SFA

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Chapter 3

Class Documentation

3.1 Netlist::InitDataObj Struct Reference

Instantiate Netlist class.

`#include <Netlist.h>`

Public Attributes

- std::vector< InitNet > netArray
- std::vector< InitInst > instArray

3.1.1 Detailed Description

Instantiate Netlist class.

See also

init(InitDataObj &).

3.1.2 Member Data Documentation

3.1.2.1 instArray

`std::vector<InitInst> Netlist::InitDataObj::instArray`

3.1.2.2 netArray

```
std::vector<InitNet> Netlist::InitDataObj::netArray
```

The documentation for this struct was generated from the following file:

- src/db/Netlist.h

3.2 Netlist::InitInst Struct Reference

Inst for instantiation.

```
#include <Netlist.h>
```

Public Attributes

- InstType type = InstType::OTHER
- std::vector< IndexType > netIdArray
- std::string name
- RealType wid = 0
- RealType len = 0

3.2.1 Detailed Description

Inst for instantiation.

3.2.2 Member Data Documentation

3.2.2.1 len

```
RealType Netlist::InitInst::len = 0
```

3.2.2.2 name

```
std::string Netlist::InitInst::name
```

3.2.2.3 netIdArray

```
std::vector<IndexType> Netlist::InitInst::netIdArray
```

3.2.2.4 type

```
InstType Netlist::InitInst::type = InstType::OTHER
```

3.2.2.5 wid

```
RealType Netlist::InitInst::wid = 0
```

The documentation for this struct was generated from the following file:

- src/db/Netlist.h

3.3 Netlist::InitNet Struct Reference

Net for instantiation.

```
#include <Netlist.h>
```

Public Attributes

- std::string name
- IndexType id = INDEX_TYPE_MAX

3.3.1 Detailed Description

Net for instantiation.

3.3.2 Member Data Documentation

3.3.2.1 id

```
IndexType Netlist::InitNet::id = INDEX_TYPE_MAX
```

3.3.2.2 name

```
std::string Netlist::InitNet::name
```

The documentation for this struct was generated from the following file:

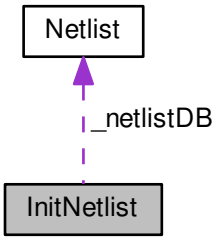
- src/db/Netlist.h

3.4 InitNetlist Class Reference

InitNetlist class.

```
#include <InitNetlist.h>
```

Collaboration diagram for InitNetlist:



Public Member Functions

- InitNetlist ()=default

  Default Constructor.
- InitNetlist (Netlist &netlist)

  Constructor with initialization.
- bool read (const std::string &filename)

  Parse file and build netlist.

Private Attributes

- Netlist & _netlistDB

3.4.1 Detailed Description

InitNetlist class.

3.4.2 Constructor & Destructor Documentation

3.4.2.1 InitNetlist() [1/2]

```
InitNetlist::InitNetlist ( )  [explicit], [default]
```

Default Constructor.

3.4.2.2 InitNetlist() [2/2]

```
InitNetlist::InitNetlist (
            Netlist & netlist )  [inline], [explicit]
```

Constructor with initialization.

3.4.3 Member Function Documentation

3.4.3.1 read()

```
PROJECT_NAMESPACE_BEGIN bool InitNetlist::read (
            const std::string & filename )
```

Parse file and build netlist.

Input files should follow same format generated through scripts/create_init_obj.py. Sample input files for c++ are under benchmarks. The python scripts take standardized hspice/spectre netlist files as inputs.

Parameters

filename	Input file to parse.

3.4.4 Member Data Documentation

3.4.4.1 _netlistDB

```
Netlist& InitNetlist::_netlistDB  [private]
```

The documentation for this class was generated from the following files:

- src/parser/InitNetlist.h
- src/parser/InitNetlist.cpp

3.5 Inst Class Reference

Inst class.

`#include <Inst.h>`

Public Member Functions

- Inst ()=default
  Default constructor.
- Inst (const std::string &name, InstType type, IndexType id)
  Constructor for Inst.
- Inst (const std::string &name, InstType type, IndexType id, RealType wid, RealType len)
  Constructor for Inst.
- const std::string & name () const
- InstType type () const
  Return type of Inst.
- IndexType id () const
  Return Id of Inst.
- const std::vector< IndexType > & pinIdArray () const
  Return the index array for pins of the Inst.
- RealType wid () const
  Return width of Inst.
- RealType len () const
  Return length of Inst.
- void addPinId (IndexType pinId)
  Add pin index to Inst.
- void setWid (RealType wid)
  Assign width of Inst.
- void setLen (RealType len)
  Assign length of Inst.

Private Attributes

- std::string _name
- InstType _type
- IndexType _id
- std::vector< IndexType > _pinIdArray
- RealType _wid
- RealType _len

3.5.1 Detailed Description

Inst class.

3.5.2 Constructor & Destructor Documentation

3.5.2.1 Inst() [1/3]

```
Inst::Inst ( )  [explicit], [default]
```

Default constructor.

3.5.2.2 Inst() [2/3]

```
Inst::Inst (
            const std::string & name,
            InstType type,
            IndexType id )  [inline], [explicit]
```

Constructor for Inst.

Constructor for netlist instances that does not have width and length attributes.

Parameters

name	Name of Inst.
type	Type of Inst. Member of InstType.

See also

type.h

Parameters

id	Id of Inst.

3.5.2.3 Inst() [3/3]

```
Inst::Inst (
            const std::string & name,
            InstType type,
            IndexType id,
            RealType wid,
            RealType len )  [inline], [explicit]
```

Constructor for Inst.

Constructor for netlist instances that have width and length attributes.

Parameters

name	Name of Inst.
type	Type of Inst. Member of InstType.
id	Id of INst.
wid	Width of Inst.
len	Length of Inst.

3.5.3 Member Function Documentation

3.5.3.1 addPinId()

```
void Inst::addPinId (
            IndexType pinId )  [inline]
```

Add pin index to Inst.

Parameters

pin↩ Id	Added pin Id.

3.5.3.2 id()

```
IndexType Inst::id ( ) const  [inline]
```

Return Id of Inst.

3.5.3.3 len()

```
RealType Inst::len ( ) const  [inline]
```

Return length of Inst.

3.5.3.4 name()

```
const std::string& Inst::name ( ) const  [inline]
```

Return name of Inst.

3.5.3.5 pinIdArray()

```
const std::vector<IndexType>& Inst::pinIdArray ( ) const  [inline]
```

Return the index array for pins of the Inst.

3.5.3.6 setLen()

```
void Inst::setLen (
            RealType len )  [inline]
```

Assign length of Inst.

3.5.3.7 setWid()

```
void Inst::setWid (
            RealType wid )  [inline]
```

Assign width of Inst.

3.5.3.8 type()

```
InstType Inst::type ( ) const  [inline]
```

Return type of Inst.

See also

InstType

3.5.3.9 wid()

```
RealType Inst::wid ( ) const  [inline]
```

Return width of Inst.

3.5.4 Member Data Documentation

3.5.4.1 _id

```
IndexType Inst::_id  [private]
```

3.5.4.2 _len

```
RealType Inst::_len  [private]
```

3.5.4.3 _name

```
std::string Inst::_name  [private]
```

3.5.4.4 _pinIdArray

```
std::vector<IndexType> Inst::_pinIdArray  [private]
```

3.5.4.5 _type

```
InstType Inst::_type  [private]
```

3.5.4.6 _wid

```
RealType Inst::_wid  [private]
```

The documentation for this class was generated from the following file:

- src/db/Inst.h

3.6 MosPair Struct Reference

A pair of id for Inst.

```
#include <type.h>
```

Public Member Functions

- MosPair (IndexType Id1, IndexType Id2)
- int operator== (const MosPair &right) const

Public Attributes

- IndexType mosId1
- IndexType mosId2
- bool valid = true

3.6.1 Detailed Description

A pair of id for Inst.

3.6.2 Constructor & Destructor Documentation

3.6.2.1 MosPair()

```
MosPair::MosPair (
            IndexType Id1,
            IndexType Id2 )  [inline]
```

Constructor

3.6.3 Member Function Documentation

3.6.3.1 operator==()

```
int MosPair::operator== (
            const MosPair & right ) const  [inline]
```

Equal operator.

Two pairs are equal if all Id are equal. Sequence does not matter.

3.6.4 Member Data Documentation

3.6.4.1 mosId1

```
IndexType MosPair::mosId1
```

Id1 of Inst.

3.6.4.2 mosId2

```
IndexType MosPair::mosId2
```

Id2 of Inst.

3.6.4.3 valid

```
bool MosPair::valid = true
```

Indicating if valid search pairs.

The documentation for this struct was generated from the following file:

- src/global/type.h

3.7 Net Class Reference

Net class.

```
#include <Net.h>
```

Public Member Functions

- Net ()=default
- Net (const std::string &name, IndexType id)

  Constructor of Net.
- const std::string & name () const
- IndexType id () const
- const std::vector< IndexType > & pinIdArray () const
- void addPinId (IndexType pinId)
- NetType netType () const

  Return net type.

Private Attributes

- std::string _name
- IndexType _id
- std::vector< IndexType > _pinIdArray

3.7.1 Detailed Description

Net class.

3.7.2 Constructor & Destructor Documentation

3.7.2.1 Net() [1/2]

```
Net::Net ( )  [explicit], [default]
```

Default constructor.

3.7.2.2 Net() [2/2]

```
Net::Net (
            const std::string & name,
            IndexType id )  [inline], [explicit]
```

Constructor of Net.

Parameters

name	Name of Net.
id	Id of Net.

3.7.3 Member Function Documentation

3.7.3.1 addPinId()

```
void Net::addPinId (
            IndexType pinId )  [inline]
```

Connect a pin to the net.

3.7.3.2 id()

```
IndexType Net::id ( ) const  [inline]
```

Return Id of Net.

3.7.3.3 name()

```
const std::string& Net::name ( ) const  [inline]
```

Return name of Net.

3.7.3.4 netType()

```
NetType Net::netType ( ) const
```

Return net type.

See also

NetType.

Return netType of net based on name. Currently supported Power/Ground names are limited to conventional VDD/VSS. Add unsupported names for Power/Ground filtering to POWER_NET_NAMES and GROUND_NET_NAMES to /db/Net.cpp.

3.7.3.5 pinIdArray()

```
const std::vector<IndexType>& Net::pinIdArray ( ) const  [inline]
```

Return index array of connected pins.

3.7.4 Member Data Documentation

3.7.4.1 _id

```
IndexType Net::_id  [private]
```

3.7.4.2 _name

```
std::string Net::_name  [private]
```

3.7.4.3 _pinIdArray

```
std::vector<IndexType> Net::_pinIdArray  [private]
```

The documentation for this class was generated from the following files:

- src/db/Net.h
- src/db/Net.cpp

3.8 Netlist Class Reference

Netlist class.

```
#include <Netlist.h>
```

Classes

- struct InitDataObj

  Instantiate Netlist class.
- struct InitInst

  Inst for instantiation.
- struct InitNet

  Net for instantiation.

