inline]

Test if a pixel value is accessible at v.

Definition at line 200 of file tr_image.hh.

10.356.4.3 template<typename S , typename I , typename T > bool mln::tr_image< S, I, T >::is_valid ( ) const [inline]

Test if this image has been initialized.

Definition at line 191 of file tr_image.hh.

10.356.4.4 template<typename S , typename I , typename T > I::value mln::tr_image< S, I, T >::operator() (const psite & *p*) const [inline]

Read-only access of pixel value at point site p.

Mutable access is only OK for reading (not writing).

Definition at line 213 of file tr_image.hh.

10.356.4.5 template<typename S , typename I , typename T > void mln::tr_image< S, I, T >::set_tr (T & *tr*) [inline]

Set the transformation.

Definition at line 231 of file tr_image.hh.

10.356.4.6 template<typename S , typename I , typename T > const T & mln::tr_image< S, I, T >::tr ( ) const [inline]

Return the underlying transformation.

Definition at line 239 of file tr_image.hh.

10.357 mln::unproject_image< I, D, F > Struct Template Reference

Un-projects an image.

#include <unproject_image.hh>

Inherits image_domain_morpher< I, D, unproject_image< I, D, F > >.

Public Member Functions

- const D & domain () const

  Give the definition domain.

- internal::morpher_lvalue_< I >::ret operator() (const typename D::psite &p)

  Read-write access to the image value located at point `p`.

- I::rvalue operator() (const typename D::psite &p) const

  Read-only access to the image value located at point `p`.

- unproject_image ()

  Constructor without argument.

- unproject_image (I &ima, const D &dom, const F &f)

  Constructor from an image `ima`*, a domain* `dom`*, and a function* `f`*.*

10.357.1 Detailed Description

template<typename I, typename D, typename F> struct mln::unproject_image< I, D, F >

Un-projects an image.

Definition at line 96 of file unproject_image.hh.

10.357.2 Constructor & Destructor Documentation

10.357.2.1 template<typename I , typename D , typename F > mln::unproject_image< I, D, F >::unproject_image ( ) [inline]

Constructor without argument.

Definition at line 182 of file unproject_image.hh.

10.357.2.2 template<typename I , typename D , typename F > mln::unproject_image< I, D, F >::unproject_image (I & *ima*, const D & *dom*, const F & *f*) [inline]

Constructor from an image `ima`, a domain `dom`, and a function `f`.

Definition at line 188 of file unproject_image.hh.

10.357.3 Member Function Documentation

10.357.3.1 template<typename I , typename D , typename F > const D & mln::unproject_image< I, D, F >::domain ( ) const [inline]

Give the definition domain.

Definition at line 205 of file unproject_image.hh.

10.357.3.2 template<typename I , typename D , typename F > internal::morpher_lvalue_< I >::ret mln::unproject_image< I, D, F >::operator() (const typename D::psite & *p*) [inline]

Read-write access to the image value located at point p.

Definition at line 225 of file unproject_image.hh.

10.357.3.3 template<typename I , typename D , typename F > I::rvalue mln::unproject_image< I, D, F >::operator() (const typename D::psite & *p*) const [inline]

Read-only access to the image value located at point p.

Definition at line 214 of file unproject_image.hh.

10.358 mln::util::adjacency_matrix< V > Class Template Reference

A class of adjacency matrix.

`#include <adjacency_matrix.hh>`

Inherits adjacency_matrix_impl_selector< V, mln::metal::equal< mln::trait::value_< V >::quant, trait::value::quant::low >::eval >.

Public Member Functions

- adjacency_matrix ()

  Constructors.

- adjacency_matrix (const V &nelements)

  Construct an adjacency matrix with `nelements` *elements maximum.*

10.358.1 Detailed Description

template<typename V = def::coord> class mln::util::adjacency_matrix< V >

A class of adjacency matrix. Support low and high quantification value types. In case of low quantification value type, it uses an image2d to store adjacency information. In case of high quantification value type, it uses a util::set to store the adjacency information.

Definition at line 136 of file adjacency_matrix.hh.

10.358.2 Constructor & Destructor Documentation

10.358.2.1 template<typename V > mln::util::adjacency_matrix< V >::adjacency_matrix ( )

Constructors.

@{

Default

Definition at line 308 of file adjacency_matrix.hh.

10.358.2.2 template<typename V > mln::util::adjacency_matrix< V >::adjacency_matrix (const V & *nelements*)

Construct an adjacency matrix with `nelements` elements maximum.

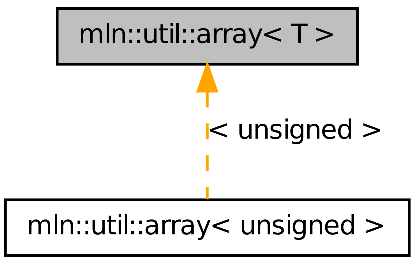
Definition at line 315 of file adjacency_matrix.hh.

10.359 mln::util::array< T > Class Template Reference

A dynamic array class.

`#include <array.hh>`

Inheritance diagram for mln::util::array< T >:



Public Types

- typedef T element

  Element associated type.

- typedef T result

  Returned value types.

- typedef array_fwd_iter< T > fwd_eiter

  Iterator types
  Forward iterator associated type.

- typedef array_bkd_iter< T > bkd_eiter

  Backward iterator associated type.

- typedef fwd_eiter eiter

  Iterator associated type.

Public Member Functions

- array< T > & append (const T &elt)

  Add the element `elt` *at the end of this array.*

- template<typename U >
  array< T > & append (const array< U > &other)

  Add the elements of `other` *at the end of this array.*

- void clear ()

  Empty the array.

- void fill (const T &value)

  Fill the whole array with value `value`*.*

- bool is_empty () const

  Test if the array is empty.

- ro_result last () const

  Return the last element.

- mutable_result last ()

  Return the last element.

- std::size_t memory_size () const

  Return the size of this array in memory.

- unsigned nelements () const

  Return the number of elements of the array.

- ro_result operator() (unsigned i) const

  Return the `i-th` *element of the array.*

- mutable_result operator() (unsigned i)

  Return the `i-th` *element of the array.*

- ro_result operator[ ] (unsigned i) const

  Return the `i-th` *element of the array.*

- mutable_result operator[ ] (unsigned i)

  Return the `i-th` *element of the array.*

- void reserve (unsigned n)

  Reserve memory for `n` *elements.*

- void resize (unsigned n)

Resize this array to `n` *elements.*

- void resize (unsigned n, const T &value)

  Resize this array to `n` *elements with* `value` *as value.*

- unsigned size () const

  Return the number of elements of the array.

- const std::vector< T > & std_vector () const

  Return the corresponding std::vector of elements.

  - array ()

    Constructors
    Constructor without arguments.

  - array (unsigned n)

    Construct a new array and resize it to
    elements.

  - array (unsigned n, const T &value)

    Construct a new array, resize it to
    elements and fill it with `default_value`*.*

10.359.1 Detailed Description

template<typename T> class mln::util::array< T >

A dynamic array class. Elements are stored by copy. Implementation is lazy.

The parameter `T` is the element type, which shall not be const-qualified.

Definition at line 99 of file util/array.hh.

10.359.2 Member Typedef Documentation

10.359.2.1 template<typename T> typedef array_bkd_iter<T> mln::util::array< T >::bkd_eiter

Backward iterator associated type.

Definition at line 124 of file util/array.hh.

10.359.2.2 template<typename T> typedef fwd_eiter mln::util::array< T >::eiter

Iterator associated type.

Definition at line 127 of file util/array.hh.

10.359.2.3 template<typename T> typedef T mln::util::array< T >::element

Element associated type.

Definition at line 107 of file util/array.hh.

10.359.2.4 template<typename T> typedef array_fwd_iter<T> mln::util::array< T >::fwd_eiter

Iterator types

Forward iterator associated type.

Definition at line 121 of file util/array.hh.

10.359.2.5 template<typename T> typedef T mln::util::array< T >::result

Returned value types.

Related to the Function_v2v concept.

Definition at line 112 of file util/array.hh.

10.359.3 Constructor & Destructor Documentation

10.359.3.1 template<typename T > mln::util::array< T >::array ( ) `[inline]`

Constructors

Constructor without arguments.

Definition at line 427 of file util/array.hh.

10.359.3.2 template<typename T > mln::util::array< T >::array (unsigned *n*) `[inline]`

Construct a new array and resize it to

elements.

Definition at line 433 of file util/array.hh.

10.359.3.3 template<typename T> mln::util::array< T >::array (unsigned *n*, const T & *value*) `[inline]`

Construct a new array, resize it to

elements and fill it with `default_value`.

Definition at line 440 of file util/array.hh.

10.359.4 Member Function Documentation

10.359.4.1 template<typename T> array< T > & mln::util::array< T >::append (const T & *elt*) `[inline]`

Add the element `elt` at the end of this array.

Definition at line 472 of file util/array.hh.

Referenced by mln::io::dicom::get_header(), and mln::io::plot::load().

10.359.4.2 template<typename T > template<typename U > array< T > & mln::util::array< T >::append (const array< U > & *other*) [inline]

Add the elements of `other` at the end of this array.

Definition at line 482 of file util/array.hh.

References mln::util::array< T >::is_empty(), and mln::util::array< T >::std_vector().

10.359.4.3 template<typename T > void mln::util::array< T >::clear ( ) [inline]

Empty the array.

All elements contained in the array are destroyed.

Postcondition

is_empty() == true

Definition at line 495 of file util/array.hh.

References mln::util::array< T >::is_empty().

Referenced by mln::io::plot::load().

10.359.4.4 template<typename T> void mln::util::array< T >::fill (const T & *value*) [inline]

Fill the whole array with value `value`.

Definition at line 504 of file util/array.hh.

10.359.4.5 template<typename T > bool mln::util::array< T >::is_empty ( ) const [inline]

Test if the array is empty.

Definition at line 578 of file util/array.hh.

References mln::util::array< T >::nelements().

Referenced by mln::util::array< T >::append(), mln::util::array< T >::clear(), mln::make::image3d(), and mln::io::pnms::load().

10.359.4.6 template<typename T > array< T >::ro_result mln::util::array< T >::last ( ) const [inline]

Return the last element.

Definition at line 562 of file util/array.hh.

References mln::util::array< T >::nelements().

10.359.4.7 template<typename T > array< T >::mutable_result mln::util::array< T >::last ( ) [inline]

Return the last element.

Definition at line 570 of file util/array.hh.

References mln::util::array< T >::nelements().

10.359.4.8 template<typename T > std::size_t mln::util::array< T >::memory_size ( ) const [inline]

Return the size of this array in memory.

Definition at line 602 of file util/array.hh.

References mln::util::array< T >::nelements().

10.359.4.9 template<typename T > unsigned mln::util::array< T >::nelements ( ) const [inline]

Return the number of elements of the array.

Definition at line 520 of file util/array.hh.

Referenced by mln::labeling::fill_holes(), mln::make::image3d(), mln::util::array< T >::is_-empty(), mln::util::array< T >::last(), mln::io::pnms::load(), mln::util::array< T >::memory_size(), mln::util::operator<<(), mln::util::array< T >::operator[ ](), mln::io::plot::save(), and mln::util::array< T >::size().

10.359.4.10 template<typename T > array< T >::ro_result mln::util::array< T >::operator() (unsigned *i*) const [inline]

Return the `i-th` element of the array.

Precondition

i < nelements()

Definition at line 528 of file util/array.hh.

10.359.4.11 template<typename T > array< T >::mutable_result mln::util::array< T >::operator() (unsigned *i*) [inline]

Return the `i-th` element of the array.

Precondition

i < nelements()

Definition at line 536 of file util/array.hh.

10.359.4.12 template<typename T > array< T >::ro_result mln::util::array< T >::operator[] (unsigned *i*) const [inline]

Return the `i-th` element of the array.

Precondition

i < nelements()

Definition at line 544 of file util/array.hh.

References mln::util::array< T >::nelements().

10.359.4.13 template<typename T > array< T >::mutable_result mln::util::array< T >::operator[] (unsigned *i*) [inline]

Return the `i-th` element of the array.

Precondition

i < nelements()

Definition at line 553 of file util/array.hh.

References mln::util::array< T >::nelements().

10.359.4.14 template<typename T > void mln::util::array< T >::reserve (unsigned *n*) [inline]

Reserve memory for `n` elements.

Definition at line 448 of file util/array.hh.

10.359.4.15 template<typename T > void mln::util::array< T >::resize (unsigned *n*) [inline]

Resize this array to `n` elements.

Definition at line 456 of file util/array.hh.

Referenced by mln::labeling::impl::generic::compute(), mln::labeling::impl::compute_fastest(), mln::io::raw::get_header(), and mln::io::dump::get_header().

10.359.4.16 template<typename T> void mln::util::array< T >::resize (unsigned *n*, const T & *value*) [inline]

Resize this array to `n` elements with `value` as value.

Definition at line 464 of file util/array.hh.

10.359.4.17 template<typename T > unsigned mln::util::array< T >::size ( ) const [inline]

Return the number of elements of the array.

Added for compatibility with fun::i2v::array.

See also

nelements

Definition at line 512 of file util/array.hh.

References mln::util::array< T >::nelements().

Referenced by mln::labeling::impl::generic::compute(), mln::labeling::impl::compute_fastest(), mln::value::lut_vec< S, T >::lut_vec(), and mln::labeled_image_base< I, E >::update_data().

10.359.4.18 template<typename T > const std::vector< T > & mln::util::array< T >::std_vector ( ) const [inline]

Return the corresponding std::vector of elements.

Definition at line 586 of file util/array.hh.

Referenced by mln::util::array< T >::append(), mln::value::lut_vec< S, T >::lut_vec(), and mln::util::operator==().

10.360 mln::util::branch< T > Class Template Reference

Class of generic branch.

`#include <tree.hh>`

Public Member Functions

- tree_node< T > & apex ()
  The getter of the appex.
- branch (tree< T > &tree, tree_node< T > &apex)
  Constructor.
- tree< T > & util_tree ()
  The getter of the tree.

10.360.1 Detailed Description

template<typename T> class mln::util::branch< T >

Class of generic branch.

Definition at line 249 of file tree.hh.

10.360.2 Constructor & Destructor Documentation

10.360.2.1 template<typename T > mln::util::branch< T >::branch (util::tree< T > & *tree*, util::tree_node< T > & *apex*) [inline]

Constructor.

Parameters

[in] ***tree*** The tree of the branch.
[in] ***apex*** The apex of the branch.

Definition at line 537 of file tree.hh.

10.360.3 Member Function Documentation

10.360.3.1 template<typename T > util::tree_node< T > & mln::util::branch< T >::apex ( ) [inline]

The getter of the appex.

Returns

The tree_node appex of the current branch.

Definition at line 548 of file tree.hh.

10.360.3.2 template<typename T > mln::util::tree< T > & mln::util::branch< T >::util_tree ( ) [inline]

The getter of the tree.

Returns

The tree of the current branch.

Definition at line 556 of file tree.hh.

10.361 mln::util::branch_iter< T > Class Template Reference

Basic 2D image class.

`#include <branch_iter.hh>`

Public Member Functions

- unsigned deepness () const
  Give how deep is the iterator in the branch.
- void invalidate ()
  Invalidate the iterator.
- bool is_valid () const
  Test the iterator validity.
- void next ()
  Go to the next point.

- operator util::tree_node< T > & () const

  Conversion to node.

- void start ()

  Start an iteration.

10.361.1 Detailed Description

template<typename T> class mln::util::branch_iter< T >

Basic 2D image class. The parameter `T` is the type of node's data. branch_iter is used to pre-order walk a branch.

Definition at line 52 of file branch_iter.hh.

10.361.2 Member Function Documentation

10.361.2.1 template<typename T > unsigned mln::util::branch_iter< T >::deepness ( ) const [inline]

Give how deep is the iterator in the branch.

Definition at line 119 of file branch_iter.hh.

References mln::util::branch_iter< T >::is_valid(), and mln::util::tree_node< T >::parent().

10.361.2.2 template<typename T > void mln::util::branch_iter< T >::invalidate ( ) [inline]

Invalidate the iterator.

Definition at line 143 of file branch_iter.hh.

Referenced by mln::util::branch_iter< T >::next().

10.361.2.3 template<typename T > bool mln::util::branch_iter< T >::is_valid ( ) const [inline]

Test the iterator validity.

Definition at line 135 of file branch_iter.hh.

Referenced by mln::util::branch_iter< T >::deepness().

10.361.2.4 template<typename T > void mln::util::branch_iter< T >::next ( ) [inline]

Go to the next point.

Definition at line 162 of file branch_iter.hh.

References mln::util::branch_iter< T >::invalidate().

10.361.2.5 template<typename T > mln::util::branch_iter< T >::operator util::tree_node< T > & ( ) const [inline]

Conversion to node.

Definition at line 101 of file branch_iter.hh.

10.361.2.6 template<typename T > void mln::util::branch_iter< T >::start ( ) [inline]

Start an iteration.

Definition at line 152 of file branch_iter.hh.

10.362 mln::util::branch_iter_ind< T > Class Template Reference

Basic 2D image class.

`#include <branch_iter_ind.hh>`

Public Member Functions

- unsigned deepness () const

  Give how deep is the iterator in the branch.

- void invalidate ()

  Invalidate the iterator.

- bool is_valid () const

  Test the iterator validity.

- void next ()

  Go to the next point.

- operator util::tree_node< T > & () const

  Conversion to node.

- void start ()

  Start an iteration.

10.362.1 Detailed Description

template<typename T> class mln::util::branch_iter_ind< T >

Basic 2D image class. The parameter `T` is the type of node's data. branch_iter_ind is used to pre-order walk a branch.

Definition at line 66 of file branch_iter_ind.hh.

10.362.2 Member Function Documentation

10.362.2.1 template<typename T > unsigned mln::util::branch_iter_ind< T >::deepness ( ) const [inline]

Give how deep is the iterator in the branch.

Definition at line 131 of file branch_iter_ind.hh.

References mln::util::branch_iter_ind< T >::is_valid(), and mln::util::tree_node< T >::parent().

10.362.2.2 template<typename T > void mln::util::branch_iter_ind< T >::invalidate ( ) [inline]

Invalidate the iterator.

Definition at line 155 of file branch_iter_ind.hh.

Referenced by mln::util::branch_iter_ind< T >::next().

10.362.2.3 template<typename T > bool mln::util::branch_iter_ind< T >::is_valid ( ) const [inline]

Test the iterator validity.

Definition at line 147 of file branch_iter_ind.hh.

Referenced by mln::util::branch_iter_ind< T >::deepness().

10.362.2.4 template<typename T > void mln::util::branch_iter_ind< T >::next ( ) [inline]

Go to the next point.

Definition at line 174 of file branch_iter_ind.hh.

References mln::util::branch_iter_ind< T >::invalidate().

10.362.2.5 template<typename T > mln::util::branch_iter_ind< T >::operator util::tree_node< T > & ( ) const [inline]

Conversion to node.

Definition at line 113 of file branch_iter_ind.hh.

10.362.2.6 template<typename T > void mln::util::branch_iter_ind< T >::start ( ) [inline]

Start an iteration.

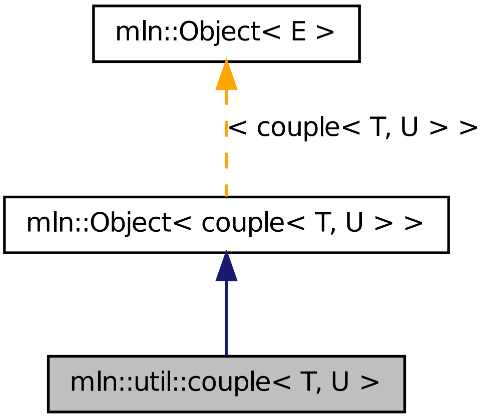
Definition at line 164 of file branch_iter_ind.hh.

10.363 mln::util::couple< T, U > Class Template Reference

Definition of a couple.

```
#include <couple.hh>
```

Inheritance diagram for mln::util::couple< T, U >:



Public Member Functions

- void change_both (const T &first, const U &second)
  Replace both members of the couple by val.
- void change_first (const T &val)
  Replace the first member of the couple by val.
- void change_second (const U &val)
  Replace the second member of the couple by val.

- const T & first () const
  Get the first member of the couple.

- const U & second () const
  Get the second member of the couple.

10.363.1 Detailed Description

template<typename T, typename U> class mln::util::couple< T, U >

Definition of a couple.

Definition at line 48 of file util/couple.hh.

10.363.2 Member Function Documentation

10.363.2.1 template<typename T , typename U > void mln::util::couple< T, U >::change_both (const T & *first*, const U & *second*) `[inline]`

Replace both members of the couple by *val*.

Definition at line 182 of file util/couple.hh.

10.363.2.2 template<typename T , typename U > void mln::util::couple< T, U >::change_first (const T & *val*) `[inline]`

Replace the first member of the couple by *val*.

Definition at line 166 of file util/couple.hh.

10.363.2.3 template<typename T , typename U > void mln::util::couple< T, U >::change_second (const U & *val*) `[inline]`

Replace the second member of the couple by *val*.

Definition at line 174 of file util/couple.hh.

10.363.2.4 template<typename T , typename U > const T & mln::util::couple< T, U >::first ( ) const `[inline]`

Get the first member of the couple.

Definition at line 134 of file util/couple.hh.

10.363.2.5 template<typename T , typename U > const U & mln::util::couple< T, U >::second ( ) const `[inline]`

Get the second member of the couple.

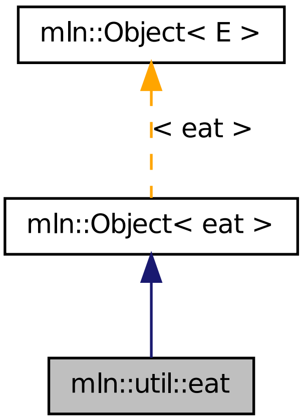
Definition at line 150 of file util/couple.hh.

10.364 mln::util::eat Struct Reference

Eat structure.

`#include <eat.hh>`

Inheritance diagram for mln::util::eat:



10.364.1 Detailed Description

Eat structure.

Definition at line 46 of file eat.hh.

10.365 mln::util::edge< G > Class Template Reference

Edge of a graph `G`.

`#include <edge.hh>`

Inherits mln::util::internal::edge_impl_< G >.

Public Types

- typedef Edge< void > category
  Object category.
- typedef G graph_t
  Graph associated type.
- typedef edge_id_t id_t
  The edge type id.
- typedef edge_id_t::value_t id_value_t
  The underlying type used to store edge ids.

Public Member Functions

- edge ()
  Constructors.

- bool is_valid () const
  Misc.
- void invalidate ()
  Invalidate that vertex.
- edge_id_t id () const
  Return the edge id.
- void update_id (const edge_id_t &id)
  Set id_ with `id`*;.*
- operator edge_id_t () const
  Conversion to the edge id.
- const G & graph () const
  Return a reference to the graph holding this edge.
- void change_graph (const G &g)
  Set g_ with `g`*;.*

- vertex_id_t v_other (const vertex_id_t &id_v) const
  Vertex and edges oriented.

- vertex_id_t v1 () const
  Edge oriented.
- vertex_id_t v2 () const
  Return the highest vertex id adjacent to this edge.
- size_t nmax_nbh_edges () const
  Return the number max of adjacent edges.
- edge_id_t ith_nbh_edge (unsigned i) const
  Return the `i` *th adjacent edge.*

10.365.1 Detailed Description

template<typename G> class mln::util::edge< G >

Edge of a graph `G`.

Definition at line 69 of file edge.hh.

10.365.2 Member Typedef Documentation

10.365.2.1 template<typename G> typedef Edge<void> mln::util::edge< G >::category

Object category.

Definition at line 73 of file edge.hh.

10.365.2.2 template<typename G> typedef G mln::util::edge< G >::graph_t

Graph associated type.

Definition at line 82 of file edge.hh.

10.365.2.3 template<typename G> typedef edge_id_t mln::util::edge< G >::id_t

The edge type id.

Definition at line 79 of file edge.hh.

10.365.2.4 template<typename G> typedef edge_id_t::value_t mln::util::edge< G >::id_value_t

The underlying type used to store edge ids.

Definition at line 76 of file edge.hh.

10.365.3 Constructor & Destructor Documentation

10.365.3.1 template<typename G > mln::util::edge< G >::edge ( ) `[inline]`

Constructors.

Definition at line 227 of file edge.hh.

References mln::util::edge< G >::invalidate().

10.365.4 Member Function Documentation

10.365.4.1 template<typename G > void mln::util::edge< G >::change_graph (const G & *g*) `[inline]`

Set g_ with `g`;.

Definition at line 290 of file edge.hh.

10.365.4.2 template<typename G > const G & mln::util::edge< G >::graph ( ) const `[inline]`

Return a reference to the graph holding this edge.

Definition at line 282 of file edge.hh.

