

Computer Architecture: Gates and Wires

Brent van Bladel

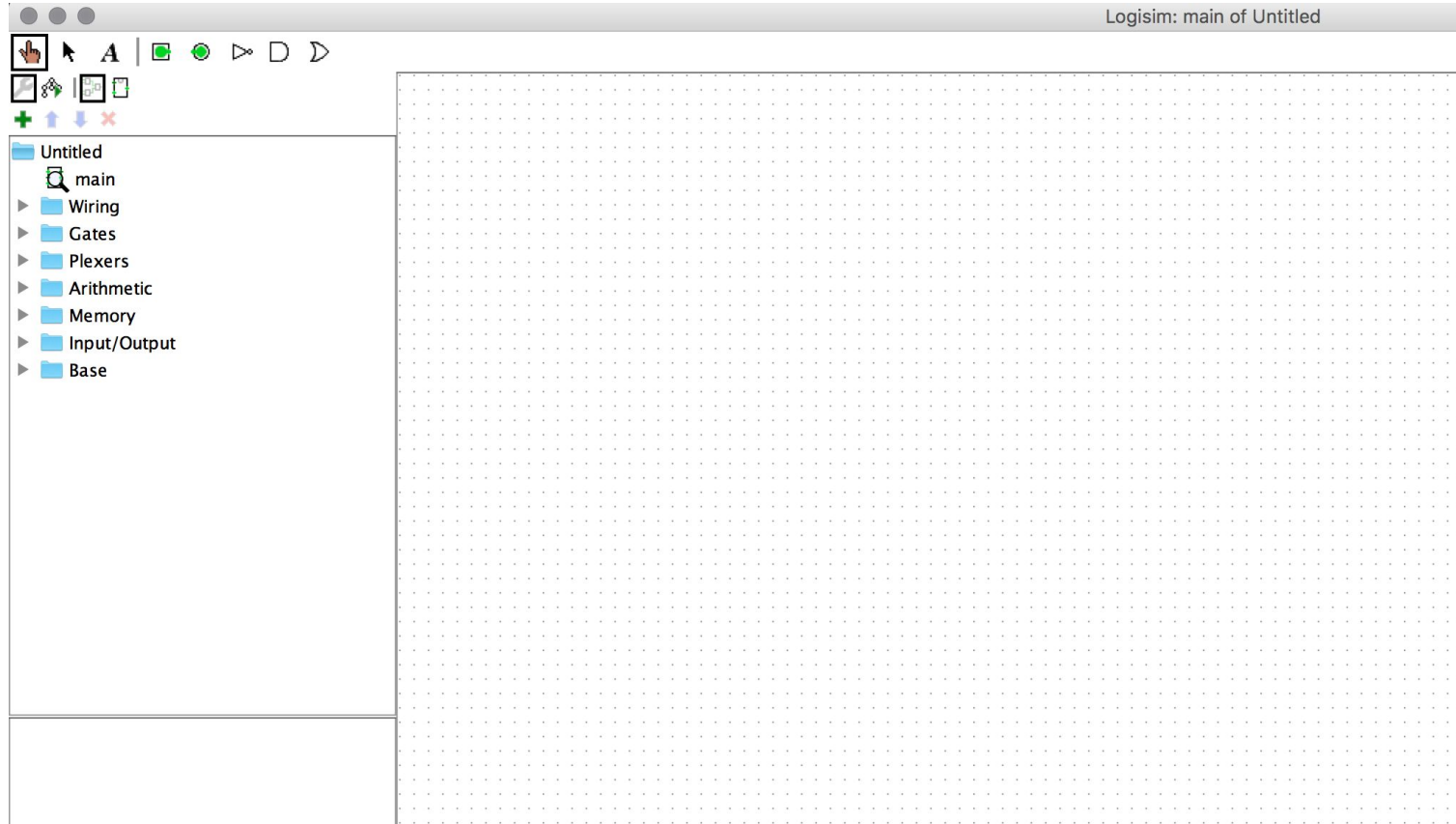
Stephen Pauwels

