LogicSim

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Chapter 1

DejaVu fonts v2.37

1.0.1 DejaVu License

Chapter 2

jQuery v3.7.1

2.0.1 jQuery License

Chapter 3

jQuery UI v1.14.1

3.0.1 jQuery UI License

Chapter 4

Hierarchical Index

4.1 Class Hierarchy

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

Chapter 5

Class Index

5.1 Class List

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

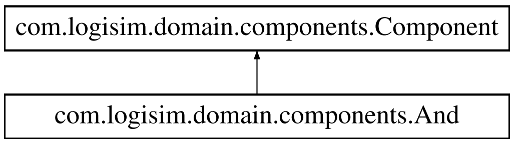
Chapter 6

Class Documentation

6.1 com.logisim.domain.components.And Class Reference

Represents a logical AND gate component within the circuit simulation.

Inheritance diagram for com.logisim.domain.components.And:


com.logisim.domain.components.Component
com.logisim.domain.components.And

Public Member Functions

- And ()

  Constructs a new AND gate component with default settings.
- boolean getOutput ()

  Retrieves the current state of the AND gate's output pin.
- void execute ()

  Executes the logic of the AND gate.

Public Member Functions inherited from com.logisim.domain.components.Component

- Component ()

  Default constructor.
- Component (String name)

  Constructs a component with a specified name.
- void setInput (int index, boolean value)

  Sets the state of a specific input pin.
- boolean getOutput (int index)

  Retrieves the state of a specific output pin.
- String getName ()

  Gets the name of the component.
- void setName (String name)

Sets the name of the component.
- boolean[ ] getInputs ()

  Retrieves the entire array of input pin states.
- void setInputs (boolean[ ] inputs)

  Sets the entire array of input pin states.
- boolean[ ] getOutputs ()

  Retrieves the entire array of output pin states.
- void setOutputs (boolean[ ] outputs)

  Sets the entire array of output pin states.
- double getPositionX ()

  Gets the X-coordinate of the component.
- double getPositionY ()

  Gets the Y-coordinate of the component.
- void setPositionX (double positionX)

  Sets the X-coordinate of the component.
- void setPositionY (double positionY)

  Sets the Y-coordinate of the component.
- String getUuid ()

  Gets the unique identifier (UUID) of the component.
- void setUuid (String uuid)

  Sets the unique identifier (UUID) of the component.

Additional Inherited Members

Protected Attributes inherited from com.logisim.domain.components.Component

- String **name**

  The name or type identifier of the component (e.g., "and", "or").
- boolean[ ] inputs

  An array representing the state of the component's input pins.
- boolean[ ] outputs

  An array representing the state of the component's output pins.
- double **positionX**

  The X-coordinate of the component's position in the visual interface.
- double **positionY**

  The Y-coordinate of the component's position in the visual interface.

6.1.1 Detailed Description

Represents a logical AND gate component within the circuit simulation.

This component accepts two boolean inputs and produces a single boolean output. The output is true if and only if both inputs are true; otherwise, the output is false.

6.1.2 Constructor & Destructor Documentation

6.1.2.1 And()

```
com.logisim.domain.components.And.And ()
```

Constructs a new AND gate component with default settings.

Initializes the component with:

- Name: "and"
- Input array size: 2
- Output array size: 1
- Default position: (100, 100)
- Initial state: All inputs and outputs set to false.

6.1.3 Member Function Documentation

6.1.3.1 execute()

```
void com.logisim.domain.components.And.execute ()
```

Executes the logic of the AND gate.

This method updates the internal output state based on the current values of the input pins. The output at index 0 is set to `true` only if both input index 0 and input index 1 are `true`.

Reimplemented from com.logisim.domain.components.Component.

6.1.3.2 getOutput()

```
boolean com.logisim.domain.components.And.getOutput ()
```

Retrieves the current state of the AND gate's output pin.

This is a convenience method that delegates to the superclass's `Component#getOutput(int)` method with index 0.

Returns

`true` if the gate is outputting a high signal, `false` otherwise.

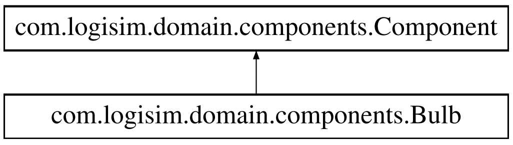
The documentation for this class was generated from the following file:

- src/main/java/com/logisim/domain/components/And.java

6.2 com.logisim.domain.components.Bulb Class Reference

Represents a light bulb component in the circuit simulation.

Inheritance diagram for com.logisim.domain.components.Bulb:


com.logisim.domain.components.Component
com.logisim.domain.components.Bulb

Public Member Functions

- Bulb ()

  Constructs a new Bulb component.
- void execute ()

  Updates the state of the bulb based on the current input.
- boolean isOn ()

  Checks if the bulb is currently illuminated.
- String getName ()

  Retrieves the unique type name of this component.

Public Member Functions inherited from com.logisim.domain.components.Component

- Component ()

  Default constructor.
- Component (String name)

  Constructs a component with a specified name.
- void setInput (int index, boolean value)

  Sets the state of a specific input pin.
- boolean getOutput (int index)

  Retrieves the state of a specific output pin.
- void setName (String name)

  Sets the name of the component.
- boolean[ ] getInputs ()

  Retrieves the entire array of input pin states.
- void setInputs (boolean[ ] inputs)

  Sets the entire array of input pin states.
- boolean[ ] getOutputs ()

  Retrieves the entire array of output pin states.
- void setOutputs (boolean[ ] outputs)

  Sets the entire array of output pin states.
- double getPositionX ()

  Gets the X-coordinate of the component.
- double getPositionY ()

  Gets the Y-coordinate of the component.
- void setPositionX (double positionX)

  Sets the X-coordinate of the component.
- void setPositionY (double positionY)

  Sets the Y-coordinate of the component.
- String getUuid ()

  Gets the unique identifier (UUID) of the component.
- void setUuid (String uuid)

  Sets the unique identifier (UUID) of the component.

Private Attributes

- boolean **isOn**

  Internal state indicating whether the bulb is currently illuminated.

Additional Inherited Members

Protected Attributes inherited from com.logisim.domain.components.Component

- String **name**

  The name or type identifier of the component (e.g., "and", "or").
- boolean[ ] inputs

  An array representing the state of the component's input pins.
- boolean[ ] outputs

  An array representing the state of the component's output pins.
- double **positionX**

  The X-coordinate of the component's position in the visual interface.
- double **positionY**

  The Y-coordinate of the component's position in the visual interface.

6.2.1 Detailed Description

Represents a light bulb component in the circuit simulation.

The Bulb serves as a visual output device. It accepts a single input signal. When the input signal is high (true), the bulb is considered "on" or illuminated. When the input signal is low (false), the bulb is "off".

6.2.2 Constructor & Destructor Documentation

6.2.2.1 Bulb()

```
com.logisim.domain.components.Bulb.Bulb ()
```

Constructs a new Bulb component.

Initializes the component with:

- 1 Input pin.
- 0 Output pins.
- Initial state set to off (`false`).

6.2.3 Member Function Documentation

6.2.3.1 execute()

```
void com.logisim.domain.components.Bulb.execute ()
```

Updates the state of the bulb based on the current input.

This method reads the value from the first input pin (index 0) and updates the internal `isOn` state to match it.

Reimplemented from com.logisim.domain.components.Component.

6.2.3.2 getName()

```
String com.logisim.domain.components.Bulb.getName ()
```

Retrieves the unique type name of this component.

Returns

The string literal "bulb".

Reimplemented from com.logisim.domain.components.Component.

6.2.3.3 isOn()

```
boolean com.logisim.domain.components.Bulb.isOn ()
```

Checks if the bulb is currently illuminated.

Returns

`true` if the bulb is on (receiving a high signal), `false` otherwise.

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

- src/main/java/com/logisim/domain/components/Bulb.java

6.3 com.logisim.domain.Circuit Class Reference

Represents a digital logic circuit consisting of components and connections.

Public Member Functions

- **Circuit** ()

  Constructs a new Circuit with a default name.
- void addComponent (Component comp) throws IllegalArgumentException

  Adds a component to the circuit.
- void removeComponent (Component comp)

  Removes a component from the circuit.
- void addConnection (int source, int sourceComp, int sink, int sinkComp)

  Adds a connection between two components identified by their indices in the component list.
- void addConnection (int sourcePin, Component sourceComp, int sinkPin, Component sinkComp)

  Adds a connection between two specific component instances.
- void simulate ()

  Simulates the circuit logic for one cycle.
- boolean[ ][ ] analyze ()

  Generates a truth table for the current circuit configuration.
- String generateBooleanExpression (boolean[ ][ ] truthTable, List< String > inputNames)

  Generates a boolean algebraic expression (Sum of Products) based on the provided truth table.
- List< Component > getComponents ()

  Retrieves the list of components in the circuit.
- String getName ()

  Retrieves the name of the circuit.
- List< Connector > getConnectors ()

  Retrieves the list of connectors (wires) in the circuit.
- long getId ()

  Gets the unique identifier of the circuit.
- void setId (long id)

  Sets the unique identifier of the circuit.
- void setName (String name)

  Sets the name of the circuit.
- void setComponents (List< Component > components)

  Replaces the current list of components with a new list.
- void setConnectors (List< Connector > connectors)

  Replaces the current list of connectors with a new list.
- String toString ()

  Returns the string representation of the circuit.

Private Attributes

- long **id**

  The unique identifier for this circuit, typically used for database persistence.
- String **name**

  The name of the circuit.
- List< Component > **components** = new ArrayList<>()

  The list of logic components (gates, switches, bulbs, etc.) contained in this circuit.
- List< Connector > **connectors** = new ArrayList<>()

  The list of connections (wires) linking the components together.

6.3.1 Detailed Description

Represents a digital logic circuit consisting of components and connections.

This class serves as the container for logic simulation. It manages a list of `Component` objects and `Connector` objects (wires). It provides functionality to modify the circuit structure, simulate the flow of signals through the components, and analyze the circuit's logic via truth tables and boolean expressions.

6.3.2 Member Function Documentation

6.3.2.1 addComponent()

```
void com.logisim.domain.Circuit.addComponent (
            Component comp) throws IllegalArgumentException
```

Adds a component to the circuit.

Parameters

comp	The `Component` to be added.

Exceptions

IllegalArgumentException	If the provided component is `null` or already exists in the circuit.

6.3.2.2 addConnection() `[1/2]`

```
void com.logisim.domain.Circuit.addConnection (
            int source,
            int sourceComp,
            int sink,
            int sinkComp)
```

Adds a connection between two components identified by their indices in the component list.

Parameters

source	The index of the output pin on the source component.
sourceComp	The index of the source component in the internal components list.
sink	The index of the input pin on the sink (destination) component.
sinkComp	The index of the sink component in the internal components list.

Exceptions

InvalidParameterException	If the component indices are out of bounds or the pin indices are invalid for the respective components.

6.3.2.3 addConnection() [2/2]

```
void com.logisim.domain.Circuit.addConnection (
            int sourcePin,
            Component sourceComp,
            int sinkPin,
            Component sinkComp)
```

Adds a connection between two specific component instances.

Parameters

sourcePin	The index of the output pin on the source component.
sourceComp	The source `Component` instance.
sinkPin	The index of the input pin on the sink component.
sinkComp	The sink `Component` instance.

Exceptions

IllegalArgumentException	If either component is null, or if the specified pin indices do not exist.

6.3.2.4 analyze()

```
boolean[][] com.logisim.domain.Circuit.analyze ()
```

Generates a truth table for the current circuit configuration.

This method identifies all `com.logisim.domain.components.Switch` components as inputs and all `com.logisim.domain.components.Bulb` components as outputs. It iterates through all possible binary combinations of input states (2^n), simulates the circuit for each combination, and records the resulting output states.

Returns

A 2D boolean array representing the truth table. Rows represent each input combination. Columns [0 to n↩ Inputs-1] represent input values. Columns [nInputs to end] represent output values. Returns a 0x0 array if no inputs or outputs are found.

