VAGEN: verilogA generator written in python

Generated by Doxygen 1.9.1

Chapter 1

VAGEN - VerilogA generator

1.1 Description

vagen is a verilogA generator that can be used for transient verification and modeling of complex analog IPs. It provides a wide range of basic models with voltage sources, current sources, digital interfaces, clocks, switches, and source measure units that you can use to build your model upon.

1.2 License

Author

Rodrigo Pedroso Mendes

Version

V1.0

Date

14/02/23 13:37:31

Chapter 2

Namespace Index

2.1 Namespace List

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

Chapter 3

Hierarchical Index

3.1 Class Hierarchy

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

Chapter 4

Class Index

4.1 Class List

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

Chapter 5

File Index

5.1 File List

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

Chapter 6

Namespace Documentation

6.1 vagen Namespace Reference

VerilogA generator.

6.1.1 Detailed Description

VerilogA generator.

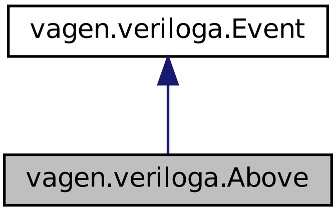
Chapter 7

Class Documentation

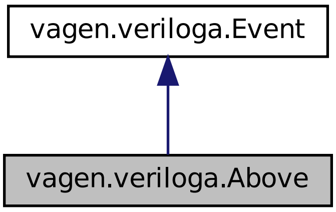
7.1 vagen.veriloga.Above Class Reference

Above Class.

Inheritance diagram for vagen.veriloga.Above:



Collaboration diagram for vagen.veriloga.Above:



Public Member Functions

- def __init__ (self, signal, threshold, ∗pars)

    Constructor.

Additional Inherited Members

7.1.1 Detailed Description

Above Class.

7.1.2 Constructor & Destructor Documentation

7.1.2.1 __init__()

```
def vagen.veriloga.Above.__init__ (
                self,
                signal,
                threshold,
               ∗ pars )
```

Constructor.

Parameters

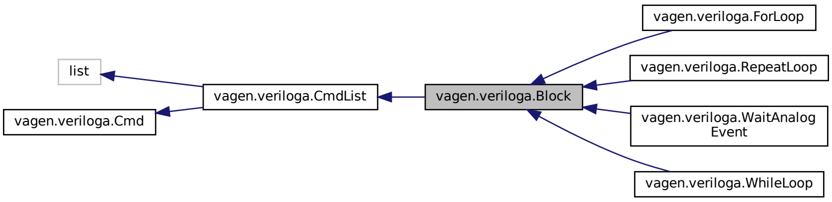
self	object pointer
signal	Real class or build-in real representing the signal
threshold	Real class or build-in real representing the threshold that must be crossed
∗pars	optional Real or build-in real parameters timeTol and expTol in this order

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

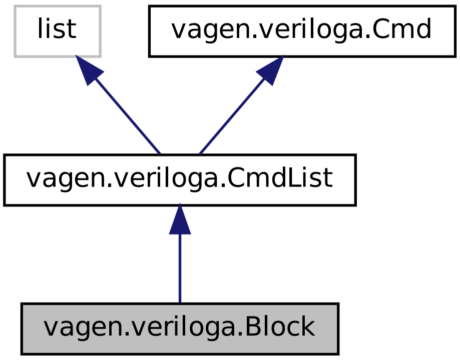
- veriloga.py

7.2 vagen.veriloga.Block Class Reference

Command Block Class.
Inheritance diagram for vagen.veriloga.Block:



Collaboration diagram for vagen.veriloga.Block:



Public Member Functions

- def __init__ (self, header, ∗cmds)

  Constructor.
- def getHeader (self)

  Return the header of a block command.
- def getVA (self, padding)

  Return the VA verilog command.

Public Attributes

- **header**

7.2.1 Detailed Description

Command Block Class.

7.2.2 Constructor & Destructor Documentation

7.2.2.1 __init__()

```
def vagen.veriloga.Block.__init__ (
              self,
              header,
             ∗ cmds )
```

Constructor.

Parameters

self	object pointer
header	header of the command block
∗*cmds*	variable number of Cmd or CmdList to be added

Reimplemented in vagen.veriloga.RepeatLoop, vagen.veriloga.WaitAnalogEvent, and vagen.veriloga.WhileLoop.

7.2.3 Member Function Documentation

7.2.3.1 getHeader()

```
def vagen.veriloga.Block.getHeader (
              self )
```

Return the header of a block command.

Parameters

self	object pointer

Returns

header o the block

7.2.3.2 getVA()

```
def vagen.veriloga.Block.getVA (
              self,
              padding )
```

Return the VA verilog command.

Parameters

self	object pointer
padding	number of tabs by which the text will be right shifted

Returns

verilog command

Reimplemented from vagen.veriloga.CmdList.

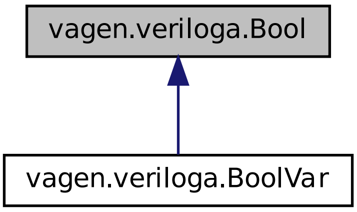
The documentation for this class was generated from the following file:

- veriloga.py

7.3 vagen.veriloga.Bool Class Reference

Class of Bool operators.

Inheritance diagram for vagen.veriloga.Bool:



Public Member Functions

- def __init__ (self, value)

  Constructor.
- def getValue (self)

  Return the operator value.
- def __and__ (self, other)

  And logic override.
- def __rand__ (self, other)

  Reverse and logic override.
- def __or__ (self, other)

  Or logic override.
- def __ror__ (self, other)

  Reverse or logic override.
- def __xor__ (self, other)

  Xor logic override.
- def __rxor__ (self, other)

  Reverse xor logic override.
- def __invert__ (self)

  Inversion override.
- def __str__ (self)

  str override
- def __eq__ (self, other)

  Equal override.
- def __ne__ (self, other)

  Not equal override.

Public Attributes

- **value**

7.3.1 Detailed Description

Class of Bool operators.

7.3.2 Constructor & Destructor Documentation

7.3.2.1 __init__()

```
def vagen.veriloga.Bool.__init__ (
                self,
                value )
```

Constructor.

Parameters

Self	The object pointer.
Value	String representing a Real expression, an Integer, a Bool, or a value that can be converted to Bool.

Reimplemented in vagen.veriloga.BoolVar.

7.3.3 Member Function Documentation

7.3.3.1 __and__()

```
def vagen.veriloga.Bool.__and__ (
              self,
              other )
```

And logic override.

Parameters

Self	First operand object pointer.
Other	Second operand.

Returns

Result of the and operation.

7.3.3.2 __eq__()

```
def vagen.veriloga.Bool.__eq__ (
              self,
              other )
```

Equal override.

Parameters

self	Left operand object pointer.
other	Right operand.

Returns

expression representing the comparison.

7.3.3.3 __invert__()

```
def vagen.veriloga.Bool.__invert__ (
              self )
```

Inversion override.

Parameters

Self	Object pointer.

Returns

Expression representing inversion.

7.3.3.4 __ne__()

```
def vagen.veriloga.Bool.__ne__ (
              self,
              other )
```

Not equal override.

Parameters

self	Left operand object pointer.
other	Right operand.

Returns

expression representing the comparison.

7.3.3.5 __or__()

```
def vagen.veriloga.Bool.__or__ (
              self,
              other )
```

Or logic override.

Parameters

Self	First operand object pointer.
Other	Second operand.

Returns

Result of the or operation.

7.3.3.6 __rand__()

```
def vagen.veriloga.Bool.__rand__ (
              self,
              other )
```

Reverse and logic override.

Parameters

Self	First operand object pointer.
Other	Second operand.

Returns

Result of the and operation.

7.3.3.7 __ror__()

```
def vagen.veriloga.Bool.__ror__ (
              self,
              other )
```

Reverse or logic override.

Parameters

Self	First operand object pointer.
Other	Second operand.

Returns

Result of the or operation.

7.3.3.8 __rxor__()

```
def vagen.veriloga.Bool.__rxor__ (
              self,
              other )
```

Reverse xor logic override.

Parameters

Self	First operand object pointer.
Other	Second operand.

Returns

Result of the exclusive or operation.

7.3.3.9 __str__()

```
def vagen.veriloga.Bool.__str__ (
              self )
```

str override

Parameters

Self	Object pointer.

Returns

String representing the expression

7.3.3.10 __xor__()

```
def vagen.veriloga.Bool.__xor__ (
              self,
              other )
```

Xor logic override.

Parameters

Self	First operand object pointer.
Other	Second operand.

Returns

Result of the exclusive or operation.

7.3.3.11 getValue()

```
def vagen.veriloga.Bool.getValue (
              self )
```

Return the operator value.

Parameters

Self	The object pointer.

Returns

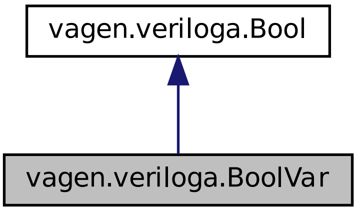
String representing the Bool expression.

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

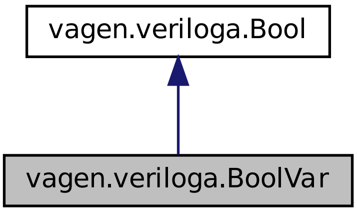
- veriloga.py

7.4 vagen.veriloga.BoolVar Class Reference

Boolean variable class.
Inheritance diagram for vagen.veriloga.BoolVar:



Collaboration diagram for vagen.veriloga.BoolVar:



Public Member Functions

- def __init__ (self, value)

  Constructor.
- def toggle (self)

  Toogle.
- def eq (self, value)

  Atribution.

Additional Inherited Members

7.4.1 Detailed Description

Boolean variable class.

7.4.2 Constructor & Destructor Documentation

7.4.2.1 __init__()

```
def vagen.veriloga.BoolVar.__init__ (
              self,
              value )
```

Constructor.

Parameters

self	object pointer
value	string representing the value

Reimplemented from vagen.veriloga.Bool.

7.4.3 Member Function Documentation

7.4.3.1 eq()

```
def vagen.veriloga.BoolVar.eq (
              self,
              value )
```

Atribution.

Parameters

self	object pointer
value	A number representing the value

Returns

Return a command representing the attribution to a variable

7.4.3.2 toggle()

```
def vagen.veriloga.BoolVar.toggle (
              self )
```

Toogle.

Parameters

self	object pointer

Returns

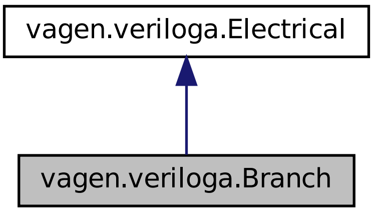
Return a command representing the state toggle

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

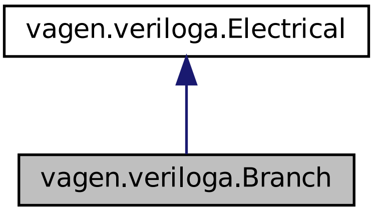
- veriloga.py

7.5 vagen.veriloga.Branch Class Reference

Branch class.
Inheritance diagram for vagen.veriloga.Branch:



Collaboration diagram for vagen.veriloga.Branch:



Public Member Functions

- def __init__ (self, node1, node2)

  constructor

Additional Inherited Members

7.5.1 Detailed Description

Branch class.

7.5.2 Constructor & Destructor Documentation

7.5.2.1 __init__()

```
def vagen.veriloga.Branch.__init__ (
              self,
              node1,
              node2 )
```

constructor

Parameters

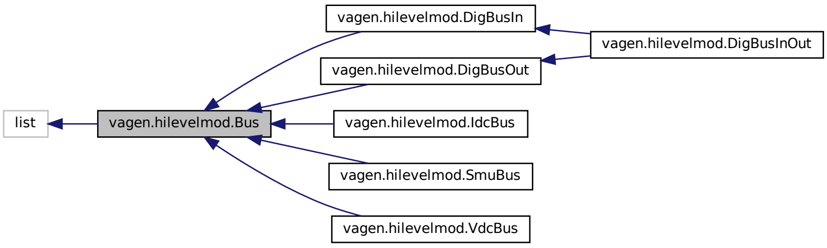
self	The object pointer.
node1	Electrical signal representing the first node
node2	Electrical signal representing the second node

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

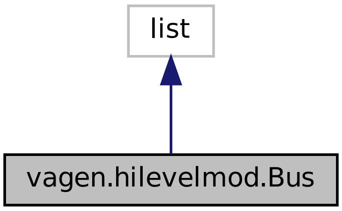
- veriloga.py

7.6 vagen.hilevelmod.Bus Class Reference

Bus class.
Inheritance diagram for vagen.hilevelmod.Bus:



Collaboration diagram for vagen.hilevelmod.Bus:



Public Member Functions

- def __init__ (self, Type, busType)

  Constructor.
- def __getitem__ (self, key)

  Slice override.
- def append (self, item)

  Append override.

Public Attributes

- **Type**
- **busType**

7.6.1 Detailed Description

Bus class.
Child of a list. It implements aditional methods to deal with read and write operations to a bus. It also overrides the slice method, so it works similar to a slice of a bus in verilog.

7.6.2 Constructor & Destructor Documentation

7.6.2.1 __init__()

```
def vagen.hilevelmod.Bus.__init__ (
              self,
              Type,
              busType )
```

Constructor.

Parameters

self	The object pointer.
Type	Type of the bus elements
busType	Type of the bus

7.6.3 Member Function Documentation

7.6.3.1 __getitem__()

```
def vagen.hilevelmod.Bus.__getitem__ (
              self,
              key )
```

Slice override.
Override the slice operator, so it will be in the format [msb:lsb:step]

Parameters

self	The object pointer.
key	Key can be an slice or index

Returns

Another bus or an element.

7.6.3.2 append()

```
def vagen.hilevelmod.Bus.append (
              self,
              item )
```

Append override.

Parameters

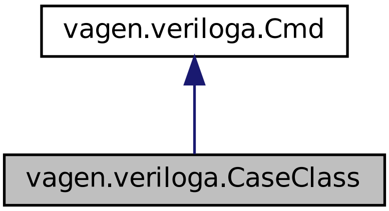
self	The object pointer.
item	Item to be appended to the bus

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

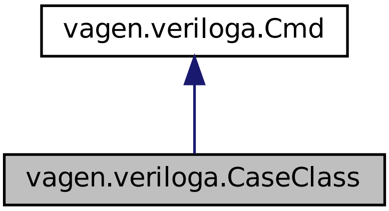
- hilevelmod.py

7.7 vagen.veriloga.CaseClass Class Reference

Condition Class.
Inheritance diagram for vagen.veriloga.CaseClass:



Collaboration diagram for vagen.veriloga.CaseClass:



Public Member Functions

- def __init__ (self, test, ∗cmds)

  Constructor.
- def getBlockList (self)

  Return the list of block of commands.
- def append (self, ∗cmds)

  Add command.
- def getVA (self, padding)

  Return the VA verilog command.

Public Attributes

- **test**
- **cmds**

7.7.1 Detailed Description

Condition Class.
It is used by the function Case in order to provide the case structure

7.7.2 Constructor & Destructor Documentation

7.7.2.1 __init__()

```
def vagen.veriloga.CaseClass.__init__ (
              self,
              test,
             * cmds )
```

Constructor.

Parameters

self	object pointer
test	Must be Integer, Bool, or Real
∗*cmds*	variable number of tupples containing a condition and a command

7.7.3 Member Function Documentation

7.7.3.1 append()

```
def vagen.veriloga.CaseClass.append (
              self,
             * cmds )
```

Add command.

Parameters

self	object pointer
∗*cmds*	variable number of tupples containing a condition and a command

7.7.3.2 getBlockList()

```
def vagen.veriloga.CaseClass.getBlockList (
              self )
```

Return the list of block of commands.

Parameters

self	object pointer

Returns

a list of block of commands

7.7.3.3 getVA()

```
def vagen.veriloga.CaseClass.getVA (
              self,
              padding )
```

Return the VA verilog command.

Parameters

self	object pointer
padding	number of tabs by which the text will be right shifted

Returns

verilog command

Reimplemented from vagen.veriloga.Cmd.

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

- veriloga.py

7.8 vagen.hilevelmod.Clock Class Reference

Clock class.

Public Member Functions

- def __init__ (self, hiLevelMod, pin)

  Constructor.
- def on (self, frequency)

  Turn the clock generator on.
- def off (self)

  Turn the clock generator off.

Public Attributes

- **clockCount**
- **isOn**
- **halfPeriod**
- **time**
- **at**

Static Public Attributes

- int **clockCount** = 1

7.8.1 Detailed Description

Clock class.

7.8.2 Constructor & Destructor Documentation

7.8.2.1 __init__()

```
def vagen.hilevelmod.Clock.__init__ (
              self,
              hiLevelMod,
              pin )
```

Constructor.

Parameters

self	The object pointer.
hiLeveMod	Hi level model in which the analog command will be added.
pin	DigIn or DigInOut

7.8.3 Member Function Documentation

7.8.3.1 off()

```
def vagen.hilevelmod.Clock.off (
              self )
```

Turn the clock generator off.

Parameters

self	The object pointer.

7.8.3.2 on()

```
def vagen.hilevelmod.Clock.on (
              self,
              frequency )
```

Turn the clock generator on.

Parameters

self	The object pointer.
frequency	frequency of the clock generator.

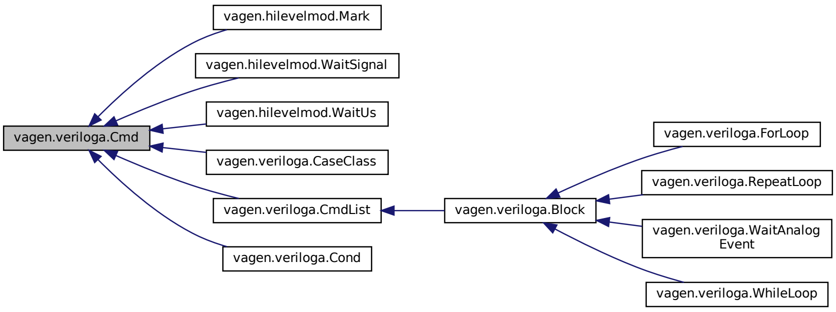
The documentation for this class was generated from the following file:

- hilevelmod.py

7.9 vagen.veriloga.Cmd Class Reference

Command class.

Inheritance diagram for vagen.veriloga.Cmd:



Public Member Functions

- def __init__ (self, cmd)

  Constructor.
- def __str__ (self)

  Return string representation.
- def getVA (self, padding)

  Return the VA verilog command.

Public Attributes

- **cmd**

7.9.1 Detailed Description

Command class.

7.9.2 Constructor & Destructor Documentation

7.9.2.1 __init__()

```
def vagen.veriloga.Cmd.__init__ (
              self,
              cmd )
```

Constructor.

Parameters

self	object pointer
cmd	command to be added to the va

Reimplemented in vagen.hilevelmod.WaitSignal, vagen.hilevelmod.WaitUs, and vagen.hilevelmod.Mark.

7.9.3 Member Function Documentation

7.9.3.1 __str__()

```
def vagen.veriloga.Cmd.__str__ (
              self )
```

Return string representation.

Parameters

self	object pointer

Returns

string representation

Reimplemented in vagen.veriloga.CmdList, vagen.hilevelmod.WaitUs, vagen.hilevelmod.WaitSignal, and vagen.hilevelmod.Mark.