Public Member Functions

- Netlist ()=default

  Default Constructor.
- void init (InitDataObj &obj)

  Initialize Netlist class.
- void print_all () const
- bool isMos (InstType instType) const

  Return true if InstType is a Mosfet. NMOS and PMOS are Mosfets.
- bool isPasvDev (InstType instType) const

  Return true if InstType is passive device. RES and CAP are passive devices.
- bool isSignal (IndexType netId) const

  Return true if corresponding net NetType::Signal.
- MosType mosType (IndexType mosId) const

  Return MosType of corresponding instance id.
- IndexType instNetId (IndexType instId, PinType pinType) const

  Return Id of Net connected to Inst by certain PinType.
- IndexType instPinId (IndexType instId, PinType pinType) const

  Return Id of Pin with PinType connected to Inst.
- IndexType srcNetId (IndexType mosId) const

  Return Source Net Id of Inst mosId. Equivalent as instNetId(mosId, PinType::SOURCE);.
- IndexType drainNetId (IndexType mosId) const

  Return Drain Net Id of Inst mosId. Equivalent as instNetId(mosId, PinType::DRAIN);.
- IndexType gateNetId (IndexType mosId) const

Return Gate Net Id of Inst mosId. Equivalent as instNetId(mosId, PinType::GATE);.

- PinType getPinTypeInstPinConn (IndexType instId, IndexType pinId) const

  Get PinType of a pin such that Inst and Pin are connected through this pin.
- PinType getPinTypeInstNetConn (IndexType instId, IndexType netId) const

  Get PinType of a pin such that Inst and Net are connected through this pin.
- void getInstNetConn (std::vector< IndexType > &instArray, IndexType netId) const

  Get all Inst that are connected to netId.
- void getInstPinConn (std::vector< IndexType > &instArray, IndexType pinId) const

  Get all Inst that are connected to pinId(through some net).
- void rmvInstHasPin (std::vector< IndexType > &instArray, IndexType pinId) const

  Remove from array, Inst that has pinId.
- void fltrInstPinConnPinType (std::vector< IndexType > &instArray, IndexType pinId, PinType connPinType) const

  Filter instArray. Remove Inst that are connected to pinId through connPinType.
- void fltrInstNetConnPinType (std::vector< IndexType > &instArray, IndexType netId, PinType connPinType) const

  Filter instArray. Remove Inst that are connected to netId through connPinType.
- void fltrInstMosType (std::vector< IndexType > &instArray, MosType mosType) const

  Filter instArray. Remove Inst whose type are mosType.
- const Pin & pin (IndexType id) const

  Return Pin of Id.
- const Net & net (IndexType id) const

  Return Net of Id.
- const Inst & inst (IndexType id) const

  Return Inst of Id.
- IndexType numPin () const

  Return number of Pin.
- IndexType numNet () const

  Return number of Net.
- IndexType numInst () const

  Return number of Inst.
- void addPin (Pin &pin)

  Add Pin to Netlist.
- void addNet (Net &net)

  Add Net to Netlist.
- void addInst (Inst &inst)

  Add Inst to Netlist.

Private Attributes

- std::vector< Net > _netArray
- std::vector< Pin > _pinArray
- std::vector< Inst > _instArray

3.8.1 Detailed Description

Netlist class.

3.8.2 Constructor & Destructor Documentation

3.8.2.1 Netlist()

```
Netlist::Netlist ( )  [explicit], [default]
```

Default Constructor.

3.8.3 Member Function Documentation

3.8.3.1 addInst()

```
void Netlist::addInst (
            Inst & inst )  [inline]
```

Add Inst to Netlist.

3.8.3.2 addNet()

```
void Netlist::addNet (
            Net & net )  [inline]
```

Add Net to Netlist.

3.8.3.3 addPin()

```
void Netlist::addPin (
            Pin & pin )  [inline]
```

Add Pin to Netlist.

3.8.3.4 drainNetId()

```
IndexType Netlist::drainNetId (
            IndexType mosId ) const  [inline]
```

Return Drain Net Id of Inst mosId. Equivalent as instNetId(mosId, PinType::DRAIN);.

See also

instNetId

3.8.3.5 fltrInstMosType()

```
void Netlist::fltrInstMosType (
            std::vector< IndexType > & instArray,
            MosType mosType ) const
```

Filter instArray. Remove Inst whose type are mosType.

Removed instId if mosType(instId) == mosType. O(n) complexity. Similar implementation of std::remove().

See also

getPinTypeInstNetConn.

3.8.3.6 fltrInstNetConnPinType()

```
void Netlist::fltrInstNetConnPinType (
            std::vector< IndexType > & instArray,
            IndexType netId,
            PinType connPinType ) const
```

Filter instArray. Remove Inst that are connected to netId through connPinType.

Removed instId if getPinTypeInstNetConn(instId, pinId) == connPinType. O(n) complexity. Similar implementation of std::remove().

See also

getPinTypeInstNetConn.

3.8.3.7 fltrInstPinConnPinType()

```
void Netlist::fltrInstPinConnPinType (
            std::vector< IndexType > & instArray,
            IndexType pinId,
            PinType connPinType ) const
```

Filter instArray. Remove Inst that are connected to pinId through connPinType.

Removed instId if getPinTypeInstPinConn(instId, pinId) == connPinType. O(n) complexity. Similar implementation of std::remove().

See also

getPinTypeInstPinConn.

3.8.3.8 gateNetId()

```
IndexType Netlist::gateNetId (
            IndexType mosId ) const  [inline]
```

Return Gate Net Id of Inst mosId. Equivalent as instNetId(mosId, PinType::GATE);.

See also

instNetId.

3.8.3.9 getInstNetConn()

```
void Netlist::getInstNetConn (
            std::vector< IndexType > & instArray,
            IndexType netId ) const
```

Get all Inst that are connected to netId.

Parameters

out	*instArray*	Array of the returned Inst Id.
in	*netId*	Id of net.

3.8.3.10 getInstPinConn()

```
void Netlist::getInstPinConn (
```

```
            std::vector< IndexType > & instArray,
            IndexType pinId ) const
```

Get all Inst that are connected to pinId(through some net).

The instance that pinId itself belongs to is not returned.

Parameters

out	*instArray*	Array of the returned Inst Id.
in	*pinId*	Id of pin.

3.8.3.11 getPinTypeInstNetConn()

```
PinType Netlist::getPinTypeInstNetConn (
            IndexType instId,
            IndexType netId ) const
```

Get PinType of a pin such that Inst and Net are connected through this pin.

Example: Suppose pin[0] of inst[1] is connected to net[2]. getPinTypeInstNetConn(1,2) would return PinType of pin[0]. This function allows us to querry for connection types and determine future search directions.

By definition this pin must belong to instId and be connected to netId. If no such pin exists PinType::OTHER is returned.

Parameters

instId	Id of Inst that returned pin is connected.
netId	Id of Net that returned pin is connected.

3.8.3.12 getPinTypeInstPinConn()

```
PinType Netlist::getPinTypeInstPinConn (
            IndexType instId,
            IndexType pinId ) const
```

Get PinType of a pin such that Inst and Pin are connected through this pin.

Example: Suppose pin[0] of inst[1] is connected to pin[2] (through some net). getPinTypeInstPinConn(1,2) would return PinType of pin[0]. This function allows us to querry for connection types and determine future search directions.

By definition this pin must belong to instId and be connected to pinId through some net. If no such pin exists PinType::OTHER is returned.

Parameters

instId	Id of Inst that returned pin is connected.
pinId	Id of Pin that returned pin is connected.

3.8.3.13 init()

```
void Netlist::init (
            InitDataObj & obj )
```

Initialize Netlist class.

3.8.3.14 inst()

```
const Inst& Netlist::inst (
            IndexType id ) const  [inline]
```

Return Inst of Id.

3.8.3.15 instNetId()

```
IndexType Netlist::instNetId (
            IndexType instId,
            PinType pinType ) const
```

Return Id of Net connected to Inst by certain PinType.

Example: instNetId(0, PinType::DRAIN) would return the net index connected to inst[0] through a pin which PinType::DRAIN. Or this returns inst[0] drain net. If the Inst does not have a PinType connected, INDEX_TYPE_MAX would be returned. Use at risk and only if InstType is known.

Parameters

instId	Id of Inst.
pinType	Returned Net Id connected to this PinType.

3.8.3.16 instPinId()

```
IndexType Netlist::instPinId (
```

```
            IndexType instId,
            PinType pinType ) const
```

Return Id of Pin with PinType connected to Inst.

Example: instPinId(0,PinType::DRAIN) would return the pin index connected to inst[0] which is PinType::DRAIN. Or this returns inst[0] drain pin index. If Inst does not have a PinType connected, INDEX_TYPE_MAX would be returned. Use at risk and only if InstType is known.

Parameters

instId	Id of Inst.
pinType	Returned Pin Id should be this PinType.

3.8.3.17 isMos()

```
bool Netlist::isMos (
            InstType instType ) const
```

Return true if InstType is a Mosfet. NMOS and PMOS are Mosfets.

3.8.3.18 isPasvDev()

```
bool Netlist::isPasvDev (
            InstType instType ) const
```

Return true if InstType is passive device. RES and CAP are passive devices.

3.8.3.19 isSignal()

```
bool Netlist::isSignal (
            IndexType netId ) const  [inline]
```

Return true if corresponding net NetType::Signal.

3.8.3.20 mosType()

```
MosType Netlist::mosType (
            IndexType mosId ) const
```

Return MosType of corresponding instance id.

3.8.3.21 net()

```
const Net& Netlist::net (
            IndexType id ) const  [inline]
```

Return Net of Id.

3.8.3.22 numInst()

```
IndexType Netlist::numInst ( ) const  [inline]
```

Return number of Inst.

3.8.3.23 numNet()

```
IndexType Netlist::numNet ( ) const  [inline]
```

Return number of Net.

3.8.3.24 numPin()

```
IndexType Netlist::numPin ( ) const  [inline]
```

Return number of Pin.

3.8.3.25 pin()

```
const Pin& Netlist::pin (
            IndexType id ) const  [inline]
```

Return Pin of Id.

3.8.3.26 print_all()

```
void Netlist::print_all ( ) const
```

Print netlist.

3.8.3.27 rmvInstHasPin()

```
void Netlist::rmvInstHasPin (
            std::vector< IndexType > & instArray,
            IndexType pinId ) const
```

Remove from array, Inst that has pinId.

O(n) complexity guaranteed. Similar implementation of std::remove().

Parameters

instArray	Reference to instance Id array.
pinId	Id of pin.

3.8.3.28 srcNetId()

```
IndexType Netlist::srcNetId (
            IndexType mosId ) const  [inline]
```

Return Source Net Id of Inst mosId. Equivalent as instNetId(mosId, PinType::SOURCE);.

See also

instNetId.

3.8.4 Member Data Documentation

3.8.4.1 _instArray

```
std::vector<Inst> Netlist::_instArray  [private]
```

3.8.4.2 _netArray

```
std::vector<Net> Netlist::_netArray  [private]
```

3.8.4.3 _pinArray

```
std::vector<Pin> Netlist::_pinArray  [private]
```

The documentation for this class was generated from the following files:

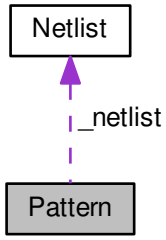
- src/db/Netlist.h
- src/db/Netlist.cpp

3.9 Pattern Class Reference

Pattern class.

`#include <Pattern.h>`

Collaboration diagram for Pattern:



Public Member Functions

- Pattern (const Netlist &netlist)

  Constructor.
- MosPattern pattern (IndexType mosId1, IndexType mosId2) const

  Return pattern for pair of mosfets.