6.3.2.5 generateBooleanExpression()

```
String com.logisim.domain.Circuit.generateBooleanExpression (
            boolean truthTable[][],
            List< String > inputNames)
```

Generates a boolean algebraic expression (Sum of Products) based on the provided truth table.

The method constructs a string expression representing the logic required to produce a 'true' output. It creates minterms for every row in the truth table where the output is true.

Parameters

truthTable	A 2D boolean array generated by `analyze()`.
inputNames	A list of names corresponding to the input columns in the truth table.

Returns

A String representing the boolean expression (e.g., "(A & B) + (!A & B)"). Returns "0" if the output is never true.

6.3.2.6 getComponents()

```
List< Component > com.logisim.domain.Circuit.getComponents ()
```

Retrieves the list of components in the circuit.

Returns

The list of `Component` objects.

6.3.2.7 getConnectors()

```
List< Connector > com.logisim.domain.Circuit.getConnectors ()
```

Retrieves the list of connectors (wires) in the circuit.

Returns

The list of `Connector` objects.

6.3.2.8 getId()

```
long com.logisim.domain.Circuit.getId ()
```

Gets the unique identifier of the circuit.

Returns

The circuit ID.

6.3.2.9 getName()

```
String com.logisim.domain.Circuit.getName ()
```

Retrieves the name of the circuit.

Returns

The circuit name.

6.3.2.10 removeComponent()

```
void com.logisim.domain.Circuit.removeComponent (
             Component comp)
```

Removes a component from the circuit.

This method also automatically removes any `Connector`s attached to the removed component to prevent dangling connections.

Parameters

comp	The `Component` to be removed.

6.3.2.11 setComponents()

```
void com.logisim.domain.Circuit.setComponents (
             List< Component > components)
```

Replaces the current list of components with a new list.

Parameters

components	The new list of `Component` objects.

6.3.2.12 setConnectors()

```
void com.logisim.domain.Circuit.setConnectors (
             List< Connector > connectors)
```

Replaces the current list of connectors with a new list.

Parameters

connectors	The new list of `Connector` objects.

6.3.2.13 setId()

```
void com.logisim.domain.Circuit.setId (
             long id)
```

Sets the unique identifier of the circuit.

Parameters

id	The new circuit ID.

6.3.2.14 setName()

```
void com.logisim.domain.Circuit.setName (
             String name)
```

Sets the name of the circuit.

Parameters

name	The new circuit name.

6.3.2.15 simulate()

```
void com.logisim.domain.Circuit.simulate ()
```

Simulates the circuit logic for one cycle.

This method executes every component (calculating outputs from inputs) and then processes every connector (propagating outputs to inputs of connected components).

6.3.2.16 toString()

```
String com.logisim.domain.Circuit.toString ()
```

Returns the string representation of the circuit.

Returns

The name of the circuit.

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

- src/main/java/com/logisim/domain/Circuit.java

6.4 com.logisim.data.CircuitDAO Class Reference

Data Access Object (DAO) responsible for handling database operations related to `Circuit` entities.

Public Member Functions

- void saveCircuit (Circuit circuit, long projectId)

  Saves a new circuit and its associated contents to the database.
- List< Circuit > getCircuitsByProjectId (long projectId)

  Retrieves a list of circuits associated with a specific project.
- void createCircuit (long projectId, String name)

  Creates a new empty circuit record in the database.
- List< Component > loadComponents (long circuitId)

  Loads and reconstructs all components belonging to a specific circuit ID.
- record ConnectionRecord (String sourceUuid, int sourcePin, String sinkUuid, int sinkPin)

  A record representing the raw data of a connection between two components.
- List< ConnectionRecord > loadConnections (long circuitId)

  Retrieves the raw connection data for a specific circuit.
- void updateCircuit (Circuit circuit)

  Updates an existing circuit in the database using a transactional approach.
- void deleteCircuit (long id)

  Deletes a circuit from the database.

Private Member Functions

- void saveComponents (Circuit circuit, long circuitId, Connection conn) throws SQLException

  Batch inserts the components of a circuit into the database.
- void saveConnectors (Circuit circuit, long circuitId, Connection conn) throws SQLException

  Batch inserts the connectors (wires) of a circuit into the database.

6.4.1 Detailed Description

Data Access Object (DAO) responsible for handling database operations related to `Circuit` entities.

This class provides methods to create, retrieve, update, and delete circuits, as well as managing the persistence of their associated components and connectors.

6.4.2 Member Function Documentation

6.4.2.1 ConnectionRecord()

```
record com.logisim.data.CircuitDAO.ConnectionRecord (
             String sourceUuid,
             int sourcePin,
             String sinkUuid,
             int sinkPin)
```

A record representing the raw data of a connection between two components.

Parameters

sourceUuid	The UUID of the source component.
sourcePin	The pin index on the source component.
sinkUuid	The UUID of the destination (sink) component.
sinkPin	The pin index on the destination component.

6.4.2.2 createCircuit()

```
void com.logisim.data.CircuitDAO.createCircuit (
             long projectId,
             String name)
```

Creates a new empty circuit record in the database.

Parameters

project↩ Id	The unique identifier of the project.
name	The name to be assigned to the new circuit.

6.4.2.3 deleteCircuit()

```
void com.logisim.data.CircuitDAO.deleteCircuit (
            long id)
```

Deletes a circuit from the database.

Due to database foreign key constraints (cascading deletes), removing the circuit usually removes associated components and connectors automatically.

Parameters

id	The unique identifier of the circuit to be deleted.

6.4.2.4 getCircuitsByProjectId()

```
List< Circuit > com.logisim.data.CircuitDAO.getCircuitsByProjectId (
            long projectId)
```

Retrieves a list of circuits associated with a specific project.

Note: This method retrieves the circuit metadata (ID and name) but does not automatically load the internal components or connectors.

Parameters

project↩ Id	The unique identifier of the project.

Returns

A `List` of `Circuit` objects containing IDs and names.

6.4.2.5 loadComponents()

```
List< Component > com.logisim.data.CircuitDAO.loadComponents (
            long circuitId)
```

Loads and reconstructs all components belonging to a specific circuit ID.

This method instantiates specific component classes (e.g., `And`, `Or`, `Switch`) based on the 'type' column stored in the database. It also handles recursive loading for sub-circuits.

Parameters

circuit↩ Id	The unique identifier of the circuit to load components from.

Returns

A `List` of fully constructed `Component` objects.

6.4.2.6 loadConnections()

```
List< ConnectionRecord > com.logisim.data.CircuitDAO.loadConnections (
            long circuitId)
```

Retrieves the raw connection data for a specific circuit.

Parameters

circuit↩ Id	The unique identifier of the circuit.

Returns

A `List` of `ConnectionRecord` objects representing the connections.

6.4.2.7 saveCircuit()

```
void com.logisim.data.CircuitDAO.saveCircuit (
            Circuit circuit,
            long projectId)
```

Saves a new circuit and its associated contents to the database.

This method first inserts the circuit record. If successful, it retrieves the generated circuit ID and proceeds to save the circuit's components and connectors.

Parameters

circuit	The `Circuit` object containing the data to be saved.
project↩ Id	The unique identifier of the project to which this circuit belongs.

6.4.2.8 saveComponents()

```
void com.logisim.data.CircuitDAO.saveComponents (
            Circuit circuit,
            long circuitId,
            Connection conn) throws SQLException  [private]
```

Batch inserts the components of a circuit into the database.

Parameters

circuit	The circuit object containing the list of components.
circuit↩ Id	The database ID of the circuit these components belong to.

conn	The active database connection to be used for the operation.

Exceptions

SQLException	If a database access error occurs or the SQL execution fails.

6.4.2.9 saveConnectors()

```
void com.logisim.data.CircuitDAO.saveConnectors (
            Circuit circuit,
            long circuitId,
            Connection conn) throws SQLException  [private]
```

Batch inserts the connectors (wires) of a circuit into the database.

Parameters

circuit	The circuit object containing the list of connectors.
circuit↩ Id	The database ID of the circuit these connectors belong to.
conn	The active database connection to be used for the operation.

Exceptions

SQLException	If a database access error occurs or the SQL execution fails.

6.4.2.10 updateCircuit()

```
void com.logisim.data.CircuitDAO.updateCircuit (
            Circuit circuit)
```

Updates an existing circuit in the database using a transactional approach.

This method performs the following steps:

1. Updates the circuit name.
2. Deletes all existing components associated with the circuit.
3. Deletes all existing connectors associated with the circuit.
4. Inserts the current state of components.
5. Inserts the current state of connectors.

Parameters

circuit	The `Circuit` object containing the updated data and ID.

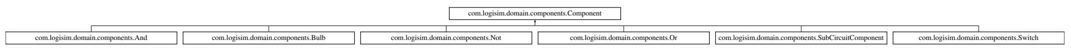
The documentation for this class was generated from the following file:

- src/main/java/com/logisim/data/CircuitDAO.java

6.5 com.logisim.domain.components.Component Class Reference

An abstract base class representing a generic component within a logic circuit.

Inheritance diagram for com.logisim.domain.components.Component:


com.logisim.domain.components.Component
com.logisim.domain.components.And
com.logisim.domain.components.Bulb
com.logisim.domain.components.Not
com.logisim.domain.components.Or
com.logisim.domain.components.SubCircuitComponent
com.logisim.domain.components.Switch

Public Member Functions

- Component ()
  Default constructor.
- Component (String name)
  Constructs a component with a specified name.
- abstract void execute ()
  Executes the logical operation of the component.
- void setInput (int index, boolean value)
  Sets the state of a specific input pin.
- boolean getOutput (int index)
  Retrieves the state of a specific output pin.
- String getName ()
  Gets the name of the component.
- void setName (String name)
  Sets the name of the component.
- boolean[ ] getInputs ()
  Retrieves the entire array of input pin states.
- void setInputs (boolean[ ] inputs)
  Sets the entire array of input pin states.
- boolean[ ] getOutputs ()
  Retrieves the entire array of output pin states.
- void setOutputs (boolean[ ] outputs)
  Sets the entire array of output pin states.
- double getPositionX ()
  Gets the X-coordinate of the component.
- double getPositionY ()
  Gets the Y-coordinate of the component.
- void setPositionX (double positionX)
  Sets the X-coordinate of the component.
- void setPositionY (double positionY)
  Sets the Y-coordinate of the component.
- String getUuid ()
  Gets the unique identifier (UUID) of the component.
- void setUuid (String uuid)
  Sets the unique identifier (UUID) of the component.

Protected Attributes

- String **name**

  The name or type identifier of the component (e.g., "and", "or").
- boolean[ ] inputs

  An array representing the state of the component's input pins.
- boolean[ ] outputs

  An array representing the state of the component's output pins.
- double **positionX**

  The X-coordinate of the component's position in the visual interface.
- double **positionY**

  The Y-coordinate of the component's position in the visual interface.

Private Attributes

- String uuid

  A unique identifier (UUID) assigned to this specific component instance.

6.5.1 Detailed Description

An abstract base class representing a generic component within a logic circuit.

This class provides the foundational structure for all specific logic gates and components (e.g., AND, OR, Switch). It manages common properties such as the component's unique identifier, its visual position on the canvas, and the state of its input and output pins.

6.5.2 Constructor & Destructor Documentation

6.5.2.1 Component() [1/2]

```
com.logisim.domain.components.Component.Component ()
```

Default constructor.

Initializes the component with a newly generated UUID.

6.5.2.2 Component() [2/2]

```
com.logisim.domain.components.Component.Component (
            String name)
```

Constructs a component with a specified name.

Initializes the component with the given name and a newly generated UUID.

Parameters

name	The name or type identifier for this component.

6.5.3 Member Function Documentation

6.5.3.1 execute()

```
abstract void com.logisim.domain.components.Component.execute ()  [abstract]
```

Executes the logical operation of the component.

Implementation classes must define this method to update the `outputs` array based on the current values in the `inputs` array.

Reimplemented in com.logisim.domain.components.And, com.logisim.domain.components.Bulb, com.logisim.domain.components.No
com.logisim.domain.components.Or, com.logisim.domain.components.SubCircuitComponent, and com.logisim.domain.components.S

6.5.3.2 getInputs()

```
boolean[] com.logisim.domain.components.Component.getInputs ()
```

Retrieves the entire array of input pin states.