7.9.3.2 getVA()

```
def vagen.veriloga.Cmd.getVA (
              self,
              padding )
```

Return the VA verilog command.

Parameters

self	object pointer
padding	padding number of tabs by which the text will be right shifted

Returns

verilog command

Reimplemented in vagen.veriloga.CaseClass, vagen.veriloga.Cond, vagen.veriloga.Block, vagen.veriloga.CmdList, vagen.hilevelmod.WaitUs, vagen.hilevelmod.WaitSignal, and vagen.hilevelmod.Mark.

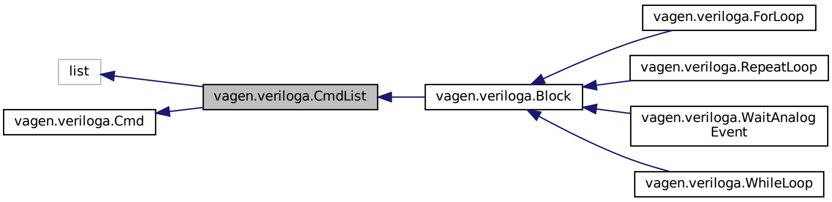
The documentation for this class was generated from the following file:

- veriloga.py

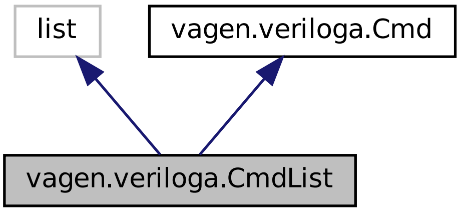
7.10 vagen.veriloga.CmdList Class Reference

Command List class.

Inheritance diagram for vagen.veriloga.CmdList:



Collaboration diagram for vagen.veriloga.CmdList:



Public Member Functions

- def __init__ (self, ∗cmds)

  Constructor.
- def __str__ (self)

  Return string representation.
- def flat (self)

  Return a flat command list Fatten.
- def append (self, ∗cmds)

  append override
- def getVA (self, padding)

  Return the VA verilog command.

Additional Inherited Members

7.10.1 Detailed Description

Command List class.

7.10.2 Constructor & Destructor Documentation

7.10.2.1 __init__()

```
def vagen.veriloga.CmdList.__init__ (
                self,
              ∗ cmds )
```

Constructor.

Parameters

self	object pointer
cmds	commands to be added to the va

7.10.3 Member Function Documentation

7.10.3.1 __str__()

```
def vagen.veriloga.CmdList.__str__ (
              self )
```

Return string representation.

Parameters

self	object pointer

Returns

string representation

Reimplemented from vagen.veriloga.Cmd.

7.10.3.2 append()

```
def vagen.veriloga.CmdList.append (
              self,
             * cmds )
```

append override

Parameters

self	object pointer

7.10.3.3 flat()

```
def vagen.veriloga.CmdList.flat (
              self )
```

Return a flat command list Fatten.

Parameters

self	object pointer

Returns

flat command list. Only imediate CmdLists will be open.

7.10.3.4 getVA()

```
def vagen.veriloga.CmdList.getVA (
              self,
              padding )
```

Return the VA verilog command.

Parameters

self	object pointer
padding	number of tabs by which the text will be right shifted

Returns

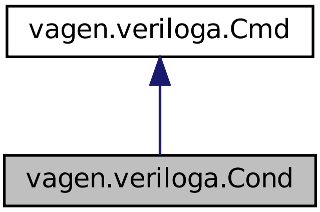
verilog command

Reimplemented from vagen.veriloga.Cmd.
Reimplemented in vagen.veriloga.Block.
The documentation for this class was generated from the following file:

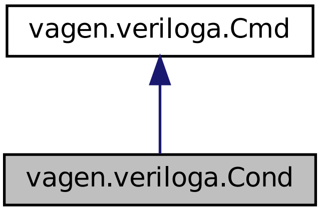
- veriloga.py

7.11 vagen.veriloga.Cond Class Reference

Condition Class.
Inheritance diagram for vagen.veriloga.Cond:



Collaboration diagram for vagen.veriloga.Cond:



Public Member Functions

- def __init__ (self, cond, ∗cmds)

  Constructor.
- def getCond (self)

  Return the Cond condition.
- def getBlock (self, state=True)

  Return the block of commands for a given state.
- def append (self, state, ∗cmds)

  Add command.
- def Else (self, ∗cmds)

List of commands to be run when condition is false.

- def getVA (self, padding)

  Return the VA verilog command.

Public Attributes

- **cond**
- **cmdDict**

7.11.1 Detailed Description

Condition Class.
It is used inside the function If in order to provide an If and else structure

7.11.2 Constructor & Destructor Documentation

7.11.2.1 __init__()

```
def vagen.veriloga.Cond.__init__ (
              self,
              cond,
            ∗ cmds )
```

Constructor.

Parameters

self	object pointer
cond	condition that must be satisfied in order to run the sequence of commands in the block
∗*cmds*	variable number of Cmd or CmdList to be added

7.11.3 Member Function Documentation

7.11.3.1 append()

```
def vagen.veriloga.Cond.append (
              self,
              state,
            ∗ cmds )
```

Add command.

Parameters

self	object pointer
state	true or false
∗*cmds*	variable number of Cmd or CmdList to be added

7.11.3.2 Else()

```
def vagen.veriloga.Cond.Else (
              self,
            ∗ cmds )
```

List of commands to be run when condition is false.

Parameters

self	object pointer
∗*cmds*	variable number of Cmd or CmdList to be added

Returns

pointer to self

7.11.3.3 getBlock()

```
def vagen.veriloga.Cond.getBlock (
              self,
              state = True )
```

Return the block of commands for a given state.

Parameters

self	object pointer
state	true or false

Returns

block of commands for True and False conditions

7.11.3.4 getCond()

```
def vagen.veriloga.Cond.getCond (
              self )
```

Return the Cond condition.

Parameters

self	object pointer

Returns

Bool class representing the condition that must be satisfied in order run the sequence of commands in the block

7.11.3.5 getVA()

```
def vagen.veriloga.Cond.getVA (
              self,
              padding )
```

Return the VA verilog command.

Parameters

self	object pointer
padding	number of tabs by which the text will be right shifted

Returns

verilog command

Reimplemented from vagen.veriloga.Cmd.

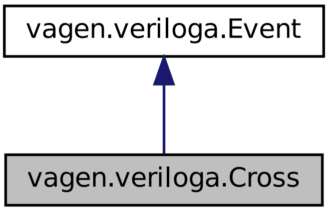
The documentation for this class was generated from the following file:

- veriloga.py

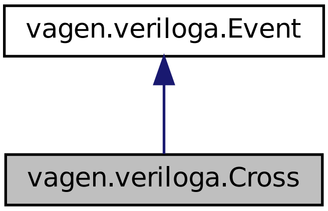
7.12 vagen.veriloga.Cross Class Reference

Cross Class.

Inheritance diagram for vagen.veriloga.Cross:



Collaboration diagram for vagen.veriloga.Cross:



Public Member Functions

- def __init__ (self, signal, threshold, edge, ∗pars)

  Constructor.

Additional Inherited Members

7.12.1 Detailed Description

Cross Class.

7.12.2 Constructor & Destructor Documentation

7.12.2.1 __init__()

```
def vagen.veriloga.Cross.__init__ (
              self,
              signal,
              threshold,
              edge,
             * pars )
```

Constructor.

Parameters

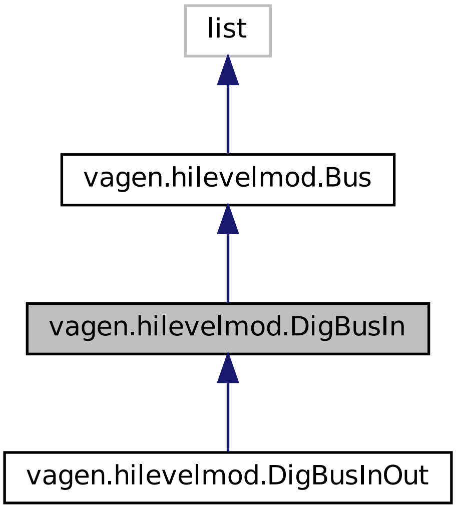
self	object pointer
signal	Real class or build-in real representing the signal
threshold	Real class or build-in real representing the threshold that must be crossed
edge	It can be rising, falling or both
∗*pars*	optional Real or build-in real parameters timeTol and expTol in this order

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

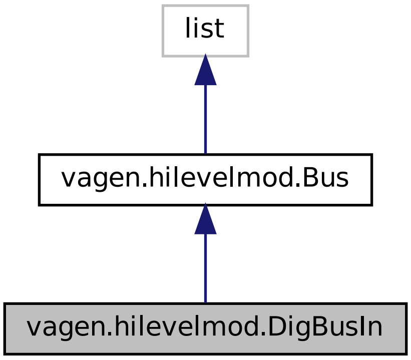
- veriloga.py

7.13 vagen.hilevelmod.DigBusIn Class Reference

DigBusIn class.
Inheritance diagram for vagen.hilevelmod.DigBusIn:



Collaboration diagram for vagen.hilevelmod.DigBusIn:



Public Member Functions

- def __init__ (self)

  Constructor.
- def read (self, signed=False)

  Read a binary from the digital input bus.

Additional Inherited Members

7.13.1 Detailed Description

DigBusIn class.
Child of a list. It implements aditional methods to deal with read and write operations to a bus. It also overrides the slice method, so it works similar to a slice of a bus in verilog

7.13.2 Constructor & Destructor Documentation

7.13.2.1 __init__()

```
def vagen.hilevelmod.DigBusIn.__init__ (
                self )
```

Constructor.

Parameters

self	The object pointer.

Reimplemented in vagen.hilevelmod.DigBusInOut.

7.13.3 Member Function Documentation

7.13.3.1 read()

```
def vagen.hilevelmod.DigBusIn.read (
              self,
              signed = False )
```

Read a binary from the digital input bus.

Parameters

self	The object pointer.
signed	Read as signed if True and unsigned otherwise.

Returns

The commands to read a digital bus as binary.

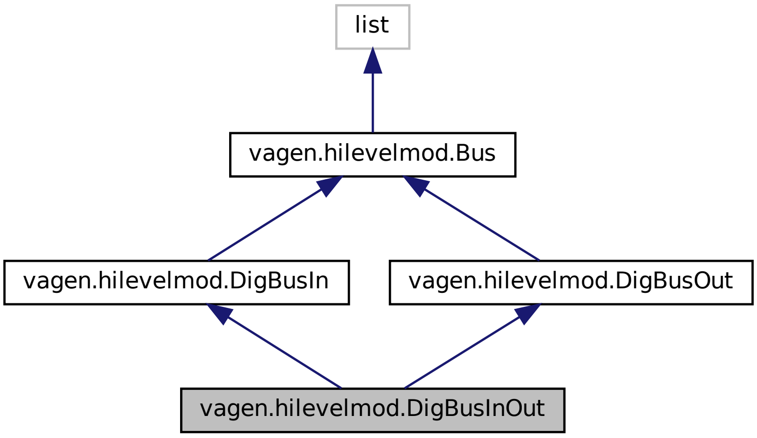
The documentation for this class was generated from the following file:

- hilevelmod.py

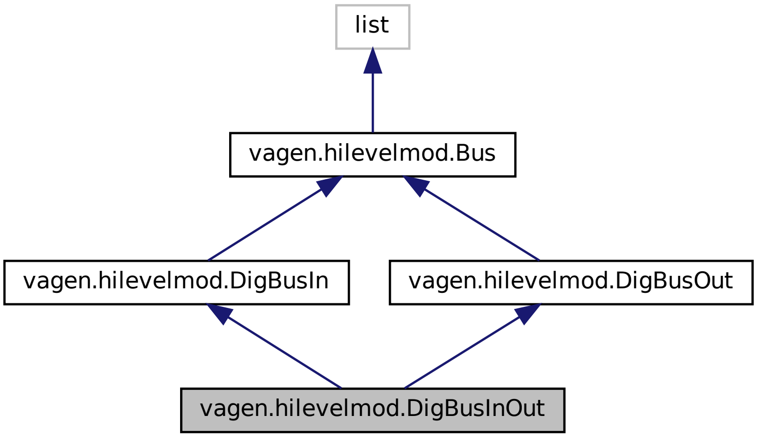
7.14 vagen.hilevelmod.DigBusInOut Class Reference

DigBusInOut class.

Inheritance diagram for vagen.hilevelmod.DigBusInOut:


list
vagen.hilevelmod.Bus
vagen.hilevelmod.DigBusIn
vagen.hilevelmod.DigBusOut
vagen.hilevelmod.DigBusInOut

Collaboration diagram for vagen.hilevelmod.DigBusInOut:


list
vagen.hilevelmod.Bus
vagen.hilevelmod.DigBusIn
vagen.hilevelmod.DigBusOut
vagen.hilevelmod.DigBusInOut

Public Member Functions

- def __init__ (self)

  Constructor.
- def hiZ (self)

  Set the pins at hiz in order to use the read function.
- def lowZ (self)

  Set the pins to low impedance in order to use the write function.

Additional Inherited Members

7.14.1 Detailed Description

DigBusInOut class.
Child of a list. It implements aditional methods to deal with read and write operations to a bus. It also overrides the slice method, so it works similar to a slice of a bus in verilog

7.14.2 Constructor & Destructor Documentation

7.14.2.1 __init__()

```
def vagen.hilevelmod.DigBusInOut.__init__ (
              self )
```

Constructor.

Parameters

self	The object pointer.

Reimplemented from vagen.hilevelmod.DigBusOut.

7.14.3 Member Function Documentation

7.14.3.1 hiZ()

```
def vagen.hilevelmod.DigBusInOut.hiZ (
              self )
```

Set the pins at hiz in order to use the read function.

Parameters

self	The object pointer.

Returns

The commands to change the inOut pin to hiZ (input).

7.14.3.2 lowZ()

```
def vagen.hilevelmod.DigBusInOut.lowZ (
              self )
```

Set the pins to low impedance in order to use the write function.

Parameters

self	The object pointer.

Returns

The commands to change the inOut pin to lowZ (output).

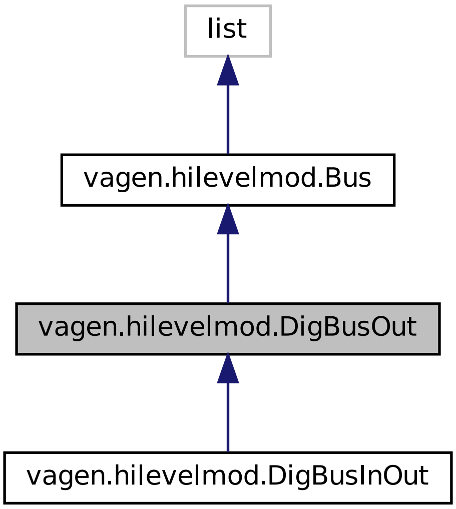
The documentation for this class was generated from the following file:

- hilevelmod.py

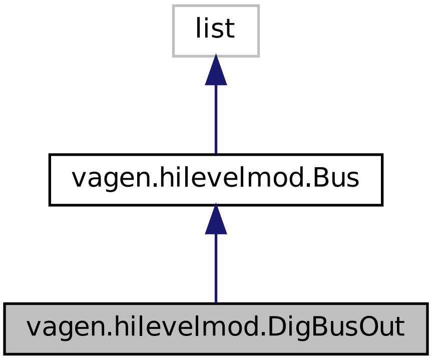
7.15 vagen.hilevelmod.DigBusOut Class Reference

DigBusOut class.

Inheritance diagram for vagen.hilevelmod.DigBusOut:



Collaboration diagram for vagen.hilevelmod.DigBusOut:



Public Member Functions

- def __init__ (self)

  Constructor.
- def setDelay (self, delay)

  Set the delay times for all digital output pin.
- def setRiseFall (self, rise, fall)

  Set the rise and the fall times of all digital output pin.
- def write (self, value)

  Write a binary to the digital output bus.

Additional Inherited Members

7.15.1 Detailed Description

DigBusOut class.
Child of a list. It implements aditional methods to deal with read and write operations to a bus. It also overrides the slice method, so it works similar to a slice of a bus in verilog

7.15.2 Constructor & Destructor Documentation

7.15.2.1 __init__()

```
def vagen.hilevelmod.DigBusOut.__init__ (
              self )
```

Constructor.

Parameters

self	The object pointer.

Reimplemented in vagen.hilevelmod.DigBusInOut.

7.15.3 Member Function Documentation

7.15.3.1 setDelay()

```
def vagen.hilevelmod.DigBusOut.setDelay (
              self,
              delay )
```

Set the delay times for all digital output pin.

Parameters

self	The object pointer.
delay	Real expression holding the delay time.

Returns

The commands to change the delay times.

7.15.3.2 setRiseFall()

```
def vagen.hilevelmod.DigBusOut.setRiseFall (
              self,
              rise,
              fall )
```

Set the rise and the fall times of all digital output pin.

Parameters

self	The object pointer.
Rise	Real expression holding the rise time.
Fall	Real expression holding the fall time.

Returns

The commands to change the rise and fall times.

7.15.3.3 write()

```
def vagen.hilevelmod.DigBusOut.write (
              self,
              value )
```

Write a binary to the digital output bus.

Parameters

self	The object pointer.
value	Integer expression representing the value to be written.

Returns

The commands to write to a digital bus.

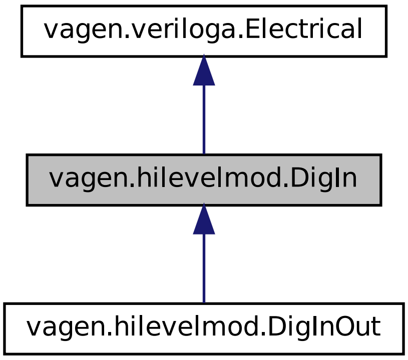
The documentation for this class was generated from the following file:

- hilevelmod.py

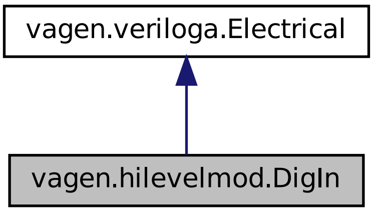
7.16 vagen.hilevelmod.DigIn Class Reference

DigIn class.

Inheritance diagram for vagen.hilevelmod.DigIn:



Collaboration diagram for vagen.hilevelmod.DigIn:



Public Member Functions

- def __init__ (self, hiLevelMod, name, state, domain, inCap, serRes, gnd, delay, rise, fall)

  Constructor.
- def read (self)

  Read a state from the digital input.

Public Attributes

- **domain**
- **inCap**

7.16.1 Detailed Description

DigIn class.
Child of Electrical implementing aditional features in order to work as a digital input pin

7.16.2 Constructor & Destructor Documentation

7.16.2.1 __init__()

```
def vagen.hilevelmod.DigIn.__init__ (
              self,
              hiLevelMod,
              name,
              state,
              domain,
              inCap,
              serRes,
              gnd,
              delay,
              rise,
              fall )
```

Constructor.

Parameters

self	The object pointer.
hiLeveMod	Hi level model in which the analog command will be added.