Private Member Functions

- bool matchedType (IndexType mosId1, IndexType mosId2) const

  Return true if Inst pair have same InstType.
- bool matchedSize (IndexType mosId1, IndexType mosId2) const

  Return true if Inst pair have same size attributes.
- bool diffPairInput (IndexType mosId1, IndexType mosId2) const

  Return true if fits MosPattern::DIFF_SOURCE.
- bool diffPairCascode (IndexType mosId1, IndexType mosId2) const

  Return true if fits MosPattern::DIFF_CASCODE.
- bool validPairCascode (IndexType mosId1, IndexType mosId2) const

  Return true if fits MosPattern::CASCODE.
- bool validPairLoad (IndexType mosId1, IndexType mosId2) const

  Return true if fits MosPattern::LOAD.
- bool crossPairCascode (IndexType mosId1, IndexType mosId2) const

  Return true if fits MosPattern::CROSS_CASCODE.
- bool crossPairLoad (IndexType mosId1, IndexType mosId2) const

  Return true if fits MosPattern::CROSS_LOAD.

Private Attributes

- const Netlist & _netlist

3.9.1 Detailed Description

Pattern class.

3.9.2 Constructor & Destructor Documentation

3.9.2.1 Pattern()

```
Pattern::Pattern (
            const Netlist & netlist )  [inline], [explicit]
```

Constructor.

Parameters

netlist	Netlist for pattern search.

3.9.3 Member Function Documentation

3.9.3.1 crossPairCascode()

```
bool Pattern::crossPairCascode (
            IndexType mosId1,
            IndexType mosId2 ) const  [private]
```

Return true if fits MosPattern::CROSS_CASCODE.

3.9.3.2 crossPairLoad()

```
bool Pattern::crossPairLoad (
            IndexType mosId1,
            IndexType mosId2 ) const  [private]
```

Return true if fits MosPattern::CROSS_LOAD.

3.9.3.3 diffPairCascode()

```
bool Pattern::diffPairCascode (
            IndexType mosId1,
            IndexType mosId2 ) const  [private]
```

Return true if fits MosPattern::DIFF_CASCODE.

3.9.3.4 diffPairInput()

```
bool Pattern::diffPairInput (
            IndexType mosId1,
            IndexType mosId2 ) const  [private]
```

Return true if fits MosPattern::DIFF_SOURCE.

3.9.3.5 matchedSize()

```
bool Pattern::matchedSize (
            IndexType mosId1,
            IndexType mosId2 ) const  [private]
```

Return true if Inst pair have same size attributes.

3.9.3.6 matchedType()

```
PROJECT_NAMESPACE_BEGIN bool Pattern::matchedType (
            IndexType mosId1,
            IndexType mosId2 ) const  [private]
```

Return true if Inst pair have same InstType.

3.9.3.7 pattern()

```
MosPattern Pattern::pattern (
            IndexType mosId1,
            IndexType mosId2 ) const
```

Return pattern for pair of mosfets.

Valid patterns have same InstType. Currently they also have same size attribute.

TODO Add ratio pair detection in future.

See also

MosPattern.

Parameters

mosId1	Id for mosfet.
mosId2	Id for mosfet.

3.9.3.8 validPairCascode()

```
bool Pattern::validPairCascode (
            IndexType mosId1,
            IndexType mosId2 ) const  [private]
```

Return true if fits MosPattern::CASCODE.

3.9.3.9 validPairLoad()

```
bool Pattern::validPairLoad (
            IndexType mosId1,
            IndexType mosId2 ) const  [private]
```

Return true if fits MosPattern::LOAD.

3.9.4 Member Data Documentation

3.9.4.1 _netlist

```
const Netlist& Pattern::_netlist  [private]
```

The documentation for this class was generated from the following files:

- src/sym_detect/Pattern.h
- src/sym_detect/Pattern.cpp

3.10 Pin Class Reference

Pin class.

```
#include <Pin.h>
```

Public Member Functions

- Pin ()=default
- Pin (IndexType id, IndexType instId, IndexType netId, PinType type)

  Constructor for Pin.
- IndexType id () const
- IndexType instId () const
- IndexType netId () const
- PinType type () const

  Return type of Pin.

Static Public Member Functions

- static PinType nextPinType (PinType type)

  Return the next search PinType for DFS.

Private Attributes

- IndexType _id
- IndexType _instId
- IndexType _netId
- PinType _type

3.10.1 Detailed Description

Pin class.

3.10.2 Constructor & Destructor Documentation

3.10.2.1 Pin() [1/2]

```
Pin::Pin ( )  [explicit], [default]
```

Default Constructor.

3.10.2.2 Pin() [2/2]

```
Pin::Pin (
            IndexType id,
            IndexType instId,
            IndexType netId,
            PinType type )  [inline], [explicit]
```

Constructor for Pin.

Parameters

id	Id of Pin.
instId	Id of connected Inst.
netId	Id of connected Net.
type	Type of Pin.

3.10.3 Member Function Documentation

3.10.3.1 id()

```
IndexType Pin::id ( ) const  [inline]
```

Return id of Pin.

3.10.3.2 instId()

```
IndexType Pin::instId ( ) const  [inline]
```

Return id of connected Inst.

3.10.3.3 netId()

```
IndexType Pin::netId ( ) const  [inline]
```

Return id of connected Net.

3.10.3.4 nextPinType()

```
PROJECT_NAMESPACE_BEGIN PinType Pin::nextPinType (
            PinType type )  [static]
```

Return the next search PinType for DFS.

Parameters

type	Querry the next search PinType.

See also

PinType

The DFS search for symmetry relys on Pin::nextPinType to define the search path direction. For example, if a Mosfet was reached through a source then the DFS algorithm would search for connected Inst of the drain. Currently supported search paths:

Input PinType	nextPinType
SOURCE	DRAIN
DRAIN	SOURCE
THIS	THAT
THAT	THIS

3.10.3.5 type()

```
PinType Pin::type ( ) const  [inline]
```

Return type of Pin.

See also

PinType

3.10.4 Member Data Documentation

3.10.4.1 _id

```
IndexType Pin::_id  [private]
```

3.10.4.2 _instId

```
IndexType Pin::_instId  [private]
```

3.10.4.3 _netId

```
IndexType Pin::_netId  [private]
```

3.10.4.4 _type

```
PinType Pin::_type  [private]
```

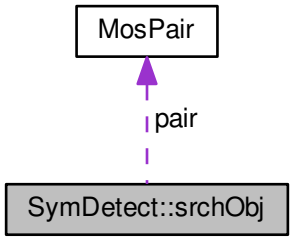
The documentation for this class was generated from the following files:

- src/db/Pin.h
- src/db/Pin.cpp

3.11 SymDetect::srchObj Struct Reference

Private object to assist DFS.

Collaboration diagram for SymDetect::srchObj:



Public Member Functions

- srchObj (MosPair &diffPair, PinType pinType)
  Constructor.

Public Attributes

- MosPair pair
- PinType srchPinType

3.11.1 Detailed Description

Private object to assist DFS.

3.11.2 Constructor & Destructor Documentation

3.11.2.1 srchObj()

```
SymDetect::srchObj::srchObj (
            MosPair & diffPair,
            PinType pinType ) [inline]
```

Constructor.

3.11.3 Member Data Documentation

3.11.3.1 pair

```
MosPair SymDetect::srchObj::pair
```

Pair of mosfet that fits MosPattern. Note it is not a reference!

3.11.3.2 srchPinType

```
PinType SymDetect::srchObj::srchPinType
```

Indicate the pinType visited from last MosPair

The documentation for this struct was generated from the following file:

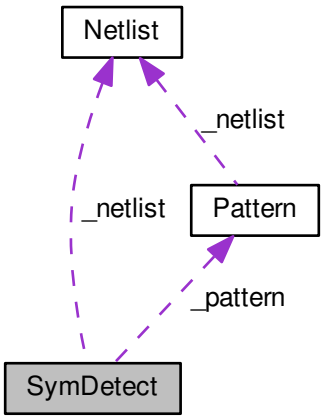
- src/sym_detect/SymDetect.h

3.12 SymDetect Class Reference

SymDetect class.

`#include <SymDetect.h>`

Collaboration diagram for SymDetect:



Classes

- struct srchObj

  Private object to assist DFS.

Public Member Functions

- SymDetect (const Netlist &netlist)

  Constructor Only needs netlist as input. Pattern class inherently constructed.
- void hiSymDetect (std::vector< std::vector< MosPair >> &symGroup) const

  Hierarchy symmetry detection.

Private Member Functions

- MosPattern srchObjPtrn (srchObj &obj) const

  Return pattern of srchObj.
- bool existPair (std::vector< MosPair > &library, IndexType instId1, IndexType instId2) const

  bool endSrch(IndexType mosId, PinType pinType) const;
- bool existPair (std::vector< srchObj > &library, IndexType instId1, IndexType instId2) const

  Check if pair already reached.
- bool endSrch (srchObj &obj) const

  Return true if end of search path.
- bool validSrchObj (IndexType instId1, IndexType instId2, IndexType srchPinId1, IndexType srchPinId2) const

  Return true if a valid pair.
- void pushNextSrchObj (std::vector< MosPair > &dfsVstPair, std::vector< srchObj > &dfsStack, srchObj &currObj, std::vector< MosPair > &diffPairSrc) const

  Push next valid srchObj to dfsStack.
- void getDiffPairNetConn (std::vector< MosPair > &diffPair, IndexType netId) const

  Get DIFF_SOURCE MosPair connected to netId.
- void getDiffPair (std::vector< MosPair > &diffPair) const

  Get DIFF_SOURCE of netlist.
- void dfsDiffPair (std::vector< MosPair > &dfsVstPair, MosPair &diffPair, std::vector< MosPair > &diffPair↩ Srch) const

  DFS search with given source. Visited MosPair are stored.
- void inVldDiffPairSrch (std::vector< MosPair > &diffPairSrch, MosPair &currPair) const

  Invalidate visited pairs from sources.

Private Attributes

- const Netlist & _netlist
- Pattern _pattern

3.12.1 Detailed Description

SymDetect class.

3.12.2 Constructor & Destructor Documentation

3.12.2.1 SymDetect()

```
SymDetect::SymDetect (
            const Netlist & netlist )  [inline], [explicit]
```

Constructor Only needs netlist as input. Pattern class inherently constructed.

Parameters

netlist	Netlist class.

3.12.3 Member Function Documentation

3.12.3.1 dfsDiffPair()

```
void SymDetect::dfsDiffPair (
            std::vector< MosPair > & dfsVstPair,
            MosPair & diffPair,
            std::vector< MosPair > & diffPairSrch ) const  [private]
```

DFS search with given source. Visited MosPair are stored.

Search for symmetry patterns in DFS manner with search source as diffPair. Store visited valid MosPair at dfsVstPair. diffPairSrch are needed as input to invalidate reached sources. dfsVstPair would be in the same hierarchy symmetry group.

See also

pushNextSrchObj

Parameters

out	*dfsVstPair*	Vector to store all visited MosPair
in	*diffPair*	DFS search source
in	*diffPairSrch*	Vector of all stored DFS search source

3.12.3.2 endSrch()

```
bool SymDetect::endSrch (
            srchObj & obj ) const  [private]
```

Return true if end of search path.

Current end search terminations: (1) DIFF_SOURCE reached through DRAIN (2) LOAD, CROSS_LOAD (3) gate connected pairs

3.12.3.3 existPair() [1/2]

```
bool SymDetect::existPair (
            std::vector< MosPair > & library,
            IndexType instId1,
            IndexType instId2 ) const  [private]
```

bool endSrch(IndexType mosId, PinType pinType) const;

Check if pair already reached.

3.12.3.4 existPair() [2/2]

```
bool SymDetect::existPair (
            std::vector< srchObj > & library,
            IndexType instId1,
            IndexType instId2 ) const  [private]
```

Check if pair already reached.