Returns

A boolean array representing all inputs.

6.5.3.3 getName()

```
String com.logisim.domain.components.Component.getName ()
```

Gets the name of the component.

Returns

The string identifier of the component.

Reimplemented in com.logisim.domain.components.Bulb, com.logisim.domain.components.SubCircuitComponent, and com.logisim.domain.components.Switch.

6.5.3.4 getOutput()

```
boolean com.logisim.domain.components.Component.getOutput (
            int index)
```

Retrieves the state of a specific output pin.

Parameters

index	The index of the output pin to read.

Returns

`true` if the pin is high, `false` if low.

6.5.3.5 getOutputs()

```
boolean[] com.logisim.domain.components.Component.getOutputs ()
```

Retrieves the entire array of output pin states.

Returns

A boolean array representing all outputs.

6.5.3.6 getPositionX()

```
double com.logisim.domain.components.Component.getPositionX ()
```

Gets the X-coordinate of the component.

Returns

The horizontal position.

6.5.3.7 getPositionY()

```
double com.logisim.domain.components.Component.getPositionY ()
```

Gets the Y-coordinate of the component.

Returns

The vertical position.

6.5.3.8 getUuid()

```
String com.logisim.domain.components.Component.getUuid ()
```

Gets the unique identifier (UUID) of the component.

Returns

The UUID string.

6.5.3.9 setInput()

```
void com.logisim.domain.components.Component.setInput (
             int index,
             boolean value)
```

Sets the state of a specific input pin.

Parameters

index	The index of the input pin to update.
value	The new boolean state (high/low) for the pin.

6.5.3.10 setInputs()

```
void com.logisim.domain.components.Component.setInputs (
            boolean[] inputs)
```

Sets the entire array of input pin states.

Parameters

inputs	The boolean array to replace the current inputs.

6.5.3.11 setName()

```
void com.logisim.domain.components.Component.setName (
            String name)
```

Sets the name of the component.

Parameters

name	The new name or type identifier.

6.5.3.12 setOutputs()

```
void com.logisim.domain.components.Component.setOutputs (
            boolean[] outputs)
```

Sets the entire array of output pin states.

Parameters

outputs	The boolean array to replace the current outputs.

6.5.3.13 setPositionX()

```
void com.logisim.domain.components.Component.setPositionX (
            double positionX)
```

Sets the X-coordinate of the component.

Parameters

positionX	The new horizontal position.

6.5.3.14 setPositionY()

```
void com.logisim.domain.components.Component.setPositionY (
             double positionY)
```

Sets the Y-coordinate of the component.

Parameters

positionY	The new vertical position.

6.5.3.15 setUuid()

```
void com.logisim.domain.components.Component.setUuid (
             String uuid)
```

Sets the unique identifier (UUID) of the component.

This is typically used when reloading a component from the database to restore its original ID.

Parameters

uuid	The UUID string to assign.

6.5.4 Member Data Documentation

6.5.4.1 inputs

```
boolean [] com.logisim.domain.components.Component.inputs  [protected]
```

An array representing the state of the component's input pins.

`true` represents a high signal (1), and `false` represents a low signal (0).

6.5.4.2 outputs

```
boolean [] com.logisim.domain.components.Component.outputs  [protected]
```

An array representing the state of the component's output pins.

This is typically updated by the `execute()` method.

6.5.4.3 uuid

```
String com.logisim.domain.components.Component.uuid  [private]
```

A unique identifier (UUID) assigned to this specific component instance.

Used for identifying the component during persistence and connection mapping.

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

- src/main/java/com/logisim/domain/components/Component.java

6.6 com.logisim.ui.logic.ConnectionManager Class Reference

Manages the interactive state for creating connections (wires) between components.

Public Member Functions

- ConnectionManager (Pane canvasPane)

    Constructs a new ConnectionManager.
- void setOnConnectionAdded (Consumer< Connector > listener)

    Sets the callback listener to be executed when a connection is successfully created.
- void onMouseMove (MouseEvent event)

    Updates the temporary interaction line to follow the mouse cursor.
- void cancelConnection ()

    Cancels the current connection attempt.
- void handlePortClick (Port clickedPort)

    Handles click events on ports to initiate or finalize a connection.

Private Member Functions

- void createConnection (Port source, Port sink)

    Finalizes the creation of a connection between two ports.

Private Attributes

- Port selectedSourcePort = null

    The port selected as the starting point (Source/Output) of the connection.
- Pane **canvasPane**

    The visual pane where wires and interaction lines are drawn.
- Consumer< Connector > onConnectionAdded

    Callback listener that is triggered when a connection is successfully finalized.
- Line **interactionLine**

    A temporary line used to visualize the wire being dragged by the user before the connection is finalized.

6.6.1 Detailed Description

Manages the interactive state for creating connections (wires) between components.

This class handles the two-step process of wiring: selecting a source output port and then selecting a destination input port. It provides visual feedback via a temporary interaction line that follows the mouse cursor and handles the validation logic to ensure connections are valid (e.g., Output to Input, no self-loops).

6.6.2 Constructor & Destructor Documentation

6.6.2.1 ConnectionManager()

```
com.logisim.ui.logic.ConnectionManager.ConnectionManager (
            Pane canvasPane)
```

Constructs a new ConnectionManager.

Parameters

canvasPane	The `Pane` used as the drawing surface for the circuit.

6.6.3 Member Function Documentation

6.6.3.1 cancelConnection()

```
void com.logisim.ui.logic.ConnectionManager.cancelConnection ()
```

Cancels the current connection attempt.

Resets the internal state by deselecting the source port and removing the temporary interaction line from the canvas.

6.6.3.2 createConnection()

```
void com.logisim.ui.logic.ConnectionManager.createConnection (
            Port source,
            Port sink) [private]
```

Finalizes the creation of a connection between two ports.

This method:

1. Creates the visual `Wire` and adds it to the canvas.
2. Creates the logical `Connector` object mapping component indices.
3. Triggers the `onConnectionAdded` callback to update the circuit model.

Parameters

source	The source (output) port.
sink	The sink (input) port.

6.6.3.3 handlePortClick()

```
void com.logisim.ui.logic.ConnectionManager.handlePortClick (
            Port clickedPort)
```

Handles click events on ports to initiate or finalize a connection.

The logic flows as follows:

1. **No Selection Active:** If the clicked port is an OUTPUT, it is selected as the source, and a temporary line is drawn. Inputs are ignored.
2. **Source Selected:** If the clicked port is an INPUT, resides on a different gate, and is not already connected, the connection is finalized. Otherwise, the operation is canceled.

Parameters

clickedPort	The `Port` that was clicked by the user.

6.6.3.4 onMouseMove()

```
void com.logisim.ui.logic.ConnectionManager.onMouseMove (
            MouseEvent event)
```

Updates the temporary interaction line to follow the mouse cursor.

This method should be called when the mouse moves over the canvas. If a connection is in progress, the end of the line snaps to the current mouse coordinates.

Parameters

event	The `MouseEvent` containing the current cursor position.

6.6.3.5 setOnConnectionAdded()

```
void com.logisim.ui.logic.ConnectionManager.setOnConnectionAdded (
            Consumer< Connector > listener)
```

Sets the callback listener to be executed when a connection is successfully created.

Parameters

listener	A `Consumer` that accepts a `Connector` object.

6.6.4 Member Data Documentation

6.6.4.1 onConnectionAdded

`Consumer<Connector> com.logisim.ui.logic.ConnectionManager.onConnectionAdded [private]`

Callback listener that is triggered when a connection is successfully finalized.

This allows the logical circuit model to be updated.

6.6.4.2 selectedSourcePort

`Port com.logisim.ui.logic.ConnectionManager.selectedSourcePort = null [private]`

The port selected as the starting point (Source/Output) of the connection.

If `null`, no connection is currently being created.

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

- src/main/java/com/logisim/ui/logic/ConnectionManager.java

6.7 com.logisim.domain.Connector Class Reference

Represents a wire connection between two components in the circuit.

Public Member Functions

- Connector (Component sourceComp, Component sinkComp, int source, int sink)

  Constructs a new Connector between two components.
- void process ()

  Transmits the signal from the source to the sink.
- String getName ()

  Retrieves the name of the connector.
- int getSource ()

  Retrieves the index of the output pin on the source component.
- int getSink ()

  Retrieves the index of the input pin on the sink component.
- Component getSourceComp ()

  Retrieves the source component associated with this connection.
- Component getSinkComp ()

  Retrieves the sink component associated with this connection.

Protected Attributes

- String **name**
- int **source**
- int **sink**
- Component **sourceComp**
- Component **sinkComp**

6.7.1 Detailed Description

Represents a wire connection between two components in the circuit.

A Connector facilitates the transmission of a logic signal (boolean state) from a specific output pin of a source component to a specific input pin of a sink component.

6.7.2 Constructor & Destructor Documentation

6.7.2.1 Connector()

```
com.logisim.domain.Connector.Connector (
            Component sourceComp,
            Component sinkComp,
            int source,
            int sink)
```

Constructs a new Connector between two components.

Parameters

sourceComp	The component generating the signal (source).
sinkComp	The component receiving the signal (sink).
source	The index of the output pin on the source component.
sink	The index of the input pin on the sink component.

6.7.3 Member Function Documentation

6.7.3.1 getName()

```
String com.logisim.domain.Connector.getName ()
```

Retrieves the name of the connector.

Returns

The name string (default "Connector").

6.7.3.2 getSink()

```
int com.logisim.domain.Connector.getSink ()
```

Retrieves the index of the input pin on the sink component.

Returns

The integer index of the sink pin.

6.7.3.3 getSinkComp()

```
Component com.logisim.domain.Connector.getSinkComp ()
```

Retrieves the sink component associated with this connection.

Returns

The `Component` instance acting as the sink.

6.7.3.4 getSource()

```
int com.logisim.domain.Connector.getSource ()
```

Retrieves the index of the output pin on the source component.

Returns

The integer index of the source pin.

6.7.3.5 getSourceComp()

```
Component com.logisim.domain.Connector.getSourceComp ()
```

Retrieves the source component associated with this connection.

Returns

The `Component` instance acting as the source.

6.7.3.6 process()

```
void com.logisim.domain.Connector.process ()
```

Transmits the signal from the source to the sink.

This method retrieves the current boolean value from the source component's output pin (specified by `source`) and applies it to the sink component's input pin (specified by `sink`).

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

- src/main/java/com/logisim/domain/Connector.java

6.8 com.logisim.data.DatabaseManager Class Reference

Manages the SQLite database connection and schema initialization for the application.

Public Member Functions

- Connection getConnection () throws SQLException

    Establishes and returns a new connection to the SQLite database.

Static Public Member Functions

- static DatabaseManager getInstance ()

    Retrieves the singleton instance of the DatabaseManager.

Private Member Functions

- DatabaseManager ()

    Private constructor to enforce the Singleton design pattern.
- void createTables ()

    Initializes the database schema by creating required tables if they do not exist.

Static Private Attributes

- static final String url

    The JDBC connection URL string pointing to the SQLite database file located in the user's home directory.
- static DatabaseManager **instance**

    The single instance of the DatabaseManager class.

6.8.1 Detailed Description

Manages the SQLite database connection and schema initialization for the application.

This class implements the Singleton design pattern to ensure a centralized point of access for database operations. It handles the creation of the database file (stored in the user's home directory) and initializes the necessary tables if they do not already exist.

6.8.2 Constructor & Destructor Documentation

6.8.2.1 DatabaseManager()

```
com.logisim.data.DatabaseManager.DatabaseManager ()  [private]
```

Private constructor to enforce the Singleton design pattern.

When instantiated, it automatically attempts to create the necessary database tables.

6.8.3 Member Function Documentation

6.8.3.1 createTables()

```
void com.logisim.data.DatabaseManager.createTables () [private]
```

Initializes the database schema by creating required tables if they do not exist.