Parameters

name	Name of the electrical pin.
state	Dummy parameter for consistency.
domain	Electrical pin. The voltage across the domain will be equal the voltage in the digial pins when the logical state is 1.
inCap	Real expression holding the value of the input capacitance. This value will be set at the beggining of the simulation and can't be changed afterwards.
serRes	Dummy parameter for consistency.
gnd	Electrical representing the ground reference.
delay	Dummy parameter for consistency.
rise	Dummy parameter for consistency.
fall	Dummy parameter for consistency.

Reimplemented in vagen.hilevelmod.DigInOut.

7.16.3 Member Function Documentation

7.16.3.1 read()

```
def vagen.hilevelmod.DigIn.read (
              self )
```

Read a state from the digital input.

Parameters

self	The object pointer.

Returns

The commands to read the stare of a digital pin.

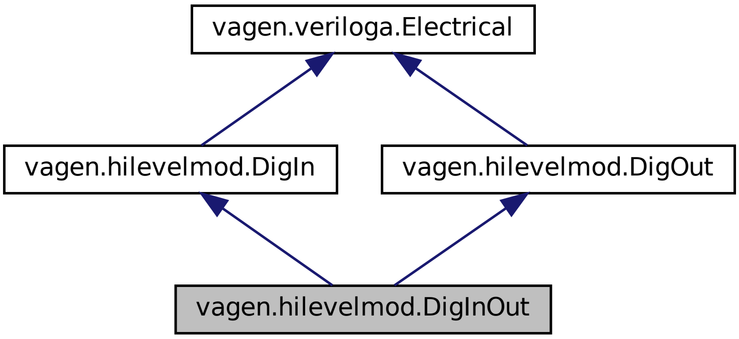
The documentation for this class was generated from the following file:

- hilevelmod.py

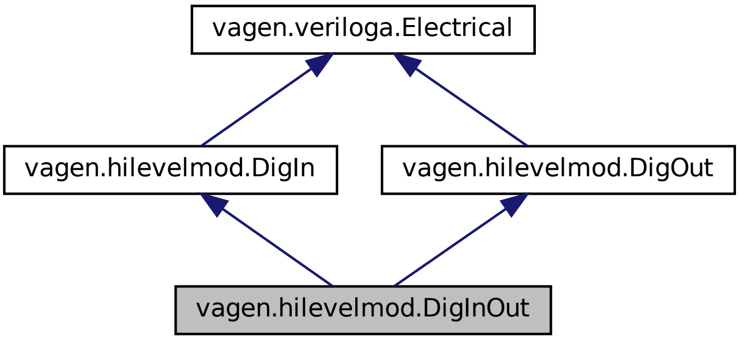
7.17 vagen.hilevelmod.DigInOut Class Reference

DigInOut class.

Inheritance diagram for vagen.hilevelmod.DigInOut:



Collaboration diagram for vagen.hilevelmod.DigInOut:



Public Member Functions

- def __init__ (self, hiLevelMod, name, state, domain, inCap, serRes, gnd, delay, rise, fall)

  Construtor.
- def hiZ (self)

  Set the pin at hiz in order to use the read function.
- def lowZ (self)

  Set the pin to low impedance in order to use the write function.

Public Attributes

- **st**
- **serRes**
- **inCap**
- **res**
- **delay**

- **rise**
- **fall**
- **domain**

7.17.1 Detailed Description

DigInOut class.
Child of Electrical implementing aditional features in order to work as a digital input/output pin

7.17.2 Constructor & Destructor Documentation

7.17.2.1 __init__()

```
def vagen.hilevelmod.DigInOut.__init__ (
              self,
              hiLevelMod,
              name,
              state,
              domain,
              inCap,
              serRes,
              gnd,
              delay,
              rise,
              fall )
```

Construtor.

Parameters

self	The object pointer.
hiLeveMod	Hi level model in which the analog command will be added.
name	Name of the electrical pin.
state	Boolean expression holding the intial state of the digital pin.
domain	electrical pin. The voltage across the digial pins will be equal to the domain when the logical state is 1.
inCap	Real expression holding the value of the input capacitance. This value will be set at the beggining of the simulation and can't be changed afterwards.
serRes	Real expression holding the value of the series resistance. This value will be set at the beggining of the simulation and can't be changed afterwards.
gnd	Electrical representing the ground reference.
delay	Real expression holding the initial delay time.
rise	Real expression holding the initial rise time.
fall	Real expression holding the initial fall time.

Reimplemented from vagen.hilevelmod.DigOut.

7.17.3 Member Function Documentation

7.17.3.1 hiZ()

```
def vagen.hilevelmod.DigInOut.hiZ (
              self )
```

Set the pin at hiz in order to use the read function.

Parameters

self	The object pointer.

Returns

The commands to change the inOut pin to hiZ (input).

7.17.3.2 lowZ()

```
def vagen.hilevelmod.DigInOut.lowZ (
              self )
```

Set the pin to low impedance in order to use the write function.

Parameters

self	The object pointer.

Returns

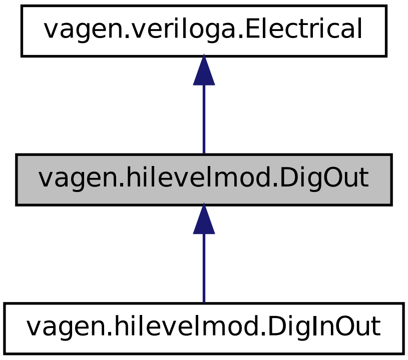
The commands to change the inOut pin to lowZ (output).

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

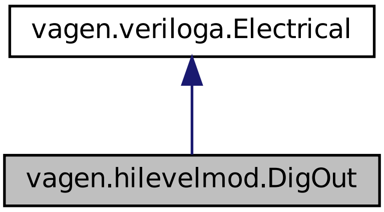
- hilevelmod.py

7.18 vagen.hilevelmod.DigOut Class Reference

DigOut class.
Inheritance diagram for vagen.hilevelmod.DigOut:



Collaboration diagram for vagen.hilevelmod.DigOut:



Public Member Functions

- def __init__ (self, hiLevelMod, name, state, domain, inCap, serRes, gnd, delay, rise, fall)

  Construtor.
- def setDelay (self, delay)

  Set the delay times of the digital output pin.
- def setRiseFall (self, rise, fall)

  Set the rise and the fall times of the digital output pin.
- def write (self, value)

  Write a state to the digital output.

Public Attributes

- **st**
- **serRes**
- **delay**
- **rise**
- **fall**

7.18.1 Detailed Description

DigOut class.
Child of Electrical implementing aditional features in order to work as a digital output pin.

7.18.2 Constructor & Destructor Documentation

7.18.2.1 __init__()

```
def vagen.hilevelmod.DigOut.__init__ (
              self,
              hiLevelMod,
              name,
              state,
              domain,
              inCap,
              serRes,
              gnd,
              delay,
                rise,
                fall )
```

Construtor.

Parameters

self	The object pointer
hiLeveMod	Hi level model in which the analog command will be added.
name	Name of the electrical pin.
state	Boolean expression holding the intial state of the digital pin.
domain	electrical pin. The voltage across the digial pins will be equal to the domain when the logical state is 1.
inCap	Dummy parameter for consistency.
serRes	Real expression holding the value of the series resistance. This value will be set at the beggining of the simulation and can't be changed afterwards.
gnd	Electrical representing the ground reference.
delay	Real expression holding the initial delay time.
rise	Real expression holding the initial rise time.
fall	Real expression holding the initial fall time.

Reimplemented in vagen.hilevelmod.DigInOut.

7.18.3 Member Function Documentation

7.18.3.1 setDelay()

```
def vagen.hilevelmod.DigOut.setDelay (
                self,
                delay )
```

Set the delay times of the digital output pin.

Parameters

self	The object pointer.
delay	Real expression holding the delay time.

Returns

The commands to change the delay.

7.18.3.2 setRiseFall()

```
def vagen.hilevelmod.DigOut.setRiseFall (
                self,
                rise,
                fall )
```

Set the rise and the fall times of the digital output pin.

Parameters

self	The object pointer.
Rise	Real expression holding the rise time.
Fall	Real expression holding the fall time.

Returns

The commands to change the rise and fall times.

7.18.3.3 write()

```
def vagen.hilevelmod.DigOut.write (
                self,
                value )
```

Write a state to the digital output.

Parameters

self	The object pointer.
value	Boolean expression representing the state to be written.

Returns

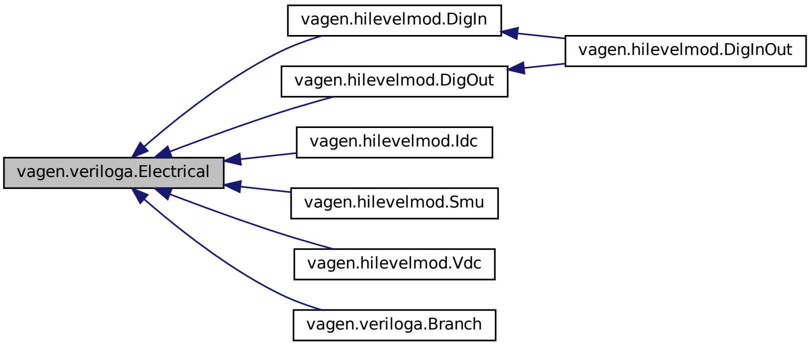
The commands to change the stare of a digital pin.

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

- hilevelmod.py

7.19 vagen.veriloga.Electrical Class Reference

Class of electrical signals.
Inheritance diagram for vagen.veriloga.Electrical:



Public Member Functions

- def __init__ (self, name)

  constructor
- def getName (self)

  Return electrical name.
- def vCont (self, value)

  Return a command representing voltage contribution.
- def iCont (self, value)

  Return a command representing current contribution.
- def vAttr (self, value)

Return a command representing voltage attribution.

- def iAttr (self, value)

  Return a command representing current attribution.
- def vInd (self, value)

  Return a command representing voltage indirect assigment (Voltage that makes value true)
- def iInd (self, value)

  Return a command representing current indirect assigment (Current that makes value true)

Public Attributes

- **name**
- **v**
- **i**

7.19.1 Detailed Description

Class of electrical signals.

7.19.2 Constructor & Destructor Documentation

7.19.2.1 __init__()

```
def vagen.veriloga.Electrical.__init__ (
              self,
              name )
```

constructor

Parameters

self	The object pointer.
name	string representing the name of the electrical signal

7.19.3 Member Function Documentation

7.19.3.1 getName()

```
def vagen.veriloga.Electrical.getName (
              self )
```

Return electrical name.

Parameters

self	The object pointer.

Returns

string representing the name of the signal

7.19.3.2 iAttr()

```
def vagen.veriloga.Electrical.iAttr (
              self,
              value )
```

Return a command representing current attribution.

Parameters

self	The object pointer.
value	Real, float or int representig the value of the attribution

Returns

a Cmd representing the current attribution

7.19.3.3 iCont()

```
def vagen.veriloga.Electrical.iCont (
              self,
              value )
```

Return a command representing current contribution.

Parameters

self	The object pointer.
value	Real, float or int representig the value of the contribution

Returns

a Cmd representing the current contribution

7.19.3.4 iInd()

```
def vagen.veriloga.Electrical.iInd (
              self,
              value )
```

Return a command representing current indirect assigment (Current that makes value true)

Parameters

self	The object pointer.
value	Bool or bool condition

Returns

a Cmd representing the current indirect assigment

7.19.3.5 vAttr()

```
def vagen.veriloga.Electrical.vAttr (
              self,
              value )
```

Return a command representing voltage attribution.

Parameters

self	The object pointer.
value	Real, float or int representig the value of the attribution

Returns

a Cmd representing the voltage attribution

7.19.3.6 vCont()

```
def vagen.veriloga.Electrical.vCont (
              self,
              value )
```

Return a command representing voltage contribution.

Parameters

self	The object pointer.
value	Real, float or int representig the value of the contribution

Returns

a Cmd representing the voltage contribution

7.19.3.7 vInd()

```
def vagen.veriloga.Electrical.vInd (
              self,
              value )
```

Return a command representing voltage indirect assigment (Voltage that makes value true)

Parameters

self	The object pointer.
value	Bool or bool condition

Returns

a Cmd representing the voltage indirect assigment

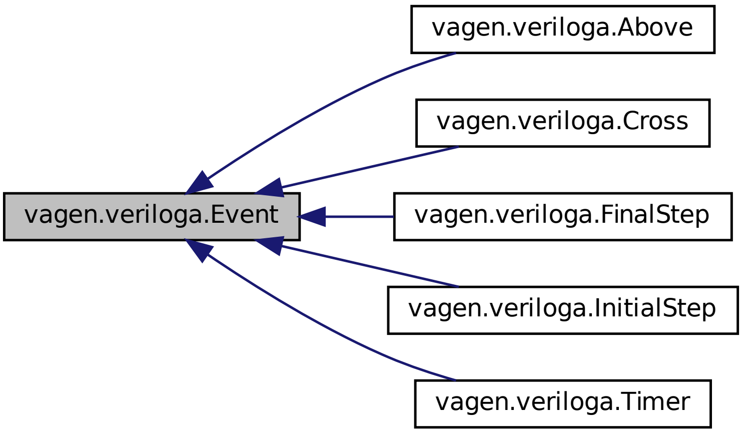
The documentation for this class was generated from the following file:

- veriloga.py

7.20 vagen.veriloga.Event Class Reference

Class of events.

Inheritance diagram for vagen.veriloga.Event:



Public Member Functions

- def __init__ (self, value)

  Constructor.
- def __or__ (self, other)

  or logic override
- def __str__ (self)

  string representation

Public Attributes

- **value**

7.20.1 Detailed Description

Class of events.

7.20.2 Constructor & Destructor Documentation

7.20.2.1 __init__()

```
def vagen.veriloga.Event.__init__ (
                self,
                value )
```

Constructor.

Parameters

self	object pointer
value	string representing the event

7.20.3 Member Function Documentation

7.20.3.1 __or__()

```
def vagen.veriloga.Event.__or__ (
              self,
              other )
```

or logic override

Parameters

self	object pointer
other	pointer to another Event object

Returns

Return an Event representing the or logic between the two

7.20.3.2 __str__()

```
def vagen.veriloga.Event.__str__ (
              self )
```

string representation

Parameters

self	object pointer
other	pointer to another Event object

Returns

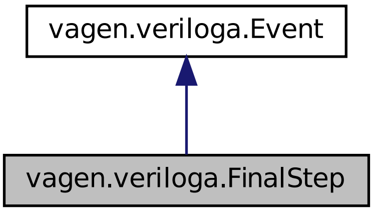
The string representation of the Event

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

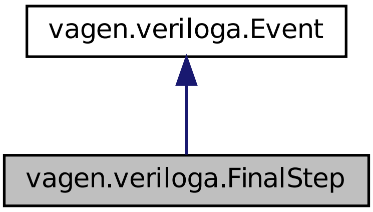
- veriloga.py

7.21 vagen.veriloga.FinalStep Class Reference

FinalStep class.
Inheritance diagram for vagen.veriloga.FinalStep:



Collaboration diagram for vagen.veriloga.FinalStep:



Public Member Functions

- def __init__ (self, ∗simTypes)

  Constructor.

Additional Inherited Members

7.21.1 Detailed Description

FinalStep class.

7.21.2 Constructor & Destructor Documentation

7.21.2.1 __init__()

```
def vagen.veriloga.FinalStep.__init__ (
                self,
              ∗ simTypes )
```

Constructor.

Parameters

self	object pointer
∗*simTypes*	optional parameters representing the simulation type

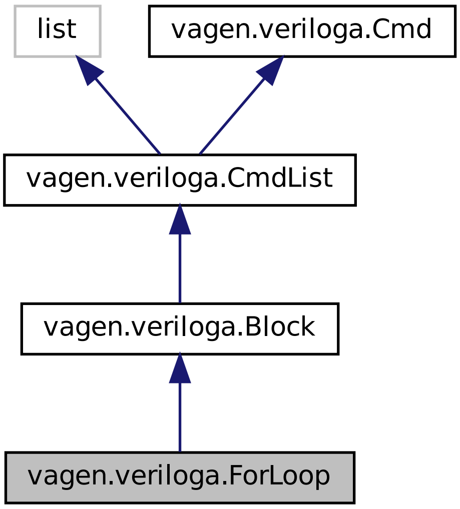
The documentation for this class was generated from the following file:

- veriloga.py

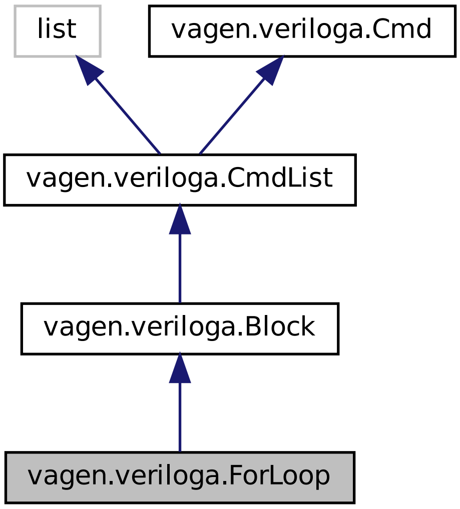
7.22 vagen.veriloga.ForLoop Class Reference

ForLoop class.

Inheritance diagram for vagen.veriloga.ForLoop:



Collaboration diagram for vagen.veriloga.ForLoop:



Public Member Functions

- def __init__ (self, start, cond, inc, ∗cmds)

  Constructor.
- def getCond (self)

Return the Forloop condition.

- def getStart (self)

  Return the Forloop start.
- def getInc (self)

  Return the Forloop increment.

Public Attributes

- **cond**
- **start**
- **inc**

7.22.1 Detailed Description

ForLoop class.

7.22.2 Constructor & Destructor Documentation

7.22.2.1 __init__()

```
def vagen.veriloga.ForLoop.__init__ (
              self,
              start,
              cond,
              inc,
             * cmds )
```

Constructor.

Parameters

self	object pointer
start	command executed at the beggining
cond	condition that must be satisfied in order repeat the sequence of commands in the block
inc	command executed at the end of each step
∗cmds	variable number of Cmd or CmdList to be added

7.22.3 Member Function Documentation

7.22.3.1 getCond()

```
def vagen.veriloga.ForLoop.getCond (
              self )
```

Return the Forloop condition.

Parameters

self	object pointer

Returns

Bool class representing the condition that must be satisfied in order repeat the sequence of commands in the block

7.22.3.2 getInc()

```
def vagen.veriloga.ForLoop.getInc (
              self )
```

Return the Forloop increment.

Parameters

self	object pointer

Returns

Cmd class representing the increment command run at each iteraction

7.22.3.3 getStart()

```
def vagen.veriloga.ForLoop.getStart (
              self )
```

Return the Forloop start.