Referenced by mln::p_edges< G, F >::has(), and mln::util::line_graph< G >::has().

10.365.4.3 template<typename G > edge_id_t mln::util::edge< G >::id ( ) const [inline]

Return the edge id.

Definition at line 259 of file edge.hh.

Referenced by mln::util::line_graph< G >::has().

10.365.4.4 template<typename G > void mln::util::edge< G >::invalidate ( ) [inline]

Invalidate that vertex.

Definition at line 306 of file edge.hh.

Referenced by mln::util::edge< G >::edge().

10.365.4.5 template<typename G > bool mln::util::edge< G >::is_valid ( ) const [inline]

Misc.

Return whether is points to a known edge.

Definition at line 298 of file edge.hh.

Referenced by mln::p_edges< G, F >::has().

10.365.4.6 template<typename G > edge_id_t mln::util::edge< G >::ith_nbh_edge (unsigned *i*) const [inline]

Return the `i` th adjacent edge.

Definition at line 351 of file edge.hh.

10.365.4.7 template<typename G > size_t mln::util::edge< G >::nmax_nbh_edges ( ) const [inline]

Return the number max of adjacent edges.

Definition at line 342 of file edge.hh.

10.365.4.8 template<typename G > mln::util::edge< G >::operator edge_id_t ( ) const [inline]

Conversion to the edge id.

Definition at line 274 of file edge.hh.

10.365.4.9 template<typename G > void mln::util::edge< G >::update_id (const edge_id_t & *id*) [inline]

Set id_ with `id`;.

Definition at line 267 of file edge.hh.

10.365.4.10 template<typename G > vertex_id_t mln::util::edge< G >::v1 ( ) const [inline]

Edge oriented.

Return the lowest vertex id adjacent to this edge.

Definition at line 324 of file edge.hh.

Referenced by mln::util::edge< G >::v_other().

10.365.4.11 template<typename G > vertex_id_t mln::util::edge< G >::v2 ( ) const [inline]

Return the highest vertex id adjacent to this edge.

Definition at line 333 of file edge.hh.

Referenced by mln::util::edge< G >::v_other().

10.365.4.12 template<typename G > vertex_id_t mln::util::edge< G >::v_other (const vertex_id_t & *id_v*) const [inline]

Vertex and edges oriented.

Return the vertex id of this edge which is different from `id_v`.

Definition at line 315 of file edge.hh.

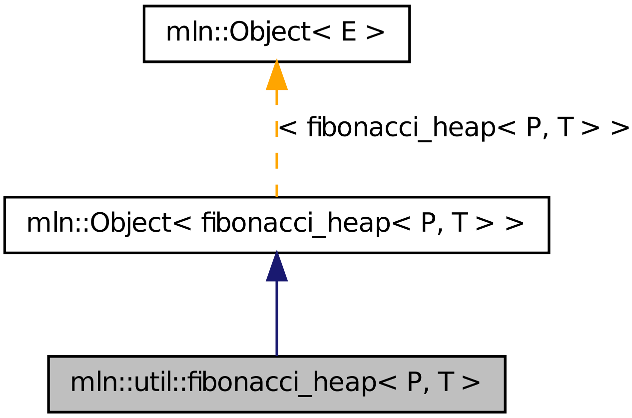
References mln::util::edge< G >::v1(), and mln::util::edge< G >::v2().

10.366 mln::util::fibonacci_heap< P, T > Class Template Reference

Fibonacci heap.

`#include <fibonacci_heap.hh>`

Inheritance diagram for mln::util::fibonacci_heap< P, T >:



Public Member Functions

- void clear ()

  Clear all elements in the heap and make the heap empty.

- fibonacci_heap ()

  Default constructor.

- fibonacci_heap (const fibonacci_heap< P, T > &node)

  Copy constructor Be ware that once this heap is constructed, the argument `node` *is cleared and all its elements are part of this new heap.*

- const T & front () const

  Return the minimum value in the heap.

- bool is_empty () const

  Is it empty?

- bool is_valid () const

  return false if it is empty.

- unsigned nelements () const

  Return the number of elements.

- fibonacci_heap< P, T > & operator= (fibonacci_heap< P, T > &rhs)

  Assignment operator.

- T pop_front ()

Return and remove the minimum value in the heap.

- void push (const P &priority, const T &value)

  Push a new element in the heap.

- void push (fibonacci_heap< P, T > &other_heap)

  Take `other_heap's` elements and insert them in this heap.

10.366.1 Detailed Description

template<typename P, typename T> class mln::util::fibonacci_heap< P, T >

Fibonacci heap.

Definition at line 117 of file fibonacci_heap.hh.

10.366.2 Constructor & Destructor Documentation

10.366.2.1 template<typename P , typename T > mln::util::fibonacci_heap< P, T >::fibonacci_heap ( ) [inline]

Default constructor.

Definition at line 472 of file fibonacci_heap.hh.

10.366.2.2 template<typename P , typename T > mln::util::fibonacci_heap< P, T >::fibonacci_heap (const fibonacci_heap< P, T > & *node*) [inline]

Copy constructor Be ware that once this heap is constructed, the argument `node` is cleared and all its elements are part of this new heap.

Definition at line 480 of file fibonacci_heap.hh.

10.366.3 Member Function Documentation

10.366.3.1 template<typename P , typename T > void mln::util::fibonacci_heap< P, T >::clear ( ) [inline]

Clear all elements in the heap and make the heap empty.

Definition at line 723 of file fibonacci_heap.hh.

References mln::util::fibonacci_heap< P, T >::pop_front().

10.366.3.2 template<typename P , typename T > const T & mln::util::fibonacci_heap< P, T >::front ( ) const [inline]

Return the minimum value in the heap.

Definition at line 569 of file fibonacci_heap.hh.

10.366.3.3 template<typename P , typename T > bool mln::util::fibonacci_heap< P, T >::is_empty ( ) const [inline]

Is it empty?

Definition at line 705 of file fibonacci_heap.hh.

Referenced by mln::util::fibonacci_heap< P, T >::pop_front(), and mln::util::fibonacci_heap< P, T >::push().

10.366.3.4 template<typename P , typename T > bool mln::util::fibonacci_heap< P, T >::is_valid ( ) const [inline]

return false if it is empty.

Definition at line 714 of file fibonacci_heap.hh.

Referenced by mln::util::fibonacci_heap< P, T >::pop_front().

10.366.3.5 template<typename P , typename T > unsigned mln::util::fibonacci_heap< P, T >::nelements ( ) const [inline]

Return the number of elements.

Definition at line 745 of file fibonacci_heap.hh.

10.366.3.6 template<typename P , typename T > fibonacci_heap< P, T > & mln::util::fibonacci_heap< P, T >::operator= (fibonacci_heap< P, T > & *rhs*) [inline]

Assignment operator.

Be ware that this operator do ∗not∗ copy the data from `rhs` to this heap. It moves all elements which means that afterwards, `rhs` is is cleared and all its elements are part of this new heap.

Definition at line 754 of file fibonacci_heap.hh.

10.366.3.7 template<typename P , typename T > T mln::util::fibonacci_heap< P, T >::pop_front ( ) [inline]

Return and remove the minimum value in the heap.

Definition at line 578 of file fibonacci_heap.hh.

References mln::util::fibonacci_heap< P, T >::is_empty(), mln::util::fibonacci_heap< P, T >::is_valid(), and mln::util::fibonacci_heap< P, T >::push().

Referenced by mln::util::fibonacci_heap< P, T >::clear().

10.366.3.8 template<typename P , typename T > void mln::util::fibonacci_heap< P, T >::push (const P & *priority,* const T & *value*) [inline]

Push a new element in the heap.

See also

insert

Definition at line 508 of file fibonacci_heap.hh.

Referenced by mln::util::fibonacci_heap< P, T >::pop_front().

10.366.3.9 template<typename P , typename T > void mln::util::fibonacci_heap< P, T >::push (fibonacci_heap< P, T > & *other_heap*) [inline]

Take `other_heap's` elements and insert them in this heap.

After this call `other_heap` is cleared.

Definition at line 520 of file fibonacci_heap.hh.

References mln::util::fibonacci_heap< P, T >::is_empty().

10.367 mln::util::graph Class Reference

Undirected graph.

`#include <graph.hh>`

Inherits graph_base< graph >.

Public Types

- typedef std::set< edge_data_t > edges_set_t

  A set to test the presence of a given edge.
- typedef std::vector< edge_data_t > edges_t

  The type of the set of edges.
- typedef std::vector< vertex_data_t > vertices_t

  The type of the set of vertices.

- typedef mln::internal::vertex_fwd_iterator< graph > vertex_fwd_iter

  Iterator types
  Vertex iterators.

- typedef mln::internal::vertex_nbh_edge_fwd_iterator< graph > vertex_nbh_edge_fwd_iter

  Vertex centered edge iterators.

- typedef mln::internal::vertex_nbh_vertex_fwd_iterator< graph > vertex_nbh_vertex_fwd_iter

  Vertex centered vertex iterators.

- typedef mln::internal::edge_fwd_iterator< graph > edge_fwd_iter

Edge iterators.

- typedef mln::internal::edge_nbh_edge_fwd_iterator< graph > edge_nbh_edge_fwd_iter

  Edge centered edge iterators.

Public Member Functions

- graph ()
- graph (unsigned nvertices)

  Construct a graph with `nvertices` vertices.

- bool has_v (const vertex_id_t &id_v) const

  Check whether a vertex id `id_v` exists in the graph.

- edge_id_t v_ith_nbh_edge (const vertex_id_t &id_v, unsigned i) const

  Returns the `i` th edge adjacent to the vertex `id_v`.

- vertex_id_t v_ith_nbh_vertex (const vertex_id_t &id_v, unsigned i) const

  Returns the `i` th vertex adjacent to the vertex `id_v`.

- size_t v_nmax () const

  Return the number of vertices in the graph.

- size_t v_nmax_nbh_edges (const vertex_id_t &id_v) const

  Return the number of adjacent edges of vertex `id_v`.

- size_t v_nmax_nbh_vertices (const vertex_id_t &id_v) const

  Return the number of adjacent vertices of vertex `id_v`.

- unsigned add_vertex ()

  Vertex oriented.

- std::pair< vertex_id_t, vertex_id_t > add_vertices (unsigned n)

  Add `n` vertices to the graph.

- vertex_t vertex (vertex_id_t id_v) const

  Return the vertex whose id is v.

- edge_id_t add_edge (const vertex_id_t &id_v1, const vertex_id_t &id_v2)

  Edge oriented.

- edge_t edge (const edge_id_t &e) const

  Return the edge whose id is e.

- const std::vector< util::ord_pair< vertex_id_t > > & edges () const

  Return the list of all edges.

- size_t e_nmax () const
  Return the number of edges in the graph.
- bool has_e (const edge_id_t &id_e) const
  Return whether `id_e` *is in the graph.*
- edge_t edge (const vertex_t &v1, const vertex_t &v2) const
  Return the corresponding edge id if exists.
- vertex_id_t v1 (const edge_id_t &id_e) const
  Return the first vertex associated to the edge `id_e`*.*
- vertex_id_t v2 (const edge_id_t &id_e) const
  Return the second vertex associated to edge `id_e`*.*
- size_t e_nmax_nbh_edges (const edge_id_t &id_e) const
  Return the number max of adjacent edge, given an edge `id_e`*.*
- edge_id_t e_ith_nbh_edge (const edge_id_t &id_e, unsigned i) const
  Return the `i` *th edge adjacent to the edge* `id_e`*.*
- template<typename G2 >
  bool is_subgraph_of (const G2 &g) const
  *Return whether this graph is a subgraph Return true if g and *this have the same graph_id.*

10.367.1 Detailed Description

Undirected graph.

Definition at line 87 of file mln/util/graph.hh.

10.367.2 Member Typedef Documentation

10.367.2.1 typedef mln::internal::edge_fwd_iterator<graph> mln::util::graph::edge_fwd_iter

Edge iterators.

Definition at line 129 of file mln/util/graph.hh.

10.367.2.2 typedef mln::internal::edge_nbh_edge_fwd_iterator<graph> mln::util::graph::edge_nbh_edge_fwd_iter

Edge centered edge iterators.

Definition at line 136 of file mln/util/graph.hh.

10.367.2.3 typedef std::set<edge_data_t> mln::util::graph::edges_set_t

A set to test the presence of a given edge.

Definition at line 102 of file mln/util/graph.hh.

10.367.2.4 typedef std::vector<edge_data_t> mln::util::graph::edges_t

The type of the set of edges.

Definition at line 100 of file mln/util/graph.hh.

10.367.2.5 typedef mln::internal::vertex_fwd_iterator<graph> mln::util::graph::vertex_fwd_iter

Iterator types

Vertex iterators.

Definition at line 108 of file mln/util/graph.hh.

10.367.2.6 typedef mln::internal::vertex_nbh_edge_fwd_iterator<graph> mln::util::graph::vertex_nbh_edge_fwd_iter

Vertex centered edge iterators.

Definition at line 115 of file mln/util/graph.hh.

10.367.2.7 typedef mln::internal::vertex_nbh_vertex_fwd_iterator<graph> mln::util::graph::vertex_nbh_vertex_fwd_iter

Vertex centered vertex iterators.

Definition at line 122 of file mln/util/graph.hh.

10.367.2.8 typedef std::vector<vertex_data_t> mln::util::graph::vertices_t

The type of the set of vertices.

Definition at line 97 of file mln/util/graph.hh.

10.367.3 Constructor & Destructor Documentation

10.367.3.1 mln::util::graph::graph ( ) `[inline]`

Constructor.

Definition at line 282 of file mln/util/graph.hh.

10.367.3.2 mln::util::graph::graph (unsigned *nvertices*) `[inline]`

Construct a graph with `nvertices` vertices.

Definition at line 288 of file mln/util/graph.hh.

10.367.4 Member Function Documentation

10.367.4.1 edge_id_t mln::util::graph::add_edge (const vertex_id_t & *id_v1*, const vertex_id_t & *id_v2*) `[inline]`

Edge oriented.

Add an edge.

Returns

The id of the new edge if it does not exist yet; otherwise, return `mln_max(unsigned)`.

Definition at line 386 of file mln/util/graph.hh.

References edge(), and has_v().

Referenced by mln::make::voronoi().

10.367.4.2 unsigned mln::util::graph::add_vertex ( ) `[inline]`

Vertex oriented.

Shortcuts factoring the insertion of vertices and edges. Add a vertex.

Returns

The id of the new vertex.

Definition at line 299 of file mln/util/graph.hh.

References v_nmax().

Referenced by mln::make::voronoi().

10.367.4.3 std::pair< vertex_id_t, vertex_id_t > mln::util::graph::add_vertices (unsigned *n*) `[inline]`

Add `n` vertices to the graph.

Returns

A range of vertex ids.

Definition at line 310 of file mln/util/graph.hh.

References v_nmax().

10.367.4.4 edge_id_t mln::util::graph::e_ith_nbh_edge (const edge_id_t & *id_e*, unsigned *i*) const `[inline]`

Return the `i` th edge adjacent to the edge `id_e`.

Definition at line 503 of file mln/util/graph.hh.

References e_nmax(), e_nmax_nbh_edges(), has_e(), v1(), v2(), v_ith_nbh_edge(), and v_nmax_nbh_edges().

10.367.4.5 size_t mln::util::graph::e_nmax ( ) const [inline]

Return the number of edges in the graph.

Definition at line 443 of file mln/util/graph.hh.

Referenced by e_ith_nbh_edge(), and edge().

10.367.4.6 size_t mln::util::graph::e_nmax_nbh_edges (const edge_id_t & *id_e*) const [inline]

Return the number max of adjacent edge, given an edge `id_e`.

Definition at line 495 of file mln/util/graph.hh.

References has_e(), v1(), v2(), and v_nmax_nbh_edges().

Referenced by e_ith_nbh_edge().

10.367.4.7 graph::edge_t mln::util::graph::edge (const edge_id_t & *e*) const [inline]

Return the edge whose id is *e*.

Definition at line 435 of file mln/util/graph.hh.

References e_nmax().

Referenced by add_edge().

10.367.4.8 graph::edge_t mln::util::graph::edge (const vertex_t & *v1*, const vertex_t & *v2*) const [inline]

Return the corresponding edge id if exists.

If it is not, returns an invalid edge.

Definition at line 457 of file mln/util/graph.hh.

References has_v().

10.367.4.9 const std::vector< util::ord_pair< vertex_id_t > > & mln::util::graph::edges ( ) const [inline]

Return the list of all edges.

Definition at line 428 of file mln/util/graph.hh.

10.367.4.10 bool mln::util::graph::has_e (const edge_id_t & *id_e*) const [inline]

Return whether `id_e` is in the graph.

Definition at line 450 of file mln/util/graph.hh.

Referenced by e_ith_nbh_edge(), e_nmax_nbh_edges(), v1(), and v2().

10.367.4.11 bool mln::util::graph::has_v (const vertex_id_t & *id_v*) const [inline]

Check whether a vertex id `id_v` exists in the graph.

Definition at line 338 of file mln/util/graph.hh.

Referenced by add_edge(), edge(), v_ith_nbh_edge(), v_ith_nbh_vertex(), v_nmax_nbh_edges(), v_-nmax_nbh_vertices(), and vertex().

10.367.4.12 template<typename G2 > bool mln::util::graph::is_subgraph_of (const G2 & *g*) const [inline]

Return whether this graph is a subgraph Return true if g and *this have the same graph_id.

Definition at line 519 of file mln/util/graph.hh.

10.367.4.13 vertex_id_t mln::util::graph::v1 (const edge_id_t & *id_e*) const [inline]

Return the first vertex associated to the edge `id_e`.

Definition at line 479 of file mln/util/graph.hh.

References has_e().

Referenced by e_ith_nbh_edge(), and e_nmax_nbh_edges().

10.367.4.14 vertex_id_t mln::util::graph::v2 (const edge_id_t & *id_e*) const [inline]

Return the second vertex associated to edge `id_e`.

Definition at line 487 of file mln/util/graph.hh.

References has_e().

Referenced by e_ith_nbh_edge(), and e_nmax_nbh_edges().

10.367.4.15 edge_id_t mln::util::graph::v_ith_nbh_edge (const vertex_id_t & *id_v*, unsigned *i*) const [inline]

Returns the `i` th edge adjacent to the vertex `id_v`.

Definition at line 353 of file mln/util/graph.hh.

References has_v(), and v_nmax_nbh_edges().

Referenced by e_ith_nbh_edge(), and v_ith_nbh_vertex().

10.367.4.16 vertex_id_t mln::util::graph::v_ith_nbh_vertex (const vertex_id_t & *id_v*, unsigned *i*) const [inline]

Returns the `i` th vertex adjacent to the vertex `id_v`.

Definition at line 371 of file mln/util/graph.hh.

References has_v(), and v_ith_nbh_edge().

10.367.4.17 size_t mln::util::graph::v_nmax ( ) const [inline]

Return the number of vertices in the graph.

Definition at line 331 of file mln/util/graph.hh.

Referenced by add_vertex(), and add_vertices().

10.367.4.18 size_t mln::util::graph::v_nmax_nbh_edges (const vertex_id_t & *id_v*) const [inline]

Return the number of adjacent edges of vertex `id_v`.

Definition at line 345 of file mln/util/graph.hh.

References has_v().

Referenced by e_ith_nbh_edge(), e_nmax_nbh_edges(), v_ith_nbh_edge(), and v_nmax_nbh_vertices().

10.367.4.19 size_t mln::util::graph::v_nmax_nbh_vertices (const vertex_id_t & *id_v*) const [inline]

Return the number of adjacent vertices of vertex `id_v`.

Definition at line 363 of file mln/util/graph.hh.

References has_v(), and v_nmax_nbh_edges().

10.367.4.20 graph::vertex_t mln::util::graph::vertex (vertex_id_t *id_v*) const [inline]

Return the vertex whose id is *v*.

Definition at line 322 of file mln/util/graph.hh.

References has_v().

10.368 mln::util::greater_point< I > Class Template Reference

A “greater than” functor comparing points w.r.t.

`#include <greater_point.hh>`

Public Member Functions

- bool operator() (const point &x, const point &y)
  Is x greater than y?

10.368.1 Detailed Description

template<typename I> class mln::util::greater_point< I >

A “greater than” functor comparing points w.r.t. the values they refer to in an image.

This functor used in useful to implement ordered queues of points.

Definition at line 42 of file greater_point.hh.

10.368.2 Member Function Documentation

10.368.2.1 template< typename I > bool mln::util::greater_point< I >::operator() (const point & *x*, const point & *y*)

Is *x* greater than *y*?

Definition at line 74 of file greater_point.hh.

10.369 mln::util::greater_psite< I > Class Template Reference

A "greater than" functor comparing psites w.r.t.

`#include <greater_psite.hh>`

Public Member Functions

- bool operator() (const psite &x, const psite &y)

  Is x greater than y?

10.369.1 Detailed Description

template<typename I> class mln::util::greater_psite< I >

A "greater than" functor comparing psites w.r.t. the values they refer to in an image.

This functor used in useful to implement ordered queues of psites.

Definition at line 42 of file greater_psite.hh.

10.369.2 Member Function Documentation

10.369.2.1 template< typename I > bool mln::util::greater_psite< I >::operator() (const psite & *x*, const psite & *y*)

Is *x* greater than *y*?

Definition at line 74 of file greater_psite.hh.

10.370 mln::util::head< T, R > Class Template Reference

Top structure of the soft heap.

`#include <soft_heap.hh>`

10.370.1 Detailed Description

template<typename T, typename R> class mln::util::head< T, R >

Top structure of the soft heap.

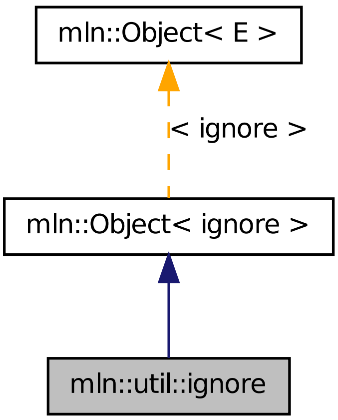
Definition at line 138 of file soft_heap.hh.

10.371 mln::util::ignore Struct Reference

Ignore structure.

`#include <ignore.hh>`

Inheritance diagram for mln::util::ignore:



10.371.1 Detailed Description

Ignore structure.

Definition at line 46 of file ignore.hh.

10.372 mln::util::ilcell< T > Struct Template Reference

Element of an item list. Store the data (key) used in soft_heap.

`#include <soft_heap.hh>`

10.372.1 Detailed Description

template<typename T> struct mln::util::ilcell< T >

Element of an item list. Store the data (key) used in soft_heap.

Definition at line 76 of file soft_heap.hh.

10.373 mln::util::line_graph< G > Class Template Reference

Undirected line graph of a graph of type G.

`#include <line_graph.hh>`

Inherits graph_base< line_graph< G > >.

Public Types

- typedef std::vector< edge_data_t > edges_t

  The type of the set of edges.

- typedef std::vector< vertex_data_t > vertices_t

  The type of the set of vertices.

  - typedef mln::internal::vertex_fwd_iterator< line_graph< G > > vertex_fwd_iter

    Iterator types
    Vertex iterators.

  - typedef mln::internal::edge_fwd_iterator< line_graph< G > > edge_fwd_iter

    Edge iterators.

  - typedef mln::internal::edge_nbh_edge_fwd_iterator< line_graph< G > > edge_nbh_edge_fwd_iter

    Edge nbh edge iterators.

  - typedef mln::internal::vertex_nbh_vertex_fwd_iterator< line_graph< G > > vertex_nbh_vertex_fwd_iter

    Vertex nbh vertex iterators.

  - typedef mln::internal::vertex_nbh_edge_fwd_iterator< line_graph< G > > vertex_nbh_edge_fwd_iter

    Vertex nbh edge iterators.

Public Member Functions

- template<typename G2 >
  bool has (const util::vertex< G2 > &v) const

  Check whether a vertex `v` exists in the line graph.

- bool has_v (const vertex_id_t &id_v) const

  Check whether a vertex id `id_v` exists in the line graph.

- edge_id_t v_ith_nbh_edge (const vertex_id_t &id_v, unsigned i) const

  Returns the `i` th edge adjacent to the vertex `id_v`.

- vertex_id_t v_ith_nbh_vertex (const vertex_id_t &id_v, unsigned i) const

  Returns the `i` th vertex adjacent to the vertex `id_v`.

- size_t v_nmax () const

  Return the number of vertices in the graph.

- size_t v_nmax_nbh_edges (const vertex_id_t &id_v) const

  Return the number of adjacent edges of vertex `id_v`.

- size_t v_nmax_nbh_vertices (const vertex_id_t &id_v) const

  Return the number of adjacent vertices of vertex `id_v`.

  - vertex_t vertex (const vertex_id_t &id_v) const

    Vertex oriented.

  - edge_t edge (const edge_id_t &e) const

    Edge oriented.