The following tables are created:

- **projects**: Stores project metadata.
- **circuits**: Stores circuits linked to projects.
- **components**: Stores individual components within circuits.
- **connectors**: Stores wiring connections between components.

6.8.3.2 getConnection()

```
Connection com.logisim.data.DatabaseManager.getConnection () throws SQLException
```

Establishes and returns a new connection to the SQLite database.

Returns

A `Connection` object connected to the database.

Exceptions

SQLException	If a database access error occurs.

6.8.3.3 getInstance()

```
DatabaseManager com.logisim.data.DatabaseManager.getInstance () [static]
```

Retrieves the singleton instance of the DatabaseManager.

If the instance does not exist, it is created.

Returns

The single instance of `DatabaseManager`.

6.8.4 Member Data Documentation

6.8.4.1 url

`final String com.logisim.data.DatabaseManager.url [static], [private]`

Initial value:

```
=
        "jdbc:sqlite:" + System.getProperty("user.home") + "/logisim_data.db"
```

The JDBC connection URL string pointing to the SQLite database file located in the user's home directory.

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

- src/main/java/com/logisim/data/DatabaseManager.java

6.9 com.logisim.ui.components.GateFactory Class Reference

A factory class responsible for creating and configuring the visual representations of logic components (gates, switches, bulbs, etc.) on the UI canvas.

Classes

- class **Delta**

  Helper class to store the offset during drag operations.

Static Public Member Functions

- static void setConnectionManager (ConnectionManager cm)

  Sets the `ConnectionManager` used to handle port interactions.
- static StackPane createGateWithHitBox (String gateName, double x, double y, Pane canvasPane, GridController gridController, Component component, Consumer< StackPane > onDeleteAction, Consumer< StackPane > onToggleAction)

  Creates a visual component (StackPane) representing a logic gate or device.
- static void refreshComponentState (StackPane visualGate)

  Updates the visual state of a component (Switch or Bulb) based on its logical state.

Static Private Member Functions

- static StackPane createSubCircuitVisual (double x, double y, com.logisim.domain.components.SubCircuitComponent subComp, Pane canvasPane, GridController gridController, java.util.function.Consumer< StackPane > on↩DeleteAction)

  Creates the specific visual representation for a `SubCircuitComponent`.
- static void setupSwitchInteraction (StackPane stack, ImageView view, Switch switchLogic, Consumer< StackPane > onToggleAction)

  Configures the mouse interaction for `Switch` components.
- static void addPortsToGate (StackPane stack)

  Dynamically adds `Port` objects to a component's visual stack.
- static void configurePortEvents (Port port)

  Binds mouse click events on ports to the `ConnectionManager`.
- static void makeDraggableandDeletable (StackPane node, Pane canvasPane, GridController gridController, Consumer< StackPane > onDeleteAction)

  Adds drag-and-drop functionality and a context menu for deletion to the component.

Static Private Attributes

- static ConnectionManager **connectionManager**
- static final double **GATE_VISUAL_SIZE** = 100.0

6.9.1 Detailed Description

A factory class responsible for creating and configuring the visual representations of logic components (gates, switches, bulbs, etc.) on the UI canvas.

This class handles:

- Loading the appropriate images for components.
- Creating dynamic visual structures for sub-circuits.
- Attaching input/output `Port`s to components.
- Setting up event handlers for dragging, clicking, and context menus.

6.9.2 Member Function Documentation

6.9.2.1 addPortsToGate()

```
void com.logisim.ui.components.GateFactory.addPortsToGate (
             StackPane stack) [static], [private]
```

Dynamically adds `Port` objects to a component's visual stack.

This method calculates the physical positions of input pins (left side) and output pins (right side) based on the number of inputs/outputs defined in the component's logic.

Parameters

stack	The component's visual container.

6.9.2.2 configurePortEvents()

```
void com.logisim.ui.components.GateFactory.configurePortEvents (
             Port port) [static], [private]
```

Binds mouse click events on ports to the `ConnectionManager`.

Parameters

port	The port to configure.

6.9.2.3 createGateWithHitBox()

```
StackPane com.logisim.ui.components.GateFactory.createGateWithHitBox (
            String gateName,
            double x,
            double y,
            Pane canvasPane,
            GridController gridController,
            Component component,
            Consumer< StackPane > onDeleteAction,
            Consumer< StackPane > onToggleAction)  [static]
```

Creates a visual component (StackPane) representing a logic gate or device.

This is the main entry point for adding components to the UI. It determines the specific type of component (Standard Gate, Switch, Bulb, or SubCircuit), creates the visual elements, attaches ports, and configures user interactions (dragging, toggling, deleting).

Parameters

gateName	The string identifier for the gate type (used for image loading).
x	The initial X coordinate on the canvas.
y	The initial Y coordinate on the canvas.
canvasPane	The parent pane where this component will be added (used for drag bounds/calculations).
gridController	The controller used for snapping the component to the grid.
component	The underlying logical `Component` object.
onDeleteAction	A callback function to execute when the delete context menu item is clicked.
onToggleAction	A callback function to execute when a switch is toggled (can be null for non-switches).

Returns

A `StackPane` containing the visual elements of the component.

6.9.2.4 createSubCircuitVisual()

```
StackPane com.logisim.ui.components.GateFactory.createSubCircuitVisual (
            double x,
            double y,
            com.logisim.domain.components.SubCircuitComponent subComp,
            Pane canvasPane,
            GridController gridController,
            java.util.function.Consumer< StackPane > onDeleteAction)  [static], [private]
```

Creates the specific visual representation for a `SubCircuitComponent`.

Unlike standard gates which use static images, sub-circuits are drawn dynamically as a rectangle with text labels and a variable number of input/output pins.

Parameters

x	The initial X coordinate.
y	The initial Y coordinate.
subComp	The sub-circuit logical component.
canvasPane	The canvas pane.
gridController	The grid controller for snapping.
onDeleteAction	The callback for deletion.

Returns

A `StackPane` representing the sub-circuit.

6.9.2.5 makeDraggableandDeletable()

```
void com.logisim.ui.components.GateFactory.makeDraggableandDeletable (
            StackPane node,
            Pane canvasPane,
            GridController gridController,
            Consumer< StackPane > onDeleteAction) [static], [private]
```

Adds drag-and-drop functionality and a context menu for deletion to the component.

Dragging snaps the component to the grid defined by the `GridController`. The context menu allows removing the component via the `onDeleteAction`.

Parameters

node	The visual component to make interactive.
canvasPane	The pane containing the component.
gridController	The controller for grid snapping calculations.
onDeleteAction	The callback to execute on deletion.

6.9.2.6 refreshComponentState()

```
void com.logisim.ui.components.GateFactory.refreshComponentState (
            StackPane visualGate) [static]
```

Updates the visual state of a component (Switch or Bulb) based on its logical state.

This is typically called during or after circuit simulation to reflect signal changes (e.g., turning a bulb on or off).

Parameters

visualGate	The visual `StackPane` of the component.

6.9.2.7 setConnectionManager()

```
void com.logisim.ui.components.GateFactory.setConnectionManager (
            ConnectionManager cm)  [static]
```

Sets the `ConnectionManager` used to handle port interactions.

Parameters

cm	The connection manager instance.

6.9.2.8 setupSwitchInteraction()

```
void com.logisim.ui.components.GateFactory.setupSwitchInteraction (
            StackPane stack,
            ImageView view,
            Switch switchLogic,
            Consumer< StackPane > onToggleAction)  [static], [private]
```

Configures the mouse interaction for `Switch` components.

Sets up a click handler that toggles the logical state of the switch, updates the visual image (on/off), and triggers the provided callback.

Parameters

stack	The visual container of the switch.
view	The ImageView to update.
switchLogic	The underlying switch logical component.
onToggleAction	The callback to execute after toggling.

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

- src/main/java/com/logisim/ui/components/GateFactory.java

6.10 com.logisim.ui.controllers.GridController Class Reference

Controller responsible for managing the background grid of the circuit editor.

Public Member Functions

- GridController (Canvas gridCanvas, int gridSize)

    Constructs a new GridController.
- void drawGrid ()

    Renders the grid lines onto the canvas.
- double snap (double value)

    Aligns a raw coordinate value to the nearest grid line.
- int getGridSize ()

    Retrieves the configured grid size.

Private Attributes

- final Canvas **gridCanvas**

    The canvas element where the grid lines are drawn.
- final int **gridSize**

    The spacing between grid lines in pixels (cell size).

6.10.1 Detailed Description

Controller responsible for managing the background grid of the circuit editor.

This class handles the rendering of the visual grid lines on a JavaFX `Canvas`. It also provides utility methods for "snapping" coordinates to the nearest grid points, ensuring that components align neatly within the workspace.

6.10.2 Constructor & Destructor Documentation

6.10.2.1 GridController()

```
com.logisim.ui.controllers.GridController.GridController (
            Canvas gridCanvas,
            int gridSize)
```

Constructs a new GridController.

Initializes the controller with a target canvas and specific grid size. It also sets up listeners on the canvas's width and height properties to automatically redraw the grid whenever the window is resized.

Parameters

gridCanvas	The JavaFX `Canvas` to draw the grid upon.
gridSize	The distance in pixels between grid lines.

6.10.3 Member Function Documentation

6.10.3.1 drawGrid()

```
void com.logisim.ui.controllers.GridController.drawGrid ()
```

Renders the grid lines onto the canvas.

This method first clears the entire canvas and then draws vertical and horizontal lines spaced by `gridSize`. The lines are drawn with a light gray color to serve as a subtle visual guide.

6.10.3.2 getGridSize()

```
int com.logisim.ui.controllers.GridController.getGridSize ()
```

Retrieves the configured grid size.

Returns

The size of the grid cells in pixels.

6.10.3.3 snap()

```
double com.logisim.ui.controllers.GridController.snap (
            double value)
```

Aligns a raw coordinate value to the nearest grid line.

This method rounds the provided value to the nearest multiple of `gridSize`. It is used to ensure components snap to the grid when dragged or placed.

Parameters

value	The raw coordinate value (X or Y).

Returns

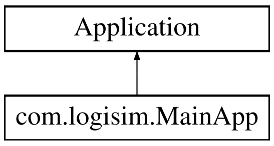
The coordinate value rounded to the nearest grid interval.

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

- src/main/java/com/logisim/ui/controllers/GridController.java

6.11 com.logisim.MainApp Class Reference

Inheritance diagram for com.logisim.MainApp:



Public Member Functions

- void **start** (Stage primaryStage) throws Exception

Static Public Member Functions

- static void **main** (String[ ] args)

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

- src/main/java/com/logisim/MainApp.java

6.12 com.logisim.ui.controllers.MainViewController Class Reference

The primary controller for the Circuit Editor view.

Public Member Functions

- Circuit loadFullCircuitFromDB (long id)

  Loads a complete circuit model from the database to be used as a sub-circuit logic container.
- void handleAnalyze ()

  Performs a combinatorial logic analysis of the circuit.
- void initialize ()

  Initializes the controller.
- VBox **getSidebar** ()
- void **setSidebar** (VBox sidebar)
- Pane **getCanvasPane** ()
- void **setCanvasPane** (Pane canvasPane)
- ScrollPane **getCanvasScrollPane** ()
- void **setCanvasScrollPane** (ScrollPane canvasScrollPane)
- Button **getBtnAnd** ()
- void **setBtnAnd** (Button btnAnd)
- Button **getBtnOr** ()
- void **setBtnOr** (Button btnOr)
- Button **getBtnNot** ()
- void **setBtnNot** (Button btnNot)
- Canvas **getGridCanvas** ()
- void **setGridCanvas** (Canvas gridCanvas)
- GridController **getGridController** ()
- void **setGridController** (GridController gridController)
- Project **getCurrentProject** ()
- void **setCurrentProject** (Project currentProject)
- void setContext (Project project, Circuit circuit)

  Initializes the view with a specific Project and Circuit context.