Parameters

self	object pointer

Returns

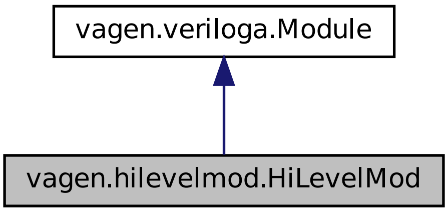
Cmd class representing the initial command run by the loop

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

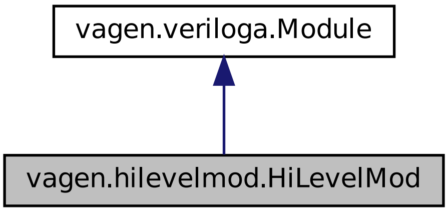
- veriloga.py

7.23 vagen.hilevelmod.HiLevelMod Class Reference

HiLevelMod class.
Inheritance diagram for vagen.hilevelmod.HiLevelMod:



Collaboration diagram for vagen.hilevelmod.HiLevelMod:



Public Member Functions

- def __init__ (self, tbName, timeTol=None)

  Constructor.
- def var (self, value=0, name="")

  Add variable to the module.
- def marker (self, name, riseFall=100e-12)

  Return a marker object.
- def dig (self, domain, name="", width=1, direction="internal", value=0, inCap=1e-14, serRes=100.0, gnd=None, delay=0, rise=1e-12, fall=1e-12)

  Return a DigIn, DigOut, or DigInOut object.
- def sw (self, pin1, pin2, cond=0.0, rise=1e-6, fall=1e-6)

  switch
- def clock (self, pin)

  Build a clock model using a digital pin.
- def smu (self, name="", width=1, direction="internal", volt=0, minCur=0, maxCur=0, res=1e12, gnd=None)

  Return a Smu object or a SmuBus object if width $>$ 1.
- def vdc (self, name="", width=1, direction="internal", value=0, gnd=None, rise=0, fall=0)

  Return a Vdc object or a VdcBus object if width $>$ 1.
- def idc (self, name="", width=1, direction="internal", value=0, gnd=None, rise=0, fall=0)

  Return a Idc object or a IdcBus object if width $>$ 1.
- def seqNested (self, cmdsIn)

  Sequence.
- def seq (self, cond)

  Sequence.
- def getEqs (self)

  Return the equations in a format that can be imported by the maestro view.
- def getOcn (self)

  Return a ocean script that add equations to the opened session of adexl.

Public Attributes

- **dcCmdList**
- **time**
- **state**
- **runSt**
- **eventId**

- **evntList**
- **pEventList**
- **evntListG**
- **markers**
- **nSeq**
- **testSeqs**
- **timeArgs**
- **nState**
- **pCase**
- **cond**

7.23.1 Detailed Description

HiLevelMod class.
Child of the module class in the veriloA module. It provides aditional methods for dealing with digital bus, current sources, voltage sources, clocks and switches

7.23.2 Constructor & Destructor Documentation

7.23.2.1 __init__()

```
def vagen.hilevelmod.HiLevelMod.__init__ (
              self,
              tbName,
              timeTol = None )
```

Constructor.

Parameters

self	The object pointer.
tbName	Name of the test bench.
timeTol	Time tolerances for the timer.

7.23.3 Member Function Documentation

7.23.3.1 clock()

```
def vagen.hilevelmod.HiLevelMod.clock (
              self,
              pin )
```

Build a clock model using a digital pin.

Parameters

self	The object pointer.
pin	DigIn or DigInOut.

Returns

a Clock class.

7.23.3.2 dig()

```
def vagen.hilevelmod.HiLevelMod.dig (
              self,
              domain,
              name = "",
              width = 1,
              direction = "internal",
              value = 0,
              inCap = 1e-14,
              serRes = 100.0,
              gnd = None,
              delay = 0,
              rise = 1e-12,
              fall = 1e-12 )
```

Return a DigIn, DigOut, or DigInOut object.
A DigBusIn, DigBusOut or DigBusInOut will be returned if width $>$ 0.

Parameters

self	The object pointer.
domain	electrical pin. The voltage across the digial pins will be equal to the domain when the logical state is 1.
name	Name of the electrical pin.
value	Integer expression holding the intial value of the digital pin.
width	If width is greather than 1, It returns a bus.
direction	It can be internal, input, output, or inout.
inCap	Real expression holding the value of the input capacitance. This value will be set at the beggining of the simulation and can't be changed afterwards.
serRes	Real expression holding the value of the series resistance. This value will be set at the beggining of the simulation and can't be changed afterwards.
gnd	Electrical representing the ground reference.
delay	Real expression holding the delay.
rise	Real expression holding the initial rise time.
fall	Real expression holding the initial fall time.

Returns

DigIn, DigOut, or DigInOut object. A DigBusIn, DigBusOut or DigBusInOut will be returned if width $>$ 0.

7.23.3.3 getEqs()

```
def vagen.hilevelmod.HiLevelMod.getEqs (
              self )
```

Return the equations in a format that can be imported by the maestro view.

Parameters

self	The object pointer.

7.23.3.4 getOcn()

```
def vagen.hilevelmod.HiLevelMod.getOcn (
              self )
```

Return a ocean script that add equations to the opened session of adexl.

Parameters

self	The object pointer.

7.23.3.5 idc()

```
def vagen.hilevelmod.HiLevelMod.idc (
              self,
              name = "",
              width = 1,
              direction = "internal",
              value = 0,
              gnd = None,
              rise = 0,
              fall = 0 )
```

Return a Idc object or a IdcBus object if width $>$ 1.

Parameters

self	The object pointer.
name	Name of the voltage source.
width	If width is greather than 1, It returns a list.
direction	It can be internal, input, output, or inout.
value	Real expression holding the inital value.
gnd	Electrical representing the ground reference.
rise	Real expression holding the initial rise time.
fall	Real expression holding the initial fall time.

Returns

Idc or IdcBus depending on the width.

7.23.3.6 marker()

```
def vagen.hilevelmod.HiLevelMod.marker (
              self,
              name,
              riseFall = 100e-12 )
```

Return a marker object.

Parameters

self	The object pointer.
name	Name of the marker.
riseFall	Rise and fall times of the marker pin. Default is 100ps.

Returns

Marker class.

7.23.3.7 seq()

```
def vagen.hilevelmod.HiLevelMod.seq (
              self,
              cond )
```

Sequence.

Parameters

cond	condition to run the sequence.

Returns

function that accepts variable number of commands to be added to the sequence.

7.23.3.8 seqNested()

```
def vagen.hilevelmod.HiLevelMod.seqNested (
              self,
              cmdsIn )
```

Sequence.
Do not use it! Use Seq instead.

Parameters

cmdsIn	list of commands to be processed.

Returns

The list of remaining commands to be processed.

7.23.3.9 smu()

```
def vagen.hilevelmod.HiLevelMod.smu (
              self,
              name = "",
              width = 1,
              direction = "internal",
              volt = 0,
              minCur = 0,
              maxCur = 0,
              res = 1e12,
              gnd = None )
```

Return a Smu object or a SmuBus object if width $>$ 1.

Parameters

self	The object pointer.
name	Name of the smu electrical pin.
width	If width is greather than 1, It returns a SmuBus.
direction	It can be internal, input, output, or inout.

Parameters

volt	Real expression holding the inital voltage.
minCur	Real expression holding the inital minimum current.
maxCur	Real expression holding the inital maximum current.
res	Real expression holding the resitance.

Returns

Smu or SmuBus depending on the width.

Parameters

gnd	Electrical representing the ground reference.

7.23.3.10 sw()

```
def vagen.hilevelmod.HiLevelMod.sw (
              self,
              pin1,
              pin2,
              cond = 0.0,
              rise = 1e-6,
              fall = 1e-6 )
```

switch

Parameters

self	The object pointer.
pin1	First node (Electrical)
pin2	Second node (Electrical)
cond	Initial switch conductance. Default is 0S.
rise	Rise time for changes in the conductance. Default is 1us.
fall	Fall time for changes in the conductance. Default is 1us.

Returns

a Sw class.

7.23.3.11 var()

```
def vagen.hilevelmod.HiLevelMod.var (
              self,
              value = 0,
              name = "" )
```

Add variable to the module.

Also, the intial value of the variable will be set during the static analysis and the initial step of transient. The type of the variable will be compatible with the type of the initial value.

Parameters

self	The object pointer.
name	Name of the variable.
value	Initial value. Default is 0.

Returns

a variable class.

Reimplemented from vagen.veriloga.Module.

7.23.3.12 vdc()

```
def vagen.hilevelmod.HiLevelMod.vdc (
              self,
              name = "",
              width = 1,
              direction = "internal",
              value = 0,
              gnd = None,
              rise = 0,
              fall = 0 )
```

Return a Vdc object or a VdcBus object if width $>$ 1.

Parameters

self	The object pointer.
name	Name of the voltage source.
width	If width is greather than 1, It returns a list.
direction	It can be internal, input, output, or inout.
value	Real expression holding the inital value.
gnd	Electrical representing the ground reference.
rise	Real expression holding the initial rise time.
fall	Real expression holding the initial fall time.

Returns

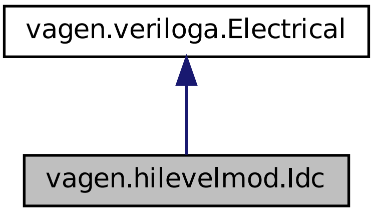
Vdc or VdcBus depending on the width.

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

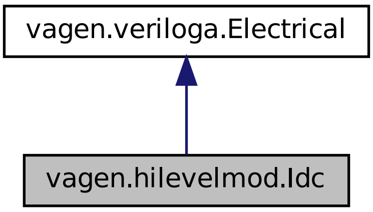
- hilevelmod.py

7.24 vagen.hilevelmod.Idc Class Reference

Idc class.
Inheritance diagram for vagen.hilevelmod.Idc:



Collaboration diagram for vagen.hilevelmod.Idc:



Public Member Functions

- def __init__ (self, hiLevelMod, name, value, gnd, rise, fall)

  Construtor.
- def setRiseFall (self, rise, fall)

  Set the rise and the fall times for changes in the voltage.
- def applyI (self, value)

  Change the value of the current source.

Public Attributes

- **cur**
- **rise**
- **fall**

7.24.1 Detailed Description

Idc class.
Child of Electrical implementing aditional features in order to work as a current source.

7.24.2 Constructor & Destructor Documentation

7.24.2.1 __init__()

```
def vagen.hilevelmod.Idc.__init__ (
                self,
                hiLevelMod,
                name,
                value,
                gnd,
                rise,
                fall )
```

Construtor.

Parameters

self	The object pointer.
hiLeveMod	Hi level model in which the analog command will be added.
name	Name of the current source electrical pin.

Parameters

value	Real expression holding the inital voltage.
gnd	Electrical representing the ground reference.
rise	Real expression holding the initial rise time.
fall	Real expression holding the initial fall time.

7.24.3 Member Function Documentation

7.24.3.1 applyI()

```
def vagen.hilevelmod.Idc.applyI (
              self,
              value )
```

Change the value of the current source.

Parameters

self	The object pointer.
value	Teal expression holding the current.

Returns

The commands to change the current.

7.24.3.2 setRiseFall()

```
def vagen.hilevelmod.Idc.setRiseFall (
              self,
              rise,
              fall )
```

Set the rise and the fall times for changes in the voltage.

Parameters

self	The object pointer.
rise	Real expression holding the rise time for changes in the current.
fall	Real expression holding the fall time for changes in the current.

Returns

The commands to change the rise and fall times.

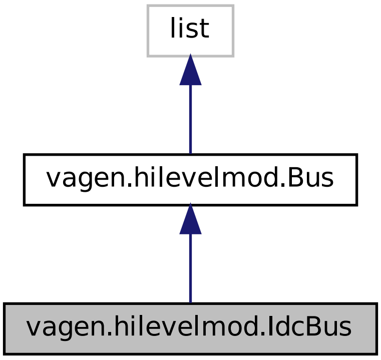
The documentation for this class was generated from the following file:

- hilevelmod.py

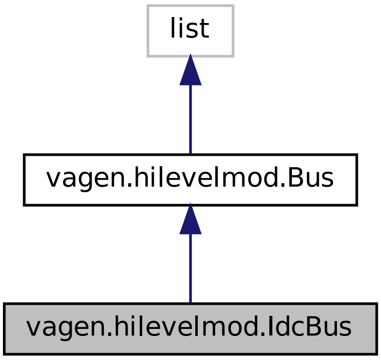
7.25 vagen.hilevelmod.IdcBus Class Reference

IdcBus class.

Inheritance diagram for vagen.hilevelmod.IdcBus:



Collaboration diagram for vagen.hilevelmod.IdcBus:



Public Member Functions

- def __init__ (self)

  Constructor.
- def setRiseFall (self, rise, fall)

  Set the rise and the fall times for changes in the voltage.
- def applyI (self, value)

  Change the value of the current source.

Additional Inherited Members

7.25.1 Detailed Description

IdcBus class.

Child of a list. It implements aditional methods to deal with read and write operations to a bus. It also overrides the slice method, so it works similar to a slice of a bus in verilog.

7.25.2 Constructor & Destructor Documentation

7.25.2.1 __init__()

```
def vagen.hilevelmod.IdcBus.__init__ (
              self )
```

Constructor.

Parameters

self	The object pointer.

7.25.3 Member Function Documentation

7.25.3.1 applyI()

```
def vagen.hilevelmod.IdcBus.applyI (
              self,
              value )
```

Change the value of the current source.

Parameters

self	The object pointer.
value	Real expression holding the current.

Returns

The commands to change the current.

7.25.3.2 setRiseFall()

```
def vagen.hilevelmod.IdcBus.setRiseFall (
              self,
              rise,
              fall )
```

Set the rise and the fall times for changes in the voltage.

Parameters

self	The object pointer.
rise	Real expression holding the rise time for changes in the current.
fall	Real expression holding the fall time for changes in the current.

Returns

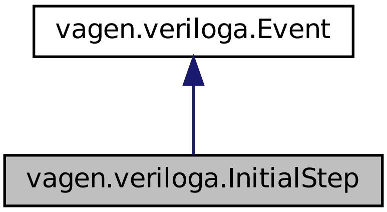
The commands to change the rise and fall times.

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

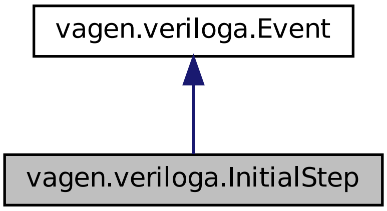
- hilevelmod.py

7.26 vagen.veriloga.InitialStep Class Reference

InitialStep class.
Inheritance diagram for vagen.veriloga.InitialStep:



Collaboration diagram for vagen.veriloga.InitialStep:



Public Member Functions

- def __init__ (self, ∗simTypes)

  Constructor.

Additional Inherited Members

7.26.1 Detailed Description

InitialStep class.

7.26.2 Constructor & Destructor Documentation

7.26.2.1 __init__()

```
def vagen.veriloga.InitialStep.__init__ (
                self,
              ∗ simTypes )
```

Constructor.

Parameters

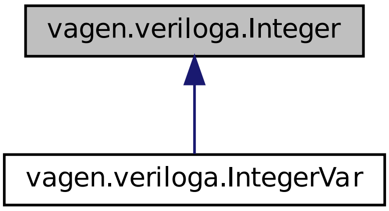
self	object pointer
∗*simTypes*	optional parameters representing the simulation type

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

- veriloga.py

7.27 vagen.veriloga.Integer Class Reference

Class of Integer operators.
Inheritance diagram for vagen.veriloga.Integer:



Public Member Functions

- def __init__ (self, value)

  Constructor.
- def getValue (self)

  Return the operator value.
- def __add__ (self, other)

  Addition override.
- def __radd__ (self, other)

  Reverse addition override.
- def __sub__ (self, other)

  Subtraction override.
- def __rsub__ (self, other)

  Reverse subtraction override.
- def __mul__ (self, other)

  Multiplication override.
- def __rmul__ (self, other)

  Reverse multiplication override.
- def __truediv__ (self, other)

  Division override.
- def __rtruediv__ (self, other)

  Reverse division override.
- def __mod__ (self, other)

  module override
- def __rmod__ (self, other)

reverse module override

- def __pow__ (self, other)

  Pow override.
- def __rpow__ (self, other)

  Reverse pow override.
- def __rshift__ (self, other)

  right shift override.
- def __rrshift__ (self, other)

  Reverse right shift override.
- def __lshift__ (self, other)

  left shift override.
- def __rlshift__ (self, other)

  Reverse left shift override.
- def __and__ (self, other)

  Bitwise and logic.
- def __rand__ (self, other)

  Reverse bitwise and logic.
- def __or__ (self, other)

  Bitwise or logic.
- def __ror__ (self, other)

  Reverse bitwise or logic.
- def __xor__ (self, other)

  Bitwise xor logic.
- def __rxor__ (self, other)

  Reverse bitwise xor logic.
- def __lt__ (self, other)

  Less than override.
- def __gt__ (self, other)

  Greater than override.
- def __le__ (self, other)

  Less than equal override.
- def __ge__ (self, other)

  Greater than equal override.
- def __eq__ (self, other)

  Equal override.
- def __ne__ (self, other)

  Not equal override.
- def __neg__ (self)

  negation override
- def __abs__ (self)

  abs override
- def __pos__ (self)

  pos override
- def __invert__ (self)

  invert override
- def __str__ (self)

  str override

Public Attributes

- **value**

7.27.1 Detailed Description

Class of Integer operators.

7.27.2 Constructor & Destructor Documentation

7.27.2.1 __init__()

```
def vagen.veriloga.Integer.__init__ (
              self,
              value )
```

Constructor.

Parameters

Self	The object pointer.
Value	String representing a Real expression, an Integer, a Bool, or a value that can be converted to Integer.

Reimplemented in vagen.veriloga.IntegerVar.

7.27.3 Member Function Documentation

7.27.3.1 __abs__()

```
def vagen.veriloga.Integer.__abs__ (
              self )
```

abs override

Parameters

self	Object pointer.

Returns

expression representing absolute value.

7.27.3.2 __add__()

```
def vagen.veriloga.Integer.__add__ (
              self,
              other )
```

Addition override.

Parameters

self	The object pointer.
other	expression to be added.

Returns

expression representing the addition.

7.27.3.3 __and__()

```
def vagen.veriloga.Integer.__and__ (
              self,
              other )
```

Bitwise and logic.

Parameters

self	first operator.
other	second operator.

Returns

expression representing the bitwise and.

7.27.3.4 __eq__()

```
def vagen.veriloga.Integer.__eq__ (
              self,
              other )
```

Equal override.

Parameters

self	Left operand object pointer.
other	Right operand.

Returns

expression representing the comparison.

7.27.3.5 __ge__()

```
def vagen.veriloga.Integer.__ge__ (
              self,
              other )
```

Greater than equal override.

Parameters

self	Left operand object pointer.
other	Right operand.

Returns

expression representing the comparison.

7.27.3.6 __gt__()

```
def vagen.veriloga.Integer.__gt__ (
              self,
              other )
```

Greater than override.

Parameters

self	Left operand object pointer.
other	Right operand.

Returns

expression representing the comparison.

7.27.3.7 __invert__()

```
def vagen.veriloga.Integer.__invert__ (
              self )
```

invert override

Parameters

self	Object pointer.

Returns

expression representing bitwise not in all bits

7.27.3.8 __le__()

```
def vagen.veriloga.Integer.__le__ (
              self,
              other )
```

Less than equal override.

Parameters

self	Left operand object pointer.
other	Right operand.

Returns

expression representing the comparison.

7.27.3.9 __lshift__()

```
def vagen.veriloga.Integer.__lshift__ (
              self,
              other )
```

left shift override.

Parameters

self	Integer to be shifted.
other	number of times the number will be shifted.

Returns

expression representing the shift.

7.27.3.10 __lt__()

```
def vagen.veriloga.Integer.__lt__ (
              self,
              other )
```

Less than override.

Parameters

self	Left operand object pointer.
other	Right operand.