Gates and Wires

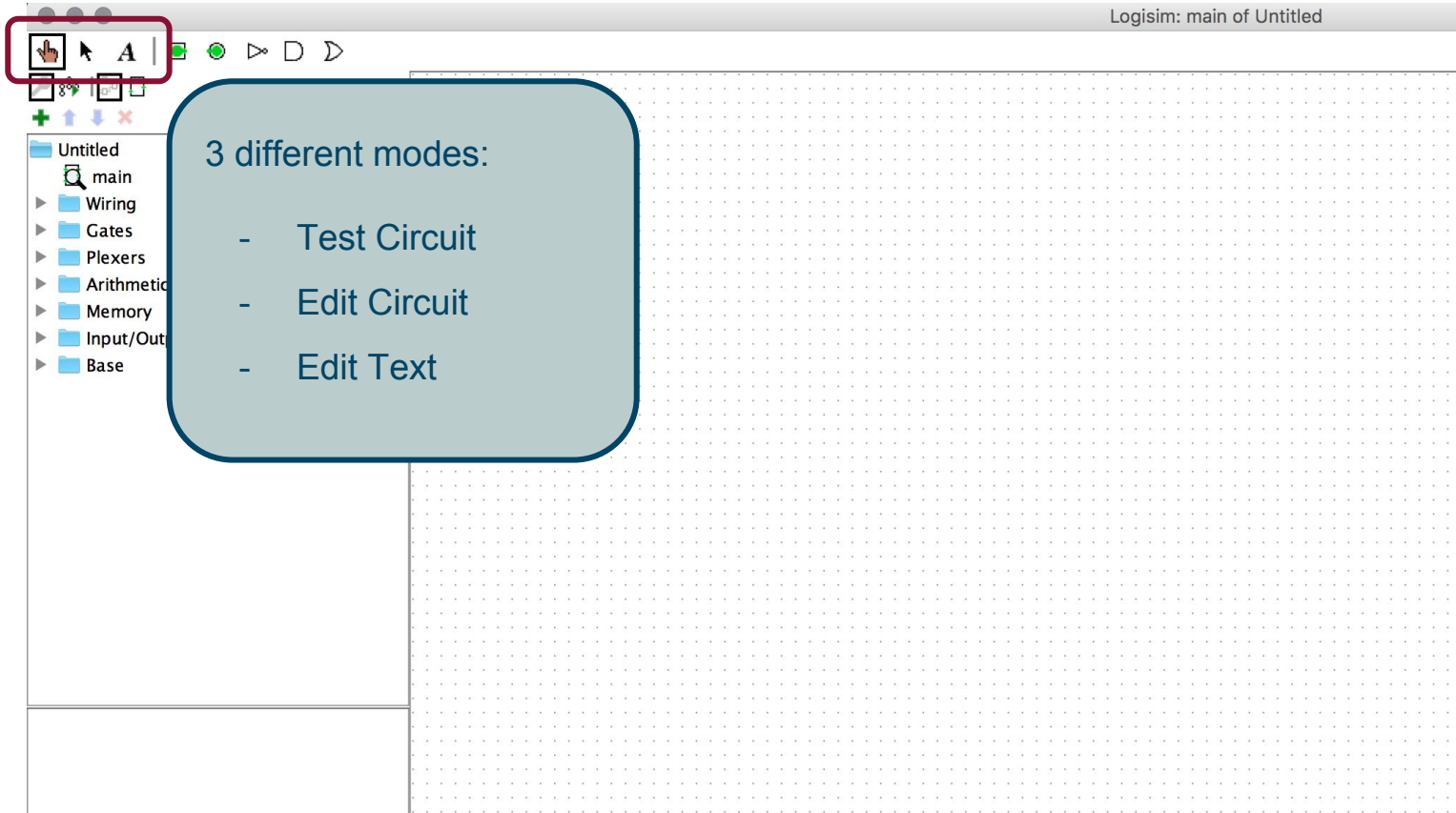
- Introduction to CA from Boolean Theory
- Introduction to Logisim