Static Public Member Functions

- static int **getGridsize** ()

Private Member Functions

- void refreshSubCircuitSidebar ()

  Refreshes the sidebar with buttons to insert other circuits from the current project.
- void spawnSubCircuit (Circuit template)

  Instantiates a sub-circuit component and places it on the canvas.
- void handleBackToDashboard ()

  Navigates the user back to the Project Dashboard.
- void **handleSave** ()

  Saves the current state of the circuit (layout, components, and connections) to the database.
- void handleRun ()

  Triggers a simulation cycle for the current circuit.
- void showAlert (String title, String content)

  Displays a generic information alert dialog.
- void showAnalysisWindow (boolean[ ][ ] rawData, List< String > headers, String expression)

  Helper method to display the analysis results in a dedicated window.
- void handleDeleteGate (StackPane visualGate)

  Handles the deletion of a component from the canvas and circuit logic.
- void handleToggleSwitch (StackPane visualGate)

  Callback handler for toggling a switch component.
- Port findPort (StackPane gate, boolean isInput, int index)

  Helper to find a specific Port inside a Gate's StackPane.

Private Attributes

- VBox **sidebar**
- Pane **canvasPane**
- ScrollPane **canvasScrollPane**
- Button **btnAnd**
- Button **btnOr**
- Button **btnNot**
- Button **btnSwitch**
- Button **btnBulb**
- Canvas **gridCanvas**
- VBox **subCircuitContainer**
- GridController **gridController**
- Project **currentProject**
- Circuit **currentCircuit**
- CircuitDAO **circuitDAO** = new CircuitDAO()

Static Private Attributes

- static final int **gridSize** = 20

6.12.1 Detailed Description

The primary controller for the Circuit Editor view.

This class manages the user interface interaction for creating, editing, and simulating digital logic circuits. It handles component placement, wiring, database persistence, and navigation within a project.

6.12.2 Member Function Documentation

6.12.2.1 findPort()

```
Port com.logisim.ui.controllers.MainViewController.findPort (
            StackPane gate,
            boolean isInput,
            int index) [private]
```

Helper to find a specific Port inside a Gate's StackPane.

Parameters

gate	The StackPane representing the gate
isInput	True if we want an input port, False for output
index	The index (e.g., 0 for top input, 1 for bottom input)

Returns

The `Port` object if found, otherwise null.

6.12.2.2 handleAnalyze()

```
void com.logisim.ui.controllers.MainViewController.handleAnalyze ()
```

Performs a combinatorial logic analysis of the circuit.

Identifies input switches and output bulbs, generates a truth table, and derives a boolean expression. Results are shown in a new window.

6.12.2.3 handleBackToDashboard()

```
void com.logisim.ui.controllers.MainViewController.handleBackToDashboard () [private]
```

Navigates the user back to the Project Dashboard.

This method loads the dashboard FXML and passes the current project context back to it.

6.12.2.4 handleDeleteGate()

```
void com.logisim.ui.controllers.MainViewController.handleDeleteGate (
             StackPane visualGate) [private]
```

Handles the deletion of a component from the canvas and circuit logic.

Also removes any wires attached to the deleted component.

Parameters

visualGate	The visual `StackPane` element to be removed.

6.12.2.5 handleRun()

```
void com.logisim.ui.controllers.MainViewController.handleRun () [private]
```

Triggers a simulation cycle for the current circuit.

Updates the logical state of all components and refreshes the visual state (e.g., bulb images) to reflect the new logic values.

6.12.2.6 handleToggleSwitch()

```
void com.logisim.ui.controllers.MainViewController.handleToggleSwitch (
             StackPane visualGate) [private]
```

Callback handler for toggling a switch component.

Triggers a simulation run to propagate the new switch state through the circuit.

Parameters

visualGate	The visual element of the switch that was toggled.

6.12.2.7 initialize()

```
void com.logisim.ui.controllers.MainViewController.initialize ()
```

Initializes the controller.

Sets up the grid controller, connection manager, event listeners for resizing, and assigns action handlers to the component toolbar buttons.

6.12.2.8 loadFullCircuitFromDB()

```
Circuit com.logisim.ui.controllers.MainViewController.loadFullCircuitFromDB (
            long id)
```

Loads a complete circuit model from the database to be used as a sub-circuit logic container.

Parameters

id	The database ID of the circuit to load.

Returns

A fully constructed `Circuit` object with components and logic connections.

6.12.2.9 refreshSubCircuitSidebar()

```
void com.logisim.ui.controllers.MainViewController.refreshSubCircuitSidebar () [private]
```

Refreshes the sidebar with buttons to insert other circuits from the current project.

This allows the user to use other existing circuits as "Sub-Circuits" within the current design. The method filters out the current circuit to prevent recursive inclusion.

6.12.2.10 setContext()

```
void com.logisim.ui.controllers.MainViewController.setContext (
            Project project,
            Circuit circuit)
```

Initializes the view with a specific Project and Circuit context.

This method loads the circuit's existing components and connections from the database, reconstructs their visual representations on the canvas, and refreshes the sidebar.

Parameters

project	The `Project` containing the circuit.
circuit	The `Circuit` to be edited.

6.12.2.11 showAlert()

```
void com.logisim.ui.controllers.MainViewController.showAlert (
            String title,
            String content)  [private]
```

Displays a generic information alert dialog.

Parameters

title	The title of the dialog window.
content	The message content to display.

6.12.2.12 showAnalysisWindow()

```
void com.logisim.ui.controllers.MainViewController.showAnalysisWindow (
            boolean rawData[][],
            List< String > headers,
            String expression)  [private]
```

Helper method to display the analysis results in a dedicated window.

Parameters

rawData	The 2D boolean array representing the truth table.
headers	The list of column headers (Input names and Output names).
expression	The derived boolean expression string.

6.12.2.13 spawnSubCircuit()

```
void com.logisim.ui.controllers.MainViewController.spawnSubCircuit (
            Circuit template)  [private]
```

Instantiates a sub-circuit component and places it on the canvas.

Parameters

template	The `Circuit` metadata object representing the circuit to import.

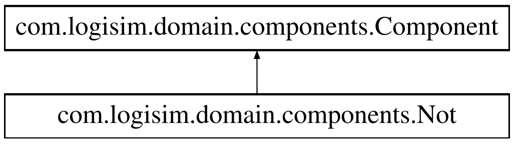
The documentation for this class was generated from the following file:

- src/main/java/com/logisim/ui/controllers/MainViewController.java

6.13 com.logisim.domain.components.Not Class Reference

Represents a logical NOT gate (inverter) in the circuit simulation.

Inheritance diagram for com.logisim.domain.components.Not:


com.logisim.domain.components.Component
com.logisim.domain.components.Not

Public Member Functions

- Not ()

  Constructs a new NOT gate component with default settings.
- void setInput (boolean value)

  Sets the state of the component's single input pin.
- boolean getOutput ()

  Retrieves the state of the component's single output pin.
- void execute ()

  Executes the logical operation of the NOT gate.

Public Member Functions inherited from com.logisim.domain.components.Component

- Component ()

  Default constructor.
- Component (String name)

  Constructs a component with a specified name.
- void setInput (int index, boolean value)

  Sets the state of a specific input pin.
- boolean getOutput (int index)

  Retrieves the state of a specific output pin.
- String getName ()

  Gets the name of the component.
- void setName (String name)

  Sets the name of the component.
- boolean[ ] getInputs ()

  Retrieves the entire array of input pin states.
- void setInputs (boolean[ ] inputs)

  Sets the entire array of input pin states.
- boolean[ ] getOutputs ()

  Retrieves the entire array of output pin states.
- void setOutputs (boolean[ ] outputs)

  Sets the entire array of output pin states.
- double getPositionX ()

  Gets the X-coordinate of the component.
- double getPositionY ()

  Gets the Y-coordinate of the component.

- void setPositionX (double positionX)

  Sets the X-coordinate of the component.
- void setPositionY (double positionY)

  Sets the Y-coordinate of the component.
- String getUuid ()

  Gets the unique identifier (UUID) of the component.
- void setUuid (String uuid)

  Sets the unique identifier (UUID) of the component.

Additional Inherited Members

Protected Attributes inherited from com.logisim.domain.components.Component

- String **name**

  The name or type identifier of the component (e.g., "and", "or").
- boolean[ ] inputs

  An array representing the state of the component's input pins.
- boolean[ ] outputs

  An array representing the state of the component's output pins.
- double **positionX**

  The X-coordinate of the component's position in the visual interface.
- double **positionY**

  The Y-coordinate of the component's position in the visual interface.

6.13.1 Detailed Description

Represents a logical NOT gate (inverter) in the circuit simulation.

A NOT gate implements logical negation. It has a single input and a single output. The output is always the inverse of the input (i.e., if input is true, output is false; if input is false, output is true).

6.13.2 Constructor & Destructor Documentation

6.13.2.1 Not()

```
com.logisim.domain.components.Not.Not ()
```

Constructs a new NOT gate component with default settings.

Initializes the component with:

- Name: "not"
- Input array size: 1
- Output array size: 1
- Default position: (100, 100)
- Initial state: Input set to false, resulting in Output set to true.

6.13.3 Member Function Documentation

6.13.3.1 execute()

```
void com.logisim.domain.components.Not.execute ()
```

Executes the logical operation of the NOT gate.

This method inverts the value found at input index 0 and stores the result at output index 0.

Reimplemented from com.logisim.domain.components.Component.

6.13.3.2 getOutput()

```
boolean com.logisim.domain.components.Not.getOutput ()
```

Retrieves the state of the component's single output pin.

This is a convenience wrapper around `Component#getOutput(int)` targeting index 0.

Returns

`true` if the output is high, `false` otherwise.

6.13.3.3 setInput()

```
void com.logisim.domain.components.Not.setInput (
            boolean value)
```

Sets the state of the component's single input pin.

This is a convenience wrapper around `Component#setInput(int, boolean)` targeting index 0.

Parameters

value	The boolean value to apply to the input.

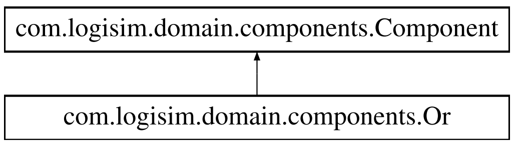
The documentation for this class was generated from the following file:

- src/main/java/com/logisim/domain/components/Not.java

6.14 com.logisim.domain.components.Or Class Reference

Represents a logical OR gate component within the circuit simulation.

Inheritance diagram for com.logisim.domain.components.Or:


com.logisim.domain.components.Component
com.logisim.domain.components.Or

Public Member Functions

- Or ()

  Constructs a new OR gate component with default settings.
- boolean getOutput ()

  Retrieves the current state of the OR gate's output pin.
- void execute ()

  Executes the logical operation of the OR gate.

Public Member Functions inherited from com.logisim.domain.components.Component

- Component ()

  Default constructor.
- Component (String name)

  Constructs a component with a specified name.
- void setInput (int index, boolean value)

  Sets the state of a specific input pin.
- boolean getOutput (int index)

  Retrieves the state of a specific output pin.
- String getName ()

  Gets the name of the component.
- void setName (String name)

  Sets the name of the component.
- boolean[ ] getInputs ()

  Retrieves the entire array of input pin states.
- void setInputs (boolean[ ] inputs)

  Sets the entire array of input pin states.
- boolean[ ] getOutputs ()

  Retrieves the entire array of output pin states.
- void setOutputs (boolean[ ] outputs)

  Sets the entire array of output pin states.
- double getPositionX ()

  Gets the X-coordinate of the component.
- double getPositionY ()

  Gets the Y-coordinate of the component.
- void setPositionX (double positionX)

  Sets the X-coordinate of the component.
- void setPositionY (double positionY)

  Sets the Y-coordinate of the component.
- String getUuid ()

  Gets the unique identifier (UUID) of the component.
- void setUuid (String uuid)

  Sets the unique identifier (UUID) of the component.

Additional Inherited Members

Protected Attributes inherited from com.logisim.domain.components.Component

- String **name**

  The name or type identifier of the component (e.g., "and", "or").
- boolean[ ] inputs

  An array representing the state of the component's input pins.
- boolean[ ] outputs

  An array representing the state of the component's output pins.
- double **positionX**

  The X-coordinate of the component's position in the visual interface.
- double **positionY**

  The Y-coordinate of the component's position in the visual interface.