Returns

expression representing the comparison.

7.27.3.11 __mod__()

```
def vagen.veriloga.Integer.__mod__ (
              self,
              other )
```

module override

Parameters

self	Dividend.
other	Quotient.

Returns

expression representing the mdule.

7.27.3.12 __mul__()

```
def vagen.veriloga.Integer.__mul__ (
              self,
              other )
```

Multiplication override.

Parameters

self	Multiplicand object pointer.
other	Multiplier.

Returns

expression representing the multiplication.

7.27.3.13 __ne__()

```
def vagen.veriloga.Integer.__ne__ (
              self,
              other )
```

Not equal override.

Parameters

self	Left operand object pointer.
other	Right operand.

Returns

expression representing the comparison.

7.27.3.14 __neg__()

```
def vagen.veriloga.Integer.__neg__ (
              self )
```

negation override

Parameters

self	Object pointer.

Returns

expression representing negation.

7.27.3.15 __or__()

```
def vagen.veriloga.Integer.__or__ (
              self,
              other )
```

Bitwise or logic.

Parameters

self	first operator.
other	second operator.

Returns

expression representing the bitwise and.

7.27.3.16 __pos__()

```
def vagen.veriloga.Integer.__pos__ (
              self )
```

pos override

Parameters

self	Object pointer.

Returns

copy of the same object.

7.27.3.17 __pow__()

```
def vagen.veriloga.Integer.__pow__ (
              self,
              other )
```

Pow override.

Parameters

self	Base object pointer.
other	Exponent.

Returns

expression representing the power.

7.27.3.18 __radd__()

```
def vagen.veriloga.Integer.__radd__ (
              self,
              other )
```

Reverse addition override.

Parameters

self	The object pointer.
other	expression to be added.

Returns

expression representing the addition.

7.27.3.19 __rand__()

```
def vagen.veriloga.Integer.__rand__ (
              self,
              other )
```

Reverse bitwise and logic.

Parameters

self	first operator.
other	second operator.

Returns

expression representing the bitwise and.

7.27.3.20 __rlshift__()

```
def vagen.veriloga.Integer.__rlshift__ (
              self,
              other )
```

Reverse left shift override.

Parameters

self	number of times the number will be shifted.
other	Integer to be shifted.

Returns

expression representing the shift.

7.27.3.21 __rmod__()

```
def vagen.veriloga.Integer.__rmod__ (
              self,
              other )
```

reverse module override

Parameters

self	Quotient.
other	Dividend.

Returns

expression representing the mdule.

7.27.3.22 __rmul__()

```
def vagen.veriloga.Integer.__rmul__ (
              self,
              other )
```

Reverse multiplication override.

Parameters

self	Multiplier object pointer.
other	Multiplicand.

Returns

expression representing the multiplication.

7.27.3.23 __ror__()

```
def vagen.veriloga.Integer.__ror__ (
              self,
              other )
```

Reverse bitwise or logic.

Parameters

self	first operator.
other	second operator.

Returns

expression representing the bitwise and.

7.27.3.24 __rpow__()

```
def vagen.veriloga.Integer.__rpow__ (
              self,
              other )
```

Reverse pow override.

Parameters

self	Exponent object pointer.
other	Base.

Returns

expression representing the power.

7.27.3.25 __rrshift__()

```
def vagen.veriloga.Integer.__rrshift__ (
              self,
              other )
```

Reverse right shift override.

Parameters

self	number of times the number will be shifted.
other	Integer to be shifted.

Returns

expression representing the shift.

7.27.3.26 __rshift__()

```
def vagen.veriloga.Integer.__rshift__ (
              self,
              other )
```

right shift override.

Parameters

self	Integer to be shifted.
other	number of times the number will be shifted.

Returns

expression representing the shift.

7.27.3.27 __rsub__()

```
def vagen.veriloga.Integer.__rsub__ (
              self,
              other )
```

Reverse subtraction override.

Parameters

self	Subtrahend object pointer.
other	Minuend.

Returns

expression representing the subtraction.

7.27.3.28 __rtruediv__()

```
def vagen.veriloga.Integer.__rtruediv__ (
              self,
              other )
```

Reverse division override.

Parameters

self	Quotient object pointer.
other	Dividend.

Returns

expression representing the division.

7.27.3.29 __rxor__()

```
def vagen.veriloga.Integer.__rxor__ (
              self,
              other )
```

Reverse bitwise xor logic.

Parameters

self	first operator.
other	second operator.

Returns

expression representing the bitwise and.

7.27.3.30 __str__()

```
def vagen.veriloga.Integer.__str__ (
              self )
```

str override

Parameters

self	Object pointer.

Returns

string representing the expression

7.27.3.31 __sub__()

```
def vagen.veriloga.Integer.__sub__ (
              self,
              other )
```

Subtraction override.

Parameters

self	Minuend object pointer.
other	Subtrahend.

Returns

expression representing the subtraction.

7.27.3.32 __truediv__()

```
def vagen.veriloga.Integer.__truediv__ (
              self,
              other )
```

Division override.

Parameters

self	Dividend object pointer.
other	Quotient.

Returns

expression representing the division.

7.27.3.33 __xor__()

```
def vagen.veriloga.Integer.__xor__ (
              self,
              other )
```

Bitwise xor logic.

Parameters

self	first operator.
other	second operator.

Returns

expression representing the bitwise and.

7.27.3.34 getValue()

```
def vagen.veriloga.Integer.getValue (
              self )
```

Return the operator value.

Parameters

Self	The object pointer.

Returns

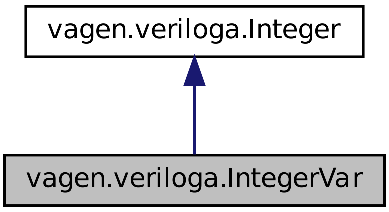
String representing the Bool expression.

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

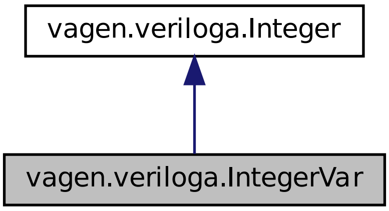
- veriloga.py

7.28 vagen.veriloga.IntegerVar Class Reference

Integer variable class.
Inheritance diagram for vagen.veriloga.IntegerVar:



Collaboration diagram for vagen.veriloga.IntegerVar:



Public Member Functions

- def __init__ (self, value)

  Constructor.
- def inc (self)

  Increment.
- def dec (self)

Decrement.

- def eq (self, value)

  Atribution.

Additional Inherited Members

7.28.1 Detailed Description

Integer variable class.

7.28.2 Constructor & Destructor Documentation

7.28.2.1 __init__()

```
def vagen.veriloga.IntegerVar.__init__ (
              self,
              value )
```

Constructor.

Parameters

self	object pointer
value	string representing the value

Reimplemented from vagen.veriloga.Integer.

7.28.3 Member Function Documentation

7.28.3.1 dec()

```
def vagen.veriloga.IntegerVar.dec (
              self )
```

Decrement.

Parameters

self	object pointer

Returns

command representing the decrement

7.28.3.2 eq()

```
def vagen.veriloga.IntegerVar.eq (
              self,
              value )
```

Atribution.

Parameters

self	object pointer
value	A number representing the value

Returns

Return a command representing the attribution to a variable

7.28.3.3 inc()

```
def vagen.veriloga.IntegerVar.inc (
              self )
```

Increment.

Parameters

self	object pointer

Returns

command representing the increment

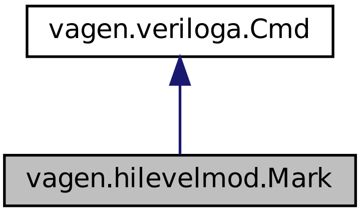
The documentation for this class was generated from the following file:

- veriloga.py

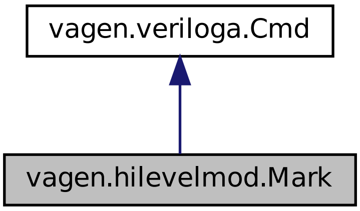
7.29 vagen.hilevelmod.Mark Class Reference

Mark command class.

Inheritance diagram for vagen.hilevelmod.Mark:



Collaboration diagram for vagen.hilevelmod.Mark:



Public Member Functions

- def __init__ (self, cmd)

  Construtor.
- def getCmd (self)

  Return the command.
- def __str__ (self)

  Dummy method.
- def getVA (self, padding)

  Dummy method.

Public Attributes

- **cmd**

7.29.1 Detailed Description

Mark command class.
This class of commands are responsible for storing the command thar marks an specific event

7.29.2 Constructor & Destructor Documentation

7.29.2.1 __init__()

```
def vagen.hilevelmod.Mark.__init__ (
              self,
              cmd )
```

Construtor.

Parameters

self	The object pointer.
cmd	Command to be added to the marker.

Reimplemented from vagen.veriloga.Cmd.

7.29.3 Member Function Documentation

7.29.3.1 __str__()

```
def vagen.hilevelmod.Mark.__str__ (
              self )
```

Dummy method.
Raise exception when runned.

Parameters

self	The object pointer.

Reimplemented from vagen.veriloga.Cmd.

7.29.3.2 getCmd()

```
def vagen.hilevelmod.Mark.getCmd (
self )
```

Return the command.

Parameters

self	The object pointer.

Returns

Command passed to the constructor.

7.29.3.3 getVA()

```
def vagen.hilevelmod.Mark.getVA (
              self,
              padding )
```

Dummy method.
Raise exception when runned.

Parameters

self	The object pointer.

Reimplemented from vagen.veriloga.Cmd.

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

- hilevelmod.py

7.30 vagen.hilevelmod.Marker Class Reference

Marker class.

Public Member Functions

- def __init__ (self, hiLevelMod, name, riseFall)

  Construtor.
- def getName (self)

  Return the name of the Marker.
- def mark (self, name)

  Mark a particular event by flipping the internal variable.
- def low (self)

  Force the internal variable low.
- def high (self)

  Force the internal variable high.
- def getEqs (self)

  Return a dictionay with the cadence equations for the marker

Public Attributes

- **name**
- **markList**
- **markerPin**
- **markSt**

7.30.1 Detailed Description

Marker class.
Responsible for flipping the state of one variable to mark events and generates cadence equations that calculate the time of the events

7.30.2 Constructor & Destructor Documentation

7.30.2.1 __init__()

```
def vagen.hilevelmod.Marker.__init__ (
              self,
              hiLevelMod,
              name,
              riseFall )
```

Construtor.

Parameters

self	The object pointer.
hiLeveMod	Hi level model in which the analog command will be added
name	Name of the marker.
riseFall	Rise and fall times of the marker pin.

7.30.3 Member Function Documentation

7.30.3.1 getEqs()

```
def vagen.hilevelmod.Marker.getEqs (
              self )
```

Return a dictionay with the cadence equations for the marker

Parameters

self	The object pointer.

Returns

The dictionary with the cadence equations.

7.30.3.2 getName()

```
def vagen.hilevelmod.Marker.getName (
              self )
```

Return the name of the Marker.

Parameters

self	The object pointer.

Returns

Name of the Marker.

7.30.3.3 high()

```
def vagen.hilevelmod.Marker.high (
              self )
```

Force the internal variable high.

You shouldn't use because it will break the synchronism between the cadence equations and the events. It was implemented for usage in specific power down conditions only.

Parameters

self	The object pointer.

Returns

The Mark command.

7.30.3.4 low()

```
def vagen.hilevelmod.Marker.low (
              self )
```

Force the internal variable low.

You shouldn't use because it will break the synchronism between the cadence equations and the events. It was implemented for usage in specific power down conditions only.

Parameters

self	The object pointer.

Returns

The Mark command.

7.30.3.5 mark()

```
def vagen.hilevelmod.Marker.mark (
              self,
              name )
```

Mark a particular event by flipping the internal variable.

Parameters

self	The object pointer.
name	Name of the event.

Returns

The Mark command.

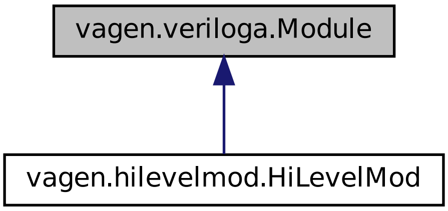
The documentation for this class was generated from the following file:

- hilevelmod.py

7.31 vagen.veriloga.Module Class Reference

verilogA class

Inheritance diagram for vagen.veriloga.Module:



Public Member Functions

- def __init__ (self, moduleName)

  constructor
- def getModuleName (self)

  return module name
- def fixName (self, name)

  If name is an empty string, get the next name available in the namespace.
- def var (self, vType=Integer, name="")

  Add variable to the module.
- def par (self, value, name)

  Add parameter to the module.
- def analog (self, ∗args)

  Add commands to the analog block.
- def beginningAnalog (self, ∗args)

  Add commands to beginning of the analog block.
- def endAnalog (self, ∗args)

  Add commands to the end of the analog block.
- def addNode (self, name, width, direction)

  Add node.
- def electrical (self, name="", width=1, direction="internal")

  Return electrical class.
- def getVA (self)

  Return the VA verilog code.

Public Attributes

- **moduleName**
- **nameCount**
- **nameSpace**
- **nodes**
- **ports**
- **parameters**
- **variables**
- **cmds**
- **endCmds**
- **beginningCmds**

7.31.1 Detailed Description

verilogA class

7.31.2 Constructor & Destructor Documentation

7.31.2.1 __init__()

```
def vagen.veriloga.Module.__init__ (
              self,
              moduleName )
```

constructor

Parameters

self	The object pointer.
node1	Electrical signal representing the first node
moduleName	name of the module (the first word after module in the va)

7.31.3 Member Function Documentation

7.31.3.1 addNode()

```
def vagen.veriloga.Module.addNode (
              self,
              name,
              width,
              direction )
```

Add node.

Parameters

self	The object pointer.
name	string representing the name of the electrical signal
width	int representing the width of the electrical signal
direction	direction of the signal. It can be on the strings "internal", "input", "output", or "inout"

Returns

string with the name of the node

7.31.3.2 analog()

```
def vagen.veriloga.Module.analog (
              self,
             * args )
```

Add commands to the analog block.

Parameters

self	The object pointer.
∗*args*	variable number of Cmd or CmdList to be added

7.31.3.3 beginningAnalog()

```
def vagen.veriloga.Module.beginningAnalog (
              self,
             * args )
```

Add commands to beginning of the analog block.

Parameters

self	The object pointer.
∗*args*	variable number of Cmd or CmdList to be added

7.31.3.4 electrical()

```
def vagen.veriloga.Module.electrical (
              self,
              name = "",
              width = 1,
              direction = "internal" )
```

Return electrical class.

Parameters

self	The object pointer.
name	string representing the name of the electrical signal
width	int representing the width of the electrical signal
direction	direction of the signal. It can be on the strings "internal", "input", "output", or "inout"

Returns

list of electrical classes or an electrical class depending on the width

7.31.3.5 endAnalog()

```
def vagen.veriloga.Module.endAnalog (
              self,
             * args )
```

Add commands to the end of the analog block.

Parameters

self	The object pointer.
∗*args*	variable number of Cmd or CmdList to be added

7.31.3.6 fixName()

```
def vagen.veriloga.Module.fixName (
              self,
              name )
```

If name is an empty string, get the next name available in the namespace.
If name isn't empty, check if the name is available in the verilogA namespace and raise an exception if it doesn't

Parameters

self	The object pointer.
name	string to be checked

Returns

string representing a valid name in the verilogA namespace

7.31.3.7 getModuleName()

```
def vagen.veriloga.Module.getModuleName (
              self )
```

return module name

Parameters

self	The object pointer

Returns

string representing the name of the module

7.31.3.8 getVA()

```
def vagen.veriloga.Module.getVA (
              self )
```

Return the VA verilog code.

Parameters

self	The object pointer.

Returns

string with the verilogA code

7.31.3.9 par()

```
def vagen.veriloga.Module.par (
              self,
              value,
              name )
```

Add parameter to the module.

Parameters

self	The object pointer.
value	Initial value. It can be Real, Integer, int or float.
name	string representing the name of the parameter in the verilogA

Returns

RealVar or RealVar depending on the initial value

7.31.3.10 var()

```
def vagen.veriloga.Module.var (
              self,
              vType = Integer,
              name = "" )
```

Add variable to the module.

Parameters

self	The object pointer.
vType	it can be Integer Bool or Real
name	string representing the name of the variable in the verilogA

Returns

RealVar, IntegerVar or BoolVar depending on the vType

Reimplemented in vagen.hilevelmod.HiLevelMod.

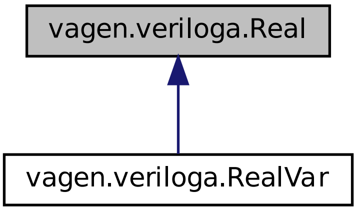
The documentation for this class was generated from the following file:

- veriloga.py

7.32 vagen.veriloga.Real Class Reference

Class of Real operators.

Inheritance diagram for vagen.veriloga.Real:



Public Member Functions

- def __init__ (self, value)

  Constructor.
- def getValue (self)

  Return the operator value.
- def __add__ (self, other)

  Addition override.
- def __sub__ (self, other)

  Subtraction override.
- def __mul__ (self, other)

  Multiplication override.
- def __truediv__ (self, other)

  Division override.
- def __pow__ (self, other)

  Pow override.
- def __gt__ (self, other)

  Greater than override.
- def __lt__ (self, other)

  Less than override.
- def __le__ (self, other)

  Less than equal override.
- def __ge__ (self, other)

  Greater than equal override.
- def __eq__ (self, other)

  Equal override.
- def __ne__ (self, other)

  Not equal override.
- def __radd__ (self, other)

  Reverse addition override.
- def __rsub__ (self, other)

  Reverse subtraction override.
- def __rmul__ (self, other)

  Reverse multiplication override.
- def __rtruediv__ (self, other)

  Reverse division override.
- def __rpow__ (self, other)

  Pow override.
- def __neg__ (self)

  negation override
- def __pos__ (self)

  pos override
- def __abs__ (self)

  abs override
- def __str__ (self)

  str override

Public Attributes

- **value**

7.32.1 Detailed Description

Class of Real operators.

7.32.2 Constructor & Destructor Documentation

7.32.2.1 __init__()

```
def vagen.veriloga.Real.__init__ (
              self,
              value )
```

Constructor.

Parameters

self	The object pointer.
value	String representing a Real expression, an Integer, a Bool, or a value that can be converted to Real.

Reimplemented in vagen.veriloga.RealVar.

7.32.3 Member Function Documentation

7.32.3.1 __abs__()

```
def vagen.veriloga.Real.__abs__ (
              self )
```

abs override

Parameters

self	Object pointer.

Returns

expression representing absolute value.

7.32.3.2 __add__()

```
def vagen.veriloga.Real.__add__ (
              self,
              other )
```

Addition override.

Parameters

self	The object pointer.
other	expression to be added.

Returns

expression representing the addition.

7.32.3.3 __eq__()

```
def vagen.veriloga.Real.__eq__ (
              self,
              other )
```

Equal override.

Parameters

self	Left operand object pointer.
other	Right operand.

Returns

expression representing the comparison.

7.32.3.4 __ge__()

```
def vagen.veriloga.Real.__ge__ (
              self,
              other )
```

Greater than equal override.

Parameters

self	Left operand object pointer.
other	Right operand.