  - size_t e_nmax () const

    Return the number of edges in the graph.

  - bool has_e (const util::edge_id_t &id_e) const

    Return whether `id_e` is in the line graph.

  - template<typename G2 >
    bool has (const util::edge< G2 > &e) const

    Return whether `e` is in the line graph.

  - vertex_id_t v1 (const edge_id_t &id_e) const

    Return the first vertex associated to the edge `id_e`.

  - vertex_id_t v2 (const edge_id_t &id_e) const

    Return the second vertex associated to edge `id_e`.

  - size_t e_nmax_nbh_edges (const edge_id_t &id_e) const

    Return the number max of adjacent edge, given an edge `id_e`.

  - edge_id_t e_ith_nbh_edge (const edge_id_t &id_e, unsigned i) const

Return the `i` *th edge adjacent to the edge* `id_e`*.*

- template<typename G2 >
  bool is_subgraph_of (const G2 &g) const
  *Return whether this graph is a subgraph Return true if g and *this have the same graph_id.*
- const G & graph () const
  Return the underlying graph.

10.373.1 Detailed Description

template<typename G> class mln::util::line_graph< G >

Undirected line graph of a graph of type `G`.

Definition at line 82 of file line_graph.hh.

10.373.2 Member Typedef Documentation

10.373.2.1 template<typename G> typedef mln::internal::edge_fwd_iterator< line_graph<G> > mln::util::line_graph< G >::edge_fwd_iter

Edge iterators.

Definition at line 114 of file line_graph.hh.

10.373.2.2 template<typename G> typedef mln::internal::edge_nbh_edge_fwd_iterator< line_graph<G> > mln::util::line_graph< G >::edge_nbh_edge_fwd_iter

Edge nbh edge iterators.

Definition at line 123 of file line_graph.hh.

10.373.2.3 template<typename G> typedef std::vector<edge_data_t> mln::util::line_graph< G >::edges_t

The type of the set of edges.

Definition at line 98 of file line_graph.hh.

10.373.2.4 template<typename G> typedef mln::internal::vertex_fwd_iterator< line_graph<G> > mln::util::line_graph< G >::vertex_fwd_iter

Iterator types

Vertex iterators.

Definition at line 105 of file line_graph.hh.

10.373.2.5 template<typename G> typedef mln::internal::vertex_nbh_edge_fwd_iterator< line_graph<G> > mln::util::line_graph< G >::vertex_nbh_edge_fwd_iter

Vertex nbh edge iterators.

Definition at line 141 of file line_graph.hh.

10.373.2.6 template<typename G> typedef mln::internal::vertex_nbh_vertex_fwd_iterator< line_graph<G> > mln::util::line_graph< G >::vertex_nbh_vertex_fwd_iter

Vertex nbh vertex iterators.

Definition at line 132 of file line_graph.hh.

10.373.2.7 template<typename G> typedef std::vector<vertex_data_t> mln::util::line_graph< G >::vertices_t

The type of the set of vertices.

Definition at line 95 of file line_graph.hh.

10.373.3 Member Function Documentation

10.373.3.1 template<typename G > edge_id_t mln::util::line_graph< G >::e_ith_nbh_edge (const edge_id_t & *id_e*, unsigned *i*) const [inline]

Return the `i` th edge adjacent to the edge `id_e`.

Definition at line 460 of file line_graph.hh.

References mln::util::line_graph< G >::e_nmax(), mln::util::line_graph< G >::e_nmax_nbh_edges(), mln::util::line_graph< G >::has_e(), mln::util::line_graph< G >::v1(), mln::util::line_graph< G >::v2(), mln::util::line_graph< G >::v_ith_nbh_edge(), and mln::util::line_graph< G >::v_nmax_nbh_edges().

10.373.3.2 template<typename G > size_t mln::util::line_graph< G >::e_nmax ( ) const [inline]

Return the number of edges in the graph.

Definition at line 408 of file line_graph.hh.

Referenced by mln::util::line_graph< G >::e_ith_nbh_edge(), and mln::util::line_graph< G >::edge().

10.373.3.3 template<typename G > size_t mln::util::line_graph< G >::e_nmax_nbh_edges (const edge_id_t & *id_e*) const [inline]

Return the number max of adjacent edge, given an edge `id_e`.

Definition at line 451 of file line_graph.hh.

References mln::util::line_graph< G >::has_e(), mln::util::line_graph< G >::v1(), mln::util::line_graph< G >::v2(), and mln::util::line_graph< G >::v_nmax_nbh_edges().

Referenced by mln::util::line_graph< G >::e_ith_nbh_edge().

10.373.3.4 template< typename G > line_graph< G >::edge_t mln::util::line_graph< G >::edge (const edge_id_t & *e*) const [inline]

Edge oriented.

Return the edge whose id is *e*.

Definition at line 399 of file line_graph.hh.

References mln::util::line_graph< G >::e_nmax().

10.373.3.5 template< typename G > const G & mln::util::line_graph< G >::graph ( ) const [inline]

Return the underlying graph.

Definition at line 485 of file line_graph.hh.

10.373.3.6 template< typename G > template< typename G2 > bool mln::util::line_graph< G >::has (const util::vertex< G2 > & *v*) const [inline]

Check whether a vertex `v` exists in the line graph.

Definition at line 345 of file line_graph.hh.

References mln::util::vertex< G >::graph(), mln::util::line_graph< G >::has_v(), and mln::util::vertex< G >::id().

10.373.3.7 template< typename G > template< typename G2 > bool mln::util::line_graph< G >::has (const util::edge< G2 > & *e*) const [inline]

Return whether `e` is in the line graph.

Definition at line 425 of file line_graph.hh.

References mln::util::edge< G >::graph(), mln::util::line_graph< G >::has_e(), and mln::util::edge< G >::id().

10.373.3.8 template< typename G > bool mln::util::line_graph< G >::has_e (const util::edge_id_t & *id_e*) const [inline]

Return whether `id_e` is in the line graph.

Definition at line 416 of file line_graph.hh.

Referenced by mln::util::line_graph< G >::e_ith_nbh_edge(), mln::util::line_graph< G >::e_nmax_nbh_edges(), mln::util::line_graph< G >::has(), mln::util::line_graph< G >::v1(), and mln::util::line_graph< G >::v2().

10.373.3.9 template< typename G > bool mln::util::line_graph< G >::has_v (const vertex_id_t & *id_v*) const [inline]

Check whether a vertex id `id_v` exists in the line graph.

Definition at line 336 of file line_graph.hh.

Referenced by mln::util::line_graph< G >::has(), mln::util::line_graph< G >::v_ith_nbh_edge(), mln::util::line_graph< G >::v_ith_nbh_vertex(), mln::util::line_graph< G >::v_nmax_nbh_edges(), mln::util::line_graph< G >::v_nmax_nbh_vertices(), and mln::util::line_graph< G >::vertex().

10.373.3.10 template<typename G > template<typename G2 > bool mln::util::line_graph< G >::is_subgraph_of (const G2 & *g*) const [inline]

Return whether this graph is a subgraph Return true if g and ∗this have the same graph_id.

Definition at line 477 of file line_graph.hh.

10.373.3.11 template<typename G > vertex_id_t mln::util::line_graph< G >::v1 (const edge_id_t & *id_e*) const [inline]

Return the first vertex associated to the edge `id_e`.

Definition at line 433 of file line_graph.hh.

References mln::util::line_graph< G >::has_e().

Referenced by mln::util::line_graph< G >::e_ith_nbh_edge(), and mln::util::line_graph< G >::e_nmax_-nbh_edges().

10.373.3.12 template<typename G > vertex_id_t mln::util::line_graph< G >::v2 (const edge_id_t & *id_e*) const [inline]

Return the second vertex associated to edge `id_e`.

Definition at line 442 of file line_graph.hh.

References mln::util::line_graph< G >::has_e().

Referenced by mln::util::line_graph< G >::e_ith_nbh_edge(), and mln::util::line_graph< G >::e_nmax_-nbh_edges().

10.373.3.13 template<typename G > edge_id_t mln::util::line_graph< G >::v_ith_nbh_edge (const vertex_id_t & *id_v*, unsigned *i*) const [inline]

Returns the `i` th edge adjacent to the vertex `id_v`.

Definition at line 363 of file line_graph.hh.

References mln::util::line_graph< G >::has_v(), mln::util::line_graph< G >::v_nmax(), and mln::util::line_graph< G >::v_nmax_nbh_edges().

Referenced by mln::util::line_graph< G >::e_ith_nbh_edge(), and mln::util::line_graph< G >::v_ith_-nbh_vertex().

10.373.3.14 template<typename G > vertex_id_t mln::util::line_graph< G >::v_ith_nbh_vertex (const vertex_id_t & *id_v*, unsigned *i*) const [inline]

Returns the `i` th vertex adjacent to the vertex `id_v`.

Definition at line 383 of file line_graph.hh.

References mln::util::line_graph< G >::has_v(), and mln::util::line_graph< G >::v_ith_nbh_edge().

10.373.3.15 template<typename G > size_t mln::util::line_graph< G >::v_nmax ( ) const [inline]

Return the number of vertices in the graph.

Definition at line 328 of file line_graph.hh.

Referenced by mln::util::line_graph< G >::v_ith_nbh_edge().

10.373.3.16 template<typename G > size_t mln::util::line_graph< G >::v_nmax_nbh_edges (const vertex_id_t & *id_v*) const [inline]

Return the number of adjacent edges of vertex `id_v`.

Definition at line 354 of file line_graph.hh.

References mln::util::line_graph< G >::has_v().

Referenced by mln::util::line_graph< G >::e_ith_nbh_edge(), mln::util::line_graph< G >::e_nmax_nbh_edges(), mln::util::line_graph< G >::v_ith_nbh_edge(), and mln::util::line_graph< G >::v_nmax_nbh_vertices().

10.373.3.17 template<typename G > size_t mln::util::line_graph< G >::v_nmax_nbh_vertices (const vertex_id_t & *id_v*) const [inline]

Return the number of adjacent vertices of vertex `id_v`.

Definition at line 374 of file line_graph.hh.

References mln::util::line_graph< G >::has_v(), and mln::util::line_graph< G >::v_nmax_nbh_edges().

10.373.3.18 template<typename G > line_graph< G >::vertex_t mln::util::line_graph< G >::vertex (const vertex_id_t & *id_v*) const [inline]

Vertex oriented.

Shortcuts factoring the insertion of vertices and edges.

Return the vertex whose id is *v*.

Definition at line 318 of file line_graph.hh.

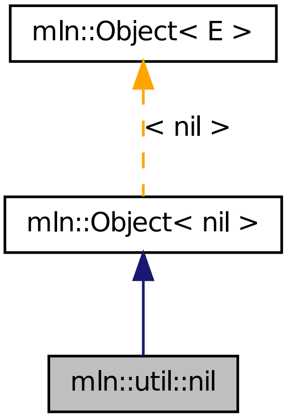
References mln::util::line_graph< G >::has_v().

10.374 mln::util::nil Struct Reference

Nil structure.

```
#include <nil.hh>
```

Inheritance diagram for mln::util::nil:



10.374.1 Detailed Description

Nil structure.

Definition at line 46 of file util/nil.hh.

10.375 mln::util::node< T, R > Class Template Reference

Meta-data of an element in the heap.

`#include <soft_heap.hh>`

10.375.1 Detailed Description

template<typename T, typename R> class mln::util::node< T, R >

Meta-data of an element in the heap.

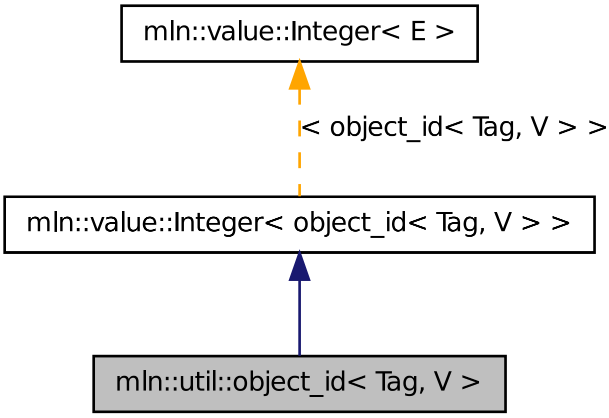
Definition at line 97 of file soft_heap.hh.

10.376 mln::util::object_id< Tag, V > Class Template Reference

Base class of an object id.

`#include <object_id.hh>`

Inheritance diagram for mln::util::object_id< Tag, V >:



Public Types

- typedef V value_t

  The underlying type id.

Public Member Functions

- object_id ()

  Constructors.

10.376.1 Detailed Description

template<typename Tag, typename V> class mln::util::object_id< Tag, V >

Base class of an object id.

Template Parameters

Tag the tag type

Equiv the equivalent value.

Definition at line 66 of file object_id.hh.

10.376.2 Member Typedef Documentation

10.376.2.1 template<typename Tag, typename V> typedef V mln::util::object_id< Tag, V >::value_t

The underlying type id.

Definition at line 70 of file object_id.hh.

10.376.3 Constructor & Destructor Documentation

10.376.3.1 template<typename Tag , typename V > mln::util::object_id< Tag, V >::object_id ( ) [inline]

Constructors.

Definition at line 120 of file object_id.hh.

10.377 mln::util::ord< T > Struct Template Reference

Function-object that defines an ordering between objects with type `T`: *lhs* R *rhs*.

`#include <ord.hh>`

10.377.1 Detailed Description

template<typename T> struct mln::util::ord< T >

Function-object that defines an ordering between objects with type `T`: *lhs* R *rhs*. Its meaning is "lhs less-than rhs."

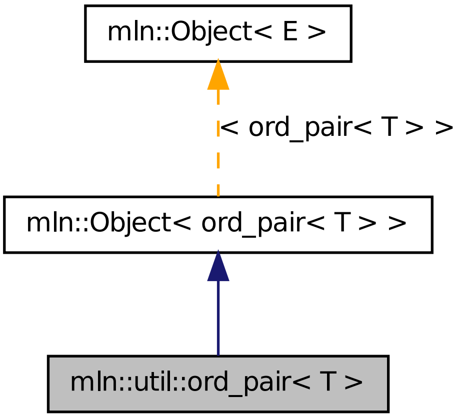
Definition at line 48 of file util/ord.hh.

10.378 mln::util::ord_pair< T > Struct Template Reference

Ordered pair structure s.a.

`#include <ord_pair.hh>`

Inheritance diagram for mln::util::ord_pair< T >:



Public Member Functions

- void change_both (const T &first, const T &second)

  Replace both members of the pair by val, while keeping the relative order.

- void change_first (const T &val)

  Replace the first member of the pair by val, while keeping the relative order.

- void change_second (const T &val)

  Replace the second member of the pair by val, while keeping the relative order.

  - const T & first () const

    Get the first (lowest) member of the pair.

  - const T & second () const

    Get the second (highest) member of the pair.

10.378.1 Detailed Description

template<typename T> struct mln::util::ord_pair< T >

Ordered pair structure s.a. this->first <= this->second; ordered pairs are partially ordered using lexicographical ordering.

Definition at line 50 of file ord_pair.hh.

10.378.2 Member Function Documentation

10.378.2.1 template<typename T > void mln::util::ord_pair< T >::change_both (const T & *first*, const T & *second*) [inline]

Replace both members of the pair by *val*, while keeping the relative order.

Postcondition

*first_* <= *second_* (with <= being the mln::util::ord_weak relationship).

Definition at line 211 of file ord_pair.hh.

References mln::util::ord_strict(), and mln::util::ord_weak().

10.378.2.2 template<typename T > void mln::util::ord_pair< T >::change_first (const T & *val*) [inline]

Replace the first member of the pair by *val*, while keeping the relative order.

Postcondition

*first_* <= *second_* (with <= being the mln::util::ord_weak relationship).

Definition at line 181 of file ord_pair.hh.

References mln::util::ord_strict(), and mln::util::ord_weak().

10.378.2.3 template<typename T > void mln::util::ord_pair< T >::change_second (const T & *val*) [inline]

Replace the second member of the pair by *val*, while keeping the relative order.

Postcondition

*first_* <= *second_* (with <= being the mln::util::ord_weak relationship).

Definition at line 196 of file ord_pair.hh.

References mln::util::ord_strict(), and mln::util::ord_weak().

10.378.2.4 template<typename T > const T & mln::util::ord_pair< T >::first ( ) const [inline]

Get the first (lowest) member of the pair.

Definition at line 149 of file ord_pair.hh.

10.378.2.5 template<typename T > const T & mln::util::ord_pair< T >::second ( ) const [inline]

Get the second (highest) member of the pair.

Definition at line 165 of file ord_pair.hh.

10.379 mln::util::pix< I > Struct Template Reference

Structure pix.

`#include <pix.hh>`

Public Types

- typedef I::psite psite

    Point_Site associated type.

- typedef I::value value

    Value associated type.

Public Member Functions

- const I & ima () const

    The getter of the image associate to pix structure.

- const I::psite & p () const

    The getter of psite associate to pix structure.

- pix (const Image< I > &ima, const typename I::psite &p)

    Constructor.

- I::rvalue v () const

    The getter of value associate to pix structure.

10.379.1 Detailed Description

template<typename I> struct mln::util::pix< I >

Structure pix.

Definition at line 69 of file util/pix.hh.

10.379.2 Member Typedef Documentation

10.379.2.1 template<typename I> typedef I ::psite mln::util::pix< I >::psite

Point_Site associated type.

Definition at line 73 of file util/pix.hh.

10.379.2.2 template<typename I> typedef I ::value mln::util::pix< I >::value

Value associated type.

Definition at line 76 of file util/pix.hh.

10.379.3 Constructor & Destructor Documentation

10.379.3.1 template<typename I > mln::util::pix< I >::pix (const Image< I > & *ima*, const typename I::psite & *p*) [inline]

Constructor.

Parameters

[in] ***ima*** The image.
[in] ***p*** The p_site.

Definition at line 121 of file util/pix.hh.

10.379.4 Member Function Documentation

10.379.4.1 template<typename I > const I & mln::util::pix< I >::ima ( ) const [inline]

The getter of the image associate to pix structure.

Returns

The image ima_.

Definition at line 131 of file util/pix.hh.

10.379.4.2 template<typename I > const I::psite & mln::util::pix< I >::p ( ) const [inline]

The getter of psite associate to pix structure.

Returns

The psite p_.

Definition at line 140 of file util/pix.hh.

10.379.4.3 template<typename I > I::rvalue mln::util::pix< I >::v ( ) const [inline]

The getter of value associate to pix structure.

Returns

The value of pix.

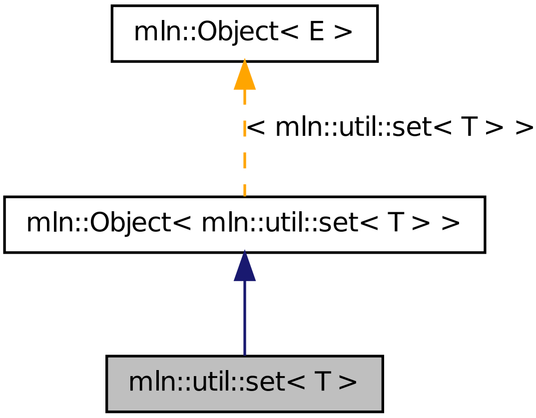
Definition at line 150 of file util/pix.hh.

10.380 mln::util::set< T > Class Template Reference

An "efficient" mathematical set class.

`#include <set.hh>`

Inheritance diagram for mln::util::set< T >:



Public Types

- typedef set_bkd_iter< T > bkd_eiter

  Backward iterator associated type.

- typedef fwd_eiter eiter

  Iterator associated type.

- typedef T element

  Element associated type.

- typedef set_fwd_iter< T > fwd_eiter

  Forward iterator associated type.

Public Member Functions

- void clear ()

  Empty the set.

- const T first_element () const

  Return the first element of the set.

- bool has (const T &elt) const

  Test if the object `elt` *belongs to the set.*

- set< T > & insert (const T &elt)

Insert an element `elt` *into the set.*

- template<typename U >
  set< T > & insert (const set< U > &other)

  Insert the elements of `other` *into the set.*

- bool is_empty () const

  Test if the set is empty.

- const T last_element () const

  Return the last element of the set.

- std::size_t memory_size () const

  Return the size of this set in memory.

- unsigned nelements () const

  Return the number of elements of the set.

- const T & operator[ ] (unsigned i) const

  Return the i-th element of the set.

- set< T > & remove (const T &elt)

  Remove an element `elt` *into the set.*

- set ()

  Constructor without arguments.

- const std::vector< T > & std_vector () const

  Give access to the set elements.

10.380.1 Detailed Description

template<typename T> class mln::util::set< T >

An "efficient" mathematical set class. This set class is designed to store a mathematical set and to present it to the user as a linear array (std::vector).

Elements are stored by copy. Implementation is lazy.

The set has two states: frozen or not. There is an automatic switch of state when the user modifies its contents (insert, remove, or clear) or access to its contents (op[i]).

The parameter `T` is the element type, which shall not be const-qualified.

The unicity of set elements is handled by the mln::util::ord mechanism.

See also

mln::util::ord

Definition at line 81 of file util/set.hh.

10.380.2 Member Typedef Documentation

10.380.2.1 template<typename T> typedef set_bkd_iter<T> mln::util::set< T >::bkd_eiter

Backward iterator associated type.

Definition at line 93 of file util/set.hh.

10.380.2.2 template<typename T> typedef fwd_eiter mln::util::set< T >::eiter

Iterator associated type.

Definition at line 96 of file util/set.hh.

10.380.2.3 template<typename T> typedef T mln::util::set< T >::element

Element associated type.

Definition at line 86 of file util/set.hh.

10.380.2.4 template<typename T> typedef set_fwd_iter<T> mln::util::set< T >::fwd_eiter

Forward iterator associated type.

Definition at line 90 of file util/set.hh.

10.380.3 Constructor & Destructor Documentation

10.380.3.1 template<typename T > mln::util::set< T >::set ( ) [inline]

Constructor without arguments.

Definition at line 348 of file util/set.hh.

10.380.4 Member Function Documentation

10.380.4.1 template<typename T > void mln::util::set< T >::clear ( ) [inline]

Empty the set.

All elements contained in the set are destroyed so the set is emptied.

Postcondition

is_empty() == true

Definition at line 390 of file util/set.hh.

References mln::util::set< T >::is_empty().

10.380.4.2 template<typename T > const T mln::util::set< T >::first_element ( ) const [inline]

Return the first element of the set.

Precondition

not is_empty()

Definition at line 427 of file util/set.hh.

References mln::util::set< T >::is_empty().

10.380.4.3 template<typename T > bool mln::util::set< T >::has (const T & *elt*) const [inline]

Test if the object `elt` belongs to the set.

Parameters

`[in]` ***elt*** A possible element of the set.

Returns

True is `elt` is in the set.

Definition at line 445 of file util/set.hh.

10.380.4.4 template<typename T > set< T > & mln::util::set< T >::insert (const T & *elt*) [inline]

Insert an element `elt` into the set.

Parameters

`[in]` ***elt*** The element to be inserted.

If `elt` is already in the set, this method is a no-op.

Returns

The set itself after insertion.

Definition at line 356 of file util/set.hh.

Referenced by mln::p_key< K, P >::change_keys().

10.380.4.5 template<typename T > template<typename U > set< T > & mln::util::set< T >::insert (const set< U > & *other*) [inline]

Insert the elements of `other` into the set.

Parameters

`[in]` ***other*** The set containing the elements to be inserted.

Returns

The set itself after insertion.

Definition at line 367 of file util/set.hh.

References mln::util::set< T >::is_empty(), and mln::util::set< T >::std_vector().

10.380.4.6 template< typename T > bool mln::util::set< T >::is_empty ( ) const [inline]

Test if the set is empty.

Definition at line 453 of file util/set.hh.

References mln::util::set< T >::nelements().

Referenced by mln::util::set< T >::clear(), mln::util::set< T >::first_element(), mln::util::set< T >::insert(), and mln::util::set< T >::last_element().

10.380.4.7 template< typename T > const T mln::util::set< T >::last_element ( ) const [inline]

Return the last element of the set.

Precondition

not is_empty()

Definition at line 436 of file util/set.hh.

References mln::util::set< T >::is_empty().

10.380.4.8 template< typename T > std::size_t mln::util::set< T >::memory_size ( ) const [inline]

Return the size of this set in memory.

Definition at line 494 of file util/set.hh.

References mln::util::set< T >::nelements().

10.380.4.9 template< typename T > unsigned mln::util::set< T >::nelements ( ) const [inline]

Return the number of elements of the set.

Definition at line 409 of file util/set.hh.

Referenced by mln::util::set< T >::is_empty(), mln::util::set< T >::memory_size(), and mln::util::set< T >::operator[ ]().

10.380.4.10 template< typename T > const T & mln::util::set< T >::operator[ ] (unsigned *i*) const [inline]

Return the i-th element of the set.