Logisim



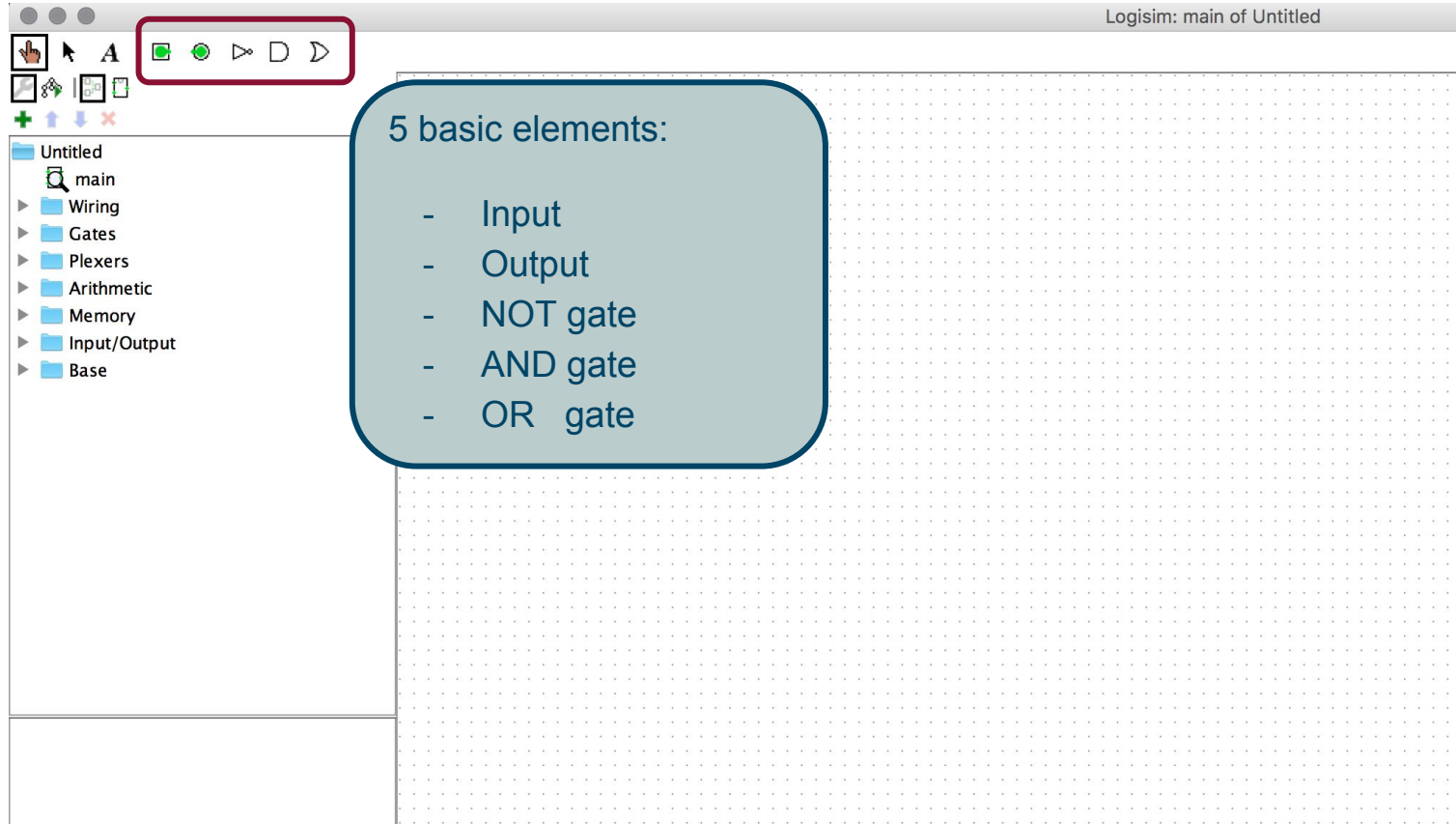
Logisim



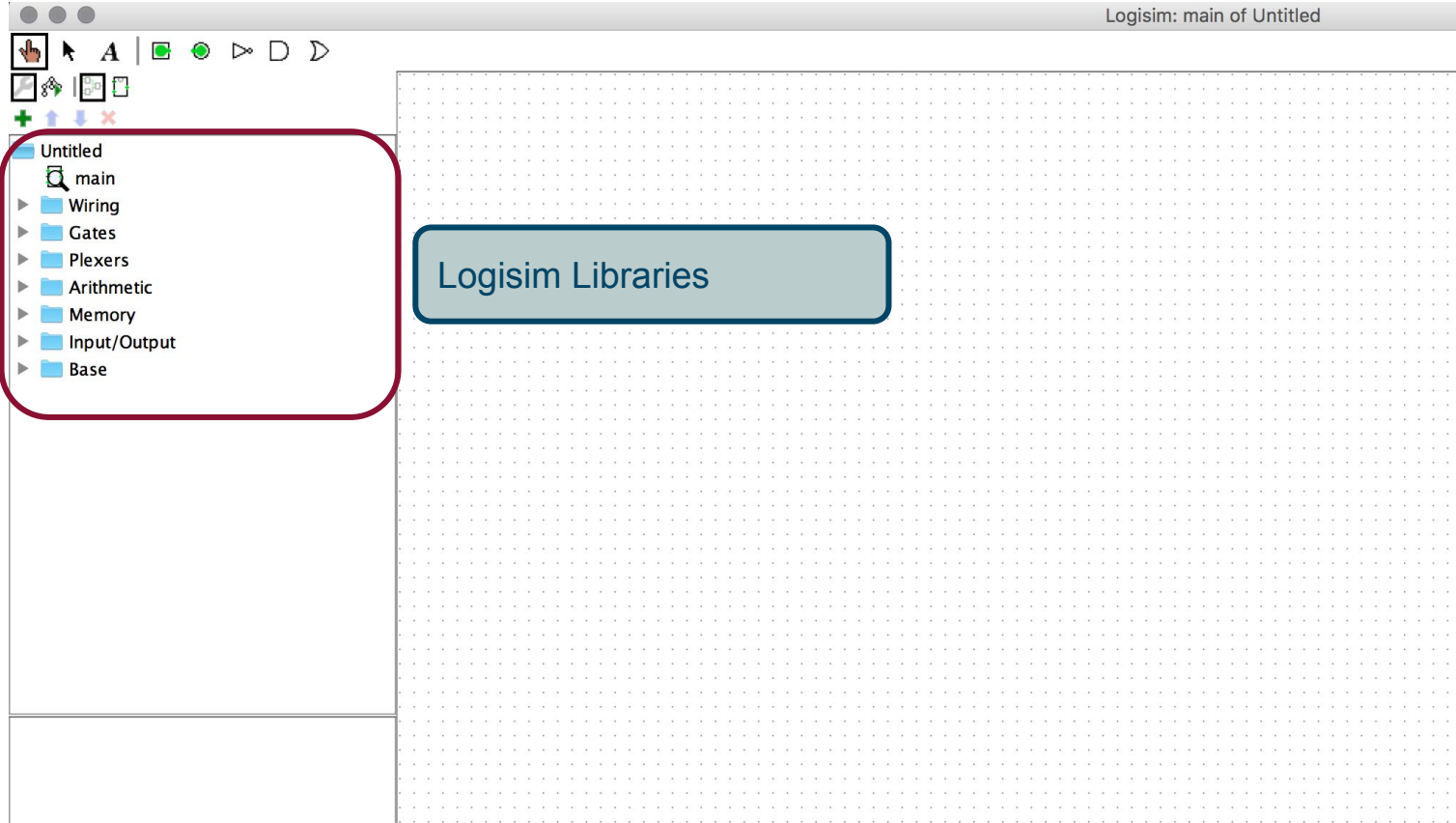
3 different modes:

- Test Circuit
- Edit Circuit
- Edit Text

Logisim



Logisim



Logisim

Logisim: main of Untitled

The screenshot shows the Logisim software interface. On the left is a component palette with categories like Wiring, Gates, Plexers, Arithmetic, Memory, Input/Output, and Base. The main workspace contains a circuit diagram with several components: a green wire connecting two pins labeled '0', a green wire connecting two pins labeled '1', a green wire connecting a pin labeled '1' to a blue pin labeled 'X', a blue wire connecting a blue pin labeled 'X' to another blue pin labeled 'X', a blue wire connecting a blue pin labeled 'X' to a red pin labeled 'E' through a NOT gate, an orange wire connecting a pin labeled '00' to a blue pin labeled 'X' with labels '2' and '1' near the connection points, and a black wire connecting two pins labeled '01'. A light blue circle highlights the blue pin labeled 'X' in the fourth row. At the bottom left, a 'Pin' configuration table is visible.

Pin	
Facing	East
Output?	No
Data Bits	1
Three-state?	Yes
Pull Behavior	Unchanged
Label	
Label Location	West
Label Font	SansSerif Plain 12

Logisim

The screenshot shows the Logisim software interface. The main workspace contains a circuit diagram on a grid. The diagram includes several components: two green wires connecting '0' and '1' labels, a blue wire connecting '1' and 'X', a blue wire connecting 'X' and 'X', a blue wire connecting 'X' to an inverter, and an orange wire connecting '00' to 'X'. A red box highlights the top two green wires. A blue box highlights the 'X' input of the inverter. The bottom of the interface shows a 'Pin' configuration table.