3.12.3.5 getDiffPair()

```
void SymDetect::getDiffPair (
            std::vector< MosPair > & diffPair ) const  [private]
```

Get DIFF_SOURCE of netlist.

Iterate all signal nets for getDiffPairNetConn. This would return all DFS sources.

See also

getDiffPairNetConn

Parameters

diffPair	Store the output vector

3.12.3.6 getDiffPairNetConn()

```
PROJECT_NAMESPACE_BEGIN void SymDetect::getDiffPairNetConn (
```

```
            std::vector< MosPair > & diffPair,
            IndexType netId ) const  [private]
```

Get DIFF_SOURCE MosPair connected to netId.

Find MosPair that follow MosPattern::DIFF_SOURCE and the sources are both connected to netId. Theses MosPair are appended to diffPair.

Parameters

netId	Source should be connected to netId.
diffPair	Stored output vector.

3.12.3.7 hiSymDetect()

```
void SymDetect::hiSymDetect (
            std::vector< std::vector< MosPair >> & symGroup ) const
```

Hierarchy symmetry detection.

Output would contain 2 levels of hierarchy. symGroup is a vector of std::vector<MosPair> oneGroup. Where oneGroup is a group of MosPair in the same symmetry group. Each MosPair should follow a MosPattern.

Parameters

symGroup	Detected symmetry groups of netlist.

See also

MosPattern
MosPair

3.12.3.8 inVldDiffPairSrch()

```
void SymDetect::inVldDiffPairSrch (
            std::vector< MosPair > & diffPairSrch,
            MosPair & currPair ) const  [private]
```

Invalidate visited pairs from sources.

If a MosPair have already been visited and is a DFS source, it should be invalidated as a DFS search source to avoid revisiting.

Parameters

diffPairSrch	Vector of all DFS sources.
currPair	MosPair to invalidate.

3.12.3.9 pushNextSrchObj()

```
void SymDetect::pushNextSrchObj (
            std::vector< MosPair > & dfsVstPair,
            std::vector< srchObj > & dfsStack,
            srchObj & currObj,
            std::vector< MosPair > & diffPairSrc ) const  [private]
```

Push next valid srchObj to dfsStack.

This function push valid pairs that could be reached from currObj to dfsStack. It also removes reached DIFF_SO↩ URCE MosPair from diffPairSrc.

See also

inVldDiffPairSrch.

Parameters

dfsVstPair	All current visited MosPair
dfsStack	Stack to store to visit MosPair
currObj	Current srchObj under visit
diffPairSrc	All DFS sources

3.12.3.10 srchObjPtrn()

```
MosPattern SymDetect::srchObjPtrn (
            srchObj & obj ) const  [private]
```

Return pattern of srchObj.

3.12.3.11 validSrchObj()

```
bool SymDetect::validSrchObj (
            IndexType instId1,
            IndexType instId2,
            IndexType srchPinId1,
            IndexType srchPinId2 ) const  [private]
```

Return true if a valid pair.

Valid pairs have following attributes: (1) Reached through same PinType (2) Not reached through gate (3) Valid MosPattern

Parameters

instId1	Reached pair instId1
instId2	Reached pair instId2
srchPinId1	instId1 reached by srchPinId1.
srchPinId2	instId2 reached by srchPinId2.

3.12.4 Member Data Documentation

3.12.4.1 _netlist

```
const Netlist& SymDetect::_netlist  [private]
```

3.12.4.2 _pattern

```
Pattern SymDetect::_pattern  [private]
```

The documentation for this class was generated from the following files:

- src/sym_detect/SymDetect.h
- src/sym_detect/SymDetect.cpp

Chapter 4

File Documentation

4.1 build/debug/CMakeFiles/3.7.2/CompilerIdC/CMakeCCompilerId.c File Reference

Macros

- #define COMPILER_ID ""
- #define STRINGIFY_HELPER(X) #X
- #define STRINGIFY(X) STRINGIFY_HELPER(X)
- #define PLATFORM_ID
- #define ARCHITECTURE_ID
- #define DEC(n)
- #define HEX(n)
- #define C_DIALECT

Functions

- int main (int argc, char ∗argv[ ])

Variables

- char const ∗ info_compiler = "INFO" ":" "compiler[" COMPILER_ID "]"
- char const ∗ info_platform = "INFO" ":" "platform[" PLATFORM_ID "]"
- char const ∗ info_arch = "INFO" ":" "arch[" ARCHITECTURE_ID "]"
- const char ∗ info_language_dialect_default

4.1.1 Macro Definition Documentation

4.1.1.1 ARCHITECTURE_ID

```
#define ARCHITECTURE_ID
```

4.1.1.2 C_DIALECT

```
#define C_DIALECT
```

4.1.1.3 COMPILER_ID

```
#define COMPILER_ID ""
```

4.1.1.4 DEC

```
#define DEC(
              n )
```

Value:

```
('0' + (((n) / 10000000)%10)), \
  ('0' + (((n) / 1000000)%10)),  \
  ('0' + (((n) / 100000)%10)),   \
  ('0' + (((n) / 10000)%10)),    \
  ('0' + (((n) / 1000)%10)),     \
  ('0' + (((n) / 100)%10)),      \
  ('0' + (((n) / 10)%10)),       \
  ('0' +  ((n) % 10))
```

4.1.1.5 HEX

```
#define HEX(
              n )
```

Value:

```
('0' + ((n)>>28 & 0xF)), \
  ('0' + ((n)>>24 & 0xF)), \
  ('0' + ((n)>>20 & 0xF)), \
  ('0' + ((n)>>16 & 0xF)), \
  ('0' + ((n)>>12 & 0xF)), \
  ('0' + ((n)>>8  & 0xF)), \
  ('0' + ((n)>>4  & 0xF)), \
  ('0' + ((n)     & 0xF))
```

4.1.1.6 PLATFORM_ID

```
#define PLATFORM_ID
```

4.1.1.7 STRINGIFY

```
#define STRINGIFY(
              X ) STRINGIFY_HELPER(X)
```

4.1.1.8 STRINGIFY_HELPER

```
#define STRINGIFY_HELPER(
              X ) #X
```

4.1.2 Function Documentation

4.1.2.1 main()

```
int main (
             int argc,
             char * argv[] )
```

4.1.3 Variable Documentation

4.1.3.1 info_arch

```
char const* info_arch = "INFO" ":" "arch[" ARCHITECTURE_ID "]"
```

4.1.3.2 info_compiler

```
char const* info_compiler = "INFO" ":" "compiler[" COMPILER_ID "]"
```

4.1.3.3 info_language_dialect_default

```
const char* info_language_dialect_default
```

Initial value:

```
=
  "INFO" ":" "dialect_default[" C_DIALECT "]"
```

4.1.3.4 info_platform

```
char const* info_platform = "INFO" ":" "platform[" PLATFORM_ID "]"
```

4.2 build/debug/CMakeFiles/3.7.2/CompilerIdCXX/CMakeCXXCompilerId.cpp File Reference

Macros

- #define COMPILER_ID ""
- #define STRINGIFY_HELPER(X) #X
- #define STRINGIFY(X) STRINGIFY_HELPER(X)
- #define PLATFORM_ID
- #define ARCHITECTURE_ID
- #define DEC(n)
- #define HEX(n)

Functions

- int main (int argc, char *argv[])

Variables

- char const * info_compiler = "INFO" ":" "compiler[" COMPILER_ID "]"
- char const * info_platform = "INFO" ":" "platform[" PLATFORM_ID "]"
- char const * info_arch = "INFO" ":" "arch[" ARCHITECTURE_ID "]"
- const char * info_language_dialect_default

4.2.1 Macro Definition Documentation

4.2.1.1 ARCHITECTURE_ID

```
#define ARCHITECTURE_ID
```

4.2.1.2 COMPILER_ID

```
#define COMPILER_ID ""
```

4.2.1.3 DEC

```
#define DEC(
              n )
```

Value:

```
('0' + (((n) / 10000000)%10)), \
  ('0' + (((n) / 1000000)%10)),  \
  ('0' + (((n) / 100000)%10)),   \
  ('0' + (((n) / 10000)%10)),    \
  ('0' + (((n) / 1000)%10)),     \
  ('0' + (((n) / 100)%10)),      \
  ('0' + (((n) / 10)%10)),       \
  ('0' +  ((n) % 10))
```

4.2.1.4 HEX

```
#define HEX(
              n )
```

Value:

```
('0' + ((n)>>28 & 0xF)), \
  ('0' + ((n)>>24 & 0xF)), \
  ('0' + ((n)>>20 & 0xF)), \
  ('0' + ((n)>>16 & 0xF)), \
  ('0' + ((n)>>12 & 0xF)), \
  ('0' + ((n)>>8  & 0xF)), \
  ('0' + ((n)>>4  & 0xF)), \
  ('0' + ((n)     & 0xF))
```

4.2.1.5 PLATFORM_ID

```
#define PLATFORM_ID
```

4.2.1.6 STRINGIFY

```
#define STRINGIFY(
              X ) STRINGIFY_HELPER(X)
```

4.2.1.7 STRINGIFY_HELPER

```
#define STRINGIFY_HELPER(
              X ) #X
```

4.2.2 Function Documentation

4.2.2.1 main()

```
int main (
            int argc,
            char * argv[] )
```

4.2.3 Variable Documentation

4.2.3.1 info_arch

```
char const* info_arch = "INFO" ":" "arch[" ARCHITECTURE_ID "]"
```

4.2.3.2 info_compiler

```
char const* info_compiler = "INFO" ":" "compiler[" COMPILER_ID "]"
```

4.2.3.3 info_language_dialect_default

```
const char* info_language_dialect_default
```

Initial value:

```
= "INFO" ":" "dialect_default["


  "98"
"]"
```

4.2.3.4 info_platform

```
char const* info_platform = "INFO" ":" "platform[" PLATFORM_ID "]"
```

4.3 build/debug/CMakeFiles/feature_tests.c File Reference

Functions

- int main (int argc, char **argv)

Variables

- const char features [ ]

4.3.1 Function Documentation

4.3.1.1 main()

```
int main (
            int argc,
            char ** argv )
```

4.3.2 Variable Documentation

4.3.2.1 features

```
const char features[]
```

4.4 build/debug/CMakeFiles/feature_tests.cxx File Reference

Functions

- int main (int argc, char **argv)

Variables

- const char features [ ]

4.4.1 Function Documentation

4.4.1.1 main()

```
int main (
             int argc,
             char ** argv )
```

4.4.2 Variable Documentation

4.4.2.1 features

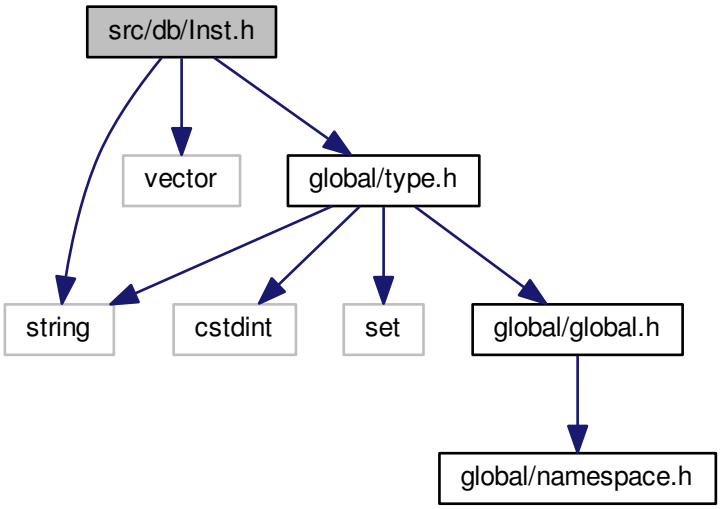
```
const char features[]
```

4.5 src/db/Inst.h File Reference

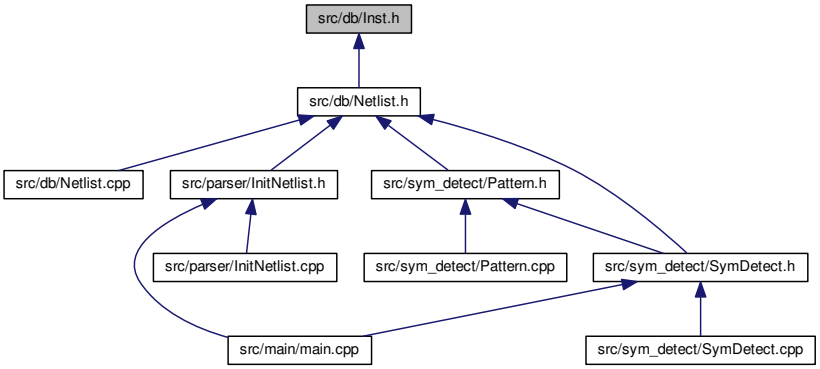
Instance class.

```
#include <string>
#include <vector>
#include "global/type.h"
```

Include dependency graph for Inst.h:



This graph shows which files directly or indirectly include this file:



Classes

- class Inst

  Inst class.