6.14.1 Detailed Description

Represents a logical OR gate component within the circuit simulation.

This component accepts two boolean inputs and produces a single boolean output. The output is true if at least one of the inputs is true. It is false only if both inputs are false.

6.14.2 Constructor & Destructor Documentation

6.14.2.1 Or()

```
com.logisim.domain.components.Or.Or ()
```

Constructs a new OR gate component with default settings.

Initializes the component with:

- Name: "or"
- Input array size: 2
- Output array size: 1
- Default position: (100, 100)
- Initial state: All inputs and outputs set to false.

6.14.3 Member Function Documentation

6.14.3.1 execute()

```
void com.logisim.domain.components.Or.execute ()
```

Executes the logical operation of the OR gate.

This method updates the internal output state based on the current values of the input pins. The output at index 0 is set to `true` if either input index 0 or input index 1 (or both) are `true`.

Reimplemented from com.logisim.domain.components.Component.

6.14.3.2 getOutput()

```
boolean com.logisim.domain.components.Or.getOutput ()
```

Retrieves the current state of the OR gate's output pin.

This is a convenience method that delegates to the superclass's `Component#getOutput(int)` method with index 0.

Returns

`true` if the gate is outputting a high signal, `false` otherwise.

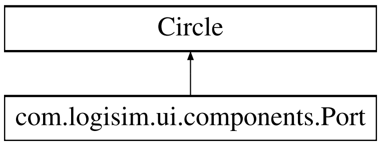
The documentation for this class was generated from the following file:

- src/main/java/com/logisim/domain/components/Or.java

6.15 com.logisim.ui.components.Port Class Reference

Represents a specific connection point (pin) on a visual logic component.

Inheritance diagram for com.logisim.ui.components.Port:



Public Member Functions

- Port (boolean isInput, StackPane parentGate, int index)
  Constructs a new Port instance.
- boolean isInput ()
  Checks if this port is an input.
- boolean getConnectionState ()
  Retrieves the current connection state or signal value of the port.
- void setConnectionState (boolean value)
  Sets the connection state or signal value for this port.
- void setSelected (boolean value)
  Sets the selection status of the port.
- StackPane getParentGate ()
  Retrieves the visual component that owns this port.
- boolean isSelected ()
  Checks if the port is currently selected.
- int getIndex ()
  Retrieves the logical index of this port.

Private Attributes

- boolean isInput

  Indicates the direction of the port.
- boolean **selected**

  Indicates whether this port is currently selected by the user (e.g., during the process of creating a connection).
- boolean **connectionState** = false

  Represents the active state or signal value associated with this port.
- int **index**

  The index of this port corresponding to the component's internal input or output arrays.
- StackPane **parentGate**

  The visual container (StackPane) of the component to which this port belongs.

6.15.1 Detailed Description

Represents a specific connection point (pin) on a visual logic component.

A Port acts as an interface for creating wire connections between components. It is visually represented as a small circle. It maintains information about whether it is an input or output, its index within the component's logical structure, and its parent visual component.

6.15.2 Constructor & Destructor Documentation

6.15.2.1 Port()

```
com.logisim.ui.components.Port.Port (
             boolean isInput,
             StackPane parentGate,
             int index)
```

Constructs a new Port instance.

Initializes the port's visual style (transparent fill, blue stroke) and sets up mouse hover effects to provide visual feedback (turning yellow on hover).

Parameters

isInput	`true` if this is an input pin, `false` for output.
parentGate	The visual `StackPane` of the owning component.
index	The logical index of this pin on the component.

6.15.3 Member Function Documentation

6.15.3.1 getConnectionState()

```
boolean com.logisim.ui.components.Port.getConnectionState ()
```

Retrieves the current connection state or signal value of the port.

Returns

The boolean state of the connection.

6.15.3.2 getIndex()

```
int com.logisim.ui.components.Port.getIndex ()
```

Retrieves the logical index of this port.

This index corresponds to the `inputs[]` or `outputs[]` array in the underlying logic component.

Returns

The integer index.

6.15.3.3 getParentGate()

```
StackPane com.logisim.ui.components.Port.getParentGate ()
```

Retrieves the visual component that owns this port.

Returns

The parent `StackPane`.

6.15.3.4 isInput()

```
boolean com.logisim.ui.components.Port.isInput ()
```

Checks if this port is an input.

Returns

`true` if input, `false` if output.

6.15.3.5 isSelected()

```
boolean com.logisim.ui.components.Port.isSelected ()
```

Checks if the port is currently selected.

Returns

`true` if selected, `false` otherwise.

6.15.3.6 setConnectionState()

```
void com.logisim.ui.components.Port.setConnectionState (
            boolean value)
```

Sets the connection state or signal value for this port.

Parameters

value	The new boolean state.

6.15.3.7 setSelected()

```
void com.logisim.ui.components.Port.setSelected (
            boolean value)
```

Sets the selection status of the port.

Used by the connection manager to highlight ports during wiring.

Parameters

value	`true` to mark as selected, `false` otherwise.

6.15.4 Member Data Documentation

6.15.4.1 isInput

```
boolean com.logisim.ui.components.Port.isInput  [private]
```

Indicates the direction of the port.

`true` if this is an input port; `false` if it is an output port.

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

- src/main/java/com/logisim/ui/components/Port.java

6.16 com.logisim.domain.Project Class Reference

Represents a project within the Logisim application.

Public Member Functions

- void save ()

  Persists the current project state to the database.
- void load ()

  Loads the project data from the database.
- void export ()

  Exports the project's circuits to JPG image files.
- Project (String name)

  Constructs a new Project with a specified name.
- Project (long id, String name)

  Constructs a new Project with a specified ID and name.
- Project ()

  Default constructor.
- String getName ()

  Retrieves the name of the project.
- List< Circuit > getCircuits ()

  Retrieves the list of circuits contained in this project.
- long getId ()

  Retrieves the unique identifier of the project.
- void setId (long id)

  Sets the unique identifier of the project.
- void setName (String name)

  Sets the name of the project.
- void setCircuits (List< Circuit > circuits)

  Sets the list of circuits for this project.
- ProjectDAO getProjectdao ()

  Retrieves the Data Access Object associated with this project.
- void setProjectdao (ProjectDAO projectdao)

  Sets the Data Access Object for this project.
- String toString ()

  Returns a string representation of the project.

Private Attributes

- long **id**

  The unique identifier for the project, typically assigned by the database.
- String **name**

  The display name of the project.
- List< Circuit > **circuits** = new ArrayList<>()

  The list of circuits associated with this project.
- ProjectDAO **projectdao** = new ProjectDAO()

  The Data Access Object responsible for persisting project data.

6.16.1 Detailed Description

Represents a project within the Logisim application.

A Project serves as a container for multiple `Circuit` instances. It allows users to organize related circuits together. This class also handles high-level persistence operations by delegating to the `ProjectDAO`.

6.16.2 Constructor & Destructor Documentation

6.16.2.1 Project() [1/3]

```
com.logisim.domain.Project.Project (
             String name)
```

Constructs a new Project with a specified name.

Parameters

name	The name to assign to the project.

6.16.2.2 Project() [2/3]

```
com.logisim.domain.Project.Project (
             long id,
             String name)
```

Constructs a new Project with a specified ID and name.

This constructor is typically used when reconstructing a project object from database records.

Parameters

id	The database ID of the project.
name	The name of the project.

6.16.2.3 Project() [3/3]

```
com.logisim.domain.Project.Project ()
```

Default constructor.

Initializes the project with the default name "Project".

6.16.3 Member Function Documentation

6.16.3.1 export()

```
void com.logisim.domain.Project.export ()
```

Exports the project's circuits to JPG image files.

This method renders the circuit components and wires onto a `BufferedImage`. It simulates the visual layout used in the UI (approx 100x100 components) and draws orthogonal lines for wires.

6.16.3.2 getCircuits()

`List< Circuit > com.logisim.domain.Project.getCircuits ()`

Retrieves the list of circuits contained in this project.

Returns

A list of `Circuit` objects.

6.16.3.3 getId()

`long com.logisim.domain.Project.getId ()`

Retrieves the unique identifier of the project.

Returns

The project ID.

6.16.3.4 getName()

`String com.logisim.domain.Project.getName ()`

Retrieves the name of the project.

Returns

The project name.

6.16.3.5 getProjectdao()

`ProjectDAO com.logisim.domain.Project.getProjectdao ()`

Retrieves the Data Access Object associated with this project.

Returns

The `ProjectDAO` instance.

6.16.3.6 load()

`void com.logisim.domain.Project.load ()`

Loads the project data from the database.

This method refreshes the list of circuits associated with this project ID. It uses `CircuitDAO` to fetch components AND connections, reconstructing the full logical graph of the circuit.

6.16.3.7 save()

```
void com.logisim.domain.Project.save ()
```

Persists the current project state to the database.

This method delegates the saving operation to the internal `ProjectDAO` instance.

6.16.3.8 setCircuits()

```
void com.logisim.domain.Project.setCircuits (
             List< Circuit > circuits)
```

Sets the list of circuits for this project.

Parameters

circuits	The new list of `Circuit` objects.

6.16.3.9 setId()

```
void com.logisim.domain.Project.setId (
             long id)
```

Sets the unique identifier of the project.

Parameters

id	The new project ID.

6.16.3.10 setName()

```
void com.logisim.domain.Project.setName (
             String name)
```

Sets the name of the project.

Parameters

name	The new project name.

6.16.3.11 setProjectdao()

```
void com.logisim.domain.Project.setProjectdao (
             ProjectDAO projectdao)
```

Sets the Data Access Object for this project.

Parameters

projectdao	The `ProjectDAO` instance to be used for persistence.

6.16.3.12 toString()

```
String com.logisim.domain.Project.toString ()
```

Returns a string representation of the project.

Returns

The name of the project.

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

- src/main/java/com/logisim/domain/Project.java

6.17 com.logisim.data.ProjectDAO Class Reference

Data Access Object (DAO) responsible for handling database operations related to `Project` entities.

Public Member Functions

- void saveProject (Project project)

  Saves a new project and all its associated circuits to the database.
- List< Project > getAllProjects ()

  Retrieves all projects stored in the database.
- void deleteProject (long id)

  Deletes a project from the database by its unique identifier.

Private Attributes

- final CircuitDAO **circuitDAO** = new CircuitDAO()

  Helper DAO used to manage the persistence of circuits belonging to a project.

6.17.1 Detailed Description

Data Access Object (DAO) responsible for handling database operations related to `Project` entities.

This class manages the persistence of projects and delegates the saving of associated circuits to the `CircuitDAO`.

6.17.2 Member Function Documentation

6.17.2.1 deleteProject()

```
void com.logisim.data.ProjectDAO.deleteProject (
            long id)
```

Deletes a project from the database by its unique identifier.

Depending on the database schema configuration (specifically cascading deletes), this operation usually removes all associated circuits and components as well.

Parameters

id	The unique database identifier of the project to be deleted.

6.17.2.2 getAllProjects()

```
List< Project > com.logisim.data.ProjectDAO.getAllProjects ()
```

Retrieves all projects stored in the database.

The results are ordered by their creation timestamp in descending order (newest projects first).

Returns

A `List` of `Project` objects populated with IDs and names.

6.17.2.3 saveProject()

```
void com.logisim.data.ProjectDAO.saveProject (
            Project project)
```

Saves a new project and all its associated circuits to the database.

This method performs an SQL insertion for the project to generate a Project ID. Once the ID is obtained, it iterates through the circuits contained within the project object and saves them using the `CircuitDAO`.

Parameters

project	The `Project` object containing the data to be persisted.

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

- src/main/java/com/logisim/data/ProjectDAO.java

6.18 com.logisim.ui.controllers.ProjectDashboardController Class Reference

Controller class for the Project Dashboard view.

Public Member Functions

- void initialize ()

  Initializes the controller class.
- void setProject (Project project)

  Sets the project context for this dashboard.