Returns

expression representing the comparison.

7.32.3.5 __gt__()

```
def vagen.veriloga.Real.__gt__ (
              self,
              other )
```

Greater than override.

Parameters

self	Left operand object pointer.
other	Right operand.

Returns

expression representing the comparison.

7.32.3.6 __le__()

```
def vagen.veriloga.Real.__le__ (
              self,
              other )
```

Less than equal override.

Parameters

self	Left operand object pointer.
other	Right operand.

Returns

expression representing the comparison.

7.32.3.7 __lt__()

```
def vagen.veriloga.Real.__lt__ (
              self,
              other )
```

Less than override.

Parameters

self	Left operand object pointer.
other	Right operand.

Returns

expression representing the comparison.

7.32.3.8 __mul__()

```
def vagen.veriloga.Real.__mul__ (
              self,
              other )
```

Multiplication override.

Parameters

self	Multiplicand object pointer.
other	Multiplier.

Returns

expression representing the multiplication.

7.32.3.9 __ne__()

```
def vagen.veriloga.Real.__ne__ (
              self,
              other )
```

Not equal override.

Parameters

self	Left operand object pointer.
other	Right operand.

Returns

expression representing the comparison.

7.32.3.10 __neg__()

```
def vagen.veriloga.Real.__neg__ (
              self )
```

negation override

Parameters

self	Object pointer.

Returns

expression representing negation.

7.32.3.11 __pos__()

```
def vagen.veriloga.Real.__pos__ (
              self )
```

pos override

Parameters

self	Object pointer.

Returns

copy of the same object.

7.32.3.12 __pow__()

```
def vagen.veriloga.Real.__pow__ (
              self,
              other )
```

Pow override.

Parameters

self	Base object pointer.
other	Exponent.

Returns

expression representing the power.

7.32.3.13 __radd__()

```
def vagen.veriloga.Real.__radd__ (
              self,
              other )
```

Reverse addition override.

Parameters

self	The object pointer.
other	expression to be added.

Returns

expression representing the addition.

7.32.3.14 __rmul__()

```
def vagen.veriloga.Real.__rmul__ (
              self,
              other )
```

Reverse multiplication override.

Parameters

self	Multiplier object pointer.
other	Multiplicand.

Returns

expression representing the multiplication.

7.32.3.15 __rpow__()

```
def vagen.veriloga.Real.__rpow__ (
              self,
              other )
```

Pow override.

Parameters

self	Exponent object pointer.
other	Base.

Returns

expression representing the power.

7.32.3.16 __rsub__()

```
def vagen.veriloga.Real.__rsub__ (
              self,
              other )
```

Reverse subtraction override.

Parameters

self	Subtrahend object pointer.
other	Minuend.

Returns

expression representing the subtraction.

7.32.3.17 __rtruediv__()

```
def vagen.veriloga.Real.__rtruediv__ (
              self,
              other )
```

Reverse division override.

Parameters

self	Quotient object pointer.
other	Dividend.

Returns

expression representing the division.

7.32.3.18 __str__()

```
def vagen.veriloga.Real.__str__ (
              self )
```

str override

Parameters

self	Object pointer.

Returns

string representing the expression

7.32.3.19 __sub__()

```
def vagen.veriloga.Real.__sub__ (
              self,
              other )
```

Subtraction override.

Parameters

self	Minuend object pointer.
other	Subtrahend.

Returns

expression representing the subtraction.

7.32.3.20 __truediv__()

```
def vagen.veriloga.Real.__truediv__ (
              self,
              other )
```

Division override.

Parameters

self	Dividend object pointer.
other	Quotient.

Returns

expression representing the division.

7.32.3.21 getValue()

```
def vagen.veriloga.Real.getValue (
              self )
```

Return the operator value.

Parameters

self	The object pointer.

Returns

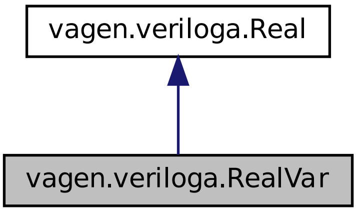
String representing the Real expression.

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

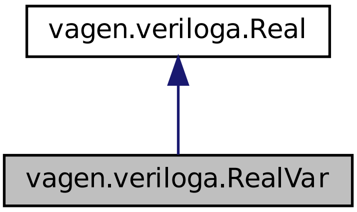
- veriloga.py

7.33 vagen.veriloga.RealVar Class Reference

Real variable class.
Inheritance diagram for vagen.veriloga.RealVar:



Collaboration diagram for vagen.veriloga.RealVar:



Public Member Functions

- def __init__ (self, value)

  Constructor.
- def eq (self, value)

  Atribution.

Additional Inherited Members

7.33.1 Detailed Description

Real variable class.

7.33.2 Constructor & Destructor Documentation

7.33.2.1 __init__()

```
def vagen.veriloga.RealVar.__init__ (
              self,
              value )
```

Constructor.

Parameters

self	object pointer
value	string representing the value

Reimplemented from vagen.veriloga.Real.

7.33.3 Member Function Documentation

7.33.3.1 eq()

```
def vagen.veriloga.RealVar.eq (
              self,
              value )
```

Atribution.

Parameters

self	object pointer
value	A number representing the value

Returns

Return a command representing the attribution to a variable

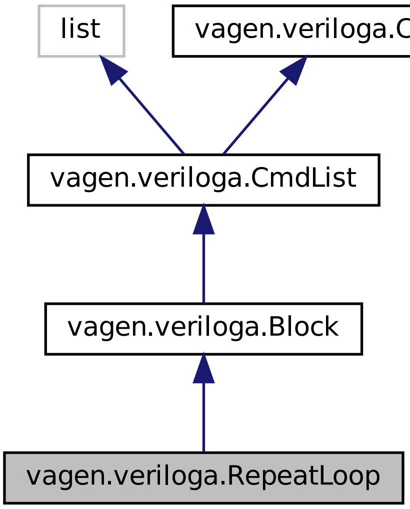
The documentation for this class was generated from the following file:

- veriloga.py

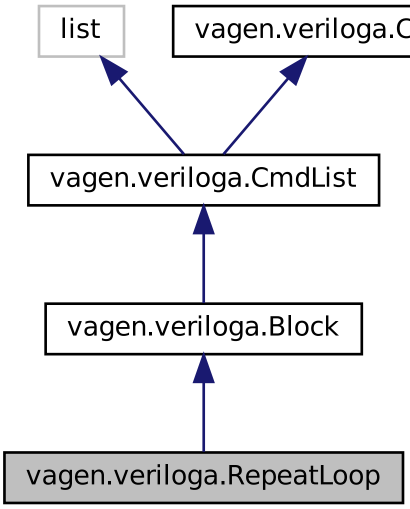
7.34 vagen.veriloga.RepeatLoop Class Reference

RepeatLoop class

Inheritance diagram for vagen.veriloga.RepeatLoop:



Collaboration diagram for vagen.veriloga.RepeatLoop:



Public Member Functions

- def __init__ (self, n, ∗cmds)

  Constructor.
- def getN (self)

  Return the repeat count.

Public Attributes

- **n**

7.34.1 Detailed Description

RepeatLoop class

7.34.2 Constructor & Destructor Documentation

7.34.2.1 __init__()

```
def vagen.veriloga.RepeatLoop.__init__ (
              self,
              n,
             ∗ cmds )
```

Constructor.

Parameters

self	object pointer
n	Integer class or int representing the number of times the block of commands must be repeated
∗*cmds*	variable number of Cmd or CmdList to be added

Reimplemented from vagen.veriloga.Block.

7.34.3 Member Function Documentation

7.34.3.1 getN()

```
def vagen.veriloga.RepeatLoop.getN (
              self )
```

Return the repeat count.

Parameters

self	object pointer

Returns

Integer class representing the number of times the block of commands will be repeated

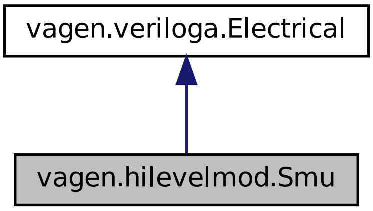
The documentation for this class was generated from the following file:

- veriloga.py

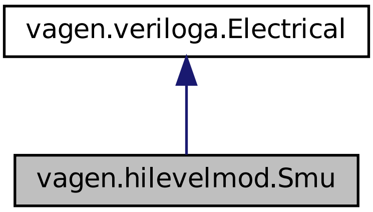
7.35 vagen.hilevelmod.Smu Class Reference

Smu class.

Inheritance diagram for vagen.hilevelmod.Smu:



Collaboration diagram for vagen.hilevelmod.Smu:



Public Member Functions

- def __init__ (self, hiLevelMod, name, volt, minCur, maxCur, res, gnd)

  Construtor.
- def applyV (self, value, limit)

  Configure the smu as current limited voltage source and apply the desired voltage.
- def applyI (self, value, limit)

  Configure the smu as voltage limited current source and apply the desired current.
- def applyR (self, value)

  Configure the resistive load.

Public Attributes

- **volt**
- **maxCur**
- **minCur**
- **res**
- **vDelay**
- **iDelay**
- **rDelay**
- **riseFall**

7.35.1 Detailed Description

Smu class.
Child of Electrical implementing aditional features in order to work as a Source Measure Unit

7.35.2 Constructor & Destructor Documentation

7.35.2.1 __init__()

```
def vagen.hilevelmod.Smu.__init__ (
              self,
              hiLevelMod,
              name,
              volt,
              minCur,
              maxCur,
                res,
                gnd )
```

Construtor.

Parameters

self	The object pointer.
hiLeveMod	Hi level model in which the analog command will be added.
name	Name of the smu electrical pin.
volt	Real expression holding the inital voltage.
minCur	Real expression holding the inital minimum current.
maxCur	Real expression holding the inital maximum current.
res	Real expression holding the resitance.
gnd	Electrical representing the ground reference.

7.35.3 Member Function Documentation

7.35.3.1 applyI()

```
def vagen.hilevelmod.Smu.applyI (
                self,
                value,
                limit )
```

Configure the smu as voltage limited current source and apply the desired current.
Positive currents are sink current sources. The limit corresponds to the uppper voltage when value $<$ 0 and to the lower voltage when value $>$ 0.

Parameters

self	The object pointer.
value	Real expression holding the current to be applied.
limit	Real expression holding the voltage limit.

Returns

The commands to configure the Smu in current mode.

7.35.3.2 applyR()

```
def vagen.hilevelmod.Smu.applyR (
                self,
                value )
```

Configure the resistive load.

Parameters

self	The object pointer.
value	Real expression holding the value of the resistor.

Returns

The commands to configure the Smu in resistance mode.

7.35.3.3 applyV()

```
def vagen.hilevelmod.Smu.applyV (
              self,
              value,
              limit )
```

Configure the smu as current limited voltage source and apply the desired voltage.

Parameters

self	The object pointer.
value	Real expression holding the voltage to be applied.
limit	Real expression holding the current limit.

Returns

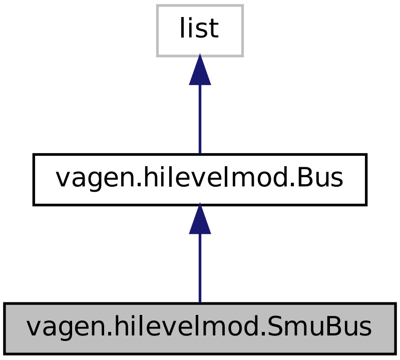
The commands to configure the Smu in voltage mode.

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

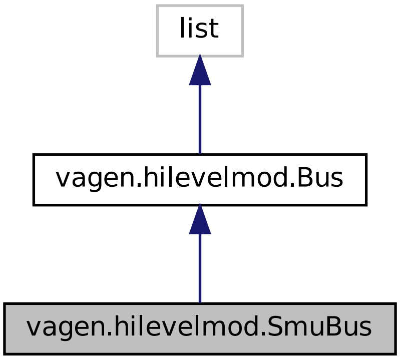
- hilevelmod.py

7.36 vagen.hilevelmod.SmuBus Class Reference

SmuBus class.
Inheritance diagram for vagen.hilevelmod.SmuBus:



Collaboration diagram for vagen.hilevelmod.SmuBus:



Public Member Functions

- def __init__ (self)

  Constructor.
- def applyI (self, value, limit)

  Configure the smu as voltage limited current source and apply the desired current.
- def applyV (self, value, limit)

  Configure the smu as current limited voltage source and apply the desired voltage.
- def applyR (self, value)

  Configure the resistive load.

Additional Inherited Members

7.36.1 Detailed Description

SmuBus class.
Child of a list. It implements aditional methods to deal with read and write operations to a bus. It also overrides the slice method, so it works similar to a slice of a bus in verilog.

7.36.2 Constructor & Destructor Documentation

7.36.2.1 __init__()

```
def vagen.hilevelmod.SmuBus.__init__ (
              self )
```

Constructor.

Parameters

self	The object pointer.

7.36.3 Member Function Documentation

7.36.3.1 applyI()

```
def vagen.hilevelmod.SmuBus.applyI (
              self,
              value,
              limit )
```

Configure the smu as voltage limited current source and apply the desired current.

Positive currents are sink current sources. The limit corresponds to the uppper voltage when value $<$ 0 and to the lower voltage when value $>$ 0.

Parameters

self	The object pointer.
value	Real expression holding the current to be applied.
limit	Real expression holding the voltage limit.

Returns

The commands to configure the Smu in current mode.

7.36.3.2 applyR()

```
def vagen.hilevelmod.SmuBus.applyR (
              self,
              value )
```

Configure the resistive load.

Parameters

self	The object pointer.
value	Real expression holding the value of the resistor.

Returns

The commands to configure the Smu in resistance mode.

7.36.3.3 applyV()

```
def vagen.hilevelmod.SmuBus.applyV (
              self,
              value,
              limit )
```

Configure the smu as current limited voltage source and apply the desired voltage.

Parameters

self	The object pointer.
value	Real expression holding the voltage to be applied.
limit	Real expression holding the current limit.

Returns

The commands to configure the Smu in voltage mode.

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

- hilevelmod.py

7.37 vagen.hilevelmod.Sw Class Reference

Sw class.

Public Member Functions

- def __init__ (self, hiLevelMod, pin1, pin2, cond, rise, fall)

  Construtor.
- def setRiseFall (self, rise, fall)

  Set the rise and the fall times of all digital output pin.
- def setCond (self, cond)

  Set the conductance.

Public Attributes

- **swCount**
- **cond**
- **rise**
- **fall**
- **branch**

Static Public Attributes

- int **swCount** = 1

7.37.1 Detailed Description

Sw class.
Switch between two nodes.

7.37.2 Constructor & Destructor Documentation

7.37.2.1 __init__()

```
def vagen.hilevelmod.Sw.__init__ (
              self,
              hiLevelMod,
              pin1,
              pin2,
              cond,
              rise,
              fall )
```

Construtor.

Parameters

self	The object pointer.
hiLeveMod	Hi level model in which the analog command will be added.

Parameters

pin1	First node
pin2	Second node
cond	Real expression representing the initial switch conductance
rise	Real expression representing the rise time for changes in the conductance
fall	Real expression representing the fall time for changes in the conductance

7.37.3 Member Function Documentation

7.37.3.1 setCond()

```
def vagen.hilevelmod.Sw.setCond (
              self,
              cond )
```

Set the conductance.

Parameters

self	The object pointer.
cond	Real expression holding the conductance value.

Returns

The commands to change the conductance.

7.37.3.2 setRiseFall()

```
def vagen.hilevelmod.Sw.setRiseFall (
              self,
              rise,
              fall )
```

Set the rise and the fall times of all digital output pin.

Parameters

self	The object pointer.
Rise	Real expression holding the rise time.
Fall	Real expression holding the fall time.

Returns

The commands to change the rise and fall times.

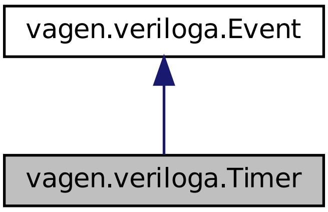
The documentation for this class was generated from the following file:

- hilevelmod.py

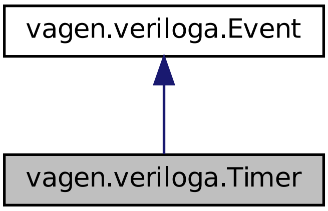
7.38 vagen.veriloga.Timer Class Reference

Timer Class.

Inheritance diagram for vagen.veriloga.Timer:



Collaboration diagram for vagen.veriloga.Timer:



Public Member Functions

- def __init__ (self, startTime, ∗pars)

  Constructor.

Additional Inherited Members

7.38.1 Detailed Description

Timer Class.

7.38.2 Constructor & Destructor Documentation

7.38.2.1 __init__()

```
def vagen.veriloga.Timer.__init__ (
                self,
                startTime,
              ∗ pars )
```

Constructor.

Parameters

self	object pointer

Parameters

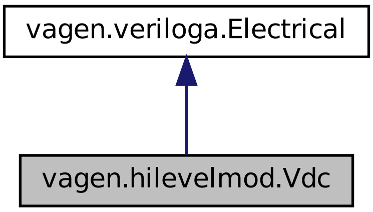
startTime	Real or build-in real representing the time tolerance
∗*pars*	optional Real or build-in real parameters timeTol and expTol in this order

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

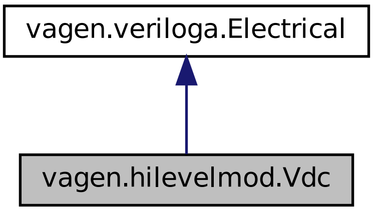
- veriloga.py

7.39 vagen.hilevelmod.Vdc Class Reference

Vdc class.
Inheritance diagram for vagen.hilevelmod.Vdc:



Collaboration diagram for vagen.hilevelmod.Vdc:



Public Member Functions

- def __init__ (self, hiLevelMod, name, value, gnd, rise, fall)

    Construtor.

- def setRiseFall (self, rise, fall)

    Set the rise and the fall times for changes in the voltage.

- def applyV (self, value)

    Change the value of the voltage source.

Public Attributes

- **volt**
- **rise**
- **fall**

7.39.1 Detailed Description

Vdc class.
Child of Electrical implementing aditional features in order to work as a voltage source.

7.39.2 Constructor & Destructor Documentation

7.39.2.1 __init__()

```
def vagen.hilevelmod.Vdc.__init__ (
              self,
              hiLevelMod,
              name,
              value,
              gnd,
              rise,
              fall )
```

Construtor.

Parameters

self	The object pointer.
hiLeveMod	Hi level model in which the analog command will be added.
name	Name of the voltage source electrical pin.
value	Real expression holding the inital voltage.
gnd	Electrical representing the ground reference.
rise	Real expression holding the initial rise time.
fall	Real expression holding the initial fall time.

7.39.3 Member Function Documentation

7.39.3.1 applyV()

```
def vagen.hilevelmod.Vdc.applyV (
              self,
              value )
```

Change the value of the voltage source.

Parameters

self	The object pointer.
value	Real expression holding the voltage.

Returns

The commands to change the voltage.

7.39.3.2 setRiseFall()

```
def vagen.hilevelmod.Vdc.setRiseFall (
              self,
              rise,
              fall )
```

Set the rise and the fall times for changes in the voltage.

Parameters

self	The object pointer.
rise	Real expression holding the rise time for changes in the voltage.
fall	Real expression holding the fall time for changes in the voltage.