Parameters

[in] ***i*** Index of the element to retrieve.

Precondition

i < nelements()

The element is returned by reference and is constant.

Definition at line 417 of file util/set.hh.

References mln::util::set< T >::nelements().

10.380.4.11 template<typename T > set< T > & mln::util::set< T >::remove (const T & *elt*) [inline]

Remove an element `elt` into the set.

Parameters

`[in]` ***elt*** The element to be inserted.

If `elt` is already in the set, this method is a no-op.

Returns

The set itself after suppression.

Definition at line 380 of file util/set.hh.

10.380.4.12 template<typename T > const std::vector< T > & mln::util::set< T >::std_vector ( ) const [inline]

Give access to the set elements.

The complexity of this method is O(1).

Postcondition

The set is frozen.

Returns

An array (std::vector) of elements.

Definition at line 461 of file util/set.hh.

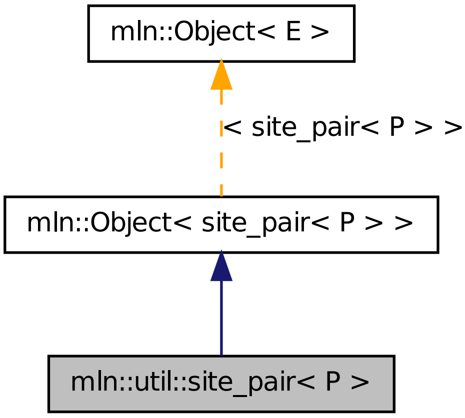
Referenced by mln::util::set< T >::insert().

10.381 mln::util::site_pair< P > Class Template Reference

A pair of sites.

`#include <site_pair.hh>`

Inheritance diagram for mln::util::site_pair< P >:



Public Member Functions

- const P & first () const

    Return the first site.

- const util::ord_pair< P > & pair () const

    Return the underlying pair.

- const P & second () const

    Return the second site.

10.381.1 Detailed Description

template<typename P> class mln::util::site_pair< P >

A pair of sites. It can be used as site.

Definition at line 52 of file site_pair.hh.

10.381.2 Member Function Documentation

10.381.2.1 template<typename P > const P & mln::util::site_pair< P >::first ( ) const [inline]

Return the first site.

Definition at line 142 of file site_pair.hh.

10.381.2.2 template<typename P > const util::ord_pair< P > & mln::util::site_pair< P >::pair ( ) const [inline]

Return the underlying pair.

Definition at line 158 of file site_pair.hh.

10.381.2.3 template<typename P > const P & mln::util::site_pair< P >::second ( ) const [inline]

Return the second site.

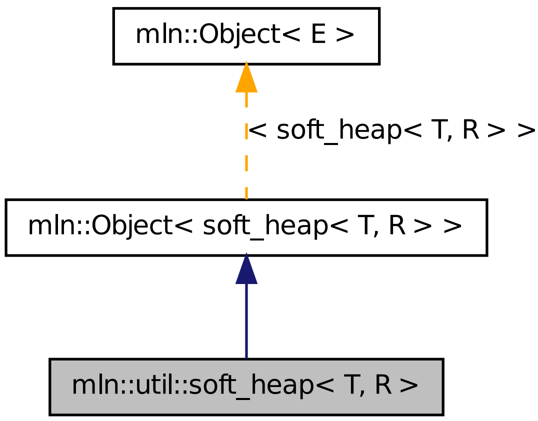
Definition at line 150 of file site_pair.hh.

10.382 mln::util::soft_heap< T, R > Class Template Reference

Soft heap.

`#include <soft_heap.hh>`

Inheritance diagram for mln::util::soft_heap< T, R >:



Public Types

- typedef T element

  Element associated type.

Public Member Functions

- void clear ()

Clear the heap.

- bool is_empty () const

  Return true if there is at least one element.

- bool is_valid () const

  Return true if there is at least one element.

- int nelements () const

  Return the number of element in the heap.

- T pop_front ()

  Returns the element with the lowest priority and remove it from the heap.

- void push (soft_heap< T, R > &sh)

  Merge `sh` *with this heap.*

- void push (const T &element)

  Add a new element `element`*.*

- soft_heap (unsigned r=20)

  Default constructor.

- ~soft_heap ()

  Destructor.

10.382.1 Detailed Description

template<typename T, typename R> class mln::util::soft_heap< T, R >

Soft heap. T key, the data to store in the heap. For instance a point 2d. R rank, for instance int_u8

Definition at line 178 of file soft_heap.hh.

10.382.2 Member Typedef Documentation

10.382.2.1 template<typename T, typename R> typedef T mln::util::soft_heap< T, R >::element

Element associated type.

Definition at line 185 of file soft_heap.hh.

10.382.3 Constructor & Destructor Documentation

10.382.3.1 template<typename T , typename R > mln::util::soft_heap< T, R >::soft_heap (unsigned *r = 20*) `[inline]`

Default constructor.

A corruption threshold `r` can be specified. This threshold means that if nodes have a rank higher than this threshold they can be "corrupted" and therefore their rank can be reduced.

Definition at line 619 of file soft_heap.hh.

10.382.3.2 template<typename T , typename R > mln::util::soft_heap< T, R >::~soft_heap ( ) `[inline]`

Destructor.

Definition at line 631 of file soft_heap.hh.

10.382.4 Member Function Documentation

10.382.4.1 template<typename T , typename R > void mln::util::soft_heap< T, R >::clear ( ) `[inline]`

Clear the heap.

Definition at line 771 of file soft_heap.hh.

10.382.4.2 template<typename T , typename R > bool mln::util::soft_heap< T, R >::is_empty ( ) const `[inline]`

Return true if there is at least one element.

Definition at line 753 of file soft_heap.hh.

10.382.4.3 template<typename T , typename R > bool mln::util::soft_heap< T, R >::is_valid ( ) const `[inline]`

Return true if there is at least one element.

Definition at line 744 of file soft_heap.hh.

Referenced by mln::util::soft_heap< T, R >::pop_front().

10.382.4.4 template<typename T , typename R > int mln::util::soft_heap< T, R >::nelements ( ) const `[inline]`

Return the number of element in the heap.

Definition at line 762 of file soft_heap.hh.

Referenced by mln::util::soft_heap< T, R >::push().

10.382.4.5 template<typename T , typename R > T mln::util::soft_heap< T, R >::pop_front ( ) `[inline]`

Returns the element with the lowest priority and remove it from the heap.

Definition at line 675 of file soft_heap.hh.

References mln::util::soft_heap< T, R >::is_valid().

10.382.4.6 template<typename T , typename R > void mln::util::soft_heap< T, R >::push (const T & *element*) [inline]

Add a new element `element`.

Definition at line 646 of file soft_heap.hh.

10.382.4.7 template<typename T , typename R > void mln::util::soft_heap< T, R >::push (soft_heap< T, R > & *sh*) [inline]

Merge `sh` with this heap.

Be ware that after this call, `sh` will be empty. This heap will hold the elements which were part of `sh`.

Definition at line 658 of file soft_heap.hh.

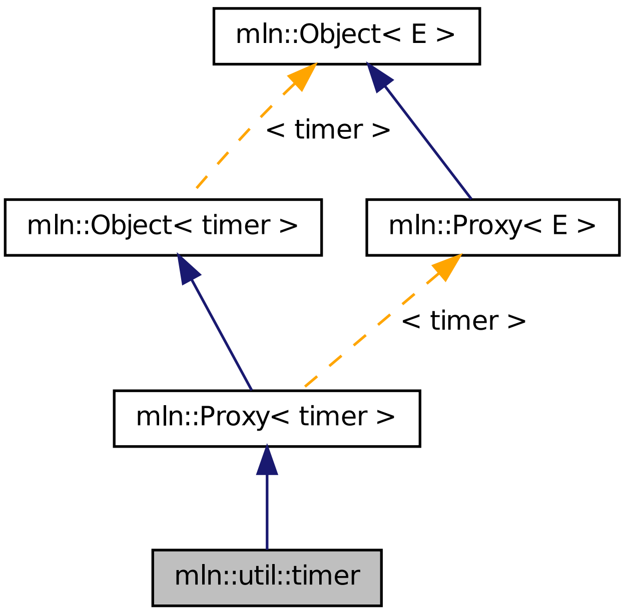
References mln::util::soft_heap< T, R >::nelements().

10.383 mln::util::timer Class Reference

Timer structure.

`#include <timer.hh>`

Inheritance diagram for mln::util::timer:



10.383.1 Detailed Description

Timer structure.

Definition at line 45 of file mln/util/timer.hh.

10.384 mln::util::tracked_ptr< T > Struct Template Reference

Smart pointer for shared data with tracking.

`#include <tracked_ptr.hh>`

Public Member Functions

- operator bool () const

  Coercion towards Boolean (for arithmetical tests).

- bool operator! () const

  Negation (for arithmetical tests).

- T ∗ operator-> ()

  Mimics the behavior of op-> for a pointer in the mutable case.

- const T ∗ operator-> () const

  Mimics the behavior of op-> for a pointer in the const case.

- tracked_ptr< T > & operator= (T ∗ptr)

  Assignment.

- tracked_ptr< T > & operator= (const tracked_ptr< T > &rhs)

  Assignment.

- ∼tracked_ptr ()

  Destructor.

  - tracked_ptr ()

    Constructors.

  - tracked_ptr (const tracked_ptr< T > &rhs)

    Copy constructor.

10.384.1 Detailed Description

template<typename T> struct mln::util::tracked_ptr< T >

Smart pointer for shared data with tracking.

Definition at line 52 of file tracked_ptr.hh.

10.384.2 Constructor & Destructor Documentation

10.384.2.1 template< typename T > mln::util::tracked_ptr< T >::tracked_ptr ( ) [inline]

Constructors.

Definition at line 140 of file tracked_ptr.hh.

10.384.2.2 template< typename T > mln::util::tracked_ptr< T >::tracked_ptr (const tracked_ptr< T > & *rhs*) [inline]

Copy constructor.

Definition at line 164 of file tracked_ptr.hh.

10.384.2.3 template< typename T > mln::util::tracked_ptr< T >::~tracked_ptr ( ) [inline]

Destructor.

Definition at line 216 of file tracked_ptr.hh.

10.384.3 Member Function Documentation

10.384.3.1 template< typename T > mln::util::tracked_ptr< T >::operator bool ( ) const [inline]

Coercion towards Boolean (for arithmetical tests).

Definition at line 106 of file tracked_ptr.hh.

10.384.3.2 template< typename T > bool mln::util::tracked_ptr< T >::operator! ( ) const [inline]

Negation (for arithmetical tests).

Definition at line 114 of file tracked_ptr.hh.

10.384.3.3 template< typename T > T * mln::util::tracked_ptr< T >::operator-> ( ) [inline]

Mimics the behavior of op-> for a pointer in the mutable case.

Invariant

Pointer proxy exists.

Definition at line 131 of file tracked_ptr.hh.

10.384.3.4 template< typename T > const T * mln::util::tracked_ptr< T >::operator-> ( ) const [inline]

Mimics the behavior of op-> for a pointer in the const case.

Invariant

Pointer proxy exists.

Definition at line 122 of file tracked_ptr.hh.

10.384.3.5 template<typename T > tracked_ptr< T > & mln::util::tracked_ptr< T >::operator= (T * *ptr*) [inline]

Assignment.

Definition at line 195 of file tracked_ptr.hh.

10.384.3.6 template<typename T > tracked_ptr< T > & mln::util::tracked_ptr< T >::operator= (const tracked_ptr< T > & *rhs*) [inline]

Assignment.

Definition at line 176 of file tracked_ptr.hh.

10.385 mln::util::tree< T > Class Template Reference

Class of generic tree.

`#include <tree.hh>`

Public Member Functions

- void add_tree_down (T &elt)

  Bind a new tree downer the current.

- void add_tree_up (T &elt)

  Bind a new tree upper the current.

- bool check_consistency ()

  Check the consistency of the tree.

- branch< T > main_branch ()

  Convert the tree into brach.

- tree_node< T > * root ()

  The getter of the root.

- tree ()

  Constructor.

- tree (tree_node< T > *root)

  Constructor.

10.385.1 Detailed Description

template<typename T> class mln::util::tree< T >

Class of generic tree.

Definition at line 187 of file tree.hh.

10.385.2 Constructor & Destructor Documentation

10.385.2.1 template<typename T > mln::util::tree< T >::tree ( ) [inline]

Constructor.

Definition at line 285 of file tree.hh.

10.385.2.2 template<typename T > mln::util::tree< T >::tree (tree_node< T > * *root*) [inline]

Constructor.

Parameters

[in] ***root*** The root of the tree.

Definition at line 292 of file tree.hh.

10.385.3 Member Function Documentation

10.385.3.1 template<typename T > void mln::util::tree< T >::add_tree_down (T & *elt*) [inline]

Bind a new tree downer the current.

Parameters

[in] ***elt*** The new value of the new tree_node of the new tree add downer the current.

Definition at line 328 of file tree.hh.

10.385.3.2 template<typename T > void mln::util::tree< T >::add_tree_up (T & *elt*) [inline]

Bind a new tree upper the current.

Parameters

[in] ***elt*** The new value of the new tree_node of the new tree add upper the current.

Definition at line 317 of file tree.hh.

References mln::util::tree_node< T >::children().

10.385.3.3 template<typename T > bool mln::util::tree< T >::check_consistency ( ) [inline]

Check the consistency of the tree.

Returns

true if no error, else false.

Definition at line 338 of file tree.hh.

References mln::util::tree< T >::root().

10.385.3.4 template<typename T > branch< T > mln::util::tree< T >::main_branch ( ) [inline]

Convert the tree into brach.

Returns

The root's tree_node of the the current tree.

Definition at line 309 of file tree.hh.

References mln::util::tree< T >::root().

10.385.3.5 template<typename T > tree_node< T > * mln::util::tree< T >::root ( ) [inline]

The getter of the root.

Returns

The root's tree_node of the the current tree.

Definition at line 301 of file tree.hh.

Referenced by mln::util::tree< T >::check_consistency(), mln::util::display_tree(), mln::util::tree< T >::main_branch(), and mln::util::tree_to_fast().

10.386 mln::util::tree_node< T > Class Template Reference

Class of generic tree_node for tree.

`#include <tree.hh>`

Public Member Functions

- tree_node< T > * add_child (T elt)

  Create a tree_node with `elt` which become the child of the current tree_node.

- tree_node< T > * add_child (tree_node< T > *tree_node)

Bind `tree_node` to the current tree_node and become its child.

- bool check_consistency ()

  Check the consistency of the tree_node.

- children_t & children ()

  The getter of the children.

- const children_t & children () const

  The getter of the children.

- tree_node< T > * delete_tree_node ()

  Delete the current tree_node.

- T & elt ()

  The getter of the element.

- const T & elt () const

  The const getter of the element.

- tree_node< T > * parent ()

  The getter of the parent.

- void print (std::ostream &ostr, int level=0)

  Print on `ostr` the arborescence with the current tree_node as root.

- tree_node< T > * search (T &elt)

  Search the tree_node with value `elt` in the arborescence of the current tree_node.

- int search_rec (tree_node< T > **res, T &elt)

  The using method for method search.

- void set_parent (tree_node< T > *parent)

  Bind `tree_node` to the current tree_node and become its parent.

- tree_node ()

  Constructor.

- tree_node (T elt)

  Constructor.

10.386.1 Detailed Description

template<typename T> class mln::util::tree_node< T >

Class of generic tree_node for tree.

Definition at line 58 of file tree.hh.

10.386.2 Constructor & Destructor Documentation

10.386.2.1 template<typename T > mln::util::tree_node< T >::tree_node ( ) [inline]

Constructor.

Definition at line 345 of file tree.hh.

10.386.2.2 template<typename T > mln::util::tree_node< T >::tree_node (T *elt*) [inline]

Constructor.

Parameters

[in] ***elt*** The element of tree_node.

Definition at line 352 of file tree.hh.

10.386.3 Member Function Documentation

10.386.3.1 template<typename T > tree_node< T > * mln::util::tree_node< T >::add_child (T *elt*) [inline]

Create a tree_node with `elt` which become the child of the current tree_node.

Parameters

[in] ***elt*** The element of the new child to add.

Returns

The new tree_node created.

Definition at line 394 of file tree.hh.

10.386.3.2 template<typename T > tree_node< T > * mln::util::tree_node< T >::add_child (tree_node< T > * *tree_node*) [inline]

Bind `tree_node` to the current tree_node and become its child.

Parameters

[in] ***tree_node*** The new child tree_node.

Returns

The child tree_node.

Definition at line 407 of file tree.hh.

References mln::util::tree_node< T >::children(), and mln::util::tree_node< T >::parent().

10.386.3.3 template< typename T > bool mln::util::tree_node< T >::check_consistency ( ) [inline]

Check the consistency of the tree_node.

Returns

true if no error, else false.

Definition at line 519 of file tree.hh.

10.386.3.4 template< typename T > const std::vector< tree_node< T > * > & mln::util::tree_node< T >::children ( ) const [inline]

The getter of the children.

Returns

The children of the tree_node in const.

Definition at line 386 of file tree.hh.

10.386.3.5 template< typename T > std::vector< tree_node< T > * > & mln::util::tree_node< T >::children ( ) [inline]

The getter of the children.

Returns

The children of the tree_node.

Definition at line 378 of file tree.hh.

Referenced by mln::util::tree_node< T >::add_child(), and mln::util::tree< T >::add_tree_up().

10.386.3.6 template< typename T > tree_node< T > * mln::util::tree_node< T >::delete_tree_node ( ) [inline]

Delete the current tree_node.

Definition at line 427 of file tree.hh.

10.386.3.7 template< typename T > const T & mln::util::tree_node< T >::elt ( ) const [inline]

The const getter of the element.

Returns

The element of the tree_node in const.

Definition at line 361 of file tree.hh.

10.386.3.8 template<typename T > T & mln::util::tree_node< T >::elt ( ) [inline]

The getter of the element.

Returns

The element of the tree_node.

Definition at line 369 of file tree.hh.

Referenced by mln::util::tree_node< T >::print().

10.386.3.9 template<typename T > tree_node< T > * mln::util::tree_node< T >::parent ( ) [inline]

The getter of the parent.

Returns

The parent of the tree_node.

Definition at line 477 of file tree.hh.

Referenced by mln::util::tree_node< T >::add_child(), mln::util::branch_iter_ind< T >::deepness(), and mln::util::branch_iter< T >::deepness().

10.386.3.10 template<typename T > void mln::util::tree_node< T >::print (std::ostream & *ostr*, int *level* = *0*) [inline]

Print on `ostr` the arborescence with the current tree_node as root.

Parameters

[in] ***ostr*** The output stream.

[in] ***level*** The deep level

Definition at line 449 of file tree.hh.

References mln::util::tree_node< T >::elt().

10.386.3.11 template<typename T > tree_node< T > * mln::util::tree_node< T >::search (T & *elt*) [inline]

Search the tree_node with value `elt` in the arborescence of the current tree_node.

Parameters

[in] ***elt*** The value of the searched tree_node.

Returns

If not found 0 else the tree_node with `elt` value.

Definition at line 507 of file tree.hh.

References mln::util::tree_node< T >::search_rec().

10.386.3.12 template<typename T > int mln::util::tree_node< T >::search_rec (tree_node< T > ** *res,* T & *elt*) [inline]

The using method for method search.

Definition at line 485 of file tree.hh.

Referenced by mln::util::tree_node< T >::search().

10.386.3.13 template<typename T > void mln::util::tree_node< T >::set_parent (tree_node< T > * *parent*) [inline]

Bind `tree_node` to the current tree_node and become its parent.

Parameters

[in] ***parent*** The new parent tree_node.

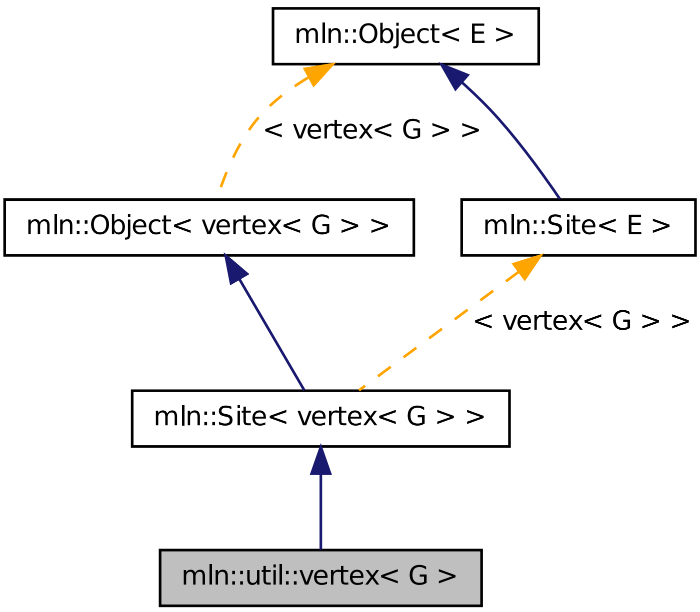
Definition at line 467 of file tree.hh.

10.387 mln::util::vertex< G > Class Template Reference

Vertex of a graph `G`.

`#include <vertex.hh>`

Inheritance diagram for mln::util::vertex< G >:



Public Types

- typedef Vertex< void > Category
  Object category.
- typedef G graph_t
  Graph associated type.
- typedef vertex_id_t id_t
  The vertex type id.
- typedef vertex_id_t::value_t id_value_t
  The underlying type used to store vertex ids.

Public Member Functions

- void change_graph (const G &g)
  Change the parent graph of that vertex.
- edge< G > edge_with (const vertex< G > &v_id) const
  Returns true if this vertex has an edge with the given vertex.
- const G & graph () const
  Returns the graph pointer this vertex belongs to.
- const vertex_id_t & id () const
  Returns the vertex id.
- void invalidate ()
  Invalidate that vertex.
- bool is_valid () const
  Check whether the vertex is still part of the graph.
- edge_id_t ith_nbh_edge (unsigned i) const
  Returns the ith edge starting from this vertex.
- vertex_id_t ith_nbh_vertex (unsigned i) const
  Returns the ith vertex adjacent to this vertex.
- unsigned nmax_nbh_edges () const
  Returns the number max of edges starting from this vertex.
- unsigned nmax_nbh_vertices () const
  Returns the number max of vertices adjacent to this vertex.
- operator vertex_id_t () const
  Conversion to the vertex id.

- vertex_id_t other (const edge_id_t &id_e) const
  Returns the other vertex located on edge `id_e`.
- void update_id (const vertex_id_t &id)
  Update the vertex id.

  - vertex ()
    Constructors.

10.387.1 Detailed Description

template<typename G> class mln::util::vertex< G >

Vertex of a graph `G`.

Definition at line 71 of file vertex.hh.

10.387.2 Member Typedef Documentation

10.387.2.1 template<typename G> typedef Vertex<void> mln::util::vertex< G >::Category

Object category.

Definition at line 77 of file vertex.hh.

10.387.2.2 template<typename G> typedef G mln::util::vertex< G >::graph_t

Graph associated type.

Definition at line 86 of file vertex.hh.

10.387.2.3 template<typename G> typedef vertex_id_t mln::util::vertex< G >::id_t

The vertex type id.

Definition at line 83 of file vertex.hh.

10.387.2.4 template<typename G> typedef vertex_id_t::value_t mln::util::vertex< G >::id_value_t

The underlying type used to store vertex ids.

Definition at line 80 of file vertex.hh.

10.387.3 Constructor & Destructor Documentation

10.387.3.1 template<typename G > mln::util::vertex< G >::vertex ( ) `[inline]`

Constructors.

Definition at line 226 of file vertex.hh.

References mln::util::vertex< G >::invalidate().

10.387.4 Member Function Documentation

10.387.4.1 template<typename G > void mln::util::vertex< G >::change_graph (const G & *g*) [inline]

Change the parent graph of that vertex.

Definition at line 331 of file vertex.hh.

10.387.4.2 template<typename G > edge< G > mln::util::vertex< G >::edge_with (const vertex< G > & *v_id*) const [inline]

Returns true if this vertex has an edge with the given vertex.

Definition at line 321 of file vertex.hh.

10.387.4.3 template<typename G > const G & mln::util::vertex< G >::graph ( ) const [inline]

Returns the graph pointer this vertex belongs to.

Definition at line 348 of file vertex.hh.

Referenced by mln::p_vertices< G, F >::has(), mln::util::line_graph< G >::has(), and mln::util::operator==().

10.387.4.4 template<typename G > const vertex_id_t & mln::util::vertex< G >::id ( ) const [inline]

Returns the vertex id.

Definition at line 356 of file vertex.hh.

Referenced by mln::util::line_graph< G >::has(), and mln::util::operator==().

10.387.4.5 template<typename G > void mln::util::vertex< G >::invalidate ( ) [inline]

Invalidate that vertex.

Definition at line 266 of file vertex.hh.