4.5.1 Detailed Description

Instance class.

Author

Mingjie Liu

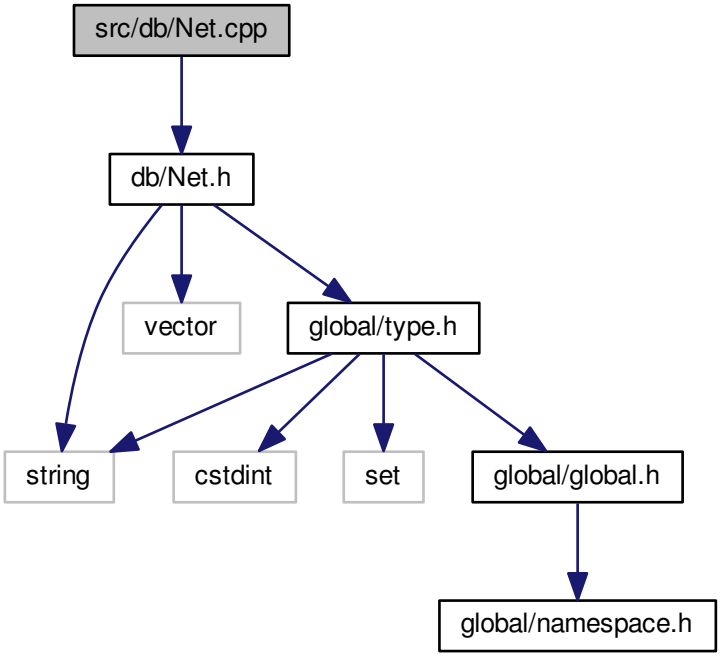
Date

11/24/2018

4.6 src/db/Net.cpp File Reference

Net class implementation.

```
#include "db/Net.h"
```
Include dependency graph for Net.cpp:



Variables

- static PROJECT_NAMESPACE_BEGIN const std::set< std::string > POWER_NET_NAMES = {"vdd", "V↩ DD", "Vdd", "VDDA", "vdda", "Vdda"}
- static const std::set< std::string > GROUND_NET_NAMES = {"vss", "VSS", "Vss", "VSSA", "vssa", "Vssa", "gnd", "Gnd", "GND"}

4.6.1 Detailed Description

Net class implementation.

Author

Mingjie Liu

Date

11/24/2018

4.6.2 Variable Documentation

4.6.2.1 GROUND_NET_NAMES

```
const std::set<std::string> GROUND_NET_NAMES = {"vss", "VSS", "Vss", "VSSA", "vssa", "Vssa",
"gnd", "Gnd", "GND"}  [static]
```

A set of possible ground net names.

4.6.2.2 POWER_NET_NAMES

```
PROJECT_NAMESPACE_BEGIN const std::set<std::string> POWER_NET_NAMES = {"vdd", "VDD", "Vdd",
"VDDA", "vdda", "Vdda"}  [static]
```

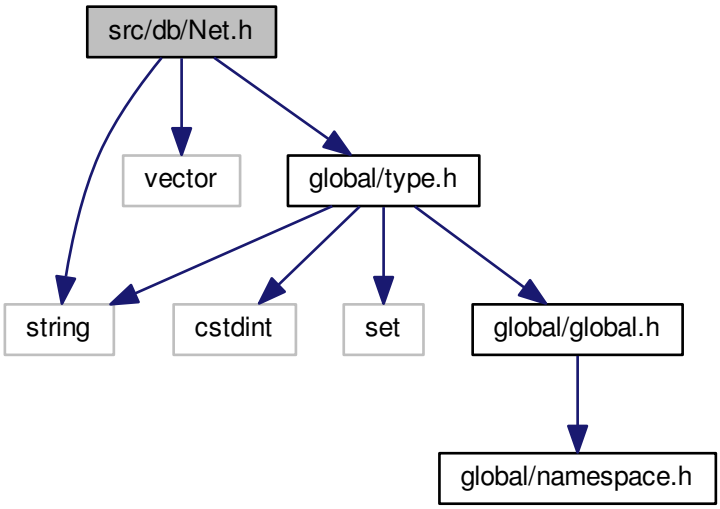
A set of possible power net names.

4.7 src/db/Net.h File Reference

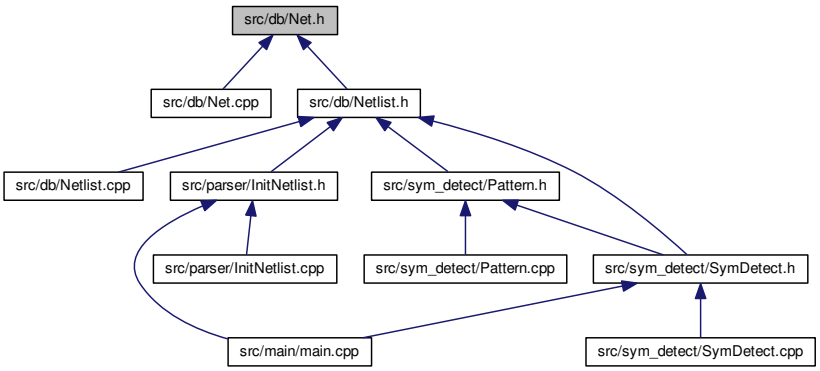
Net class.

```
#include <string>
#include <vector>
#include "global/type.h"
```

Include dependency graph for Net.h:



This graph shows which files directly or indirectly include this file:



Classes

- class Net

  Net class.

4.7.1 Detailed Description

Net class.

Author

Mingjie LIu

Date

11/24/2018

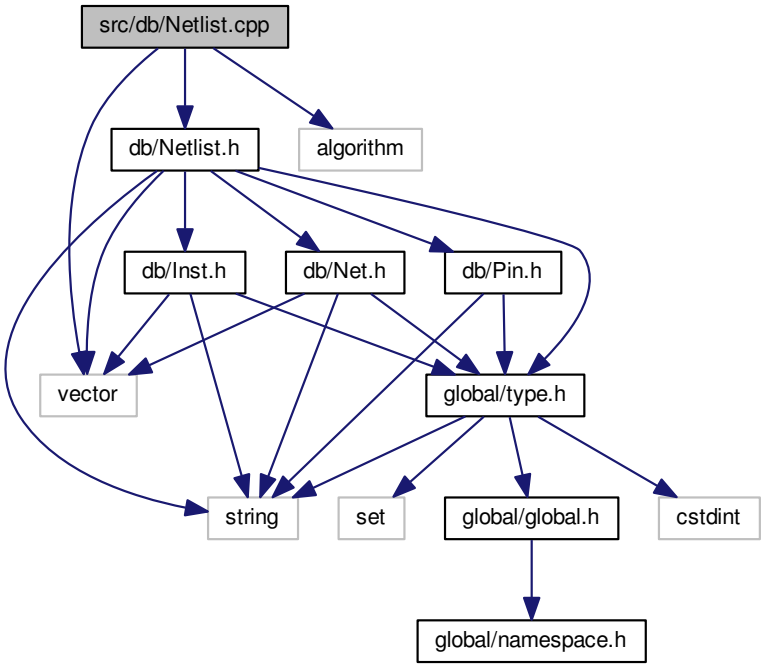
4.8 src/db/Netlist.cpp File Reference

Netlist class implementation.

```
#include "db/Netlist.h"
#include <vector>
```

```
#include <algorithm>
```

Include dependency graph for Netlist.cpp:



Variables

- static PROJECT_NAMESPACE_BEGIN const PinType MOS_PIN_TYPE [4] = {PinType::DRAIN, PinType::↩ GATE, PinType::SOURCE, PinType::BULK}

  Mos Pin Types.
- static const PinType RES_PIN_TYPE [3] = {PinType::THIS, PinType::THAT, PinType::OTHER}

  Res/Cap Pin Types.

4.8.1 Detailed Description

Netlist class implementation.

Author

Mingjie Liu

Date

11/24/2018

4.8.2 Variable Documentation

4.8.2.1 MOS_PIN_TYPE

```
PROJECT_NAMESPACE_BEGIN const PinType MOS_PIN_TYPE[4] = {PinType::DRAIN, PinType::GATE, Pin↩
Type::SOURCE, PinType::BULK}  [static]
```

Mos Pin Types.

4.8.2.2 RES_PIN_TYPE

```
const PinType RES_PIN_TYPE[3] = {PinType::THIS, PinType::THAT, PinType::OTHER}  [static]
```

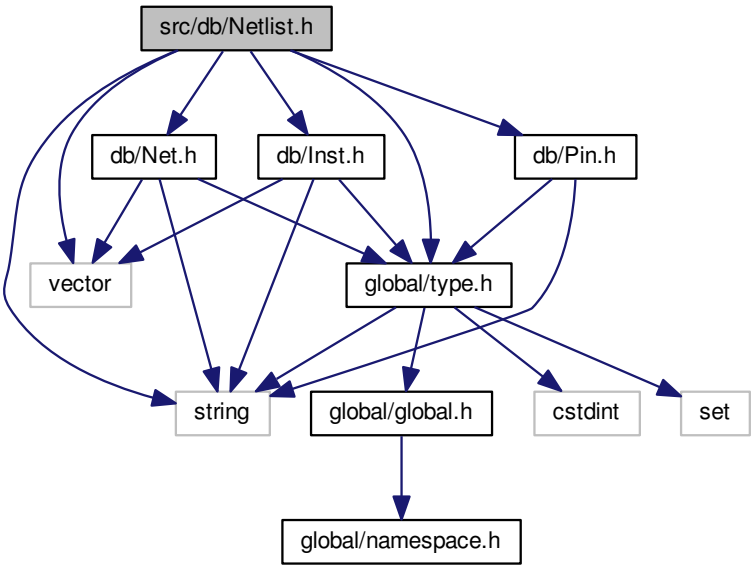
Res/Cap Pin Types.