Private Member Functions

- void refreshList ()

  Refreshes the ListView with the latest circuits from the database.
- void handleDeleteCircuit ()

  Handles the "Delete Circuit" button action.
- void handleNewCircuit ()

  Handles the "New Circuit" button action.
- void handleOpenCircuit ()

  Handles the "Open Circuit" button action.
- void handleExport ()

  Handles the "Export Project" button action.
- void handleBack ()

  Handles the "Back" button action.
- void openMainEditor (Circuit circuit)

  Transitions the scene to the Main Circuit Editor.
- void styleDialog (DialogPane dialogPane)

  Applies the application CSS styles to a dialog pane.

Private Attributes

- Label **lblProjectName**
- ListView< Circuit > **circuitList**
- Button **btnOpen**
- Button **btnDelete**
- Button **btnExport**
- Project **currentProject**

  The currently active project being managed in this dashboard.
- final CircuitDAO **circuitDao** = new CircuitDAO()

  Data Access Object used for performing database operations on circuits.

6.18.1 Detailed Description

Controller class for the Project Dashboard view.

This class manages the UI that appears after a project is selected or created. It displays a list of circuits contained within the current project and provides functionality to open existing circuits, create new ones, delete them, or export the entire project.

6.18.2 Member Function Documentation

6.18.2.1 handleBack()

```
void com.logisim.ui.controllers.ProjectDashboardController.handleBack ()  [private]
```

Handles the "Back" button action.

Navigates the user back to the initial Start View (Project Selection screen).

6.18.2.2 handleDeleteCircuit()

`void com.logisim.ui.controllers.ProjectDashboardController.handleDeleteCircuit () [private]`

Handles the "Delete Circuit" button action.

Prompts the user with a confirmation dialog. If confirmed, the selected circuit is removed from the database, and the list is refreshed.

6.18.2.3 handleExport()

`void com.logisim.ui.controllers.ProjectDashboardController.handleExport () [private]`

Handles the "Export Project" button action.

Reloads the project data to ensure the latest state is captured, then executes the project-wide export to JPG function. Displays a success message upon completion.

6.18.2.4 handleNewCircuit()

`void com.logisim.ui.controllers.ProjectDashboardController.handleNewCircuit () [private]`

Handles the "New Circuit" button action.

Displays a text input dialog to the user. If a valid name is provided, a new circuit is created in the database under the current project, and the list is refreshed.

6.18.2.5 handleOpenCircuit()

`void com.logisim.ui.controllers.ProjectDashboardController.handleOpenCircuit () [private]`

Handles the "Open Circuit" button action.

Retrieves the currently selected circuit and triggers the transition to the main editor view.

6.18.2.6 initialize()

`void com.logisim.ui.controllers.ProjectDashboardController.initialize ()`

Initializes the controller class.

This method is automatically called after the FXML file has been loaded. It sets up a listener on the `circuitList` to enable or disable the "Open" and "Delete" buttons based on whether a circuit is currently selected.

6.18.2.7 openMainEditor()

```
void com.logisim.ui.controllers.ProjectDashboardController.openMainEditor (
            Circuit circuit) [private]
```

Transitions the scene to the Main Circuit Editor.

Loads the `MainView.fxml`, initializes the `MainViewController`, and passes the current project and selected circuit context to it.

Parameters

circuit	The circuit to be opened in the editor.

6.18.2.8 refreshList()

```
void com.logisim.ui.controllers.ProjectDashboardController.refreshList ()  [private]
```

Refreshes the ListView with the latest circuits from the database.

It queries the `CircuitDAO` for all circuits associated with the `currentProject`'s ID and populates the `circuitList`.

6.18.2.9 setProject()

```
void com.logisim.ui.controllers.ProjectDashboardController.setProject (
            Project project)
```

Sets the project context for this dashboard.

This method updates the UI to display the name of the provided project and refreshes the list of associated circuits.

Parameters

project	The `Project` object to display and manage.

6.18.2.10 styleDialog()

```
void com.logisim.ui.controllers.ProjectDashboardController.styleDialog (
            DialogPane dialogPane)  [private]
```

Applies the application CSS styles to a dialog pane.

Parameters

dialogPane	The dialog pane to style.

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

- src/main/java/com/logisim/ui/controllers/ProjectDashboardController.java

6.19 com.logisim.ui.logic.SafePoints Class Reference

Utility class providing logic for determining safe spawn locations for UI components.

Static Public Member Functions

- static final Point2D getSafeSpawnPoint (ScrollPane canvasScrollPane, Pane canvasPane, int gridSize)
  Calculates a spawn point in the center of the currently visible viewport area.

6.19.1 Detailed Description

Utility class providing logic for determining safe spawn locations for UI components.

This class helps prevent usability issues where new components might appear off-screen or in obscured areas by calculating coordinates relative to the user's current viewport.

6.19.2 Member Function Documentation

6.19.2.1 getSafeSpawnPoint()

```
final Point2D com.logisim.ui.logic.SafePoints.getSafeSpawnPoint (
                ScrollPane canvasScrollPane,
                Pane canvasPane,
                int gridSize)  [static]
```

Calculates a spawn point in the center of the currently visible viewport area.

This method calculates the center coordinates of the `canvasScrollPane`'s viewport, taking into account the current scroll position. It then adjusts these coordinates to snap to the nearest grid lines defined by `gridSize`. This ensures that when a user adds a component, it appears right in front of them, even if they have scrolled away from the origin (0,0).

Parameters

canvasScrollPane	The scroll pane containing the canvas. Used to determine visible area and scroll offsets.
canvasPane	The actual content pane representing the circuit canvas. Used to determine total dimensions.
gridSize	The size of the grid cells for snapping calculations.

Returns

A `Point2D` representing the calculated X and Y coordinates for spawning a component.

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

- src/main/java/com/logisim/ui/logic/SafePoints.java

6.20 com.logisim.ui.controllers.StartScreenController Class Reference

Controller class for the application's start screen.

Public Member Functions

- void initialize ()

  Initializes the controller class.

Private Member Functions

- void handleNewProject ()

  Handles the "New Project" button action.
- void handleLoadProject ()

  Handles the "Load Project" button action.
- void handleDeleteProject ()

  Handles the "Delete Project" action.
- void showAlert (String title, String content)

  Helper method to display a styled information alert.
- void loadDashboard (Project project)

  Transitions the scene to the Project Dashboard.
- void styleDialog (javafx.scene.control.DialogPane dialogPane)

  Applies the application CSS styles to a dialog pane.

Private Attributes

- Button **btnNewProject**
- Button **btnLoadProject**

6.20.1 Detailed Description

Controller class for the application's start screen.

This class handles the initial user interactions when the application launches. It provides functionality to create new projects, load existing projects from the database, or delete existing projects. It manages the transition from the start screen to the main project dashboard.

6.20.2 Member Function Documentation

6.20.2.1 handleDeleteProject()

```
void com.logisim.ui.controllers.StartScreenController.handleDeleteProject ()  [private]
```

Handles the "Delete Project" action.

Retrieves existing projects and prompts the user to select one for deletion. If confirmed, the project (and its associated data) is removed from the database via `ProjectDAO#deleteProject(long)`.

6.20.2.2 handleLoadProject()

```
void com.logisim.ui.controllers.StartScreenController.handleLoadProject ()  [private]
```

Handles the "Load Project" button action.

Retrieves a list of existing projects from the database using `ProjectDAO`. If projects exist, a choice dialog is displayed. Upon selection, the application transitions to the dashboard view for the selected project. If no projects exist, an alert is shown.

6.20.2.3 handleNewProject()

```
void com.logisim.ui.controllers.StartScreenController.handleNewProject ()  [private]
```

Handles the "New Project" button action.

Opens a dialog prompting the user for a project name. If a valid name is provided, a new `Project` is created, saved to the database, and the application transitions to the dashboard view for the new project.

6.20.2.4 initialize()

```
void com.logisim.ui.controllers.StartScreenController.initialize ()
```

Initializes the controller class.

This method is automatically called after the FXML file has been loaded. It assigns specific CSS style classes to the primary buttons to ensure consistent UI theming.

6.20.2.5 loadDashboard()

```
void com.logisim.ui.controllers.StartScreenController.loadDashboard (
            Project project)  [private]
```

Transitions the scene to the Project Dashboard.

Loads the `project_dashboard.fxml`, initializes the `ProjectDashboardController` with the selected project context, applies the application stylesheet, and updates the stage.

Parameters

project	The `Project` context to pass to the dashboard.

6.20.2.6 showAlert()

```
void com.logisim.ui.controllers.StartScreenController.showAlert (
            String title,
            String content)  [private]
```

Helper method to display a styled information alert.

Parameters

title	The title of the alert window.
content	The message content to be displayed.

6.20.2.7 styleDialog()

```
void com.logisim.ui.controllers.StartScreenController.styleDialog (
            javafx.scene.control.DialogPane dialogPane)  [private]
```

Applies the application CSS styles to a dialog pane.

This ensures that pop-up dialogs match the overall theme of the application.

Parameters

dialogPane	The `javafx.scene.control.DialogPane` to style.

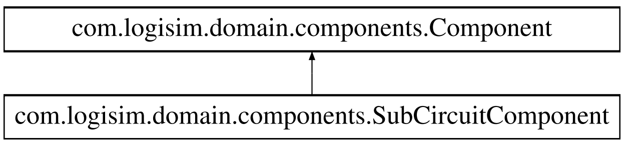
The documentation for this class was generated from the following file:

- src/main/java/com/logisim/ui/controllers/StartScreenController.java

6.21 com.logisim.domain.components.SubCircuitComponent Class Reference

Represents a complex circuit encapsulated as a single component within another circuit.

Inheritance diagram for com.logisim.domain.components.SubCircuitComponent:


com.logisim.domain.components.Component
com.logisim.domain.components.SubCircuitComponent

Public Member Functions

- SubCircuitComponent (Circuit loadedCircuit)

  Constructs a new SubCircuitComponent based on an existing circuit.
- void execute ()

  Executes the logic of the encapsulated circuit.
- String getName ()

  Retrieves the name of the component, which corresponds to the name of the inner circuit.
- long getSourceCircuitId ()

  Gets the ID of the circuit used as the source for this component.
- Circuit getInnerCircuit ()

  Retrieves the actual `Circuit` object being simulated internally.
- void setInnerCircuit (Circuit innerCircuit)

Sets the inner circuit logic.
- void setSourceCircuitId (long sourceCircuitId)

  Sets the source circuit ID.
- List< Switch > getInternalSwitches ()

  Retrieves the list of switches inside the inner circuit that act as inputs.
- void setInternalSwitches (List< Switch > internalSwitches)

  Sets the list of internal switches.
- List< Bulb > getInternalBulbs ()

  Retrieves the list of bulbs inside the inner circuit that act as outputs.
- void setInternalBulbs (List< Bulb > internalBulbs)

  Sets the list of internal bulbs.

Public Member Functions inherited from com.logisim.domain.components.Component

- Component ()

  Default constructor.
- Component (String name)

  Constructs a component with a specified name.
- void setInput (int index, boolean value)

  Sets the state of a specific input pin.
- boolean getOutput (int index)

  Retrieves the state of a specific output pin.
- void setName (String name)

  Sets the name of the component.
- boolean[ ] getInputs ()

  Retrieves the entire array of input pin states.
- void setInputs (boolean[ ] inputs)

  Sets the entire array of input pin states.
- boolean[ ] getOutputs ()

  Retrieves the entire array of output pin states.
- void setOutputs (boolean[ ] outputs)

  Sets the entire array of output pin states.
- double getPositionX ()

  Gets the X-coordinate of the component.
- double getPositionY ()

  Gets the Y-coordinate of the component.
- void setPositionX (double positionX)

  Sets the X-coordinate of the component.
- void setPositionY (double positionY)

  Sets the Y-coordinate of the component.
- String getUuid ()

  Gets the unique identifier (UUID) of the component.
- void setUuid (String uuid)

  Sets the unique identifier (UUID) of the component.

Private Attributes

- Circuit **innerCircuit**

  The underlying circuit logic being wrapped by this component.
- long **sourceCircuitId**

  The unique identifier of the source circuit in the database.
- List< Switch > **internalSwitches**

  The list of switches within the inner circuit, serving as input interfaces.
- List< Bulb > **internalBulbs**

  The list of bulbs within the inner circuit, serving as output interfaces.