Referenced by mln::util::vertex< G >::vertex().

10.387.4.6 template<typename G > bool mln::util::vertex< G >::is_valid ( ) const [inline]

Check whether the vertex is still part of the graph.

Definition at line 258 of file vertex.hh.

Referenced by mln::p_vertices< G, F >::has().

10.387.4.7 template<typename G > edge_id_t mln::util::vertex< G >::ith_nbh_edge (unsigned *i*) const [inline]

Returns the ith edge starting from this vertex.

Definition at line 285 of file vertex.hh.

10.387.4.8 template<typename G > vertex_id_t mln::util::vertex< G >::ith_nbh_vertex (unsigned *i*) const [inline]

Returns the ith vertex adjacent to this vertex.

Definition at line 303 of file vertex.hh.

10.387.4.9 template<typename G > unsigned mln::util::vertex< G >::nmax_nbh_edges ( ) const [inline]

Returns the number max of edges starting from this vertex.

If g_ is a sub graph of another graph, nmax will be retrived from the initial graph.

Definition at line 294 of file vertex.hh.

10.387.4.10 template<typename G > unsigned mln::util::vertex< G >::nmax_nbh_vertices ( ) const [inline]

Returns the number max of vertices adjacent to this vertex.

Definition at line 312 of file vertex.hh.

10.387.4.11 template<typename G > mln::util::vertex< G >::operator vertex_id_t ( ) const [inline]

Conversion to the vertex id.

FIXME: May cause ambiguities... :(

Definition at line 363 of file vertex.hh.

10.387.4.12 template<typename G > vertex_id_t mln::util::vertex< G >::other (const edge_id_t & *id_e*) const [inline]

Returns the other vertex located on edge `id_e`.

Definition at line 274 of file vertex.hh.

10.387.4.13 template<typename G > void mln::util::vertex< G >::update_id (const vertex_id_t & *id*) [inline]

Update the vertex id.

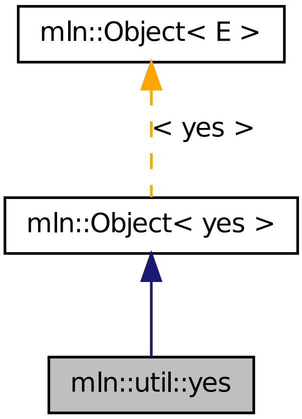
Definition at line 340 of file vertex.hh.

10.388 mln::util::yes Struct Reference

Object that always says "yes".

`#include <yes.hh>`

Inheritance diagram for mln::util::yes:



10.388.1 Detailed Description

Object that always says "yes".

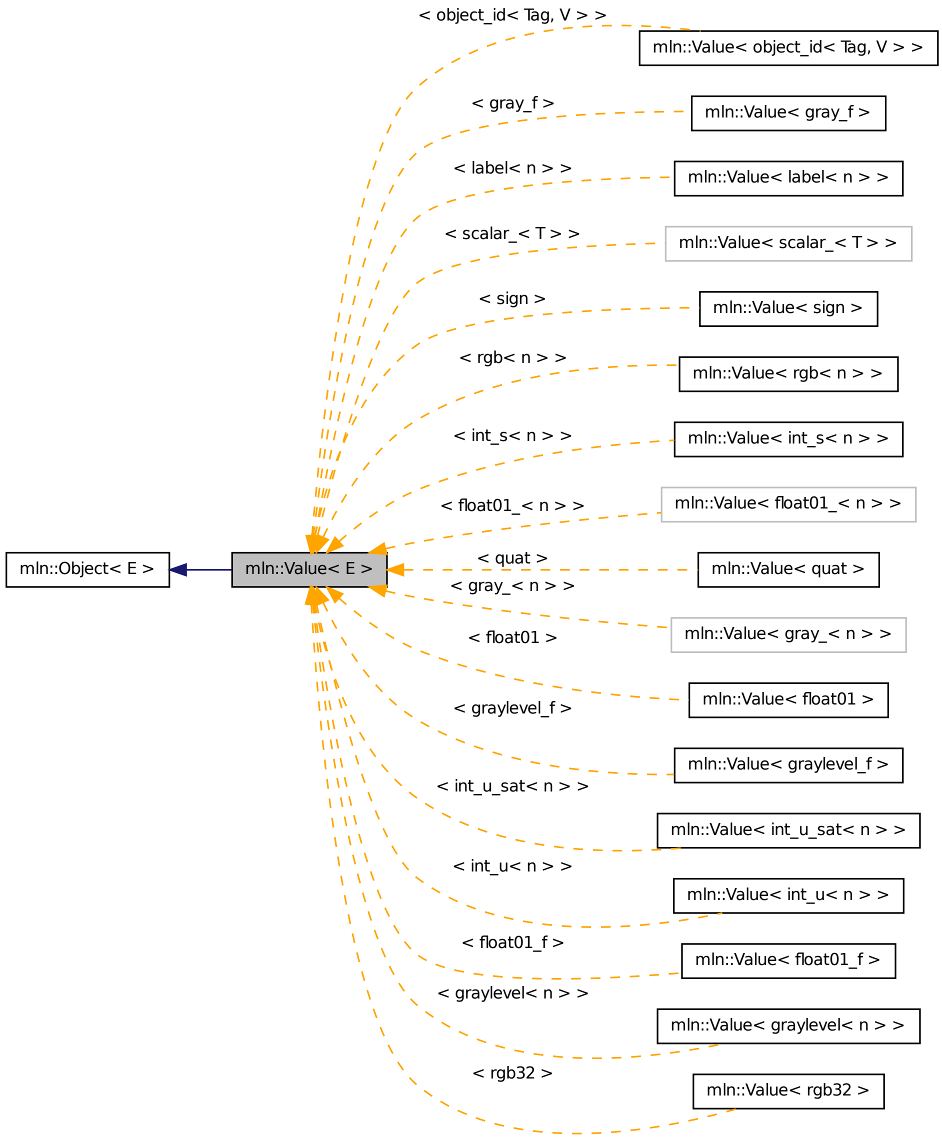
Definition at line 76 of file yes.hh.

10.389 mln::Value< E > Struct Template Reference

Base class for implementation classes of values.

`#include <value.hh>`

Inheritance diagram for mln::Value< E >:



10.389.1 Detailed Description

template<typename E> struct mln::Value< E >

Base class for implementation classes of values.

See also

mln::doc::Value for a complete documentation of this class contents.

Definition at line 57 of file core/concept/value.hh.

10.390 mln::value::float01 Class Reference

Class for floating values restricted to the interval [0..1] and discretized with n bits.

`#include <float01.hh>`

Inherits mln::value::Floating< float01 >.

Public Types

- typedef std::pair< unsigned, unsigned long > enc

  Encoding associated type.

- typedef float equiv

  Equivalent associated type.

Public Member Functions

- float01 ()

  Ctor.

- template<unsigned n>
  float01 (const float01_< n > &val)

  Ctor.

- float01 (unsigned nbits, float val)

  Ctor.

- unsigned nbits () const

  Access to the encoding size.

- operator float () const

  Conversion to float.

- float01 & set_nbits (unsigned nbits)

  Set the encoding size to nbits.

- const float01 to_nbits (unsigned nbits) const

  Return an equivalent gray encoded on `nbits` bits.

- float value () const

  Access to std type.

- unsigned long value_ind () const

  Access to the position in the quantized interval.

10.390.1 Detailed Description

Class for floating values restricted to the interval [0..1] and discretized with n bits.

Definition at line 56 of file float01.hh.

10.390.2 Member Typedef Documentation

10.390.2.1 typedef std::pair<unsigned, unsigned long> mln::value::float01::enc

Encoding associated type.

Definition at line 61 of file float01.hh.

10.390.2.2 typedef float mln::value::float01::equiv

Equivalent associated type.

Definition at line 64 of file float01.hh.

10.390.3 Constructor & Destructor Documentation

10.390.3.1 mln::value::float01::float01 ( ) `[inline]`

Ctor.

Definition at line 151 of file float01.hh.

10.390.3.2 template<unsigned n> mln::value::float01::float01 (const float01_< n > & *val*) `[inline]`

Ctor.

Definition at line 158 of file float01.hh.

10.390.3.3 mln::value::float01::float01 (unsigned *nbits*, float *val*) `[inline]`

Ctor.

Definition at line 165 of file float01.hh.

10.390.4 Member Function Documentation

10.390.4.1 unsigned mln::value::float01::nbits ( ) const `[inline]`

Access to the encoding size.

Definition at line 186 of file float01.hh.

10.390.4.2 mln::value::float01::operator float ( ) const `[inline]`

Conversion to float.

Definition at line 224 of file float01.hh.

10.390.4.3 float01 & mln::value::float01::set_nbits (unsigned *nbits*) [inline]

Set the encoding size to nbits.

Definition at line 193 of file float01.hh.

Referenced by to_nbits().

10.390.4.4 const float01 mln::value::float01::to_nbits (unsigned *nbits*) const [inline]

Return an equivalent gray encoded on `nbits` bits.

Definition at line 214 of file float01.hh.

References set_nbits().

10.390.4.5 float mln::value::float01::value ( ) const [inline]

Access to std type.

Definition at line 172 of file float01.hh.

10.390.4.6 unsigned long mln::value::float01::value_ind ( ) const [inline]

Access to the position in the quantized interval.

Definition at line 179 of file float01.hh.

10.391 mln::value::float01_f Struct Reference

Class for floating values restricted to the interval [0..1].

`#include <float01_f.hh>`

Inherits mln::value::Floating< float01_f >, and mln::value::internal::value_like_< float,float,float,float01_f >.

Public Member Functions

- float01_f ()

    Constructor without argument.

- float01_f (float val)

    Constructor from a float.

- operator float () const

    Conversion to a float.

- float01_f & operator= (const float val)

    Assignment from a float.

- float value () const

  Access to float value.

10.391.1 Detailed Description

Class for floating values restricted to the interval [0..1].

Definition at line 84 of file float01_f.hh.

10.391.2 Constructor & Destructor Documentation

10.391.2.1 mln::value::float01_f::float01_f ( ) [inline]

Constructor without argument.

Definition at line 115 of file float01_f.hh.

10.391.2.2 mln::value::float01_f::float01_f (float *val*) [inline]

Constructor from a float.

Definition at line 120 of file float01_f.hh.

10.391.3 Member Function Documentation

10.391.3.1 mln::value::float01_f::operator float ( ) const [inline]

Conversion to a float.

Definition at line 145 of file float01_f.hh.

10.391.3.2 float01_f & mln::value::float01_f::operator= (const float *val*) [inline]

Assignment from a float.

Definition at line 136 of file float01_f.hh.

10.391.3.3 float mln::value::float01_f::value ( ) const [inline]

Access to float value.

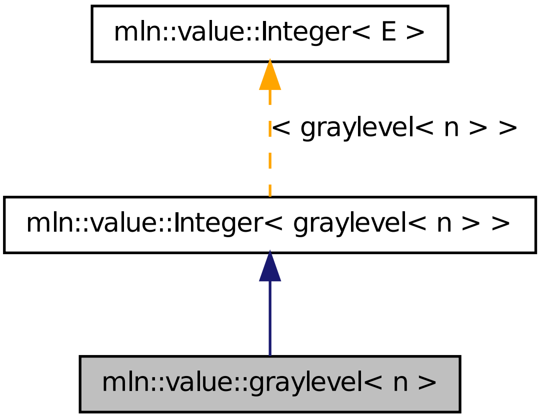
Definition at line 129 of file float01_f.hh.

10.392 mln::value::graylevel< n > Struct Template Reference

General gray-level class on n bits.

`#include <graylevel.hh>`

Inheritance diagram for mln::value::graylevel< n >:



Public Member Functions

- graylevel ()
  Constructor without argument.
- graylevel (const graylevel< n > &rhs)
  Copy constructor.
- graylevel (int val)
  Constructor from int.
- template<unsigned m>
  graylevel (const graylevel< m > &rhs)
  Constructor from any graylevel.
- graylevel< n > & operator= (const graylevel< n > &rhs)
  Assigment.
- graylevel< n > & operator= (int val)
  Assigment with int.
- template<unsigned m>
  graylevel< n > & operator= (const graylevel< m > &rhs)
  Assigment with any graylevel.
- float to_float () const
  Conversion to float between 0 and 1.

- unsigned value () const

  Access to std type.

- graylevel (const mln::literal::black_t &)

  Ctors with literals.

- graylevel< n > & operator= (const mln::literal::black_t &)

  Assigment with literals.

10.392.1 Detailed Description

template<unsigned n> struct mln::value::graylevel< n >

General gray-level class on n bits.

Definition at line 257 of file graylevel.hh.

10.392.2 Constructor & Destructor Documentation

10.392.2.1 template<unsigned n> mln::value::graylevel< n >::graylevel ( ) `[inline]`

Constructor without argument.

Definition at line 436 of file graylevel.hh.

10.392.2.2 template<unsigned n> mln::value::graylevel< n >::graylevel (const graylevel< n > & *rhs*) `[inline]`

Copy constructor.

Definition at line 463 of file graylevel.hh.

10.392.2.3 template<unsigned n> mln::value::graylevel< n >::graylevel (int *val*) `[inline]`

Constructor from int.

Definition at line 443 of file graylevel.hh.

10.392.2.4 template<unsigned n> template<unsigned m> mln::value::graylevel< n >::graylevel (const graylevel< m > & *rhs*) `[inline]`

Constructor from any graylevel.

Definition at line 481 of file graylevel.hh.

References mln::value::graylevel< n >::value().

10.392.2.5 template<unsigned n> mln::value::graylevel< n >::graylevel (const mln::literal::black_t &) [inline]

Ctors with literals.

Definition at line 499 of file graylevel.hh.

10.392.3 Member Function Documentation

10.392.3.1 template<unsigned n> graylevel< n > & mln::value::graylevel< n >::operator= (const graylevel< n > & *rhs*) [inline]

Assigment.

Definition at line 472 of file graylevel.hh.

10.392.3.2 template<unsigned n> graylevel< n > & mln::value::graylevel< n >::operator= (int *val*) [inline]

Assigment with int.

Definition at line 453 of file graylevel.hh.

10.392.3.3 template<unsigned n> graylevel< n > & mln::value::graylevel< n >::operator= (const mln::literal::black_t &) [inline]

Assigment with literals.

Definition at line 507 of file graylevel.hh.

10.392.3.4 template<unsigned n> template<unsigned m> graylevel< n > & mln::value::graylevel< n >::operator= (const graylevel< m > & *rhs*) [inline]

Assigment with any graylevel.

Definition at line 490 of file graylevel.hh.

References mln::value::graylevel< n >::value().

10.392.3.5 template<unsigned n> float mln::value::graylevel< n >::to_float ( ) const [inline]

Conversion to float between 0 and 1.

Definition at line 557 of file graylevel.hh.

Referenced by mln::value::graylevel_f::graylevel_f(), and mln::value::graylevel_f::operator=().

10.392.3.6 template<unsigned n> unsigned mln::value::graylevel< n >::value ( ) const [inline]

Access to std type.

Definition at line 549 of file graylevel.hh.

Referenced by mln::value::graylevel< n >::graylevel(), and mln::value::graylevel< n >::operator=().

10.393 mln::value::graylevel_f Struct Reference

General gray-level class on n bits.

```
#include <graylevel_f.hh>
```

Inherits mln::value::Floating< graylevel_f >, and mln::value::internal::value_like_< float01_f,float01_f::enc, internal::gray_f,graylevel_f >.

Public Member Functions

- graylevel_f ()

  Constructor without argument.

- graylevel_f (const graylevel_f &rhs)

  Copy constructor.

- graylevel_f (float val)

  Constructor from float.

- template<unsigned n>
  graylevel_f (const graylevel< n > &rhs)

  Constructor from graylevel.

- template<unsigned n>
  operator graylevel< n > () const

  Conversion to graylevel<n>.

- graylevel_f & operator= (float val)

  Assigment with float.

- graylevel_f & operator= (const graylevel_f &rhs)

  Assigment.

- template<unsigned n>
  graylevel_f & operator= (const graylevel< n > &rhs)

  Assigment with graylevel.

- float value () const

  Access to std type.

  - graylevel_f (const mln::literal::black_t &)

    Ctors with literals.

  - graylevel_f & operator= (const mln::literal::black_t &)

    Assigment with literals.

10.393.1 Detailed Description

General gray-level class on n bits.

Definition at line 193 of file graylevel_f.hh.

10.393.2 Constructor & Destructor Documentation

10.393.2.1 mln::value::graylevel_f::graylevel_f ( ) [inline]

Constructor without argument.

Definition at line 341 of file graylevel_f.hh.

10.393.2.2 mln::value::graylevel_f::graylevel_f (const graylevel_f & *rhs*) [inline]

Copy constructor.

Definition at line 383 of file graylevel_f.hh.

10.393.2.3 mln::value::graylevel_f::graylevel_f (float *val*) [inline]

Constructor from float.

Definition at line 347 of file graylevel_f.hh.

10.393.2.4 template<unsigned n> mln::value::graylevel_f::graylevel_f (const graylevel< n > & *rhs*)

Constructor from graylevel.

Definition at line 365 of file graylevel_f.hh.

References mln::value::graylevel< n >::to_float().

10.393.2.5 mln::value::graylevel_f::graylevel_f (const mln::literal::black_t &) [inline]

Ctors with literals.

Definition at line 400 of file graylevel_f.hh.

10.393.3 Member Function Documentation

10.393.3.1 template<unsigned n> mln::value::graylevel_f::operator graylevel< n > ( ) const [inline]

Conversion to graylevel<n>.

Definition at line 443 of file graylevel_f.hh.

10.393.3.2 graylevel_f & mln::value::graylevel_f::operator= (float *val*) [inline]

Assigment with float.

Definition at line 356 of file graylevel_f.hh.

10.393.3.3 template<unsigned n> graylevel_f & mln::value::graylevel_f::operator= (const graylevel< n > & *rhs*)

Assigment with graylevel.

Definition at line 374 of file graylevel_f.hh.

References mln::value::graylevel< n >::to_float().

10.393.3.4 graylevel_f & mln::value::graylevel_f::operator= (const mln::literal::black_t &) `[inline]`

Assigment with literals.

Definition at line 407 of file graylevel_f.hh.

10.393.3.5 graylevel_f & mln::value::graylevel_f::operator= (const graylevel_f & *rhs*) `[inline]`

Assigment.

Definition at line 391 of file graylevel_f.hh.

10.393.3.6 float mln::value::graylevel_f::value ( ) const `[inline]`

Access to std type.

Definition at line 450 of file graylevel_f.hh.

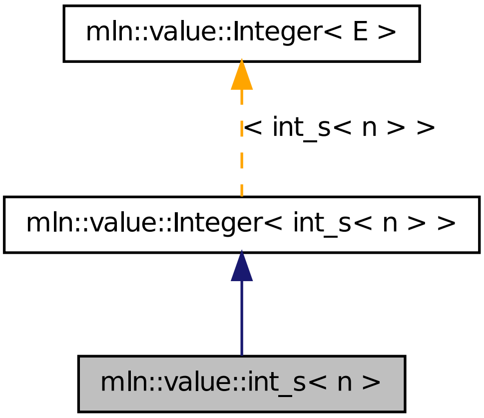
Referenced by mln::value::operator<<().

10.394 mln::value::int_s< n > Struct Template Reference

Signed integer value class.

`#include <int_s.hh>`

Inheritance diagram for mln::value::int_s< n >:



Public Member Functions

- int_s ()
  Constructor without argument.
- int_s (int i)
  Constructor from an integer.
- operator int () const
  Conversion to an integer.
- int_s< n > & operator= (int i)
  Assignment from an integer.

  - int_s (const mln::literal::zero_t &)
    Constructors/assignments with literals.

Static Public Attributes

- static const int_s< n > one = 1
  Unit value.
- static const int_s< n > zero = 0
  Zero value.

10.394.1 Detailed Description

template<unsigned n> struct mln::value::int_s< n >

Signed integer value class. The parameter is `n` the number of encoding bits.

Definition at line 115 of file int_s.hh.

10.394.2 Constructor & Destructor Documentation

10.394.2.1 template<unsigned n> mln::value::int_s< n >::int_s ( ) `[inline]`

Constructor without argument.

Definition at line 179 of file int_s.hh.

10.394.2.2 template<unsigned n> mln::value::int_s< n >::int_s (int *i*) `[inline]`

Constructor from an integer.

Definition at line 192 of file int_s.hh.

10.394.2.3 template<unsigned n> mln::value::int_s< n >::int_s (const mln::literal::zero_t &) `[inline]`

Constructors/assignments with literals.

Definition at line 222 of file int_s.hh.

10.394.3 Member Function Documentation

10.394.3.1 template<unsigned n> mln::value::int_s< n >::operator int ( ) const `[inline]`

Conversion to an integer.

Definition at line 185 of file int_s.hh.

10.394.3.2 template<unsigned n> int_s< n > & mln::value::int_s< n >::operator= (int *i*) `[inline]`

Assignment from an integer.

Definition at line 207 of file int_s.hh.

10.394.4 Member Data Documentation

10.394.4.1 template<unsigned n> const int_s< n > mln::value::int_s< n >::one = 1 `[static]`

Unit value.

Definition at line 149 of file int_s.hh.

10.394.4.2 template<unsigned n> const int_s< n > mln::value::int_s< n >::zero = 0 [static]

Zero value.

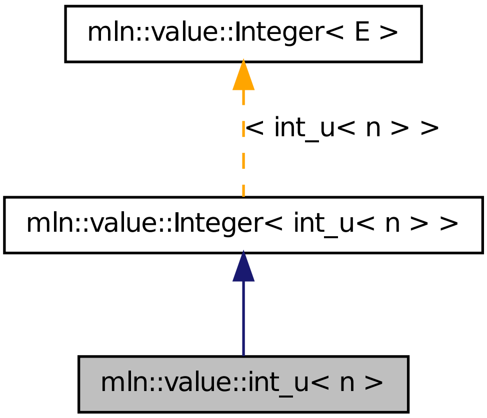
Definition at line 146 of file int_s.hh.

10.395 mln::value::int_u< n > Struct Template Reference

Unsigned integer value class.

`#include <int_u.hh>`

Inheritance diagram for mln::value::int_u< n >:



Public Member Functions

- int_u ()

  Constructor without argument.

- int_u (int i)

  Constructor from an integer.

- int_u< n > next () const

  Give the next value (i.e., i + 1).

- operator unsigned () const

  Conversion to an unsigned integer.

- int operator- () const

  Unary operator minus.

- int_u< n > & operator= (int i)
  Assignment from an integer.

- int_u (const mln::literal::zero_t &)
  Constructors/assignments with literals.

10.395.1 Detailed Description

template<unsigned n> struct mln::value::int_u< n >

Unsigned integer value class. The parameter is `n` the number of encoding bits.

Definition at line 156 of file int_u.hh.

10.395.2 Constructor & Destructor Documentation

10.395.2.1 template<unsigned n> mln::value::int_u< n >::int_u ( ) `[inline]`

Constructor without argument.

Definition at line 276 of file int_u.hh.

10.395.2.2 template<unsigned n> mln::value::int_u< n >::int_u (int *i*) `[inline]`

Constructor from an integer.

Definition at line 282 of file int_u.hh.

10.395.2.3 template<unsigned n> mln::value::int_u< n >::int_u (const mln::literal::zero_t &) `[inline]`

Constructors/assignments with literals.

Definition at line 291 of file int_u.hh.

10.395.3 Member Function Documentation

10.395.3.1 template<unsigned n> int_u< n > mln::value::int_u< n >::next ( ) const `[inline]`

Give the next value (i.e., i + 1).

Definition at line 350 of file int_u.hh.

10.395.3.2 template<unsigned n> mln::value::int_u< n >::operator unsigned ( ) const `[inline]`

Conversion to an unsigned integer.

Definition at line 323 of file int_u.hh.

10.395.3.3 template<unsigned n> int mln::value::int_u< n >::operator- ( ) const [inline]

Unary operator minus.

Definition at line 331 of file int_u.hh.

10.395.3.4 template<unsigned n> int_u< n > & mln::value::int_u< n >::operator= (int *i*) [inline]

Assignment from an integer.

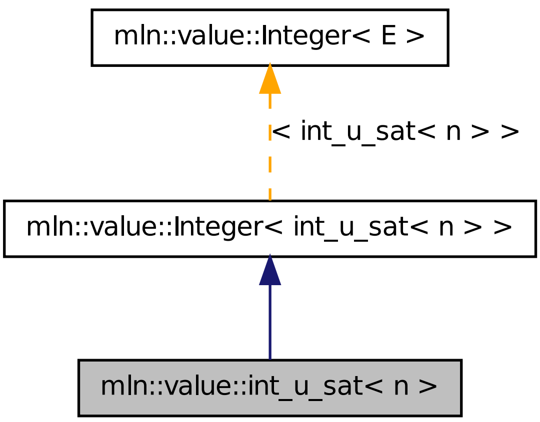
Definition at line 339 of file int_u.hh.