Pin	
Facing	East
Output?	No
Data Bits	1
Three-state?	Yes
Pull Behavior	Unchanged
Label	
Label Location	West
Label Font	SansSerif Plain 12

Normal connection: 0 or 1

Logisim

The screenshot shows the Logisim interface with a circuit diagram on a grid. The circuit includes several components: two input pins labeled '0' and '1', two output pins labeled 'X', a NOT gate, and two pins labeled '00' and '01'. A red box highlights a broken connection between an output pin 'X' and an input pin '1'. A callout box labeled 'Broken connection' points to this area. The properties panel at the bottom left is open, showing a table of settings for the selected component.

Pin	
Facing	East
Output?	No
Data Bits	1
Three-state?	Yes
Full Behavior	Unchanged
Label	
Label Location	West
Label Font	SansSerif Plain 12

Logisim

The screenshot shows the Logisim software interface. On the left is a component palette with categories like Wiring, Gates, Plexers, Arithmetic, Memory, Input/Output, and Base. The main workspace contains a circuit diagram with several components and connections. A red box highlights a connection between a component labeled 'X' and a component labeled 'E', which is identified as an error connection. A callout box points to this error with the text 'Error connection'. Below the circuit is a 'Pin' configuration table.

Pin	
Facing	East
Output?	No
Data Bits	1
Three-state?	Yes
Pull Behavior	Unchanged
Label	
Label Location	West
Label Font	SansSerif Plain 12

Logisim

The screenshot shows the Logisim software interface. On the left is a component palette with categories like Wiring, Gates, Plexers, Arithmetic, Memory, Input/Output, and Base. The main workspace contains a circuit diagram with several components: two input pins labeled '0' and '1', two output pins labeled 'X', a NOT gate, and two pins labeled '00' and '01'. A red box highlights a connection between the '00' pin (width 2) and the 'X' pin (width 1), with a callout box stating 'Incompatible width'. The bottom panel shows the properties for the selected component, with the 'Data Bits' field set to 1.

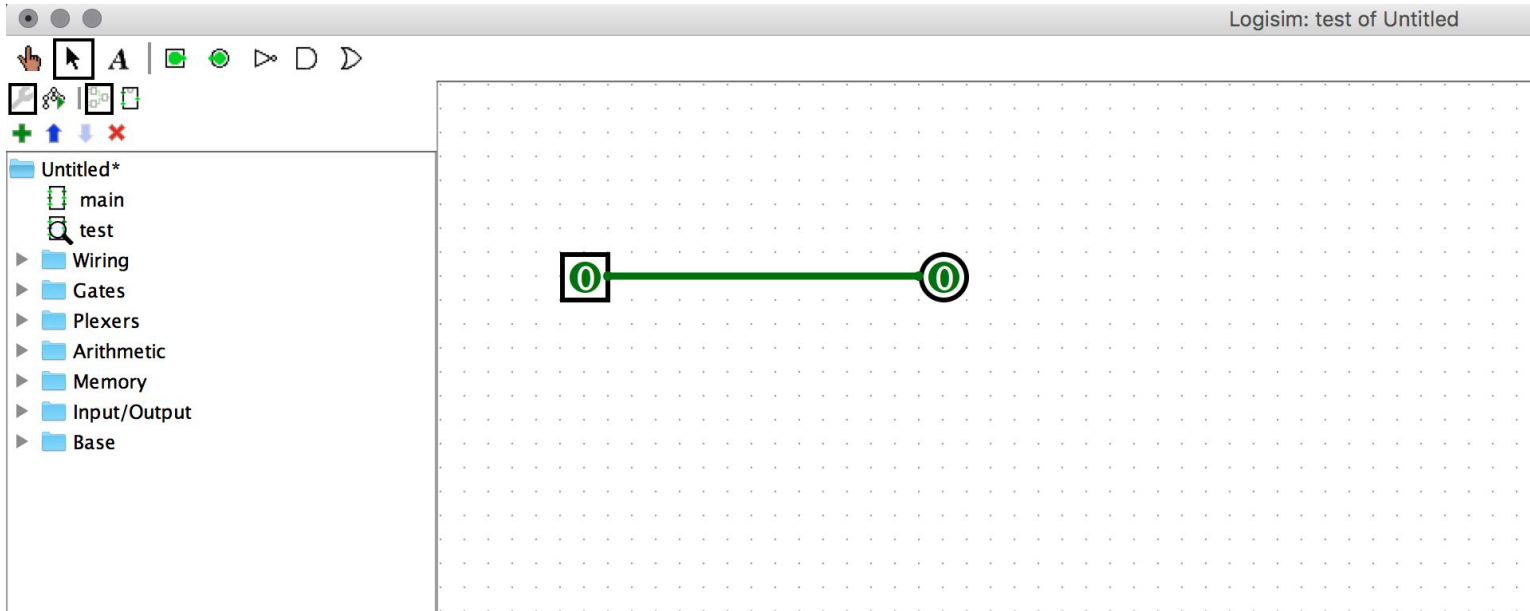
Pin	
Facing	East
Output?	No
Data Bits	1
Three-state?	Yes
Pull Behavior	Unchanged
Label	
Label Location	West
Label Font	SansSerif Plain 12