Returns

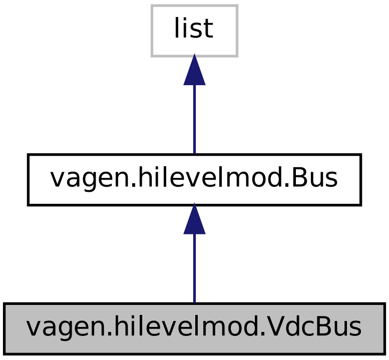
The commands to change the rise and fall times.

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

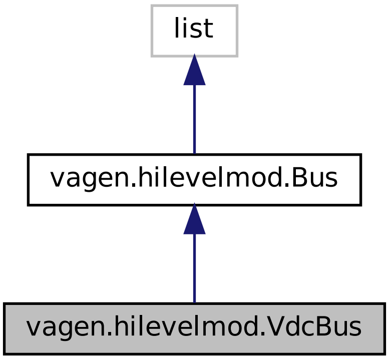
- hilevelmod.py

7.40 vagen.hilevelmod.VdcBus Class Reference

VdcBus class.
Inheritance diagram for vagen.hilevelmod.VdcBus:



Collaboration diagram for vagen.hilevelmod.VdcBus:



Public Member Functions

- def __init__ (self)

  Constructor.
- def setRiseFall (self, rise, fall)

  Set the rise and the fall times for changes in the voltage.
- def applyV (self, value)

  Change the value of the voltage source.

Additional Inherited Members

7.40.1 Detailed Description

VdcBus class.
Child of a list. It implements aditional methods to deal with read and write operations to a bus. It also overrides the slice method, so it works similar to a slice of a bus in verilog.

7.40.2 Constructor & Destructor Documentation

7.40.2.1 __init__()

```
def vagen.hilevelmod.VdcBus.__init__ (
              self )
```

Constructor.

Parameters

self	The object pointer.

7.40.3 Member Function Documentation

7.40.3.1 applyV()

```
def vagen.hilevelmod.VdcBus.applyV (
              self,
              value )
```

Change the value of the voltage source.

Parameters

self	The object pointer.
value	Real expression holding the voltage.

Returns

The commands to change the voltage.

7.40.3.2 setRiseFall()

```
def vagen.hilevelmod.VdcBus.setRiseFall (
              self,
              rise,
              fall )
```

Set the rise and the fall times for changes in the voltage.

Parameters

self	The object pointer.
rise	Real expression holding the rise time for changes in the voltage.
fall	Real expression holding the fall time for changes in the voltage.

Returns

The commands to change the rise and fall times.

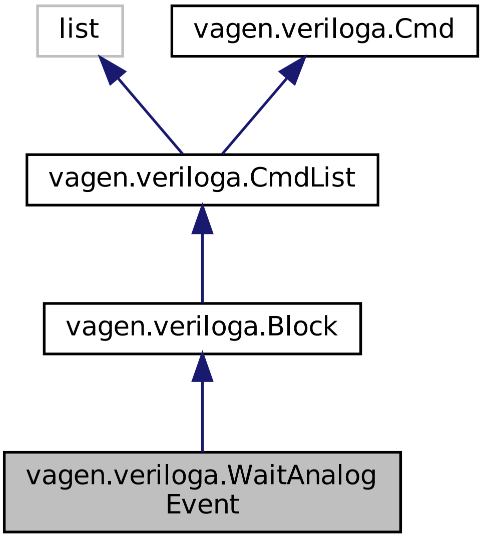
The documentation for this class was generated from the following file:

- hilevelmod.py

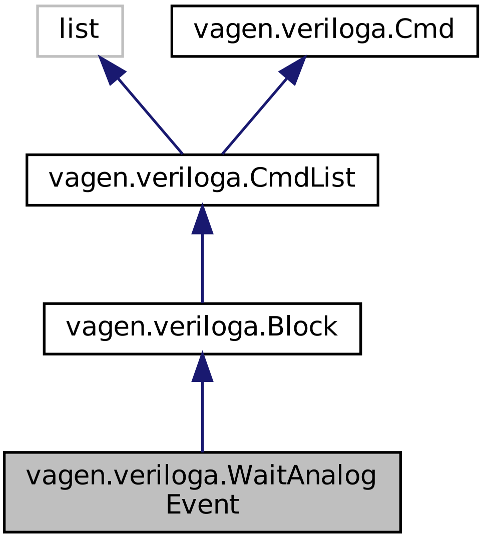
7.41 vagen.veriloga.WaitAnalogEvent Class Reference

Wait analog event class.

Inheritance diagram for vagen.veriloga.WaitAnalogEvent:



Collaboration diagram for vagen.veriloga.WaitAnalogEvent:



Public Member Functions

- def __init__ (self, event, ∗cmds)

  Constructor.

Additional Inherited Members

7.41.1 Detailed Description

Wait analog event class.

7.41.2 Constructor & Destructor Documentation

7.41.2.1 __init__()

```
def vagen.veriloga.WaitAnalogEvent.__init__ (
              self,
              event,
             * cmds )
```

Constructor.

Parameters

self	object pointer
event	Event to be waited for
∗*cmds*	variable number of Cmd or CmdList to be added

Reimplemented from vagen.veriloga.Block.

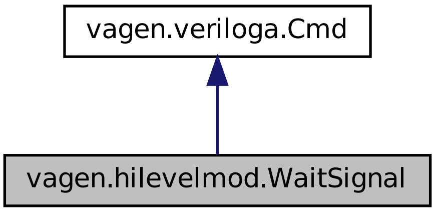
The documentation for this class was generated from the following file:

- veriloga.py

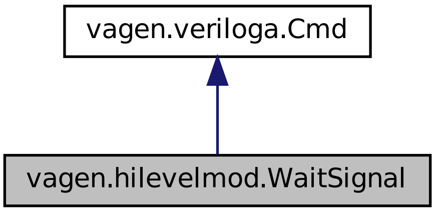
7.42 vagen.hilevelmod.WaitSignal Class Reference

WaitSignal command class.

Inheritance diagram for vagen.hilevelmod.WaitSignal:



Collaboration diagram for vagen.hilevelmod.WaitSignal:



Public Member Functions

- def __init__ (self, evnt)

  Construtor.
- def getEvnt (self)

  Return the event that triggers the next state.
- def __str__ (self)

  Dummy method.
- def getVA (self, padding)

  Dummy method.

Public Attributes

- **evnt**

7.42.1 Detailed Description

WaitSignal command class.
This class of commands are responsible for wating a specific Event before allowing a test sequence to continue

7.42.2 Constructor & Destructor Documentation

7.42.2.1 __init__()

```
def vagen.hilevelmod.WaitSignal.__init__ (
              self,
              evnt )
```

Construtor.

Parameters

self	The object pointer.
evnt	Event to be waited for.

Reimplemented from vagen.veriloga.Cmd.

7.42.3 Member Function Documentation

7.42.3.1 __str__()

```
def vagen.hilevelmod.WaitSignal.__str__ (
              self )
```

Dummy method.
Raise exception when runned.

Parameters

self	The object pointer.

Reimplemented from vagen.veriloga.Cmd.

7.42.3.2 getEvnt()

```
def vagen.hilevelmod.WaitSignal.getEvnt (
              self )
```

Return the event that triggers the next state.

Parameters

self	The object pointer.

Returns

Event passed to the constructor.

7.42.3.3 getVA()

```
def vagen.hilevelmod.WaitSignal.getVA (
              self,
              padding )
```

Dummy method.
Raise exception when runned.

Parameters

self	The object pointer.

Reimplemented from vagen.veriloga.Cmd.

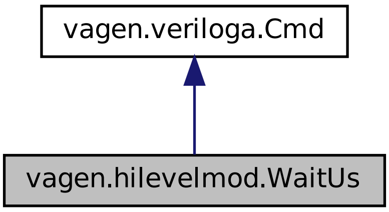
The documentation for this class was generated from the following file:

- hilevelmod.py

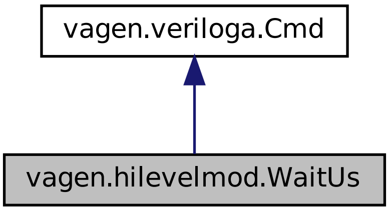
7.43 vagen.hilevelmod.WaitUs Class Reference

WaitUs command class.

Inheritance diagram for vagen.hilevelmod.WaitUs:



Collaboration diagram for vagen.hilevelmod.WaitUs:



Public Member Functions

- def __init__ (self, delay)

  Construtor.
- def getDelay (self)

  Return the delay that triggers the next state.
- def __str__ (self)

  Dummy method.
- def getVA (self, padding)

  Dummy method.

Public Attributes

- **delay**

7.43.1 Detailed Description

WaitUs command class.
This class of commands are responsible for wating a specific delay before allowing a test sequence to continue.

7.43.2 Constructor & Destructor Documentation

7.43.2.1 __init__()

```
def vagen.hilevelmod.WaitUs.__init__ (
              self,
              delay )
```

Construtor.

Parameters

self	The object pointer.
delay	Delay to be waited for.

Reimplemented from vagen.veriloga.Cmd.

7.43.3 Member Function Documentation

7.43.3.1 __str__()

```
def vagen.hilevelmod.WaitUs.__str__ (
              self )
```

Dummy method.
Raise exception when runned.

Parameters

self	The object pointer.

Reimplemented from vagen.veriloga.Cmd.

7.43.3.2 getDelay()

```
def vagen.hilevelmod.WaitUs.getDelay (
              self )
```

Return the delay that triggers the next state.

Parameters

self	The object pointer.

Returns

Delay passed to the constructor.

7.43.3.3 getVA()

```
def vagen.hilevelmod.WaitUs.getVA (
              self,
              padding )
```

Dummy method.
Raise exception when runned.

Parameters

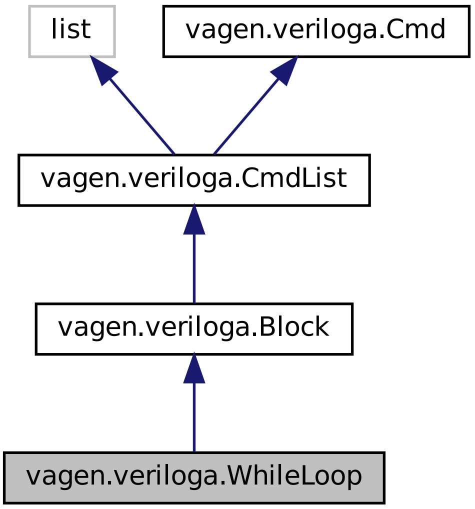
self	The object pointer.

Reimplemented from vagen.veriloga.Cmd.
The documentation for this class was generated from the following file:

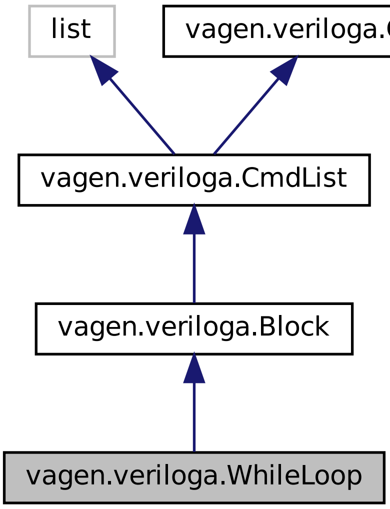
- hilevelmod.py

7.44 vagen.veriloga.WhileLoop Class Reference

WhileLoop class.
Inheritance diagram for vagen.veriloga.WhileLoop:



Collaboration diagram for vagen.veriloga.WhileLoop:



Public Member Functions

- def __init__ (self, cond, ∗cmds)

  Constructor.
- def getCond (self)

  Return the while loop condition.

Public Attributes

- **cond**

7.44.1 Detailed Description

WhileLoop class.

7.44.2 Constructor & Destructor Documentation

7.44.2.1 __init__()

```
def vagen.veriloga.WhileLoop.__init__ (
              self,
              cond,
             ∗ cmds )
```

Constructor.

Parameters

self	object pointer
cond	Bool class or build-in bool representing the condition that must be satisfied in order repeat the sequence of commands in the block

Parameters

∗*cmds*	variable number of Cmd or CmdList to be added

Reimplemented from vagen.veriloga.Block.

7.44.3 Member Function Documentation

7.44.3.1 getCond()

```
def vagen.veriloga.WhileLoop.getCond (
              self )
```

Return the while loop condition.

Parameters

self	object pointer

Returns

Bool class representing the condition that must be satisfied in order repeat the sequence of commands in the block

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

- veriloga.py

Chapter 8

File Documentation

8.1 hilevelmod.py File Reference

Hi level modeling.

Classes

- class vagen.hilevelmod.Mark

  Mark command class.
- class vagen.hilevelmod.Marker

  Marker class.
- class vagen.hilevelmod.WaitSignal

  WaitSignal command class.
- class vagen.hilevelmod.WaitUs

  WaitUs command class.
- class vagen.hilevelmod.Bus

  Bus class.
- class vagen.hilevelmod.Vdc

  Vdc class.
- class vagen.hilevelmod.VdcBus

  VdcBus class.
- class vagen.hilevelmod.Idc

  Idc class.
- class vagen.hilevelmod.IdcBus

  IdcBus class.
- class vagen.hilevelmod.Smu

  Smu class.
- class vagen.hilevelmod.SmuBus

  SmuBus class.
- class vagen.hilevelmod.DigOut

  DigOut class.
- class vagen.hilevelmod.DigIn

  DigIn class.
- class vagen.hilevelmod.DigInOut

  DigInOut class.
- class vagen.hilevelmod.DigBusOut

  DigBusOut class.
- class vagen.hilevelmod.DigBusIn

  DigBusIn class.

- class vagen.hilevelmod.DigBusInOut

  DigBusInOut class.
- class vagen.hilevelmod.Sw

  Sw class.
- class vagen.hilevelmod.Clock

  Clock class.
- class vagen.hilevelmod.HiLevelMod

  HiLevelMod class.

8.1.1 Detailed Description

Hi level modeling.

8.1.2 License

Author

Rodrigo Pedroso Mendes

Version

V1.0

Date

14/02/23 13:37:31

8.2 veriloga.py File Reference

VerilogA modeling.

Classes

- class vagen.veriloga.Real

  Class of Real operators.
- class vagen.veriloga.Bool

  Class of Bool operators.
- class vagen.veriloga.Integer

  Class of Integer operators.
- class vagen.veriloga.IntegerVar

Integer variable class.
- class vagen.veriloga.RealVar

  Real variable class.
- class vagen.veriloga.BoolVar

  Boolean variable class.
- class vagen.veriloga.Event

  Class of events.
- class vagen.veriloga.Cmd

  Command class.
- class vagen.veriloga.CmdList

  Command List class.
- class vagen.veriloga.Block

  Command Block Class.
- class vagen.veriloga.WaitAnalogEvent

  Wait analog event class.
- class vagen.veriloga.Cross

  Cross Class.
- class vagen.veriloga.Above

  Above Class.
- class vagen.veriloga.Timer

  Timer Class.
- class vagen.veriloga.InitialStep

  InitialStep class.
- class vagen.veriloga.FinalStep

  FinalStep class.
- class vagen.veriloga.RepeatLoop

  RepeatLoop class
- class vagen.veriloga.WhileLoop

  WhileLoop class.
- class vagen.veriloga.ForLoop

  ForLoop class.
- class vagen.veriloga.Cond

  Condition Class.
- class vagen.veriloga.CaseClass

  Condition Class.
- class vagen.veriloga.Electrical

  Class of electrical signals.
- class vagen.veriloga.Branch

  Branch class.
- class vagen.veriloga.Module

  verilogA class

Functions

- def vagen.veriloga.checkType (param, var, Type)

  Check if the type of variable matches the Type.
- def vagen.veriloga.checkInstance (param, var, Type)

  Check if the variable is an instance of Type.
- def vagen.veriloga.checkNotInstance (param, var, Type)

  Check if the variable isn't an instance of Type.

- def vagen.veriloga.parseReal (param, var)

    Return a Real instance.
- def vagen.veriloga.checkReal (param, var)

    Check if the var is Real or it can be parsed to Real.
- def vagen.veriloga.parseInteger (param, var)

    Return an Integer instance.
- def vagen.veriloga.checkInteger (param, var)

    Check if the variable is Integer or can be parsed to Integer.
- def vagen.veriloga.parseBool (param, var)

    Return a Bool instance.
- def vagen.veriloga.checkBool (param, var)

    Check if the variable is Bool or can be parsed to Bool.
- def vagen.veriloga.parseNumber (param, var)

    Return a Real, Integer or Boolean instance.
- def vagen.veriloga.checkNumber (param, var)

    Check if the variable is a number or can be parsed to Bool.
- def vagen.veriloga.blockComment (padding, message, align="center")

    Creates a comment block.
- def vagen.veriloga.block (header)

    Returns the pointer to a function that add commands to an analog event.
- def vagen.veriloga.At (event)

    Returns the pointer to a function that add commands to an analog event.
- def vagen.veriloga.unfoldSimTypes (∗simTypes)

    Unfold variable number of simulation types.
- def vagen.veriloga.analysis (∗simTypes)

    Type of analysis.
- def vagen.veriloga.acStim (mag, phase=0, simType="ac")

    ac stimulus
- def vagen.veriloga.Repeat (n)

    Returns the pointer to a function that add commands to an Repeat block.
- def vagen.veriloga.While (cond)

    Returns the pointer to a function that add commands to a While loop.
- def vagen.veriloga.For (start, cond, inc)

    Returns the pointer to a function that add commands to a ForLoop.
- def vagen.veriloga.If (cond)

    Returns the pointer to a function that add commands to a Cond Class.
- def vagen.veriloga.Case (test)

    Returns the pointer to a function that add commands to a Block.
- def vagen.veriloga.unfoldParams (∗params)

    Unfold variable number of parameters.
- def vagen.veriloga.Strobe (msg, ∗params)

    Strobe.
- def vagen.veriloga.Write (msg, ∗params)

    Write.
- def vagen.veriloga.Fopen (fileName)

    Fopen.
- def vagen.veriloga.Fclose (desc)

    Fclose.
- def vagen.veriloga.Fstrobe (desc, msg, ∗params)

    Fstrobe.
- def vagen.veriloga.Fwrite (desc, msg, ∗params)

Fwrite.

- def vagen.veriloga.Discontinuity (degree=0)

  discontinuity

- def vagen.veriloga.Finish ()

  finish

- def vagen.veriloga.BoundStep (step)

  bond step

- def vagen.veriloga.lastCrossing (signal, threshold, edge='both')

  last time a signal crossed a treshold

- def vagen.veriloga.random (seed)

  random number generator

- def vagen.veriloga.uDistInt (seed, start, end)

  Uniforme distribution random number generator.

- def vagen.veriloga.uDistReal (seed, start, end)

  Uniforme distribution random number generator.

- def vagen.veriloga.gaussDistInt (seed, mean, std)

  Gaussian distribution random number generator.

- def vagen.veriloga.gaussDistReal (seed, mean, std)

  Gaussian distribution random number generator.

- def vagen.veriloga.expDistInt (seed, mean)

  Exponential distribution random number generator.

- def vagen.veriloga.expDistReal (seed, mean)

  Exponential distribution random number generator.

- def vagen.veriloga.poissonDistInt (seed, mean)

  Poisson distribution random number generator.