10.396 mln::value::int_u_sat< n > Struct Template Reference

Unsigned integer value class with saturation behavior.

```
#include <int_u_sat.hh>
```

Inheritance diagram for mln::value::int_u_sat< n >:



Public Member Functions

- int_u_sat ()

  Constructor without argument.

- int_u_sat (int i)

  Constructor from an integer.

- operator int () const

  Conversion to an integer.

- int_u_sat< n > & operator+= (int i)

  Self addition.

- int_u_sat< n > & operator-= (int i)

  Self subtraction.

- int_u_sat< n > & operator= (int i)

  Assignment from an integer.

Static Public Attributes

- static const int_u_sat< n > one = 1

  Unit value.

- static const int_u_sat< n > zero = 0

  Zero value.

10.396.1 Detailed Description

template<unsigned n> struct mln::value::int_u_sat< n >

Unsigned integer value class with saturation behavior. The parameter is `n` the number of encoding bits.

Definition at line 90 of file int_u_sat.hh.

10.396.2 Constructor & Destructor Documentation

10.396.2.1 template<unsigned n> mln::value::int_u_sat< n >::int_u_sat ( ) `[inline]`

Constructor without argument.

Definition at line 149 of file int_u_sat.hh.

10.396.2.2 template<unsigned n> mln::value::int_u_sat< n >::int_u_sat (int *i*) `[inline]`

Constructor from an integer.

Definition at line 155 of file int_u_sat.hh.

10.396.3 Member Function Documentation

10.396.3.1 template<unsigned n> mln::value::int_u_sat< n >::operator int ( ) const `[inline]`

Conversion to an integer.

Definition at line 170 of file int_u_sat.hh.

10.396.3.2 template<unsigned n> int_u_sat< n > & mln::value::int_u_sat< n >::operator+= (int *i*) [inline]

Self addition.

Definition at line 195 of file int_u_sat.hh.

10.396.3.3 template<unsigned n> int_u_sat< n > & mln::value::int_u_sat< n >::operator-= (int *i*) [inline]

Self subtraction.

Definition at line 205 of file int_u_sat.hh.

10.396.3.4 template<unsigned n> int_u_sat< n > & mln::value::int_u_sat< n >::operator= (int *i*) [inline]

Assignment from an integer.

Definition at line 178 of file int_u_sat.hh.

10.396.4 Member Data Documentation

10.396.4.1 template<unsigned n> const int_u_sat< n > mln::value::int_u_sat< n >::one = 1 [static]

Unit value.

Definition at line 115 of file int_u_sat.hh.

10.396.4.2 template<unsigned n> const int_u_sat< n > mln::value::int_u_sat< n >::zero = 0 [static]

Zero value.

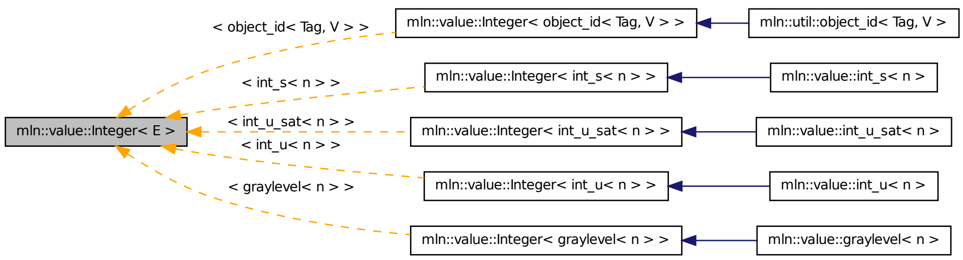
Definition at line 112 of file int_u_sat.hh.

10.397 mln::value::Integer< E > Struct Template Reference

Concept of integer.

`#include <integer.hh>`

Inheritance diagram for mln::value::Integer< E >:



10.397.1 Detailed Description

template<typename E> struct mln::value::Integer< E >

Concept of integer.

Definition at line 58 of file concept/integer.hh.

10.398 mln::value::Integer< void > Struct Template Reference

Category flag type.

```
#include <integer.hh>
```

10.398.1 Detailed Description

template<> struct mln::value::Integer< void >

Category flag type.

Definition at line 50 of file concept/integer.hh.

10.399 mln::value::label< n > Struct Template Reference

Label value class.

```
#include <label.hh>
```

Inherits mln::value::Symbolic< label< n > >, and mln::value::internal::value_like_< unsigned,internal::encoding_unsigned_< n >::ret,int,label< n > >.

Public Types

- typedef internal::encoding_unsigned_< n >::ret enc
    Encoding associated type.

Public Member Functions

- label ()

  Constructor without argument.

- label (unsigned i)

  Constructor from an (unsigned) integer.

- label (const literal::zero_t &v)

  Constructor from literal::zero.

- label< n > next () const

  Return the next value.

- operator unsigned () const

  Conversion to an unsigned integer.

- label< n > & operator++ ()

  Self increment.

- label< n > & operator-- ()

  Self decrement.

- label< n > & operator= (unsigned i)

  Assignment from an (unsigned) integer.

- label< n > & operator= (const literal::zero_t &v)

  Assignment from literal::zero.

- label< n > prev () const

  Return the previous value.

10.399.1 Detailed Description

template<unsigned n> struct mln::value::label< n >

Label value class. The parameter `n` is the number of encoding bits.

Definition at line 140 of file label.hh.

10.399.2 Member Typedef Documentation

10.399.2.1 template<unsigned n> typedef internal::encoding_unsigned_<n>::ret mln::value::label< n >::enc

Encoding associated type.

Definition at line 150 of file label.hh.

10.399.3 Constructor & Destructor Documentation

10.399.3.1 template<unsigned n> mln::value::label< n >::label ( ) [inline]

Constructor without argument.

Definition at line 271 of file label.hh.

10.399.3.2 template<unsigned n> mln::value::label< n >::label (unsigned *i*) [inline]

Constructor from an (unsigned) integer.

Definition at line 277 of file label.hh.

10.399.3.3 template<unsigned n> mln::value::label< n >::label (const literal::zero_t & *v*) [inline]

Constructor from literal::zero.

Definition at line 284 of file label.hh.

10.399.4 Member Function Documentation

10.399.4.1 template<unsigned n> label< n > mln::value::label< n >::next ( ) const [inline]

Return the next value.

Definition at line 338 of file label.hh.

10.399.4.2 template<unsigned n> mln::value::label< n >::operator unsigned ( ) const [inline]

Conversion to an unsigned integer.

Definition at line 291 of file label.hh.

10.399.4.3 template<unsigned n> label< n > & mln::value::label< n >::operator++ ( ) [inline]

Self increment.

Definition at line 318 of file label.hh.

10.399.4.4 template<unsigned n> label< n > & mln::value::label< n >::operator-- ( ) [inline]

Self decrement.

Definition at line 328 of file label.hh.

10.399.4.5 template<unsigned n> label< n > & mln::value::label< n >::operator= (unsigned *i*) [inline]

Assignment from an (unsigned) integer.

Definition at line 299 of file label.hh.

10.399.4.6 template<unsigned n> label< n > & mln::value::label< n >::operator= (const literal::zero_t & *v*) [inline]

Assignment from literal::zero.

Definition at line 309 of file label.hh.

10.399.4.7 template<unsigned n> label< n > mln::value::label< n >::prev ( ) const [inline]

Return the previous value.

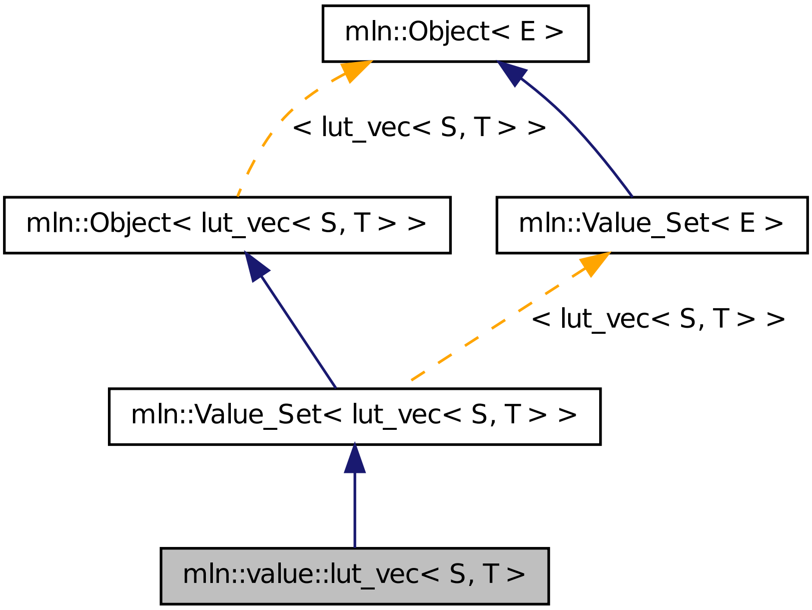
Definition at line 346 of file label.hh.

10.400 mln::value::lut_vec< S, T > Struct Template Reference

Class that defines FIXME.

`#include <lut_vec.hh>`

Inheritance diagram for mln::value::lut_vec< S, T >:



Public Types

- typedef bkd_viter_< lut_vec< S, T > > bkd_viter

  Backward Value_Iterator associated type.

- typedef fwd_viter_< lut_vec< S, T > > fwd_viter

  Forward Value_Iterator associated type.

- typedef T value

  Value associated type.

Public Member Functions

- bool has (const value &v) const

  Test if v belongs to this set.

- unsigned index_of (const value &v) const

  Give the index of value v in this set.

- unsigned nvalues () const

Give the number of values.

- T operator[ ] (unsigned i) const

  Give the `i-th` *value.*

- template<typename F >
  lut_vec (const S &vset, const Function_v2v< F > &f)

  Constructors
  Constructor from a value set and any Function_v2v.

- template<typename V >
  lut_vec (const S &vset, const Function_v2v< fun::i2v::array< V > > &f)

  Constructor from a value set and any fun::i2v::array.

- template<typename V >
  lut_vec (const S &vset, const Function_v2v< util::array< V > > &f)

  Constructor from a value set and any util::array.

10.400.1 Detailed Description

template<typename S, typename T> struct mln::value::lut_vec< S, T >

Class that defines FIXME.

Warning

This is a multi-set!!! FIXME

Definition at line 71 of file lut_vec.hh.

10.400.2 Member Typedef Documentation

10.400.2.1 template<typename S , typename T > typedef bkd_viter_< lut_vec<S,T> > mln::value::lut_vec< S, T >::bkd_viter

Backward Value_Iterator associated type.

Definition at line 80 of file lut_vec.hh.

10.400.2.2 template<typename S , typename T > typedef fwd_viter_< lut_vec<S,T> > mln::value::lut_vec< S, T >::fwd_viter

Forward Value_Iterator associated type.

Definition at line 77 of file lut_vec.hh.

10.400.2.3 template<typename S , typename T > typedef T mln::value::lut_vec< S, T >::value

Value associated type.

Definition at line 74 of file lut_vec.hh.

10.400.3 Constructor & Destructor Documentation

10.400.3.1 template< typename S , typename T > template< typename F > mln::value::lut_vec< S, T >::lut_vec (const S & *vset*, const Function_v2v< F > & *f*) [inline]

Constructors

Constructor from a value set and any Function_v2v.

Definition at line 148 of file lut_vec.hh.

10.400.3.2 template< typename S , typename T > template< typename V > mln::value::lut_vec< S, T >::lut_vec (const S & *vset*, const Function_v2v< fun::i2v::array< V > > & *f*) [inline]

Constructor from a value set and any fun::i2v::array.

Definition at line 161 of file lut_vec.hh.

10.400.3.3 template< typename S , typename T > template< typename V > mln::value::lut_vec< S, T >::lut_vec (const S & *vset*, const Function_v2v< util::array< V > > & *f*) [inline]

Constructor from a value set and any util::array.

Definition at line 172 of file lut_vec.hh.

References mln::util::array< T >::size(), and mln::util::array< T >::std_vector().

10.400.4 Member Function Documentation

10.400.4.1 template< typename S , typename T > bool mln::value::lut_vec< S, T >::has (const value & *v*) const

Test if v belongs to this set.

10.400.4.2 template< typename S , typename T > unsigned mln::value::lut_vec< S, T >::index_of (const value & *v*) const

Give the index of value v in this set.

10.400.4.3 template< typename S , typename T > unsigned mln::value::lut_vec< S, T >::nvalues ( ) const [inline]

Give the number of values.

Definition at line 202 of file lut_vec.hh.

Referenced by mln::value::lut_vec< S, T >::operator[ ]().

10.400.4.4 template<typename S , typename T > T mln::value::lut_vec< S, T >::operator[ ] (unsigned *i*) const [inline]

Give the `i-th` value.

Definition at line 193 of file lut_vec.hh.

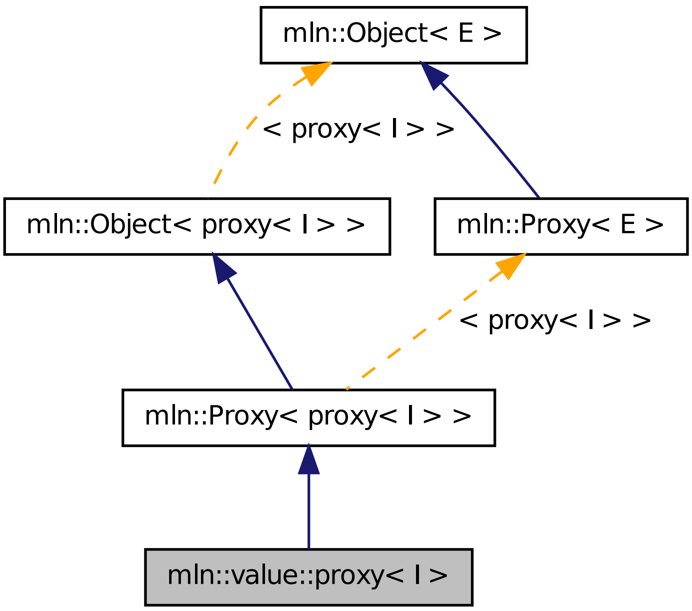
References mln::value::lut_vec< S, T >::nvalues().

10.401 mln::value::proxy< I > Class Template Reference

Generic proxy class for an image pixel value.

`#include <proxy.hh>`

Inheritance diagram for mln::value::proxy< I >:



Public Types

- typedef void enc

    Encoding associated type.

- typedef I::value equiv

    Equivalent associated type.

Public Member Functions

- proxy< I > & operator= (const proxy< I > &rhs)

    Assignment (write access); replacement for default op.

- template<typename J >
  proxy< I > & operator= (const proxy< J > &rhs)

    Assignment (write access); with other proxy.

- proxy ()

    Constructor.

- proxy (I &ima, const typename I::psite &p)

    Constructor.

- I::value to_value () const

    Explicit read access.

- ~proxy ()

    Destructor.

10.401.1 Detailed Description

template<typename I> class mln::value::proxy< I >

Generic proxy class for an image pixel value. The parameter `I` is an image type.

Definition at line 85 of file value/proxy.hh.

10.401.2 Member Typedef Documentation

10.401.2.1 template<typename I> typedef void mln::value::proxy< I >::enc

Encoding associated type.

Definition at line 91 of file value/proxy.hh.

10.401.2.2 template<typename I> typedef I ::value mln::value::proxy< I >::equiv

Equivalent associated type.

Definition at line 94 of file value/proxy.hh.

10.401.3 Constructor & Destructor Documentation

10.401.3.1 template<typename I > mln::value::proxy< I >::proxy ( ) `[inline]`

Constructor.

Definition at line 150 of file value/proxy.hh.

10.401.3.2 template<typename I > mln::value::proxy< I >::proxy (I & *ima*, const typename I::psite & *p*) [inline]

Constructor.

Definition at line 157 of file value/proxy.hh.

10.401.3.3 template<typename I > mln::value::proxy< I >::∼proxy ( ) [inline]

Destructor.

Definition at line 165 of file value/proxy.hh.

10.401.4 Member Function Documentation

10.401.4.1 template<typename I > proxy< I > & mln::value::proxy< I >::operator= (const proxy< I > & *rhs*) [inline]

Assignment (write access); replacement for default op.

Definition at line 186 of file value/proxy.hh.

References mln::value::proxy< I >::to_value().

10.401.4.2 template<typename I > template<typename J > proxy< I > & mln::value::proxy< I >::operator= (const proxy< J > & *rhs*) [inline]

Assignment (write access); with other proxy.

Definition at line 199 of file value/proxy.hh.

References mln::value::proxy< I >::to_value().

10.401.4.3 template<typename I > I::value mln::value::proxy< I >::to_value ( ) const [inline]

Explicit read access.

Definition at line 226 of file value/proxy.hh.

Referenced by mln::value::proxy< I >::operator=().

10.402 mln::value::qt::rgb32 Struct Reference

Color class for red-green-blue where every component is n-bit encoded.

`#include <rgb32.hh>`

Inherits mln::value::Vectorial< rgb32 >, and mln::value::internal::value_like_< algebra::vec< 3, int_u< 8 > >,algebra::vec< 3, int_u< 8 > >,algebra::vec< 3, int >,rgb32 >.

Public Member Functions

- rgb32 & operator= (const rgb32 &rhs)

Assignment.

- rgb32 (const algebra::vec< 3, int > &rhs)

  Constructor from a algebra::vec.

- rgb32 (int r, int g, int b)

  Constructor from component values.

- rgb32 ()

  Constructor without argument.

  - int_u< 8 > red () const

    Acces to red/green/blue component.

  - rgb32 (const mln::literal::zero_t &)

    Constructors with literals.

Static Public Attributes

- static const rgb32 zero

  Zero value.

10.402.1 Detailed Description

Color class for red-green-blue where every component is n-bit encoded.

Definition at line 197 of file rgb32.hh.

10.402.2 Constructor & Destructor Documentation

10.402.2.1 mln::value::qt::rgb32::rgb32 ( ) `[inline]`

Constructor without argument.

Definition at line 385 of file rgb32.hh.

10.402.2.2 mln::value::qt::rgb32::rgb32 (int *r*, int *g*, int *b*) `[inline]`

Constructor from component values.

Definition at line 427 of file rgb32.hh.

10.402.2.3 mln::value::qt::rgb32::rgb32 (const algebra::vec< 3, int > & *rhs*) `[inline]`

Constructor from a algebra::vec.

Definition at line 391 of file rgb32.hh.

10.402.2.4 mln::value::qt::rgb32::rgb32 (const mln::literal::zero_t &) [inline]

Constructors with literals.

Definition at line 442 of file rgb32.hh.

10.402.3 Member Function Documentation

10.402.3.1 rgb32 & mln::value::qt::rgb32::operator= (const rgb32 & *rhs*) [inline]

Assignment.

Definition at line 623 of file rgb32.hh.

10.402.3.2 int_u<8> mln::value::qt::rgb32::red ( ) const [inline]

Acces to red/green/blue component.

Definition at line 212 of file rgb32.hh.

10.402.4 Member Data Documentation

10.402.4.1 const rgb32 mln::value::qt::rgb32::zero [static]

Zero value.

Definition at line 272 of file rgb32.hh.

10.403 mln::value::rgb< n > Struct Template Reference

Color class for red-green-blue where every component is n-bit encoded.

```
#include <rgb.hh>
```

Inherits mln::value::Vectorial< rgb< n > >, and mln::value::internal::value_like_< algebra::vec< 3, int_-u< n > >,algebra::vec< 3, int_u< n > >,algebra::vec< 3, int >,rgb< n > >.

Public Member Functions

- rgb< n > & operator= (const rgb< n > &rhs)

  Assignment.

- rgb (const algebra::vec< 3, int > &rhs)

  Constructor from a algebra::vec.

- rgb (int r, int g, int b)

  Constructor from component values.

- rgb ()

  Constructor without argument.

- int_u< n > red () const
  Acces to red/green/blue component.

- rgb (const mln::literal::white_t &)
  Constructors with literals.

Static Public Attributes

- static const rgb< n > zero
  Zero value.

10.403.1 Detailed Description

template<unsigned n> struct mln::value::rgb< n >

Color class for red-green-blue where every component is n-bit encoded.

Definition at line 248 of file value/rgb.hh.

10.403.2 Constructor & Destructor Documentation

10.403.2.1 template<unsigned n> mln::value::rgb< n >::rgb ( ) [inline]

Constructor without argument.

Definition at line 422 of file value/rgb.hh.

10.403.2.2 template<unsigned n> mln::value::rgb< n >::rgb (int *r*, int *g*, int *b*) [inline]

Constructor from component values.

Definition at line 458 of file value/rgb.hh.

10.403.2.3 template<unsigned n> mln::value::rgb< n >::rgb (const algebra::vec< 3, int > & *rhs*) [inline]

Constructor from a algebra::vec.

Definition at line 428 of file value/rgb.hh.

10.403.2.4 template<unsigned n> mln::value::rgb< n >::rgb (const mln::literal::white_t &) [inline]

Constructors with literals.

Definition at line 473 of file value/rgb.hh.

10.403.3 Member Function Documentation

10.403.3.1 template<unsigned n> rgb< n > & mln::value::rgb< n >::operator= (const rgb< n > & *rhs*) `[inline]`

Assignment.

Definition at line 645 of file value/rgb.hh.

10.403.3.2 template<unsigned n> int_u<n> mln::value::rgb< n >::red ( ) const `[inline]`

Acces to red/green/blue component.

Definition at line 264 of file value/rgb.hh.

Referenced by mln::fun::v2v::rgb8_to_rgbn< n >::operator()().

10.403.4 Member Data Documentation

10.403.4.1 template<unsigned n> const rgb< n > mln::value::rgb< n >::zero `[static]`

Zero value.

Definition at line 322 of file value/rgb.hh.

10.404 mln::value::set< T > Struct Template Reference

Class that defines the set of values of type `T`.

`#include <set.hh>`

Inherits set_selector_< T, set< T >, mln::metal::equal< mln::trait::value_< T >::quant, mln::trait::value::quant::low >::value >.

Static Public Member Functions

- static const set< T > & the ()

  Return a singleton.

10.404.1 Detailed Description

template<typename T> struct mln::value::set< T >

Class that defines the set of values of type `T`. This is the exhaustive set of values obtainable from type `T`.

Definition at line 65 of file value/set.hh.

10.404.2 Member Function Documentation

10.404.2.1 template<typename T > const set< T > & mln::value::set< T >::the ( ) [inline, static]

Return a singleton.

Definition at line 80 of file value/set.hh.

10.405 mln::value::sign Class Reference

The sign class represents the value type composed by the set (-1, 0, 1) sign value type is a subset of the int value type.

`#include <sign.hh>`

Inherits Integer< sign >.

Public Types

- typedef int enc

    FIXME Are these typedefs correct?

- typedef int equiv

    Define the equivalent type.

Public Member Functions

- operator int () const

    Conversion to an integer.

- sign & operator= (int i)

    Assignment from an integer.

- sign ()

    Constructor without argument.

- sign (int i)

    Constructor from an integer.

    - sign (const mln::literal::zero_t &)

        Constructors/assignments with literals.

Static Public Attributes

- static const sign one = 1

    Unit value.

- static const sign zero = 0

  Zero value.

10.405.1 Detailed Description

The sign class represents the value type composed by the set (-1, 0, 1) sign value type is a subset of the int value type.

Definition at line 49 of file value/sign.hh.

10.405.2 Member Typedef Documentation

10.405.2.1 typedef int mln::value::sign::enc

FIXME Are these typedefs correct?

Define the encoding type

Definition at line 55 of file value/sign.hh.

10.405.2.2 typedef int mln::value::sign::equiv

Define the equivalent type.

Definition at line 58 of file value/sign.hh.

10.405.3 Constructor & Destructor Documentation

10.405.3.1 mln::value::sign::sign ( ) `[inline]`

Constructor without argument.

Definition at line 119 of file value/sign.hh.

10.405.3.2 mln::value::sign::sign (int *i*) `[inline]`

Constructor from an integer.

Definition at line 137 of file value/sign.hh.

10.405.3.3 mln::value::sign::sign (const mln::literal::zero_t &) `[inline]`

Constructors/assignments with literals.

Definition at line 155 of file value/sign.hh.

10.405.4 Member Function Documentation

10.405.4.1 mln::value::sign::operator int ( ) const [inline]

Conversion to an integer.

Definition at line 124 of file value/sign.hh.

10.405.4.2 sign & mln::value::sign::operator= (int *i*) [inline]

Assignment from an integer.

Definition at line 146 of file value/sign.hh.

10.405.5 Member Data Documentation

10.405.5.1 const sign mln::value::sign::one = 1 [static]

Unit value.

Definition at line 88 of file value/sign.hh.

10.405.5.2 const sign mln::value::sign::zero = 0 [static]

Zero value.

Definition at line 85 of file value/sign.hh.