4.9 src/db/Netlist.h File Reference

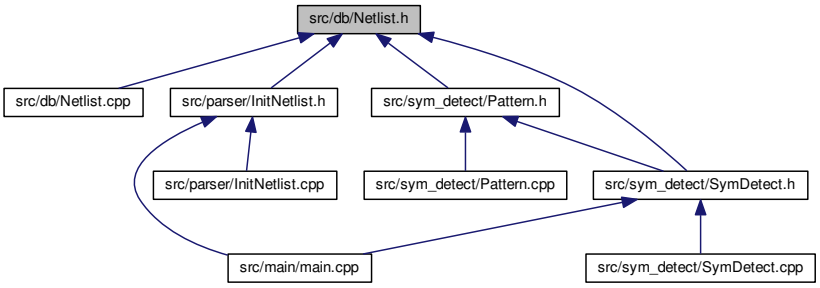
Netlist class.

```
#include <vector>
#include <string>
#include "global/type.h"
#include "db/Net.h"
#include "db/Pin.h"
#include "db/Inst.h"
```

Include dependency graph for Netlist.h:



This graph shows which files directly or indirectly include this file:



Classes

- class Netlist

  Netlist class.
- struct Netlist::InitNet

  Net for instantiation.
- struct Netlist::InitInst

  Inst for instantiation.
- struct Netlist::InitDataObj

  Instantiate Netlist class.

4.9.1 Detailed Description

Netlist class.

Author

Mingjie Liu

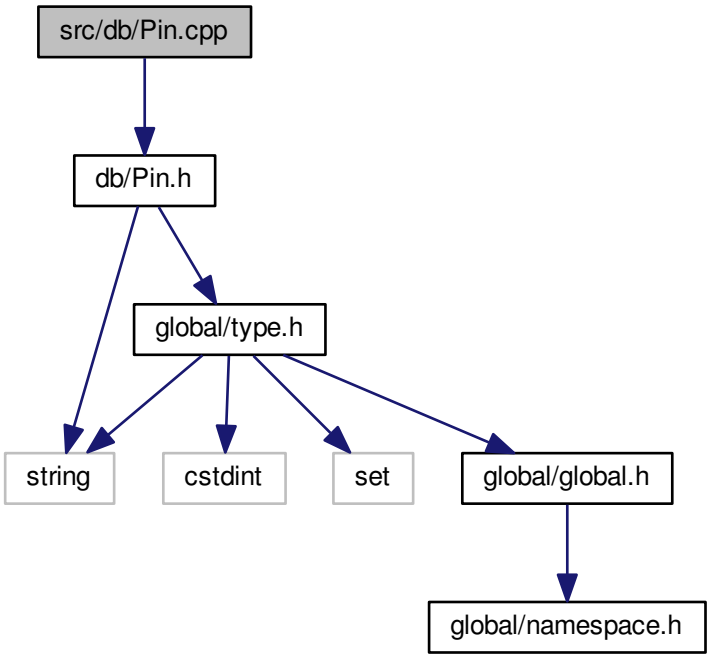
Date

11/24/2018

4.10 src/db/Pin.cpp File Reference

Net class implementation.

```
#include "db/Pin.h"
```
Include dependency graph for Pin.cpp:



4.10.1 Detailed Description

Net class implementation.

Author

Mingjie Liu

Date

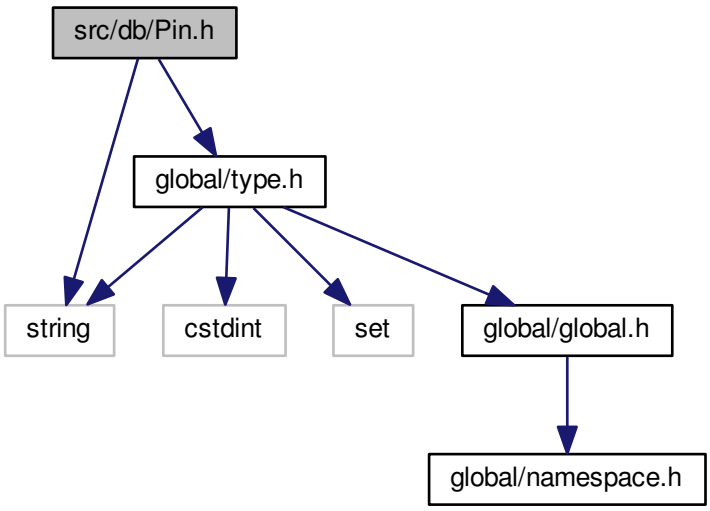
11/24/2018

4.11 src/db/Pin.h File Reference

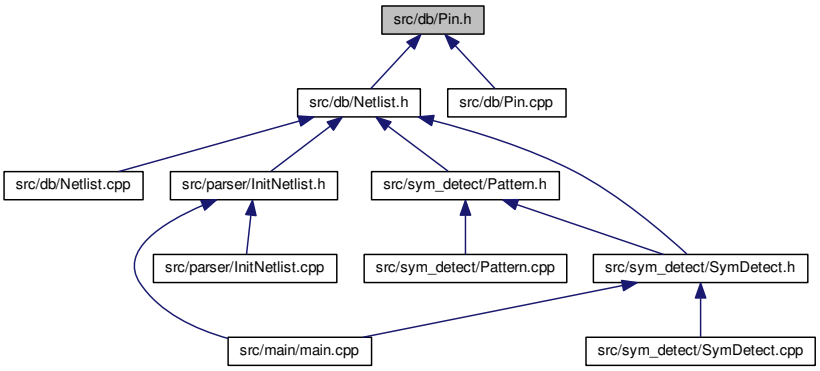
Pin class.

```
#include <string>
#include "global/type.h"
```

Include dependency graph for Pin.h:



This graph shows which files directly or indirectly include this file:



Classes

- class Pin

  Pin class.

4.11.1 Detailed Description

Pin class.

Author

Mingjie Liu

Date

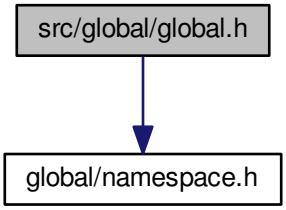
11/24/2018

4.12 src/global/global.h File Reference

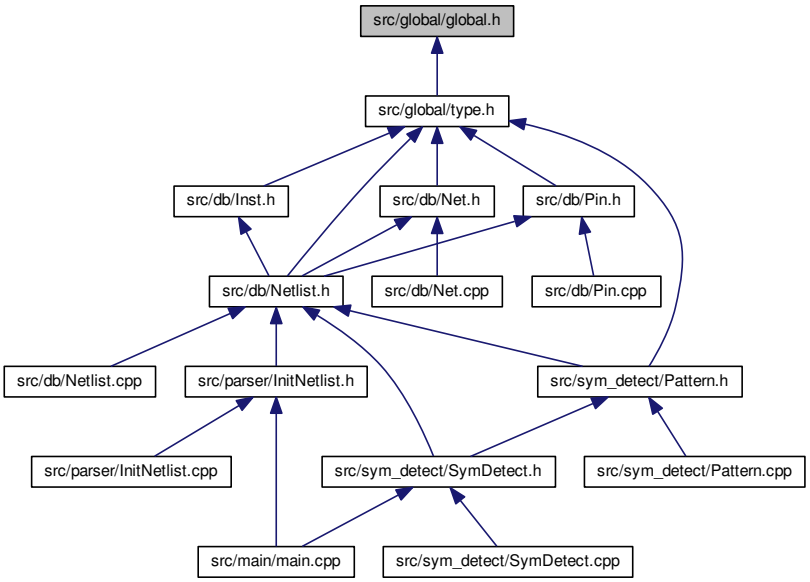
Global header file.

```
#include "global/namespace.h"
```

Include dependency graph for global.h:



This graph shows which files directly or indirectly include this file:



4.12.1 Detailed Description

Global header file.

Author

Mingjie Liu

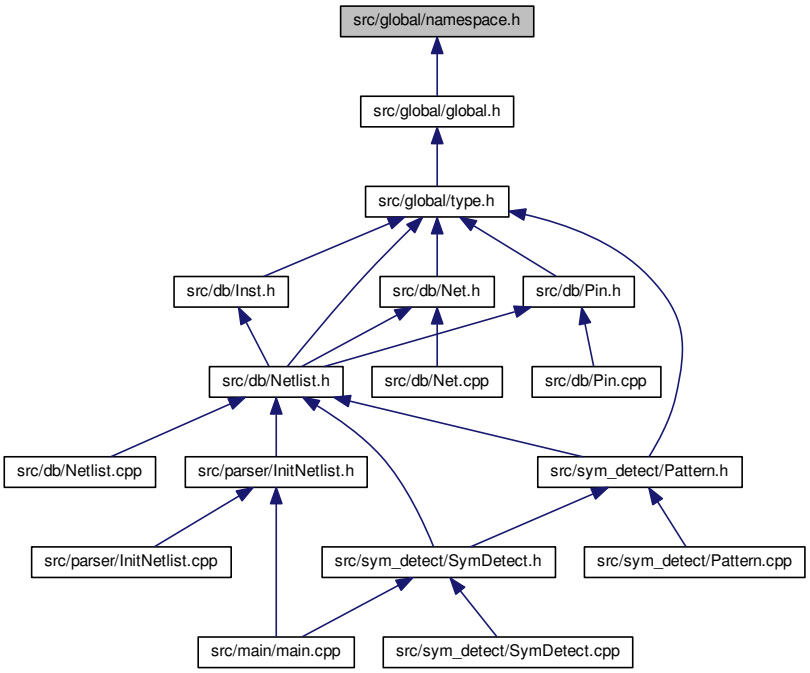
Date

11/24/2018

4.13 src/global/namespace.h File Reference

Namespace header file.

This graph shows which files directly or indirectly include this file:



Macros

- #define PROJECT_NAMESPACE SFA
- #define PROJECT_NAMESPACE_BEGIN namespace PROJECT_NAMESPACE {
- #define PROJECT_NAMESPACE_END }

4.13.1 Detailed Description

Namespace header file.

Author

Mingjie Liu

Date

11/24/2018

4.13.2 Macro Definition Documentation

4.13.2.1 PROJECT_NAMESPACE

```
#define PROJECT_NAMESPACE SFA
```

4.13.2.2 PROJECT_NAMESPACE_BEGIN

```
#define PROJECT_NAMESPACE_BEGIN namespace PROJECT_NAMESPACE {
```

4.13.2.3 PROJECT_NAMESPACE_END

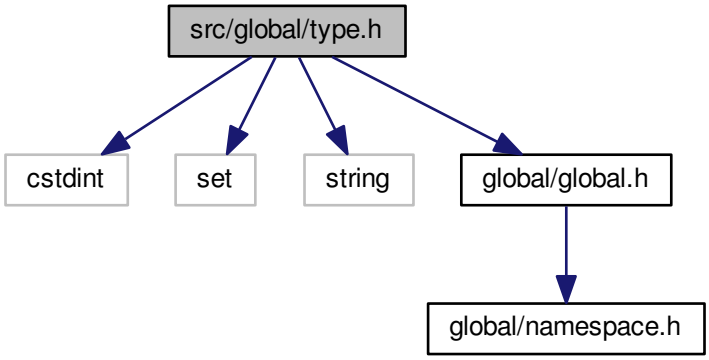
```
#define PROJECT_NAMESPACE_END }
```

4.14 src/global/type.h File Reference

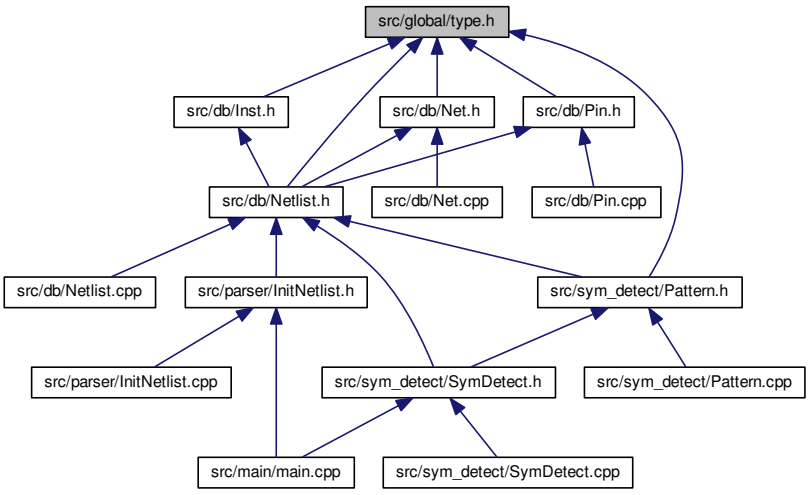
Type header file.

```
#include <cstdint>
#include <set>
#include <string>
#include "global/global.h"
```

Include dependency graph for type.h:



This graph shows which files directly or indirectly include this file:



Classes

- struct MosPair

  A pair of id for Inst.