- def vagen.veriloga.poissonDistReal (seed, mean)

  Poisson distribution random number generator.

- def vagen.veriloga.exp (x)

  Exponential function.

- def vagen.veriloga.limexp (x)

  Limited Exponential function.

- def vagen.veriloga.absDelay (x, delay)

  Absolute Delay.

- def vagen.veriloga.transition (x, delay=0, riseTime=1e-6, fallTime=1e-6)

  transition filter

- def vagen.veriloga.ternary (test, op1, op2)

  ternary function

- def vagen.veriloga.slew (x, riseSlope=10e-6, fallSlope=10e-6)

  slew filter

- def vagen.veriloga.ddt (x)

  Diferential function.

- def vagen.veriloga.idt (x, start=Real(0))

  Integral function.

- def vagen.veriloga.ceil (x)

  Ceil function.

- def vagen.veriloga.floor (x)

  floor function

- def vagen.veriloga.ln (x)

  natural log function

- def vagen.veriloga.log (x)

  log function

- def vagen.veriloga.sqrt (x)

  square root function
- def vagen.veriloga.sin (x)

  sin function
- def vagen.veriloga.cos (x)

  cos function
- def vagen.veriloga.tan (x)

  tan function
- def vagen.veriloga.asin (x)

  arc sin function
- def vagen.veriloga.acos (x)

  arc cos function
- def vagen.veriloga.atan (x)

  arc tan function
- def vagen.veriloga.atan2 (x, y)

  arc tanh2 function.
- def vagen.veriloga.hypot (x, y)

  hypot function.
- def vagen.veriloga.sinh (x)

  sinh function
- def vagen.veriloga.cosh (x)

  cosh function
- def vagen.veriloga.tanh (x)

  tanh function
- def vagen.veriloga.asinh (x)

  arc sinh function
- def vagen.veriloga.acosh (x)

  arc cosh function
- def vagen.veriloga.atanh (x)

  arc tanh function

Variables

- list vagen.veriloga.anaTypes

  types of analysis
- vagen.veriloga.temp = Real("$temperature")

  Constants for tasks that represents numbers.
- **vagen.veriloga.abstime** = Real("$abstime")
- **vagen.veriloga.vt** = Real("$vt")

8.2.1 Detailed Description

VerilogA modeling.

8.2.2 License

Author

Rodrigo Pedroso Mendes

Version

V1.0

Date

05/02/23 22:36:08

8.2.3 Function Documentation

8.2.3.1 absDelay()

```
def vagen.veriloga.absDelay (
              x,
              delay )
```

Absolute Delay.

Parameters

x	Real, float or int input
delay	Real, float or int delay input

Returns

Real expressing the absolute delay function

8.2.3.2 acos()

```
def vagen.veriloga.acos (
              x )
```

arc cos function

Parameters

x	Real, float or int angle input

Returns

Real expressing the arc cos function in radians

8.2.3.3 acosh()

```
def vagen.veriloga.acosh (
              x )
```

arc cosh function

Parameters

x	Real, float or int angle input

Returns

Real expressing the arc cosh function in radians

8.2.3.4 acStim()

```
def vagen.veriloga.acStim (
              mag,
              phase = 0,
              simType = "ac" )
```

ac stimulus

Parameters

mag	Real class or build-in real representing the magnitude
phase	Real class or build-in representing the phase (default it 0)
simType	string representing the simulation type (default is "ac")

Returns

Real expression representing the ac stimulus command

8.2.3.5 analysis()

```
def vagen.veriloga.analysis (
             * simTypes )
```

Type of analysis.

Parameters

∗*simTypes*	optional parameters representing the simulation type

Returns

Bool expression representing the analysis type test

8.2.3.6 asin()

```
def vagen.veriloga.asin (
              x )
```

arc sin function

Parameters

x	Real, float or int angle input

Returns

Real expressing the arc sin function in radians

8.2.3.7 asinh()

```
def vagen.veriloga.asinh (
              x )
```

arc sinh function

Parameters

x	Real, float or int angle input

Returns

Real expressing the arc sinh function in radians

8.2.3.8 At()

```
def vagen.veriloga.At (
              event )
```

Returns the pointer to a function that add commands to an analog event.

Parameters

event	instance of the Event class representing the analog event

Returns

function pointer

8.2.3.9 atan()

```
def vagen.veriloga.atan (
              x )
```

arc tan function

Parameters

x	Real, float or int angle input

Returns

Real expressing the arc tan function in radians

8.2.3.10 atan2()

```
def vagen.veriloga.atan2 (
              x,
              y )
```

arc tanh2 function.
Equivalent to atan(x/y)

Parameters

x	Real, float or int angle input
x	Real, float or int angle input

Returns

Real expressing the arc tan function in radians

8.2.3.11 atanh()

```
def vagen.veriloga.atanh (
              x )
```

arc tanh function

Parameters

x	Real, float or int angle input

Returns

Real expressing the arc tanh function in radians

8.2.3.12 block()

```
def vagen.veriloga.block (
              header )
```

Returns the pointer to a function that add commands to an analog event.

Parameters

header	header of the block

Returns

pointer to a function that creates a block object

8.2.3.13 blockComment()

```
def vagen.veriloga.blockComment (
              padding,
              message,
              align = "center" )
```

Creates a comment block.

Parameters

message	String representing the comment
padding	Number of tabs by which the text will be shifted left align center, left or right

Returns

The comment block.

8.2.3.14 BoundStep()

```
def vagen.veriloga.BoundStep (
              step )
```

bond step

Parameters

step	Real, float or int representing the step

Returns

Cmd representing the BondStep

8.2.3.15 Case()

```
def vagen.veriloga.Case (
              test )
```

Returns the pointer to a function that add commands to a Block.

Parameters

variable	under test of the case structure

Returns

pointer to a function that returns a CaseClass

8.2.3.16 ceil()

```
def vagen.veriloga.ceil (
              x )
```

Ceil function.

Parameters

x	Real, float or int input

Returns

Integer expressing the ceil function

8.2.3.17 checkBool()

```
def vagen.veriloga.checkBool (
              param,
              var )
```

Check if the variable is Bool or can be parsed to Bool.

Parameters

param	String representing the name of the variable.
var	Variable.

Returns

True if it can be parsed to Bool or False otherwise.

8.2.3.18 checkInstance()

```
def vagen.veriloga.checkInstance (
              param,
              var,
              Type )
```

Check if the variable is an instance of Type.
Raise an assertion error if it doesn't.

Parameters

param	String representing the name of the variable.
var	Variable.
Type	Type that the variable should match.

Returns

True if it is an instance or False otherwise.

8.2.3.19 checkInteger()

```
def vagen.veriloga.checkInteger (
              param,
              var )
```

Check if the variable is Integer or can be parsed to Integer.

Parameters

param	String representing the name of the variable.
var	Variable.

Returns

True if it can be parsed to Integer or False otherwise.

8.2.3.20 checkNotInstance()

```
def vagen.veriloga.checkNotInstance (
              param,
              var,
              Type )
```

Check if the variable isn't an instance of Type.
Raise an assertion error if it doesn't.

Parameters

param	String representing the name of the variable.
var	Variable.
Type	Type that the variable should match.

Returns

False if it is an instance or True otherwise.

8.2.3.21 checkNumber()

```
def vagen.veriloga.checkNumber (
              param,
              var )
```

Check if the variable is a number or can be parsed to Bool.

Parameters

param	String representing the name of the variable.
var	Variable.

Returns

True if it can be parsed to number or False otherwise.

8.2.3.22 checkReal()

```
def vagen.veriloga.checkReal (
              param,
              var )
```

Check if the var is Real or it can be parsed to Real.

Parameters

param	String representing the name of the variable.
var	Variable.

Returns

True if it can be parsed to Real or False otherwise.

8.2.3.23 checkType()

```
def vagen.veriloga.checkType (
              param,
              var,
              Type )
```

Check if the type of variable matches the Type.
Raise an assertion error if it doesn't.

Parameters

param	String representing the name of the variable.
var	Variable.
Type	Type that the variable should match.

Returns

True if it matches the type or False otherwise.

8.2.3.24 cos()

```
def vagen.veriloga.cos (
              x )
```

cos function

Parameters

x	Real, float or int angle in radians

Returns

Real expressing the cos function

8.2.3.25 cosh()

```
def vagen.veriloga.cosh (
              x )
```

cosh function

Parameters

x	Real, float or int angle in radians

Returns

Real expressing the cosh function

8.2.3.26 ddt()

```
def vagen.veriloga.ddt (
              x )
```

Diferential function.

Parameters

x	Real, float or int input

Returns

Real expressing the diferential function

8.2.3.27 Discontinuity()

```
def vagen.veriloga.Discontinuity (
              degree = 0 )
```

discontinuity

Parameters

degree	Integer or int representing the degree of the derivative with discontinuity

Returns

Cmd representing the discontinuity

8.2.3.28 exp()

```
def vagen.veriloga.exp (
              x )
```

Exponential function.

Parameters

x	Real, float or int input

Returns

Real expressing the exponential function

8.2.3.29 expDistInt()

```
def vagen.veriloga.expDistInt (
              seed,
              mean )
```

Exponential distribution random number generator.

Parameters

seed	IntegerVar with the seed
mean	Integer or int representing the start of the range

Returns

random Integer

8.2.3.30 expDistReal()

```
def vagen.veriloga.expDistReal (
              seed,
              mean )
```

Exponential distribution random number generator.

Parameters

seed	IntegerVar with the seed
mean	Real, float or int representing the start of the range

Returns

random Real

8.2.3.31 Fclose()

```
def vagen.veriloga.Fclose (
              desc )
```

Fclose.

Parameters

desc	Integer or int representing the file descriptor

Returns

Cmd to close the file

8.2.3.32 Finish()

```
def vagen.veriloga.Finish ( )
```

finish

Returns

Cmd representing the finish

8.2.3.33 floor()

```
def vagen.veriloga.floor (
              x )
```

floor function

Parameters

x	Real, float or int input

Returns

Integer expressing the floor function

8.2.3.34 Fopen()

```
def vagen.veriloga.Fopen (
              fileName )
```

Fopen.

Parameters

fileName	name of the file

Returns

Integer representing the file descriptor

8.2.3.35 For()

```
def vagen.veriloga.For (
              start,
              cond,
              inc )
```

Returns the pointer to a function that add commands to a ForLoop.

Parameters

start	command executed at the beggining

Parameters

cond	condition that must be satisfied in order repeat the sequence of commands in the block
inc	command executed at the end of each step

Returns

pointer to a function that returns a ForLoop class

8.2.3.36 Fstrobe()

```
def vagen.veriloga.Fstrobe (
              desc,
              msg,
             * params )
```

Fstrobe.

Parameters

desc	Integer or int representing the file descriptor
msg	message to be written
∗*params*	variable number of parameters

Returns

Cmd representing the Fstrobe

8.2.3.37 Fwrite()

```
def vagen.veriloga.Fwrite (
              desc,
              msg,
             * params )
```

Fwrite.

Parameters

desc	Integer or int representing the file descriptor
msg	message to be written
∗*params*	variable number of parameters

Returns

Cmd representing the FWrite

8.2.3.38 gaussDistInt()

```
def vagen.veriloga.gaussDistInt (
              seed,
              mean,
              std )
```

Gaussian distribution random number generator.

Parameters

seed	IntegerVar with the seed
mean	Integer or int representing the start of the range
std	Integer or int representing the end of the range

Returns

random Integer

8.2.3.39 gaussDistReal()

```
def vagen.veriloga.gaussDistReal (
              seed,
              mean,
              std )
```

Gaussian distribution random number generator.

Parameters

seed	IntegerVar with the seed
mean	Real, float or int representing the start of the range
std	Real, float or int representing the end of the range

Returns

random Real

8.2.3.40 hypot()

```
def vagen.veriloga.hypot (
              x,
              y )
```

hypot function.
Equivalent to sqrt(x∗x + y∗y)

Parameters

x	Real, float or int angle input
x	Real, float or int angle input

Returns

Real expressing the hypot function

8.2.3.41 idt()

```
def vagen.veriloga.idt (
              x,
              start = Real(0) )
```

Integral function.

Parameters

x	Real, float or int input

Parameters

start	Real, float or int input

Returns

Real expressing the integral function

8.2.3.42 If()

```
def vagen.veriloga.If (
              cond )
```

Returns the pointer to a function that add commands to a Cond Class.

Parameters

cond	condition that must be satisfied in order to run the sequence of commands in the block

Returns

pointer to a function that returns a Cmd class

8.2.3.43 lastCrossing()

```
def vagen.veriloga.lastCrossing (
              signal,
              threshold,
              edge = 'both' )
```

last time a signal crossed a treshold

Parameters

signal	Real, float or int representing the signal
threshold	Real, float or int representing the threshold that must be crossed
edge	It can be one the strings "rising", "falling" or "both"

Returns

Real class representing the last crossing.

8.2.3.44 limexp()

```
def vagen.veriloga.limexp (
              x )
```

Limited Exponential function.

Parameters

x	Real, float or int input

Returns

Real expressing the limited exponential function

8.2.3.45 ln()

```
def vagen.veriloga.ln (
              x )
```

natural log function

Parameters

x	Real, float or int input

Returns

Real expressing the natural log function

8.2.3.46 log()

```
def vagen.veriloga.log (
              x )
```

log function

Parameters

x	Real, float or int input

Returns

Real expressing the log function

8.2.3.47 parseBool()

```
def vagen.veriloga.parseBool (
              param,
              var )
```

Return a Bool instance.

Parameters

param	String representing the name of the variable.
var	Variable.

Returns

Bool object.

8.2.3.48 parseInteger()

```
def vagen.veriloga.parseInteger (
              param,
              var )
```

Return an Integer instance.

Parameters

param	String representing the name of the variable.
var	Variable.

Returns

Integer object.

8.2.3.49 parseNumber()

```
def vagen.veriloga.parseNumber (
              param,
              var )
```

Return a Real, Integer or Boolean instance.

Parameters

param	String representing the name of the variable.
var	Variable.

Returns

Real, Integer or Bool instance.

8.2.3.50 parseReal()

```
def vagen.veriloga.parseReal (
              param,
              var )
```

Return a Real instance.

Parameters

param	String representing the name of the variable.
var	Variable.

Returns

Real object.

8.2.3.51 poissonDistInt()

```
def vagen.veriloga.poissonDistInt (
              seed,
              mean )
```

Poisson distribution random number generator.

Parameters

seed	IntegerVar with the seed
mean	Integer or int representing the start of the range

Returns

random Integer

8.2.3.52 poissonDistReal()

```
def vagen.veriloga.poissonDistReal (
              seed,
              mean )
```

Poisson distribution random number generator.

Parameters

seed	IntegerVar with the seed
mean	Real, float or int representing the start of the range

Returns

random Real

8.2.3.53 random()

```
def vagen.veriloga.random (
              seed )
```

random number generator

Parameters

seed	IntegerVar with the seed

Returns

random Integer

8.2.3.54 Repeat()

```
def vagen.veriloga.Repeat (
              n )
```

Returns the pointer to a function that add commands to an Repeat block.

Parameters

n	Integer class or int representing the number of times the sequence must be repeated

Returns

pointer to a function that returns a RepeatLoop class

8.2.3.55 sin()

```
def vagen.veriloga.sin (
              x )
```

sin function

Parameters

x	Real, float or int angle in radians

Returns

Real expressing the sin function

8.2.3.56 sinh()

```
def vagen.veriloga.sinh (
              x )
```

sinh function

Parameters

x	Real, float or int angle in radians

Returns

Real expressing the sinh function

8.2.3.57 slew()

```
def vagen.veriloga.slew (
              x,
              riseSlope = 10e-6,
              fallSlope = 10e-6 )
```

slew filter

Parameters

x	Real, float or int input
riseSlope	Real, float or int delay input
fallSlope	Real, float or int delay input

Returns

Real expressing the slew filter

8.2.3.58 sqrt()

```
def vagen.veriloga.sqrt (
              x )
```

square root function

Parameters

x	Real, float or int input

Returns

Real expressing the square root function

8.2.3.59 Strobe()

```
def vagen.veriloga.Strobe (
              msg,
             * params )
```

Strobe.

Parameters

msg	message to be printed

Parameters

∗*params*	variable number of parameters

Returns

Cmd representing the strobe

8.2.3.60 tan()

```
def vagen.veriloga.tan (
              x )
```

tan function

Parameters

x	Real, float or int angle in radians

Returns

Real expressing the tan function

8.2.3.61 tanh()

```
def vagen.veriloga.tanh (
              x )
```

tanh function

Parameters

x	Real, float or int angle in radians

Returns

Real expressing the tanh function

8.2.3.62 ternary()

```
def vagen.veriloga.ternary (
              test,
              op1,
              op2 )
```

ternary function

Parameters

test	Bool or bool representing the test
op1	any Bool, Real, Integer, int, float or bool that represents the expression when test is true
op2	any Bool, Real, Integer, int, float or bool that represents the expression when test is false

Returns

Bool, Real or Inteter representing the ternary operator

8.2.3.63 transition()

```
def vagen.veriloga.transition (
              x,
              delay = 0,
              riseTime = 1e-6,
              fallTime = 1e-6 )
```

transition filter

Parameters

x	Real, float or int input
delay	Real, float or int delay input
riseTime	delay Real, float or int delay input
fallTime	delay Real, float or int delay input

Returns

Real expressing the transition filter

8.2.3.64 uDistInt()

```
def vagen.veriloga.uDistInt (
              seed,
              start,
              end )
```

Uniforme distribution random number generator.

Parameters

seed	IntegerVar with the seed
start	Integer or int representing the start of the range
end	Integer or int representing the end of the range

Returns

random Integer

8.2.3.65 uDistReal()

```
def vagen.veriloga.uDistReal (
              seed,
              start,
              end )
```

Uniforme distribution random number generator.

Parameters

seed	IntegerVar with the seed
start	Real, float or int representing the start of the range
end	Real, float or int representing the end of the range

Returns

random Real

8.2.3.66 unfoldParams()

```
def vagen.veriloga.unfoldParams (
            * params )
```

Unfold variable number of parameters.

Parameters

**params*	variable number of parameters

Returns

string representing the parameters separeted by comma

8.2.3.67 unfoldSimTypes()

```
def vagen.veriloga.unfoldSimTypes (
            * simTypes )
```

Unfold variable number of simulation types.

Parameters

list	of simulation types

Returns

string with the unfolded simulation types

8.2.3.68 While()

```
def vagen.veriloga.While (
             cond )
```

Returns the pointer to a function that add commands to a While loop.

Parameters

cond	Bool class or build-in bool representing the condition that must be satisfied in order repeat the sequence of commands in the block

Returns

pointer to a function that returns a WhileLoop class

8.2.3.69 Write()

```
def vagen.veriloga.Write (
             msg,
            * params )
```

Write.

Parameters

msg	message to be printed
∗*params*	variable number of parameters

Returns

Cmd representing the Write

8.2.4 Variable Documentation

8.2.4.1 anaTypes

```
list vagen.veriloga.anaTypes
```

Initial value:

```
=  ["ac",
            "dc",
            "ic",
            "tran",
            "pac",
            "pnoise",
            "pss",
            "pxf",
            "sp",
            "static",
            "tdr",
            "xf"]
```

types of analysis

8.2.4.2 temp

```
vagen.veriloga.temp = Real("$temperature")
```

Constants for tasks that represents numbers.

Index