10.406 mln::value::stack_image< n, I > Struct Template Reference

Stack image class.

`#include <stack.hh>`

Inherits image_value_morpher< I, algebra::vec< n, I::value >, stack_image< n, I > >.

Public Types

- typedef I::domain_t domain_t

  Site_Set associated type.

- typedef internal::helper_stack_image_lvalue_< n, I >::ret lvalue

  Return type of read-write access.

- typedef I::psite psite

  Point_Site associated type.

- typedef value rvalue

  Return type of read-only access.

- typedef stack_image< n, tag::image_< I > > skeleton

Skeleton.

- typedef algebra::vec< n, typename I::value > value

  Value associated type.

Public Member Functions

- bool is_valid () const

  Test if this image has been initialized.

- lvalue operator() (const psite &)

  Read-write access of pixel value at point site p*.*

- rvalue operator() (const psite &p) const

  Read-only access of pixel value at point site p*.*

  - stack_image (const algebra::vec< n, I > &imas)

    Constructors.

10.406.1 Detailed Description

template<unsigned n, typename I> struct mln::value::stack_image< n, I >

Stack image class. mln::value::stack_image stores a vector of n images of the same domain.

The parameter `n` is the number of images, `I` is the type of a stack element. Acces a value will compute a vector which contains n coordinates : [stack[0](p), stack[1](p), ... , stack[n](p)]

Definition at line 145 of file stack.hh.

10.406.2 Member Typedef Documentation

10.406.2.1 template<unsigned n, typename I> typedef I ::domain_t mln::value::stack_image< n, I >::domain_t

Site_Set associated type.

Definition at line 154 of file stack.hh.

10.406.2.2 template<unsigned n, typename I> typedef internal::helper_-stack_image_lvalue_<n,I>::ret mln::value::stack_image< n, I >::lvalue

Return type of read-write access.

Definition at line 166 of file stack.hh.

10.406.2.3 template<unsigned n, typename I> typedef I ::psite mln::value::stack_image< n, I >::psite

Point_Site associated type.

Definition at line 151 of file stack.hh.

10.406.2.4 template<unsigned n, typename I> typedef value mln::value::stack_image< n, I >::rvalue

Return type of read-only access.

The rvalue type is not a const reference, since the value type is built on the fly, and return by value (copy).

Definition at line 163 of file stack.hh.

10.406.2.5 template<unsigned n, typename I> typedef stack_image< n, tag::image_<I> > mln::value::stack_image< n, I >::skeleton

Skeleton.

Definition at line 170 of file stack.hh.

10.406.2.6 template<unsigned n, typename I> typedef algebra::vec<n, typename I ::value> mln::value::stack_image< n, I >::value

Value associated type.

Definition at line 157 of file stack.hh.

10.406.3 Constructor & Destructor Documentation

10.406.3.1 template<unsigned n, typename I> mln::value::stack_image< n, I >::stack_image (const algebra::vec< n, I > & *imas*) `[inline]`

Constructors.

Definition at line 236 of file stack.hh.

10.406.4 Member Function Documentation

10.406.4.1 template<unsigned n, typename I > bool mln::value::stack_image< n, I >::is_valid ( ) const `[inline]`

Test if this image has been initialized.

Definition at line 255 of file stack.hh.

10.406.4.2 template<unsigned n, typename I > stack_image< n, I >::lvalue mln::value::stack_image< n, I >::operator() (const psite & *p*) `[inline]`

Read-write access of pixel value at point site `p`.

Definition at line 296 of file stack.hh.

10.406.4.3 template<unsigned n, typename I > stack_image< n, I >::rvalue mln::value::stack_image< n, I >::operator() (const psite & *p*) const [inline]

Read-only access of pixel value at point site `p`.

Definition at line 277 of file stack.hh.

10.407 mln::value::super_value< sign > Struct Template Reference

Specializations:

`#include <super_value.hh>`

10.407.1 Detailed Description

template<> struct mln::value::super_value< sign >

Specializations: Sign type is a subset of the short value type.

Definition at line 56 of file super_value.hh.

10.408 mln::value::value_array< T, V > Struct Template Reference

Generic array class over indexed by a value set with type `T`.

`#include <value_array.hh>`

Public Member Functions

- const V & operator() (const T &v) const
  }
- const V & operator[ ] (unsigned i) const
  }
- value_array ()
  Constructors.
- const mln::value::set< T > & vset () const
  }

10.408.1 Detailed Description

template<typename T, typename V> struct mln::value::value_array< T, V >

Generic array class over indexed by a value set with type `T`.

Definition at line 45 of file value_array.hh.

10.408.2 Constructor & Destructor Documentation

10.408.2.1 template< typename T , typename V > mln::value::value_array< T, V >::value_array ( ) [inline]

Constructors.

{

Definition at line 89 of file value_array.hh.

10.408.3 Member Function Documentation

10.408.3.1 template< typename T , typename V > const V & mln::value::value_array< T, V >::operator() (const T & *v*) const [inline]

}

Access elements through a value of `T`. {

Definition at line 128 of file value_array.hh.

10.408.3.2 template< typename T , typename V > const V & mln::value::value_array< T, V >::operator[] (unsigned *i*) const [inline]

}

Access elements through array indexes. {

Definition at line 152 of file value_array.hh.

10.408.3.3 template< typename T , typename V > const mln::value::set< T > & mln::value::value_array< T, V >::vset ( ) const [inline]

}

Reference to the set of `T`.

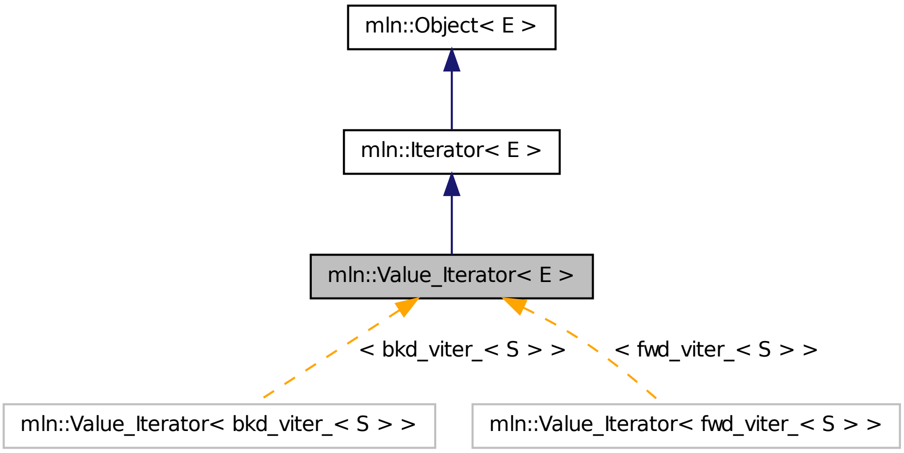
Definition at line 144 of file value_array.hh.

10.409 mln::Value_Iterator< E > Struct Template Reference

Base class for implementation of classes of iterator on values.

`#include <value_iterator.hh>`

Inheritance diagram for mln::Value_Iterator< E >:



Public Member Functions

- void next ()

  Go to the next element.

Related Functions

(Note that these are not member functions.)

- template<typename E >
  std::ostream & operator<< (std::ostream &ostr, const Value_Iterator< E > &v)

  Print an iterator `v` *on value set into the output stream* `ostr`.

10.409.1 Detailed Description

template<typename E> struct mln::Value_Iterator< E >

Base class for implementation of classes of iterator on values. An iterator on values is an iterator that browse over a set of values.

See also

mln::doc::Value_Iterator for a complete documentation of this class contents.

Definition at line 50 of file value_iterator.hh.

10.409.2 Member Function Documentation

10.409.2.1 template<typename E > void mln::Iterator< E >::next ( ) [inherited]

Go to the next element.

Warning

This is a final method; iterator classes should not re-defined this method. The actual "next" operation has to be defined through the *next_* method.

Precondition

The iterator is valid.

Definition at line 102 of file iterator.hh.

10.409.3 Friends And Related Function Documentation

10.409.3.1 template<typename E > std::ostream & operator<< (std::ostream & *ostr*, const Value_Iterator< E > & *v*) [related]

Print an iterator `v` on value set into the output stream `ostr`.

Parameters

`[in,out]` ***ostr*** An output stream.

`[in]` ***v*** An iterator on value set.

Precondition

`v` is a valid.

Returns

The modified output stream `ostr`.

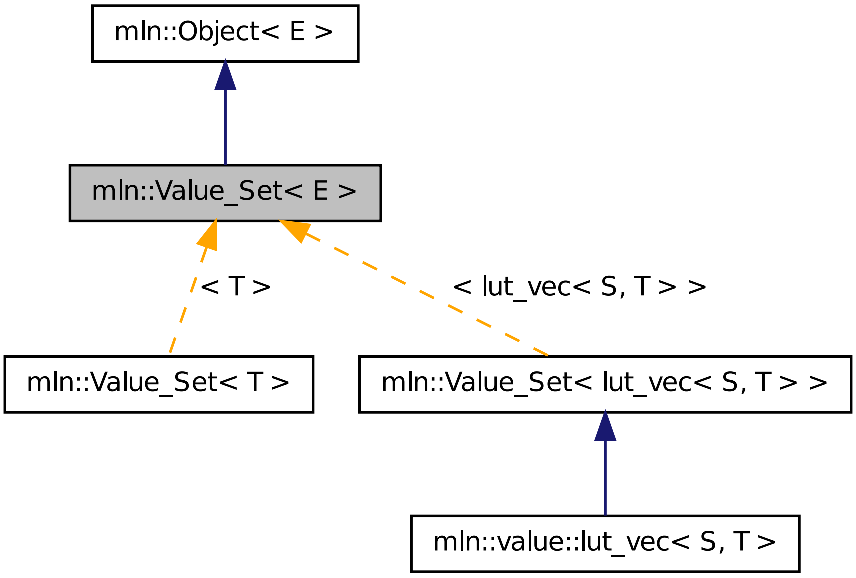
Definition at line 92 of file value_iterator.hh.

10.410 mln::Value_Set< E > Struct Template Reference

Base class for implementation classes of sets of values.

`#include <value_set.hh>`

Inheritance diagram for mln::Value_Set< E >:



10.410.1 Detailed Description

template<typename E> struct mln::Value_Set< E >

Base class for implementation classes of sets of values.

See also

mln::doc::Value_Set for a complete documentation of this class contents.

Definition at line 57 of file value_set.hh.

10.411 mln::Vertex< E > Struct Template Reference

Vertex category flag type.

```
#include <vertex.hh>
```

10.411.1 Detailed Description

template<typename E> struct mln::Vertex< E >

Vertex category flag type.

Definition at line 53 of file vertex.hh.

10.412 mln::vertex_image< P, V, G > Class Template Reference

Image based on graph vertices.

`#include <vertex_image.hh>`

Inherits image_base< fun::i2v::array< V >, p_vertices< G, internal::vfsite_selector< P, G >::site_-function_t >, vertex_image< P, V, G > >.

Public Types

- typedef G graph_t

  The type of the underlying graph.

- typedef vertex_nbh_t nbh_t

  Neighborhood type.

- typedef internal::vfsite_selector< P, G >::site_function_t site_function_t

  Function mapping graph elements to sites.

- typedef vertex_image< tag::psite_< P >, tag::value_< V >, tag::graph_< G > > skeleton

  Skeleton type.

- typedef graph_elt_neighborhood< G, S > vertex_nbh_t

  Vertex Neighborhood type.

- typedef graph_elt_window< G, S > vertex_win_t

  Vertex Window type.

- typedef vertex_win_t win_t

  Window type.

Public Member Functions

- vertex_image ()

  Constructors.

- rvalue operator() (unsigned v_id) const

  Value accessors/operators overloads.

10.412.1 Detailed Description

template<typename P, typename V, typename G = util::graph> class mln::vertex_image< P, V, G >

Image based on graph vertices.

Definition at line 126 of file core/image/vertex_image.hh.

10.412.2 Member Typedef Documentation

10.412.2.1 template<typename P, typename V, typename G = util::graph> typedef G mln::vertex_image< P, V, G >::graph_t

The type of the underlying graph.

Definition at line 141 of file core/image/vertex_image.hh.

10.412.2.2 template<typename P, typename V, typename G = util::graph> typedef vertex_nbh_t mln::vertex_image< P, V, G >::nbh_t

Neighborhood type.

Definition at line 165 of file core/image/vertex_image.hh.

10.412.2.3 template<typename P, typename V, typename G = util::graph> typedef internal::vfsite_selector<P,G>::site_function_t mln::vertex_image< P, V, G >::site_function_t

Function mapping graph elements to sites.

Definition at line 145 of file core/image/vertex_image.hh.

10.412.2.4 template<typename P, typename V, typename G = util::graph> typedef vertex_image< tag::psite_<P>, tag::value_<V>, tag::graph_<G> > mln::vertex_image< P, V, G >::skeleton

Skeleton type.

Definition at line 152 of file core/image/vertex_image.hh.

10.412.2.5 template<typename P, typename V, typename G = util::graph> typedef graph_elt_neighborhood<G,S> mln::vertex_image< P, V, G >::vertex_nbh_t

Vertex Neighborhood type.

Definition at line 160 of file core/image/vertex_image.hh.

10.412.2.6 template<typename P, typename V, typename G = util::graph> typedef graph_elt_window<G,S> mln::vertex_image< P, V, G >::vertex_win_t

Vertex Window type.

Definition at line 157 of file core/image/vertex_image.hh.

10.412.2.7 template<typename P, typename V, typename G = util::graph> typedef vertex_win_t mln::vertex_image< P, V, G >::win_t

Window type.

Definition at line 163 of file core/image/vertex_image.hh.

10.412.3 Constructor & Destructor Documentation

10.412.3.1 template<typename P , typename V , typename G > mln::vertex_image< P, V, G >::vertex_image ( ) [inline]

Constructors.

Definition at line 247 of file core/image/vertex_image.hh.

10.412.4 Member Function Documentation

10.412.4.1 template<typename P , typename V , typename G > vertex_image< P, V, G >::rvalue mln::vertex_image< P, V, G >::operator() (unsigned *v_id*) const

Value accessors/operators overloads.

Definition at line 292 of file core/image/vertex_image.hh.

10.413 mln::violent_cast_image< T, I > Struct Template Reference

Violently cast image values to a given type.

`#include <violent_cast_image.hh>`

Inherits image_value_morpher< I, T, violent_cast_image< T, I > >.

Public Types

- typedef T lvalue

  Return type of read-write access.

- typedef T rvalue

  Return type of read-only access.

- typedef violent_cast_image< tag::value_< T >, tag::image_< I > > skeleton

  Skeleton.

- typedef T value

  Value associated type.

Public Member Functions

- T operator() (const typename I::psite &p) const

  Read-only access of pixel value at point site p.

- T operator() (const typename I::psite &p)

  Mutable access is only OK for reading (not writing).

- violent_cast_image (const Image< I > &ima)

  Constructor.

10.413.1 Detailed Description

template<typename T, typename I> struct mln::violent_cast_image< T, I >

Violently cast image values to a given type.

Definition at line 112 of file violent_cast_image.hh.

10.413.2 Member Typedef Documentation

10.413.2.1 template<typename T, typename I> typedef T mln::violent_cast_image< T, I >::lvalue

Return type of read-write access.

Definition at line 122 of file violent_cast_image.hh.

10.413.2.2 template<typename T, typename I> typedef T mln::violent_cast_image< T, I >::rvalue

Return type of read-only access.

Definition at line 119 of file violent_cast_image.hh.

10.413.2.3 template<typename T, typename I> typedef violent_cast_image< tag::value_<T>, tag::image_<I> > mln::violent_cast_image< T, I >::skeleton

Skeleton.

Definition at line 125 of file violent_cast_image.hh.

10.413.2.4 template<typename T, typename I> typedef T mln::violent_cast_image< T, I >::value

Value associated type.

Definition at line 116 of file violent_cast_image.hh.

10.413.3 Constructor & Destructor Documentation

10.413.3.1 template<typename T , typename I > mln::violent_cast_image< T, I >::violent_cast_image (const Image< I > & *ima*) [inline]

Constructor.

Definition at line 172 of file violent_cast_image.hh.

10.413.4 Member Function Documentation

10.413.4.1 template<typename T , typename I > T mln::violent_cast_image< T, I >::operator() (const typename I::psite & *p*) const [inline]

Read-only access of pixel value at point site `p`.

Definition at line 191 of file violent_cast_image.hh.

10.413.4.2 template<typename T , typename I > T mln::violent_cast_image< T, I >::operator() (const typename I::psite & *p*) [inline]

Mutable access is only OK for reading (not writing).

Definition at line 200 of file violent_cast_image.hh.

10.414 mln::w_window< D, W > Struct Template Reference

Generic w_window class.

`#include <w_window.hh>`

Inherits weighted_window_base< mln::window< D >, w_window< D, W > >.

Public Types

- typedef with_w_< dpsites_bkd_piter< w_window< D, W > >, W > bkd_qiter
  Site_Iterator type to browse (backward) the points of a generic w_window.
- typedef D dpsite
  Dpsite associated type.
- typedef with_w_< dpsites_fwd_piter< w_window< D, W > >, W > fwd_qiter
  Site_Iterator type to browse (forward) the points of a generic w_window.
- typedef W weight
  Weight associated type.

Public Member Functions

- void clear ()

Clear this window.

- w_window< D, W > & insert (const W &w, const D &d)

  Insert a couple of weight `w` *and delta-point* `d`*.*

- bool is_symmetric () const

  Test if the window is symmetric.

- const std::vector< D > & std_vector () const

  Give access to the vector of delta-points.

- void sym ()

  Apply a central symmetry to the window.

- W w (unsigned i) const

  Give the `i-th` *weight.*

- w_window ()

  Constructor without argument.

- const std::vector< W > & weights () const

  Give access to the vector of weights.

- const mln::window< D > & win () const

  Give the corresponding window.

Related Functions

(Note that these are not member functions.)

- template<typename D , typename W >
  std::ostream & operator<< (std::ostream &ostr, const w_window< D, W > &w_win)

  Print a weighted window `w_win` *into an output stream* `ostr`*.*

- template<typename D , typename Wl , typename Wr >
  bool operator== (const w_window< D, Wl > &lhs, const w_window< D, Wr > &rhs)

  Equality test between two weighted windows `lhs` *and* `rhs`*.*

10.414.1 Detailed Description

template<typename D, typename W> struct mln::w_window< D, W >

Generic w_window class. This type of w_window is just like a set of delta-points. The parameter `D` is the type of delta-points; the parameter `W` is the type of weights.

Definition at line 100 of file core/w_window.hh.

10.414.2 Member Typedef Documentation

10.414.2.1 template<typename D, typename W> typedef with_w_< dpsites_bkd_piter< w_window<D, W> >, W > mln::w_window< D, W >::bkd_qiter

Site_Iterator type to browse (backward) the points of a generic w_window.

Definition at line 114 of file core/w_window.hh.

10.414.2.2 template<typename D, typename W> typedef D mln::w_window< D, W >::dpsite

Dpsite associated type.

Definition at line 104 of file core/w_window.hh.

10.414.2.3 template<typename D, typename W> typedef with_w_< dpsites_fwd_piter< w_window<D, W> >, W > mln::w_window< D, W >::fwd_qiter

Site_Iterator type to browse (forward) the points of a generic w_window.

Definition at line 111 of file core/w_window.hh.

10.414.2.4 template<typename D, typename W> typedef W mln::w_window< D, W >::weight

Weight associated type.

Definition at line 107 of file core/w_window.hh.

10.414.3 Constructor & Destructor Documentation

10.414.3.1 template<typename D , typename W > mln::w_window< D, W >::w_window ( ) [inline]

Constructor without argument.

Definition at line 213 of file core/w_window.hh.

10.414.4 Member Function Documentation

10.414.4.1 template<typename D , typename W > void mln::w_window< D, W >::clear ( ) [inline]

Clear this window.

Definition at line 308 of file core/w_window.hh.

10.414.4.2 template<typename D , typename W > w_window< D, W > & mln::w_window< D, W >::insert (const W & *w*, const D & *d*) [inline]

Insert a couple of weight `w` and delta-point `d`.

Definition at line 254 of file core/w_window.hh.

Referenced by mln::w_window< D, W >::sym(), mln::make::w_window(), mln::make::w_window1d(), mln::make::w_window3d(), and mln::make::w_window_directional().

10.414.4.3 template<typename D , typename W > bool mln::w_window< D, W >::is_symmetric ( ) const [inline]

Test if the window is symmetric.

Definition at line 284 of file core/w_window.hh.

References mln::w_window< D, W >::sym().

10.414.4.4 template<typename D , typename W > const std::vector< D > & mln::w_window< D, W >::std_vector ( ) const [inline]

Give access to the vector of delta-points.

Definition at line 228 of file core/w_window.hh.

10.414.4.5 template<typename D , typename W > void mln::w_window< D, W >::sym ( ) [inline]

Apply a central symmetry to the window.

Definition at line 296 of file core/w_window.hh.

References mln::w_window< D, W >::insert().

Referenced by mln::w_window< D, W >::is_symmetric().

10.414.4.6 template<typename D , typename W > W mln::w_window< D, W >::w (unsigned *i*) const [inline]

Give the `i-th` weight.

Definition at line 244 of file core/w_window.hh.

10.414.4.7 template<typename D , typename W > const std::vector< W > & mln::w_window< D, W >::weights ( ) const [inline]

Give access to the vector of weights.

Definition at line 236 of file core/w_window.hh.

Referenced by mln::w_window< D, W >::operator==().

10.414.4.8 template<typename D , typename W > const mln::window< D > & mln::w_window< D, W >::win ( ) const [inline]

Give the corresponding window.

Definition at line 220 of file core/w_window.hh.

Referenced by mln::w_window< D, W >::operator==().

10.414.5 Friends And Related Function Documentation

10.414.5.1 template<typename D , typename W > std::ostream & operator<< (std::ostream & *ostr*, const w_window< D, W > & *w_win*) [related]

Print a weighted window `w_win` into an output stream `ostr`.

Definition at line 420 of file core/w_window.hh.

10.414.5.2 template<typename D , typename Wl , typename Wr > bool operator== (const w_window< D, Wl > & *lhs*, const w_window< D, Wr > & *rhs*) [related]

Equality test between two weighted windows `lhs` and `rhs`.

Definition at line 430 of file core/w_window.hh.

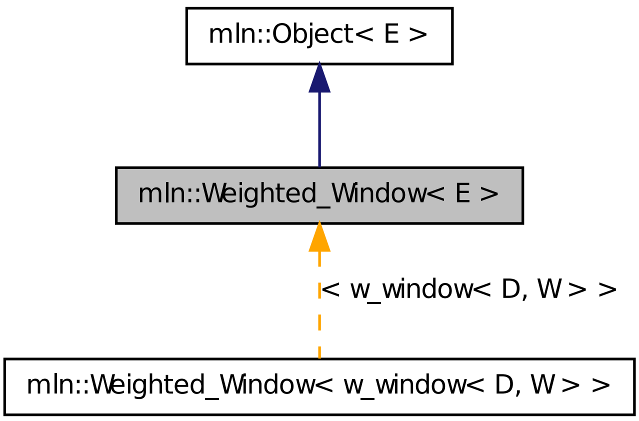
References mln::w_window< D, W >::weights(), and mln::w_window< D, W >::win().

10.415 mln::Weighted_Window< E > Struct Template Reference

Base class for implementation classes that are weighted_windows.

`#include <weighted_window.hh>`

Inheritance diagram for mln::Weighted_Window< E >:



Related Functions

(Note that these are not member functions.)

- template<typename W >
  W operator- (const Weighted_Window< W > &rhs)

Compute the symmetrical weighted window of `rhs`*.*

10.415.1 Detailed Description

template<typename E> struct mln::Weighted_Window< E >

Base class for implementation classes that are weighted_windows.

See also

mln::doc::Weighted_Window for a complete documentation of this class contents.

Definition at line 68 of file weighted_window.hh.

10.415.2 Friends And Related Function Documentation

10.415.2.1 template<typename W > W operator- (const Weighted_Window< W > & *rhs*) [related]

Compute the symmetrical weighted window of `rhs`.

10.416 mln::win::backdiag2d Struct Reference

Diagonal line window defined on the 2D square grid.

`#include <backdiag2d.hh>`

Inherits classical_window_base< dpoint2d, backdiag2d >.

Public Member Functions

- backdiag2d (unsigned length)

  Constructor.

- unsigned length () const

  Give the diagonal length, that is, its width.

10.416.1 Detailed Description

Diagonal line window defined on the 2D square grid. An backdiag2d is centered and symmetric. its width (length) is odd.

For instance:

```
 *  o
 *    o
 *      x
 *        o
 *          o
 *
```

is defined with length = 5.

Definition at line 63 of file backdiag2d.hh.

10.416.2 Constructor & Destructor Documentation

10.416.2.1 mln::win::backdiag2d::backdiag2d (unsigned *length*) [inline]

Constructor.