Typedefs

- using IndexType = std::uint32_t
- using IntType = std::int32_t
- using RealType = double
- using Byte = std::uint8_t

Enumerations

- enum InstType : Byte {
  InstType::RES, InstType::PMOS, InstType::NMOS, InstType::CAP,
  InstType::OTHER }

  Type of Inst.
- enum NetType : Byte { NetType::POWER, NetType::GROUND, NetType::SIGNAL }

  Type of Net.
- enum PinType : Byte {
  PinType::SOURCE, PinType::DRAIN, PinType::GATE, PinType::BULK,
  PinType::THIS, PinType::THAT, PinType::OTHER }

  Type of Pin.
- enum MosType : Byte { MosType::DIFF, MosType::DIODE, MosType::CAP, MosType::DUMMY }

  Connection type of Mosfet.
- enum MosPattern : Byte {
  MosPattern::DIFF_SOURCE, MosPattern::DIFF_CASCODE, MosPattern::CASCODE, MosPattern::LOAD,
  MosPattern::CROSS_CASCODE, MosPattern::CROSS_LOAD, MosPattern::INVALID }

  Pattern for pair of Mosfet.

Variables

- constexpr IndexType INDEX_TYPE_MAX = 1000000000
- constexpr IntType INT_TYPE_MAX = 1000000000
- constexpr IntType INT_TYPE_MIN = -1000000000
- constexpr RealType REAL_TYPE_MAX = 1e100
- constexpr RealType REAL_TYPE_MIN = -1e100
- constexpr RealType REAL_TYPE_TOL = 1e-6

4.14.1 Detailed Description

Type header file.

Author

Mingjie Liu

Date

11/24/2018

4.14.2 Typedef Documentation

4.14.2.1 Byte

```
using Byte = std::uint8_t
```

4.14.2.2 IndexType

```
using IndexType = std::uint32_t
```

4.14.2.3 IntType

```
using IntType = std::int32_t
```

4.14.2.4 RealType

```
using RealType = double
```

4.14.3 Enumeration Type Documentation

4.14.3.1 InstType

```
enum InstType : Byte [strong]
```

Type of Inst.

Enumerator

RES	Resistor
PMOS	PMos
NMOS	NMos
CAP	Capacitor
OTHER	Other

4.14.3.2 MosPattern

```
enum MosPattern : Byte [strong]
```

Pattern for pair of Mosfet.

See also

Pattern::pattern()

Enumerator

DIFF_SOURCE	Source connected diff pair.
DIFF_CASCODE	Cascode diff pair.
CASCODE	Gate connected cascode pair.
LOAD	Cascode pair with source connected to Power/Ground.
CROSS_CASCODE	Cross coupled cascode pair.
CROSS_LOAD	Cross coupled load.
INVALID	No pattern detected.

4.14.3.3 MosType

```
enum MosType : Byte [strong]
```

Connection type of Mosfet.

See also

Netlist::mosType().

Enumerator

DIFF	D/G/S diff
DIODE	G/D connected
CAP	G/S connected
DUMMY	D/S connected

4.14.3.4 NetType

```
enum NetType : Byte [strong]
```

Type of Net.

Enumerator

POWER	Power
GROUND	Ground
SIGNAL	Signal

4.14.3.5 PinType

```
enum PinType : Byte [strong]
```

Type of Pin.

Enumerator

SOURCE	Inst is Mosfet
DRAIN	Inst is Mosfet
GATE	Inst is Mosfet
BULK	Inst is Mosfet
THIS	Inst is Passive
THAT	Inst is Passive
OTHER	Other

4.14.4 Variable Documentation

4.14.4.1 INDEX_TYPE_MAX

```
constexpr IndexType INDEX_TYPE_MAX = 1000000000
```

4.14.4.2 INT_TYPE_MAX

```
constexpr IntType INT_TYPE_MAX = 1000000000
```

4.14.4.3 INT_TYPE_MIN

```
constexpr IntType INT_TYPE_MIN = -1000000000
```

4.14.4.4 REAL_TYPE_MAX

```
constexpr RealType REAL_TYPE_MAX = 1e100
```

4.14.4.5 REAL_TYPE_MIN

```
constexpr RealType REAL_TYPE_MIN = -1e100
```

4.14.4.6 REAL_TYPE_TOL

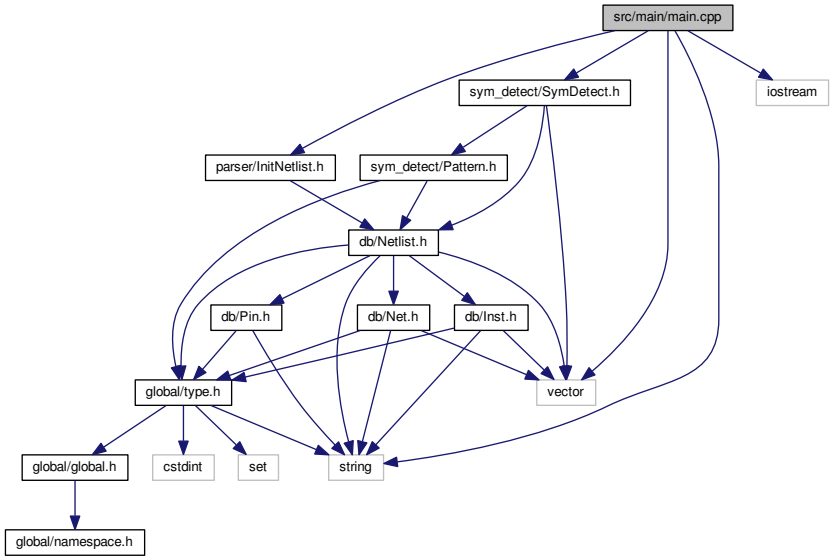
```
constexpr RealType REAL_TYPE_TOL = 1e-6
```

4.15 src/main/main.cpp File Reference

main.cpp

```
#include <string>
#include <iostream>
#include <vector>
#include "parser/InitNetlist.h"
#include "sym_detect/SymDetect.h"
```

Include dependency graph for main.cpp:



Macros

- #define __SFA_TEST__

Functions

- int main (int argc, char *argv[])

4.15.1 Detailed Description

main.cpp

Author

Mingjie LIu

Date

11/25/2018

Takes 1 argument input. Parse the file into Netlist. Detect hierarchy symmetry groups and print to command line. Input file should be of certain format. See parser/InitNetlist.h for details.

4.15.2 Macro Definition Documentation

4.15.2.1 __SFA_TEST__

```
#define __SFA_TEST__
```

4.15.3 Function Documentation

4.15.3.1 main()

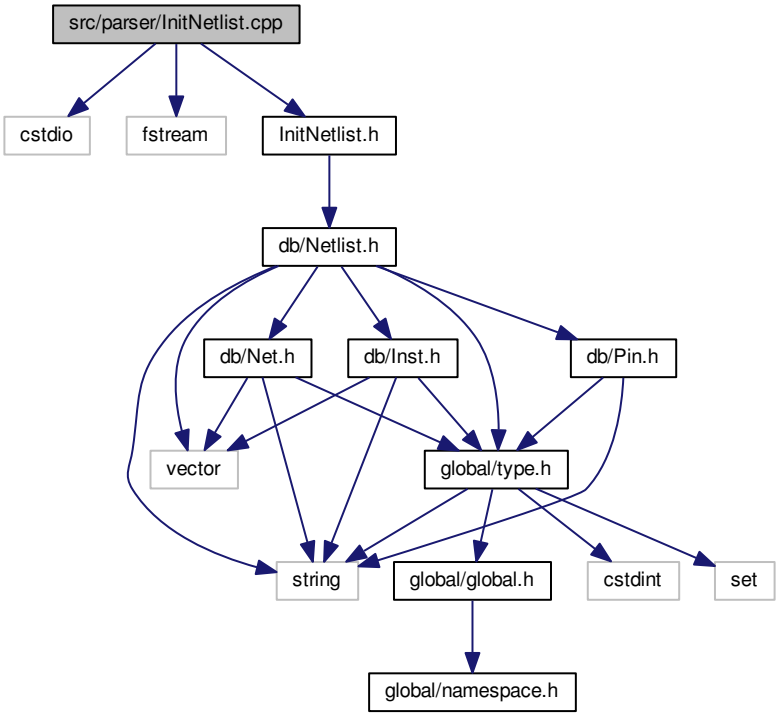
```
int main (
            int argc,
            char * argv[] )
```

4.16 src/parser/InitNetlist.cpp File Reference

Parser implementation.

```
#include <cstdio>
#include <fstream>
#include "InitNetlist.h"
```

Include dependency graph for InitNetlist.cpp:



4.16.1 Detailed Description

Parser implementation.

Author

Mingjie Liu

Date

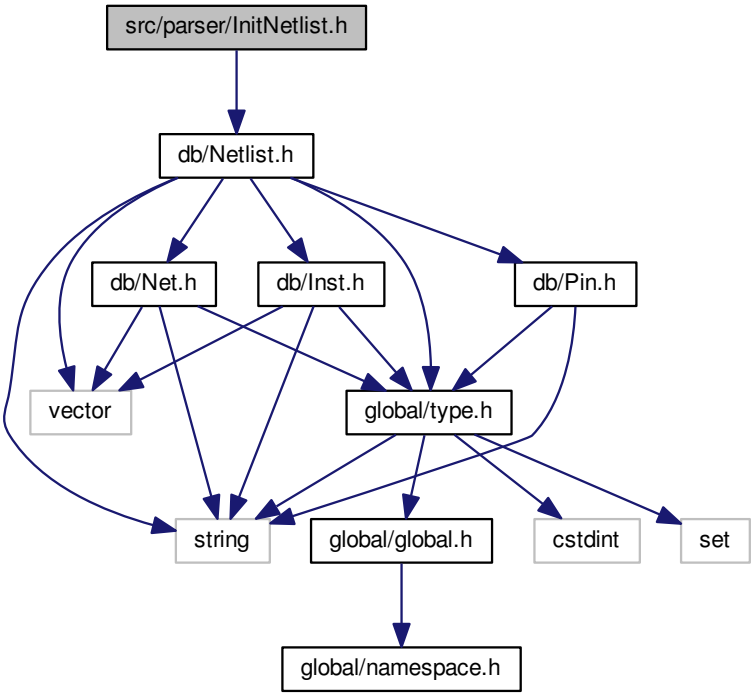
11/24/2018

4.17 src/parser/InitNetlist.h File Reference

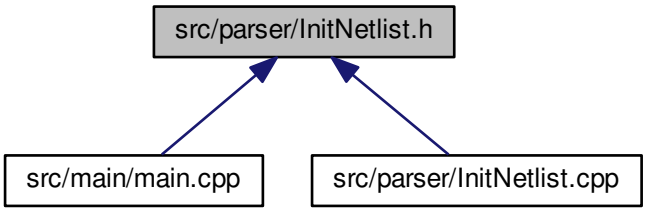
Parser to initialize netlist.

```
#include "db/Netlist.h"
```

Include dependency graph for InitNetlist.h:



This graph shows which files directly or indirectly include this file:



Classes

- class InitNetlist

  InitNetlist class.