Additional Inherited Members

Protected Attributes inherited from com.logisim.domain.components.Component

- String **name**

  The name or type identifier of the component (e.g., "and", "or").
- boolean[ ] inputs

  An array representing the state of the component's input pins.
- boolean[ ] outputs

  An array representing the state of the component's output pins.
- double **positionX**

  The X-coordinate of the component's position in the visual interface.
- double **positionY**

  The Y-coordinate of the component's position in the visual interface.

6.21.1 Detailed Description

Represents a complex circuit encapsulated as a single component within another circuit.

This class allows for hierarchical circuit design by treating an entire `Circuit` as a "black box" component.

Mapping Logic:

- **Inputs:** `Switch` components inside the inner circuit act as input pins for this component.
- **Outputs:** `Bulb` components inside the inner circuit act as output pins for this component.

6.21.2 Constructor & Destructor Documentation

6.21.2.1 SubCircuitComponent()

```
com.logisim.domain.components.SubCircuitComponent.SubCircuitComponent (
            Circuit loadedCircuit)
```

Constructs a new SubCircuitComponent based on an existing circuit.

This constructor scans the provided circuit for `Switch` and `Bulb` components. The size of the component's input array is determined by the number of switches, and the size of the output array is determined by the number of bulbs found.

Parameters

loadedCircuit	The fully loaded `Circuit` object to be encapsulated.

6.21.3 Member Function Documentation

6.21.3.1 execute()

```
void com.logisim.domain.components.SubCircuitComponent.execute ()
```

Executes the logic of the encapsulated circuit.

This method performs three main steps:

1. Maps the values from this component's input pins to the internal switches of the inner circuit.
2. Simulates the inner circuit. It runs a loop proportional to the number of components to ensure signals propagate through the internal logic gates.
3. Maps the resulting states of the internal bulbs to this component's output pins.

Reimplemented from com.logisim.domain.components.Component.

6.21.3.2 getInnerCircuit()

```
Circuit com.logisim.domain.components.SubCircuitComponent.getInnerCircuit ()
```

Retrieves the actual `Circuit` object being simulated internally.

Returns

The inner `Circuit` instance.

6.21.3.3 getInternalBulbs()

```
List< Bulb > com.logisim.domain.components.SubCircuitComponent.getInternalBulbs ()
```

Retrieves the list of bulbs inside the inner circuit that act as outputs.

Returns

A list of `Bulb` components.

6.21.3.4 getInternalSwitches()

```
List< Switch > com.logisim.domain.components.SubCircuitComponent.getInternalSwitches ()
```

Retrieves the list of switches inside the inner circuit that act as inputs.

Returns

A list of `Switch` components.

6.21.3.5 getName()

```
String com.logisim.domain.components.SubCircuitComponent.getName ()
```

Retrieves the name of the component, which corresponds to the name of the inner circuit.

Returns

The name of the encapsulated circuit.

Reimplemented from com.logisim.domain.components.Component.

6.21.3.6 getSourceCircuitId()

```
long com.logisim.domain.components.SubCircuitComponent.getSourceCircuitId ()
```

Gets the ID of the circuit used as the source for this component.

Returns

The database ID of the inner circuit.

6.21.3.7 setInnerCircuit()

```
void com.logisim.domain.components.SubCircuitComponent.setInnerCircuit (
            Circuit innerCircuit)
```

Sets the inner circuit logic.

Parameters

innerCircuit	The new `Circuit` to encapsulate.

6.21.3.8 setInternalBulbs()

```
void com.logisim.domain.components.SubCircuitComponent.setInternalBulbs (
            List< Bulb > internalBulbs)
```

Sets the list of internal bulbs.

Parameters

internalBulbs	The list of `Bulb` components.

6.21.3.9 setInternalSwitches()

```
void com.logisim.domain.components.SubCircuitComponent.setInternalSwitches (
            List< Switch > internalSwitches)
```

Sets the list of internal switches.

Parameters

internalSwitches	The list of `Switch` components.

6.21.3.10 setSourceCircuitId()

```
void com.logisim.domain.components.SubCircuitComponent.setSourceCircuitId (
            long sourceCircuitId)
```

Sets the source circuit ID.

Parameters

source↩ CircuitId	The database ID of the circuit.

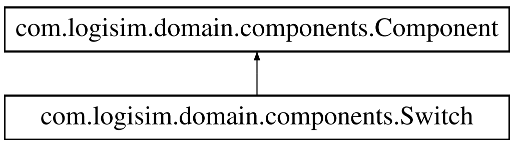
The documentation for this class was generated from the following file:

- src/main/java/com/logisim/domain/components/SubCircuitComponent.java

6.22 com.logisim.domain.components.Switch Class Reference

Represents a toggle switch component in the circuit simulation.

Inheritance diagram for com.logisim.domain.components.Switch:


com.logisim.domain.components.Component
com.logisim.domain.components.Switch

Public Member Functions

- Switch ()

  Constructs a new Switch component.
- boolean isOn ()

  Checks if the switch is currently in the "On" state.
- void execute ()

  Updates the component's output pin based on its internal state.
- void toggle ()

  Toggles the current state of the switch.
- void setState (boolean state)

  Explicitly sets the state of the switch.
- String getName ()

  Retrieves the unique type name of this component.

Public Member Functions inherited from com.logisim.domain.components.Component

- Component ()

  Default constructor.
- Component (String name)

  Constructs a component with a specified name.
- void setInput (int index, boolean value)

  Sets the state of a specific input pin.
- boolean getOutput (int index)

  Retrieves the state of a specific output pin.
- void setName (String name)

  Sets the name of the component.
- boolean[ ] getInputs ()

  Retrieves the entire array of input pin states.
- void setInputs (boolean[ ] inputs)

  Sets the entire array of input pin states.
- boolean[ ] getOutputs ()

  Retrieves the entire array of output pin states.
- void setOutputs (boolean[ ] outputs)

  Sets the entire array of output pin states.
- double getPositionX ()

  Gets the X-coordinate of the component.
- double getPositionY ()

  Gets the Y-coordinate of the component.
- void setPositionX (double positionX)

  Sets the X-coordinate of the component.
- void setPositionY (double positionY)

  Sets the Y-coordinate of the component.
- String getUuid ()

  Gets the unique identifier (UUID) of the component.
- void setUuid (String uuid)

  Sets the unique identifier (UUID) of the component.

Private Attributes

- boolean isOn

  The internal state of the switch.

Additional Inherited Members

Protected Attributes inherited from com.logisim.domain.components.Component

- String **name**

  The name or type identifier of the component (e.g., "and", "or").
- boolean[ ] inputs

  An array representing the state of the component's input pins.
- boolean[ ] outputs

  An array representing the state of the component's output pins.
- double **positionX**

  The X-coordinate of the component's position in the visual interface.
- double **positionY**

  The Y-coordinate of the component's position in the visual interface.

6.22.1 Detailed Description

Represents a toggle switch component in the circuit simulation.

A Switch acts as a primary input source for a circuit. It has no input pins but provides a single output pin. The output signal is determined by the internal state of the switch (On/High or Off/Low).

6.22.2 Constructor & Destructor Documentation

6.22.2.1 Switch()

```
com.logisim.domain.components.Switch.Switch ()
```

Constructs a new Switch component.

Initializes the component with:

- Name: "switch"
- Input array size: 0 (Switches do not receive signals from other components)
- Output array size: 1
- Initial state: Off (`false`)

6.22.3 Member Function Documentation

6.22.3.1 execute()

```
void com.logisim.domain.components.Switch.execute ()
```

Updates the component's output pin based on its internal state.

If the internal state `isOn` is true, the output at index 0 becomes true. Otherwise, it becomes false.

Reimplemented from com.logisim.domain.components.Component.

6.22.3.2 getName()

```
String com.logisim.domain.components.Switch.getName ()
```

Retrieves the unique type name of this component.

Returns

The string literal "switch".

Reimplemented from com.logisim.domain.components.Component.

6.22.3.3 isOn()

```
boolean com.logisim.domain.components.Switch.isOn ()
```

Checks if the switch is currently in the "On" state.

Returns

`true` if the switch is on, `false` otherwise.

6.22.3.4 setState()

```
void com.logisim.domain.components.Switch.setState (
             boolean state)
```

Explicitly sets the state of the switch.

This method is useful for programmatically controlling the switch, such as when it is used as an input interface for a `SubCircuitComponent`. Triggers `execute()` to update the output pin.

Parameters

state	The new state to apply (`true` for On, `false` for Off).

6.22.3.5 toggle()

```
void com.logisim.domain.components.Switch.toggle ()
```

Toggles the current state of the switch.

If the switch is On, it turns Off. If it is Off, it turns On. After changing the state, `execute()` is called immediately to update the output pin.

6.22.4 Member Data Documentation

6.22.4.1 isOn

```
boolean com.logisim.domain.components.Switch.isOn  [private]
```

The internal state of the switch.

`true` indicates the switch is closed (On), generating a high signal. `false` indicates the switch is open (Off), generating a low signal.

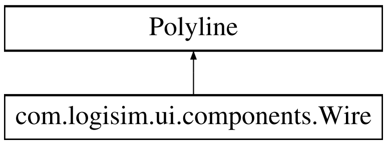
The documentation for this class was generated from the following file:

- src/main/java/com/logisim/domain/components/Switch.java

6.23 com.logisim.ui.components.Wire Class Reference

Represents a visual wire connection between two `Port`s on the circuit canvas.

Inheritance diagram for com.logisim.ui.components.Wire:



Public Member Functions

- Wire (Port source, Port sink)

  Constructs a new Wire connecting a source port to a sink port.
- Port getSource ()

  Retrieves the source port of this wire.
- Port getSink ()

  Retrieves the sink port of this wire.

Private Member Functions

- void updateWire ()

  Recalculates the geometric path of the wire based on the current positions of the ports.
- void setupInteractions ()

  Configures mouse interactions for the wire.

Private Attributes

- final Port **source**
- final Port **sink**

6.23.1 Detailed Description

Represents a visual wire connection between two `Port`s on the circuit canvas.

This class extends `Polyline` to render a physical line representing the logic flow between components. It implements an orthogonal (Manhattan-style) routing algorithm to draw lines with right angles. The wire automatically updates its geometry whenever the connected components are moved.

6.23.2 Constructor & Destructor Documentation

6.23.2.1 Wire()

```
com.logisim.ui.components.Wire.Wire (
            Port source,
            Port sink)
```

Constructs a new Wire connecting a source port to a sink port.

This constructor initializes the wire's visual properties (color, width), attaches layout listeners to the parent components of the ports to handle movement, and sets up user interactions.

Parameters

source	The Port acting as the signal source.
sink	The Port acting as the signal sink.

6.23.3 Member Function Documentation

6.23.3.1 getSink()

```
Port com.logisim.ui.components.Wire.getSink ()
```

Retrieves the sink port of this wire.

Returns

The Port where the signal terminates.

6.23.3.2 getSource()

```
Port com.logisim.ui.components.Wire.getSource ()
```

Retrieves the source port of this wire.

Returns

The Port where the signal originates.

6.23.3.3 setupInteractions()

```
void com.logisim.ui.components.Wire.setupInteractions () [private]
```

Configures mouse interactions for the wire.

Adds handlers for:

- **Hover:** Increases stroke width to indicate focus.
- **Context Menu:** Provides options to change the wire color (Red, Blue, Green, etc.) or delete the wire.

6.23.3.4 updateWire()

```
void com.logisim.ui.components.Wire.updateWire () [private]
```

Recalculates the geometric path of the wire based on the current positions of the ports.

This method computes the absolute coordinates of the source and sink ports relative to their parent container. It then generates a 4-point path:

1. Start point (Source coordinates).
2. Midpoint 1 (Horizontal movement to the midpoint between X coordinates).
3. Midpoint 2 (Vertical movement to the target Y coordinate).
4. End point (Sink coordinates).

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

- src/main/java/com/logisim/ui/components/Wire.java

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