Parameters

[in] ***length*** Length, thus width, of the diagonal line.

Precondition

`length` is odd.

Definition at line 93 of file backdiag2d.hh.

10.416.3 Member Function Documentation

10.416.3.1 unsigned mln::win::backdiag2d::length ( ) const [inline]

Give the diagonal length, that is, its width.

Definition at line 105 of file backdiag2d.hh.

10.417 mln::win::ball< G, C > Struct Template Reference

Generic ball window defined on a given grid.

`#include <ball.hh>`

Inherits classical_window_base< dpoint< G, C >, ball< G, C > >.

Public Member Functions

- ball (unsigned diameter)
  Constructor.
- unsigned diameter () const
  Give the ball diameter.

10.417.1 Detailed Description

template<typename G, typename C> struct mln::win::ball< G, C >

Generic ball window defined on a given grid. A ball is centered and symmetric; so its diameter is odd.

G is the given grid on which the ball is defined and C is the type of coordinates.

Definition at line 71 of file ball.hh.

10.417.2 Constructor & Destructor Documentation

10.417.2.1 template<typename G , typename C > mln::win::ball< G, C >::ball (unsigned *diameter*) `[inline]`

Constructor.

Parameters

`[in]` ***diameter*** Diameter of the ball.

Precondition

`diameter` is odd.

Definition at line 99 of file ball.hh.

References mln::literal::origin.

10.417.3 Member Function Documentation

10.417.3.1 template<typename G , typename C > unsigned mln::win::ball< G, C >::diameter ( ) const `[inline]`

Give the ball diameter.

Definition at line 122 of file ball.hh.

10.418 mln::win::cube3d Struct Reference

Cube window defined on the 3D grid.

`#include <cube3d.hh>`

Inherits classical_window_base< dpoint3d, cube3d >.

Public Member Functions

- cube3d (unsigned length)

  Constructor.

- unsigned length () const

  Give the cube length, that is, its height.

10.418.1 Detailed Description

Cube window defined on the 3D grid. An cube3d is centered and symmetric; so its height (length) is odd.

For instance:

```
*   o o o
*  o o o
```

```
* o o o

*   o o o
*  o x o
* o o o

*   o o o
*  o o o
* o o o
*
```

is defined with length = 3.

Definition at line 69 of file cube3d.hh.

10.418.2 Constructor & Destructor Documentation

10.418.2.1 mln::win::cube3d::cube3d (unsigned *length*) [inline]

Constructor.

Parameters

[in] ***length*** Length, thus height, of the cube3d.

Precondition

`length` is odd.

Definition at line 99 of file cube3d.hh.

10.418.3 Member Function Documentation

10.418.3.1 unsigned mln::win::cube3d::length ( ) const [inline]

Give the cube length, that is, its height.

Definition at line 113 of file cube3d.hh.

10.419 mln::win::cuboid3d Struct Reference

Cuboid defined on the 3-D square grid.

`#include <cuboid3d.hh>`

Inherits classical_window_base< dpoint3d, cuboid3d >.

Public Member Functions

- cuboid3d (unsigned depth, unsigned height, unsigned width)

    Constructor.

- unsigned volume () const

    Return the volume of the cuboid.

- unsigned depth () const
  Accessors.
- unsigned height () const
  Return the height of the cuboid.
- unsigned width () const
  Return the width of the cuboid.

10.419.1 Detailed Description

Cuboid defined on the 3-D square grid. A cuboid3d is a 3-D window with cuboid (also known as rectangular prism or rectangular parallelepiped) shape. It is centered and symmetric.

For instance:

```
    o o o o o o o
   o o o o o o o
  o o o o o o o
 o o o o o o o
o o o o o o o

    o o o o o o o
   o o o o o o o
  o o o x o o o
 o o o o o o o
o o o o o o o

    o o o o o o o
   o o o o o o o
  o o o o o o o
 o o o o o o o
o o o o o o o
```

is defined with depth = 3, height = 5 and width = 7.

Reference: `http://en.wikipedia.org/wiki/Cuboid`

Definition at line 80 of file cuboid3d.hh.

10.419.2 Constructor & Destructor Documentation

10.419.2.1 mln::win::cuboid3d::cuboid3d (unsigned *depth*, unsigned *height*, unsigned *width*) `[inline]`

Constructor.

Parameters

`[in]` ***depth*** The depth of the cuboid3d.

`[in]` ***height*** The height of the cuboid3d.

`[in]` ***width*** The width of the cuboid3d.

Precondition

Argument *depth*, *height* and *width* must be odd.

Definition at line 125 of file cuboid3d.hh.

10.419.3 Member Function Documentation

10.419.3.1 unsigned mln::win::cuboid3d::depth ( ) const [inline]

Accessors.

Return the depth of the cuboid.

Definition at line 146 of file cuboid3d.hh.

10.419.3.2 unsigned mln::win::cuboid3d::height ( ) const [inline]

Return the height of the cuboid.

Definition at line 153 of file cuboid3d.hh.

10.419.3.3 unsigned mln::win::cuboid3d::volume ( ) const [inline]

Return the volume of the cuboid.

Definition at line 167 of file cuboid3d.hh.

10.419.3.4 unsigned mln::win::cuboid3d::width ( ) const [inline]

Return the width of the cuboid.

Definition at line 160 of file cuboid3d.hh.

10.420 mln::win::diag2d Struct Reference

Diagonal line window defined on the 2D square grid.

`#include <diag2d.hh>`

Inherits classical_window_base< dpoint2d, diag2d >.

Public Member Functions

- diag2d (unsigned length)

  Constructor.

- unsigned length () const

  Give the diagonal length, that is, its width.

10.420.1 Detailed Description

Diagonal line window defined on the 2D square grid. An diag2d is centered and symmetric. its width (length) is odd.

For instance:

```
*          o
*        o
*      x
*    o
*  o
*
```

is defined with length = 5.

Definition at line 63 of file diag2d.hh.

10.420.2 Constructor & Destructor Documentation

10.420.2.1 mln::win::diag2d::diag2d (unsigned *length*) [inline]

Constructor.

Parameters

`[in]` ***length*** Length, thus width, of the diagonal line.

Precondition

`length` is odd.

Definition at line 93 of file diag2d.hh.

10.420.3 Member Function Documentation

10.420.3.1 unsigned mln::win::diag2d::length ( ) const [inline]

Give the diagonal length, that is, its width.

Definition at line 106 of file diag2d.hh.

10.421 mln::win::line< M, i, C > Struct Template Reference

Generic line window defined on a given grid in the given dimension.

`#include <line.hh>`

Inherits classical_window_base< dpoint< M, C >, line< M, i, C > >.

Public Types

- enum

  Direction.

Public Member Functions

- unsigned length () const
  Give the line length.
- line (unsigned length)
  Constructor.
- unsigned size () const
  Give the line size, that is, its length.

10.421.1 Detailed Description

template<typename M, unsigned i, typename C> struct mln::win::line< M, i, C >

Generic line window defined on a given grid in the given dimension. An line is centered and symmetric; so its length is odd.

M is the given grid on which the line is defined, i is the given dimension of the line end C is the type of the coordinates.

See also

mln::win::hline2d for an exemple of his use.

Definition at line 73 of file win/line.hh.

10.421.2 Member Enumeration Documentation

10.421.2.1 template<typename M , unsigned i, typename C > anonymous enum

Direction.

Definition at line 76 of file win/line.hh.

10.421.3 Constructor & Destructor Documentation

10.421.3.1 template<typename M , unsigned i, typename C > mln::win::line< M, i, C >::line (unsigned *length*) [inline]

Constructor.

Parameters

`[in]` ***length*** Length of the line.

Precondition

`length` is odd.

Definition at line 106 of file win/line.hh.

References mln::dpoint< G, C >::set_all().

10.421.4 Member Function Documentation

10.421.4.1 template<typename M , unsigned i, typename C > unsigned mln::win::line< M, i, C >::length ( ) const [inline]

Give the line length.

Definition at line 125 of file win/line.hh.

10.421.4.2 template<typename M , unsigned i, typename C > unsigned mln::win::line< M, i, C >::size ( ) const [inline]

Give the line size, that is, its length.

Definition at line 132 of file win/line.hh.

10.422 mln::win::multiple< W, F > Class Template Reference

Multiple window.

`#include <multiple.hh>`

Inherits window_base< W::dpsite, multiple< W, F > >.

10.422.1 Detailed Description

template<typename W, typename F> class mln::win::multiple< W, F >

Multiple window.

Definition at line 76 of file multiple.hh.

10.423 mln::win::multiple_size< n, W, F > Class Template Reference

Definition of a multiple-size window.

`#include <multiple_size.hh>`

Inherits window_base< W::dpsite, multiple_size< n, W, F > >.

10.423.1 Detailed Description

template<unsigned n, typename W, typename F> class mln::win::multiple_size< n, W, F >

Definition of a multiple-size window.

Definition at line 78 of file multiple_size.hh.

10.424 mln::win::octagon2d Struct Reference

Octagon window defined on the 2D square grid.

`#include <octagon2d.hh>`

Inherits classical_window_base< dpoint2d, octagon2d >.

Public Member Functions

- unsigned area () const

    Give the area.

- unsigned length () const

    Give the octagon length, that is, its width.

- octagon2d (unsigned length)

    Constructor.

10.424.1 Detailed Description

Octagon window defined on the 2D square grid. An octagon2d is centered and symmetric.

The length L of the octagon is such as L = 6 $*$ l + 1 where l >= 0.

For instance:

```
*     o o o
*   o o o o o
* o o o o o o o
* o o o x o o o
* o o o o o o o
*   o o o o o
*     o o o
*
```

is defined with L = 7 (l = 1).

Definition at line 67 of file octagon2d.hh.

10.424.2 Constructor & Destructor Documentation

10.424.2.1 mln::win::octagon2d::octagon2d (unsigned *length*) `[inline]`

Constructor.

Parameters

`[in]` ***length*** Length, of the octagon.

Precondition

`length` is such as length = 6$*$x + 1 where x >= 0.

Definition at line 101 of file octagon2d.hh.

10.424.3 Member Function Documentation

10.424.3.1 unsigned mln::win::octagon2d::area ( ) const [inline]

Give the area.

Definition at line 157 of file octagon2d.hh.

10.424.3.2 unsigned mln::win::octagon2d::length ( ) const [inline]

Give the octagon length, that is, its width.

Definition at line 145 of file octagon2d.hh.

10.425 mln::win::rectangle2d Struct Reference

Rectangular window defined on the 2D square grid.

`#include <rectangle2d.hh>`

Inherits classical_window_base< dpoint2d, rectangle2d >.

Public Member Functions

- unsigned area () const

  Give the rectangle area.

- unsigned height () const

  Give the rectangle height.

- rectangle2d (unsigned height, unsigned width)

  Constructor.

- const std::vector< dpoint2d > & std_vector () const

  Give the std vector of delta-points.

- unsigned width () const

  Give the rectangle width.

10.425.1 Detailed Description

Rectangular window defined on the 2D square grid. A rectangle2d is a 2D window with rectangular shape. It is centered and symmetric.

For instance:

```
*  o o o o o
*  o o x o o
*  o o o o o
*
```

is defined with height = 3 and width = 5.

Definition at line 64 of file rectangle2d.hh.

10.425.2 Constructor & Destructor Documentation

10.425.2.1 mln::win::rectangle2d::rectangle2d (unsigned *height*, unsigned *width*) `[inline]`

Constructor.

Parameters

`[in]` ***height*** Height of the rectangle2d.

`[in]` ***width*** Width of the rectangle2d.

Precondition

Height and width are odd.

Definition at line 106 of file rectangle2d.hh.

10.425.3 Member Function Documentation

10.425.3.1 unsigned mln::win::rectangle2d::area ( ) const `[inline]`

Give the rectangle area.

Definition at line 132 of file rectangle2d.hh.

10.425.3.2 unsigned mln::win::rectangle2d::height ( ) const `[inline]`

Give the rectangle height.

Definition at line 120 of file rectangle2d.hh.

10.425.3.3 const std::vector< dpoint2d > & mln::win::rectangle2d::std_vector ( ) const `[inline]`

Give the std vector of delta-points.

Definition at line 145 of file rectangle2d.hh.

10.425.3.4 unsigned mln::win::rectangle2d::width ( ) const `[inline]`

Give the rectangle width.

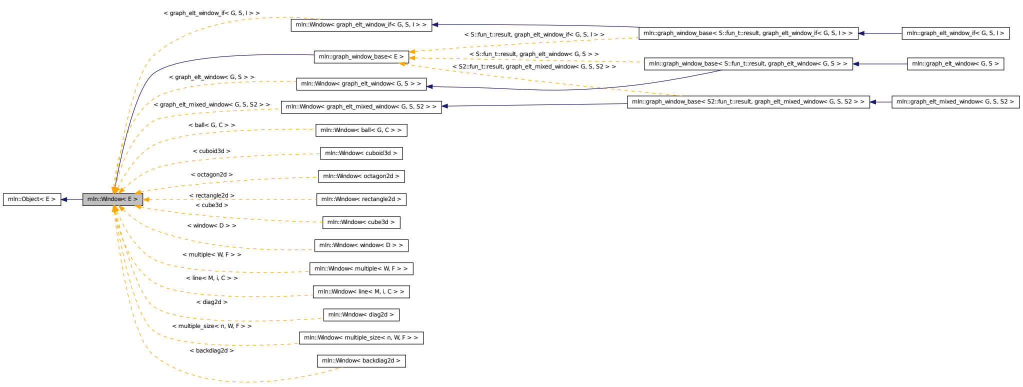
Definition at line 126 of file rectangle2d.hh.

10.426 mln::Window< E > Struct Template Reference

Base class for implementation classes that are windows.

`#include <window.hh>`

Inheritance diagram for mln::Window< E >:



10.426.1 Detailed Description

template<typename E> struct mln::Window< E >

Base class for implementation classes that are windows.

See also

mln::doc::Window for a complete documentation of this class contents.

Definition at line 87 of file concept/window.hh.

10.427 mln::window< D > Class Template Reference

Generic window class.

`#include <window.hh>`

Inherits window_base< D, window< D > >.

Public Types

- typedef dpsites_bkd_piter< window< D > > bkd_qiter

  Site_Iterator type to browse the points of a basic window w.r.t. the reverse ordering of delta-points.

- typedef dpsites_fwd_piter< window< D > > fwd_qiter

  Site_Iterator type to browse the points of a basic window w.r.t. the ordering of delta-points.

- typedef fwd_qiter qiter

  Site_Iterator type to browse the points of a basic window whatever the ordering of delta-points.

- typedef window< D > regular

  Regular window associated type.

Public Member Functions

- void clear ()

  Clear the window.

- unsigned delta () const

  Give the maximum coordinate gap between the window center and a window point.

- const D & dp (unsigned i) const

  Give the `i-th` *delta-point.*

- bool has (const D &dp) const

  Test if `dp` *is in this window definition.*

- window< D > & insert (const D &dp)

  Insert a delta-point `dp`.

- template<typename W >
  window< D > & insert (const Window< W > &win)

  Insert another window `win`.

- bool is_centered () const

  Test if the window is centered.

- bool is_empty () const

  Test if the window is empty (null size; no delta-point).

- bool is_symmetric () const
- void print (std::ostream &ostr) const

  Print the window definition into `ostr`.

- unsigned size () const

  Give the window size, i.e., the number of delta-sites.

- const std::vector< D > & std_vector () const

  Give the std vector of delta-points.

- void sym ()

  Apply a central symmetry to the target window.

- window ()

  Constructor without argument.

  - window< D > & insert (const typename D::coord &dind)

Related Functions

(Note that these are not member functions.)

- template<typename D >
  bool operator== (const window< D > &lhs, const window< D > &rhs)

  Equality comparison between windows `lhs` and `rhs`.

10.427.1 Detailed Description

template<typename D> class mln::window< D >

Generic window class. This type of window is just like a set of delta-points. The parameter is `D`, type of delta-point.

Definition at line 85 of file window.hh.

10.427.2 Member Typedef Documentation

10.427.2.1 template<typename D> typedef dpsites_bkd_piter< window<D> > mln::window< D >::bkd_qiter

Site_Iterator type to browse the points of a basic window w.r.t. the reverse ordering of delta-points.

Definition at line 124 of file window.hh.

10.427.2.2 template<typename D> typedef dpsites_fwd_piter< window<D> > mln::window< D >::fwd_qiter

Site_Iterator type to browse the points of a basic window w.r.t. the ordering of delta-points.

Definition at line 119 of file window.hh.

10.427.2.3 template<typename D> typedef fwd_qiter mln::window< D >::qiter

Site_Iterator type to browse the points of a basic window whatever the ordering of delta-points.

Definition at line 129 of file window.hh.

10.427.2.4 template<typename D> typedef window<D> mln::window< D >::regular

Regular window associated type.

Definition at line 90 of file window.hh.

10.427.3 Constructor & Destructor Documentation

10.427.3.1 template<typename D > mln::window< D >::window ( ) `[inline]`

Constructor without argument.

The constructed window is empty.

Definition at line 207 of file window.hh.

10.427.4 Member Function Documentation

10.427.4.1 template< typename D > void mln::window< D >::clear ( ) [inline]

Clear the window.

Definition at line 254 of file window.hh.

10.427.4.2 template< typename D > unsigned mln::window< D >::delta ( ) const [inline]

Give the maximum coordinate gap between the window center and a window point.

Definition at line 262 of file window.hh.

References mln::window< D >::dp(), and mln::window< D >::size().

10.427.4.3 template< typename D > const D & mln::window< D >::dp (unsigned *i*) const [inline]

Give the `i-th` delta-point.

Definition at line 302 of file window.hh.

References mln::window< D >::size().

Referenced by mln::window< D >::delta(), and mln::window< D >::insert().

10.427.4.4 template< typename D > bool mln::window< D >::has (const D & *dp*) const [inline]

Test if `dp` is in this window definition.

Definition at line 311 of file window.hh.

10.427.4.5 template< typename D > window< D > & mln::window< D >::insert (const D & *dp*) [inline]

Insert a delta-point `dp`.

Definition at line 327 of file window.hh.

Referenced by mln::c18(), mln::c26(), mln::c2_3d_sli(), mln::c4_3d(), mln::c6(), mln::window< D >::insert(), mln::morpho::line_gradient(), mln::window< D >::sym(), mln::convert::to_upper_window(), mln::convert::to_window(), mln::win_c4p(), mln::win_c4p_3d(), mln::win_c8p(), and mln::win_c8p_3d().

10.427.4.6 template< typename D > template< typename W > window< D > & mln::window< D >::insert (const Window< W > & *win*) [inline]

Insert another window `win`.

Definition at line 337 of file window.hh.

10.427.4.7 template<typename D > window< D > & mln::window< D >::insert (const typename D::coord & *dind*) `[inline]`

Insertion of a delta-point with different numbers of arguments (coordinates) w.r.t. the dimension.

Definition at line 349 of file window.hh.

References mln::window< D >::dp(), and mln::window< D >::insert().

10.427.4.8 template<typename D > bool mln::window< D >::is_centered ( ) const `[inline]`

Test if the window is centered.

Returns

True if the delta-point 0 belongs to the window.

Definition at line 226 of file window.hh.

References mln::literal::zero.

10.427.4.9 template<typename D > bool mln::window< D >::is_empty ( ) const `[inline]`

Test if the window is empty (null size; no delta-point).

Definition at line 246 of file window.hh.

10.427.4.10 template<typename D > bool mln::window< D >::is_symmetric ( ) const `[inline]`

Test if the window is symmetric.

Returns

True if for every dp of this window, -dp is also in this window.

Definition at line 216 of file window.hh.

References mln::window< D >::sym().

10.427.4.11 template<typename D > void mln::window< D >::print (std::ostream & *ostr*) const `[inline]`

Print the window definition into `ostr`.

Definition at line 390 of file window.hh.

10.427.4.12 template<typename D > unsigned mln::window< D >::size ( ) const `[inline]`

Give the window size, i.e., the number of delta-sites.

Definition at line 294 of file window.hh.

Referenced by mln::window< D >::delta(), mln::window< D >::dp(), mln::window< D >::sym(), mln::win_c4p(), mln::win_c4p_3d(), mln::win_c8p(), and mln::win_c8p_3d().

10.427.4.13 template< typename D > const std::vector< D > & mln::window< D >::std_vector ( ) const [inline]

Give the std vector of delta-points.

Definition at line 319 of file window.hh.

10.427.4.14 template< typename D > void mln::window< D >::sym ( ) [inline]

Apply a central symmetry to the target window.

Definition at line 234 of file window.hh.

References mln::window< D >::insert(), and mln::window< D >::size().

Referenced by mln::window< D >::is_symmetric().

10.427.5 Friends And Related Function Documentation

10.427.5.1 template< typename D > bool operator== (const window< D > & *lhs*, const window< D > & *rhs*) [related]

Equality comparison between windows `lhs` and `rhs`.

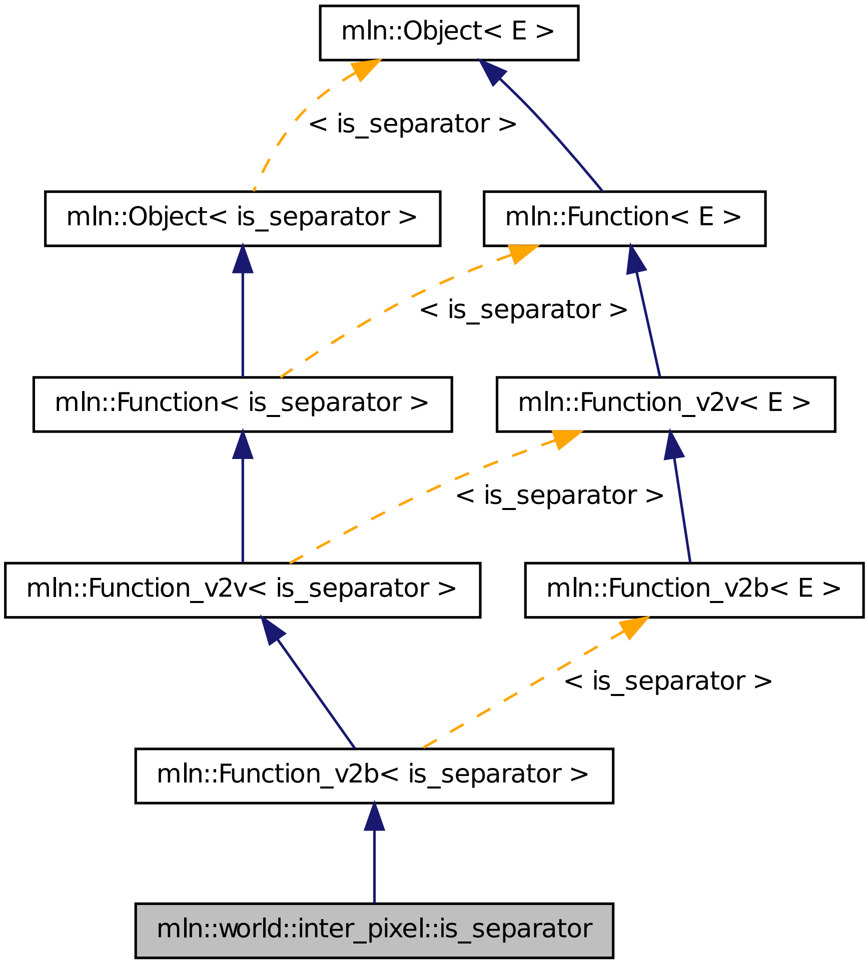
Definition at line 400 of file window.hh.

10.428 mln::world::inter_pixel::is_separator Struct Reference

Functor returning whether a site is a separator in an inter-pixel image.

`#include <is_separator.hh>`

Inheritance diagram for mln::world::inter_pixel::is_separator:



10.428.1 Detailed Description

Functor returning whether a site is a separator in an inter-pixel image.

Definition at line 52 of file is_separator.hh.

10.429 trait::graph< I > Struct Template Reference

Graph traits.

```
#include <morpho.hh>
```

10.429.1 Detailed Description

template<typename I> struct trait::graph< I >

Graph traits.

Definition at line 73 of file morpho.hh.

10.430 trait::graph< mln::complex_image< 1, G, V > > Struct Template Reference

Graph traits for 1-complexes images.

`#include <morpho.hh>`

10.430.1 Detailed Description

template<typename G, typename V> struct trait::graph< mln::complex_image< 1, G, V > >

Graph traits for 1-complexes images.

Definition at line 133 of file morpho.hh.

10.431 trait::graph< mln::image2d< T > > Struct Template Reference

Graph traits for mln::image2d.

`#include <morpho.hh>`

10.431.1 Detailed Description

template<typename T> struct trait::graph< mln::image2d< T > >

Graph traits for mln::image2d.

Definition at line 94 of file morpho.hh.

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