4.17.1 Detailed Description

Parser to initialize netlist.

Author

Mingjie Liu

Date

11/24/2018

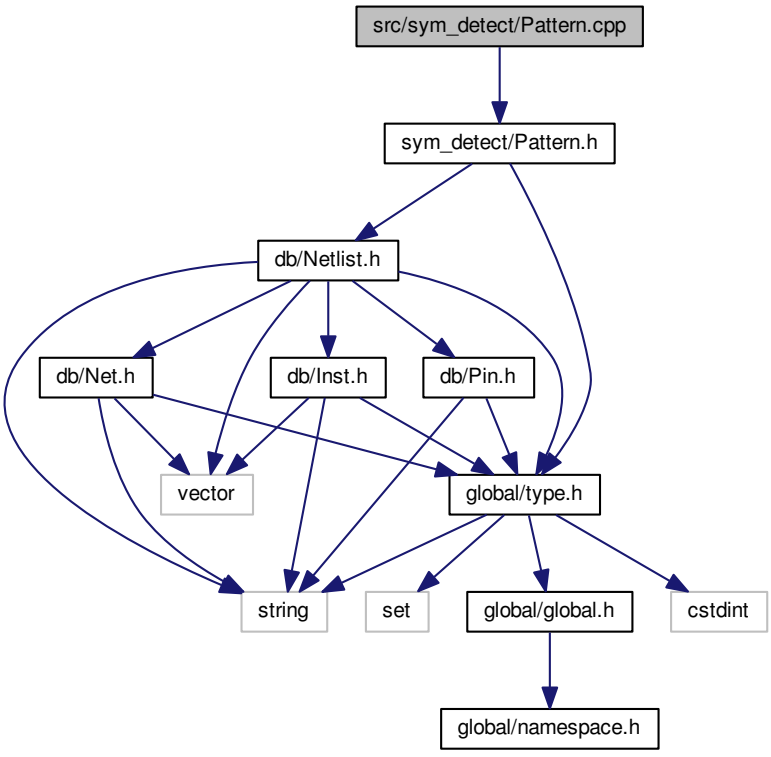
Input file should follow same format generated through scripts/create_init_obj.py. The python scripts take standardized hspice/spectre netlist files as inputs. Sample input files for c++ are under benchmarks.

4.18 src/sym_detect/Pattern.cpp File Reference

Pattern definitions.

```
#include "sym_detect/Pattern.h"
```

Include dependency graph for Pattern.cpp:



4.18.1 Detailed Description

Pattern definitions.

Author

Mingjie Liu

Date

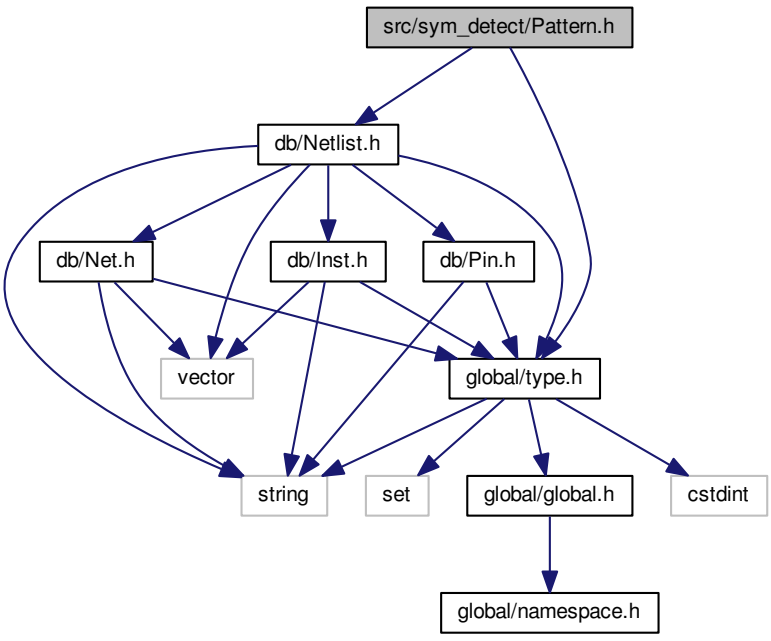
11/24/2018

4.19 src/sym_detect/Pattern.h File Reference

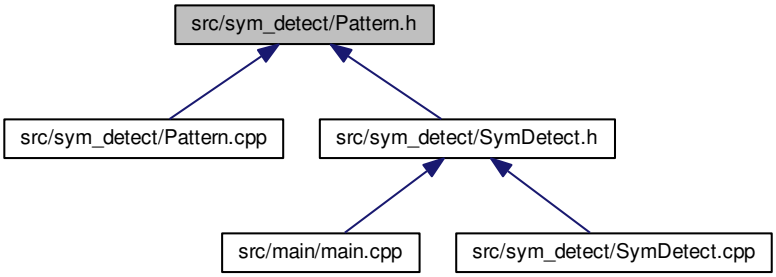
Mosfet pair patterns.

```
#include "db/Netlist.h"
#include "global/type.h"
```

Include dependency graph for Pattern.h:



This graph shows which files directly or indirectly include this file:



Classes

- class Pattern

  Pattern class.

4.19.1 Detailed Description

Mosfet pair patterns.

Author

Mingjie Liu

Date

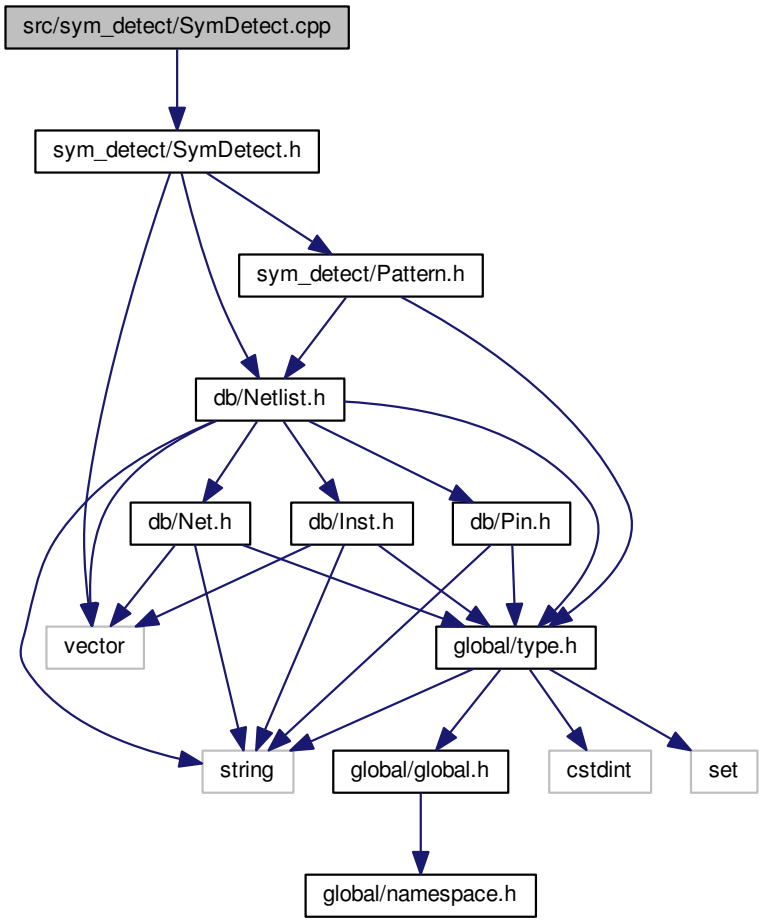
11/24/2018

4.20 src/sym_detect/SymDetect.cpp File Reference

Detect symmetric patterns.

```
#include "sym_detect/SymDetect.h"
```

Include dependency graph for SymDetect.cpp:



4.20.1 Detailed Description

Detect symmetric patterns.

Author

Mingjie Llu

Date

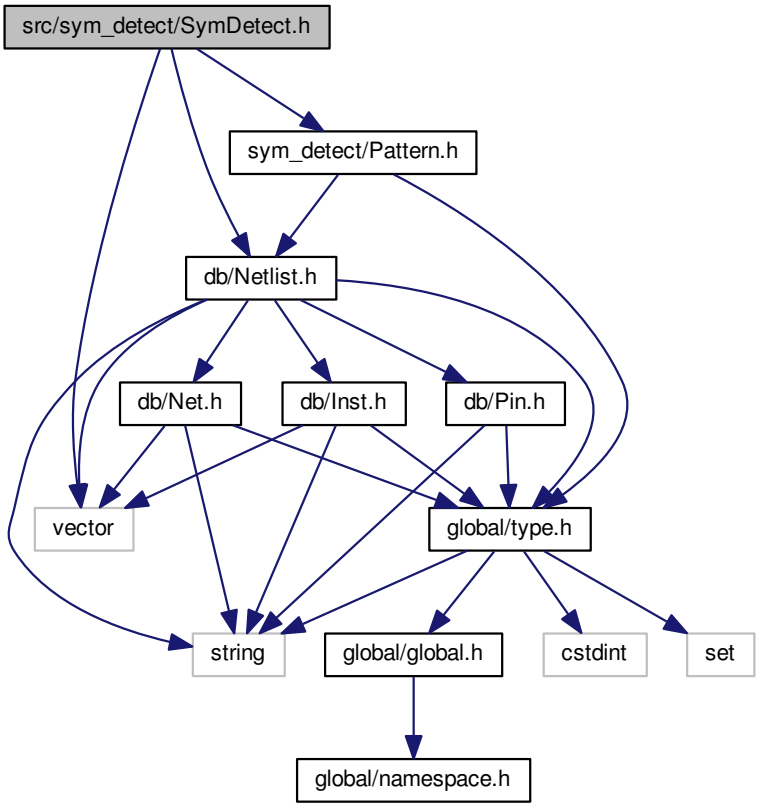
11/24/2018

4.21 src/sym_detect/SymDetect.h File Reference

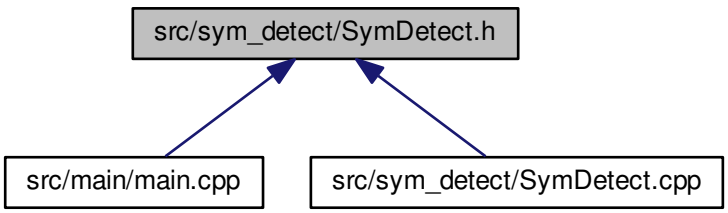
Detect symmetric patterns.

```
#include "db/Netlist.h"
#include "sym_detect/Pattern.h"
#include <vector>
```

Include dependency graph for SymDetect.h:



This graph shows which files directly or indirectly include this file:



Classes

- class SymDetect

  SymDetect class.
- struct SymDetect::srchObj

  Private object to assist DFS.

4.21.1 Detailed Description

Detect symmetric patterns.

Author

Mingjie Liu

Date

11/24/2018

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