Logisim

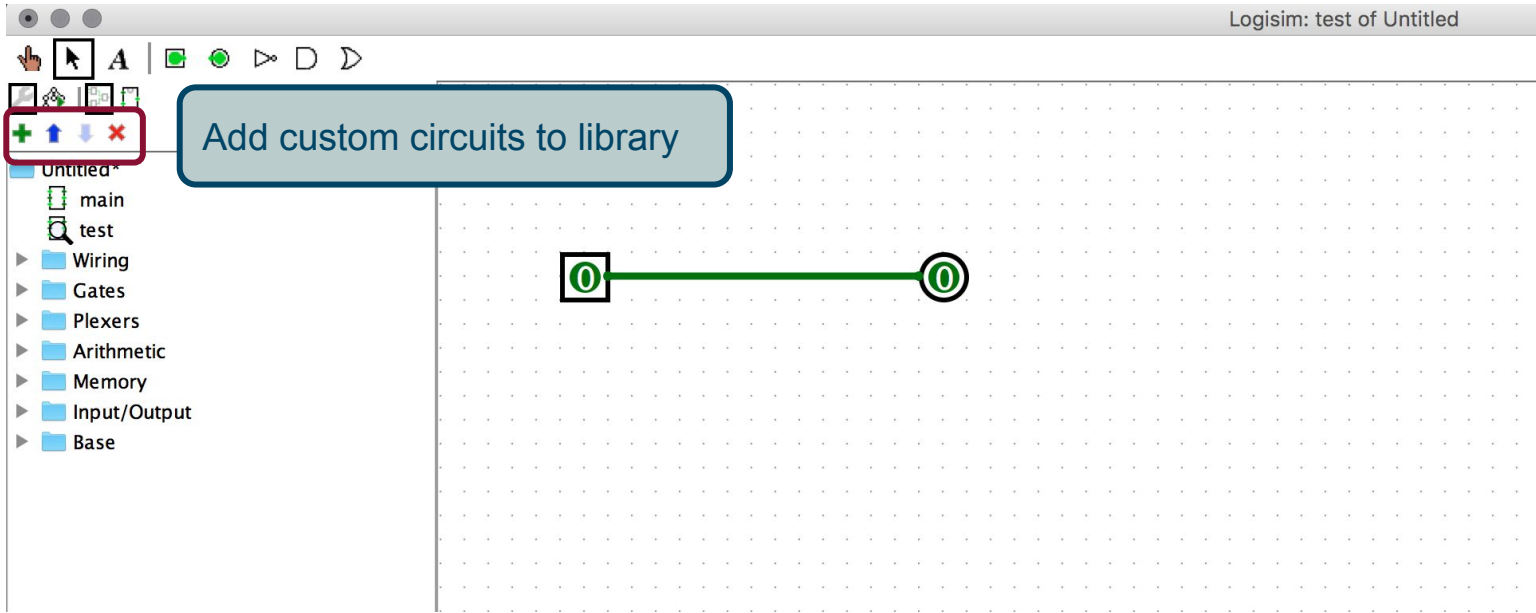
The screenshot shows the Logisim software interface. On the left is a component library with categories like Wiring, Gates, Plexers, Arithmetic, Memory, Input/Output, and Base. The main workspace contains a circuit diagram with several components and connections. A red box highlights a 2-bit connection between two pins labeled '00' and '01'. A callout box points to this connection with the text 'Normal connection: 2 bit'. At the bottom left, a 'Pin' configuration table is visible, with the 'Data Bits' field set to '1' and highlighted by a red box.

Pin	
Facing	East
Output?	No
Data Bits	1
Three-state?	Yes
Pull Behavior	Unchanged
Label	
Label Location	West
Label Font	SansSerif Plain 12

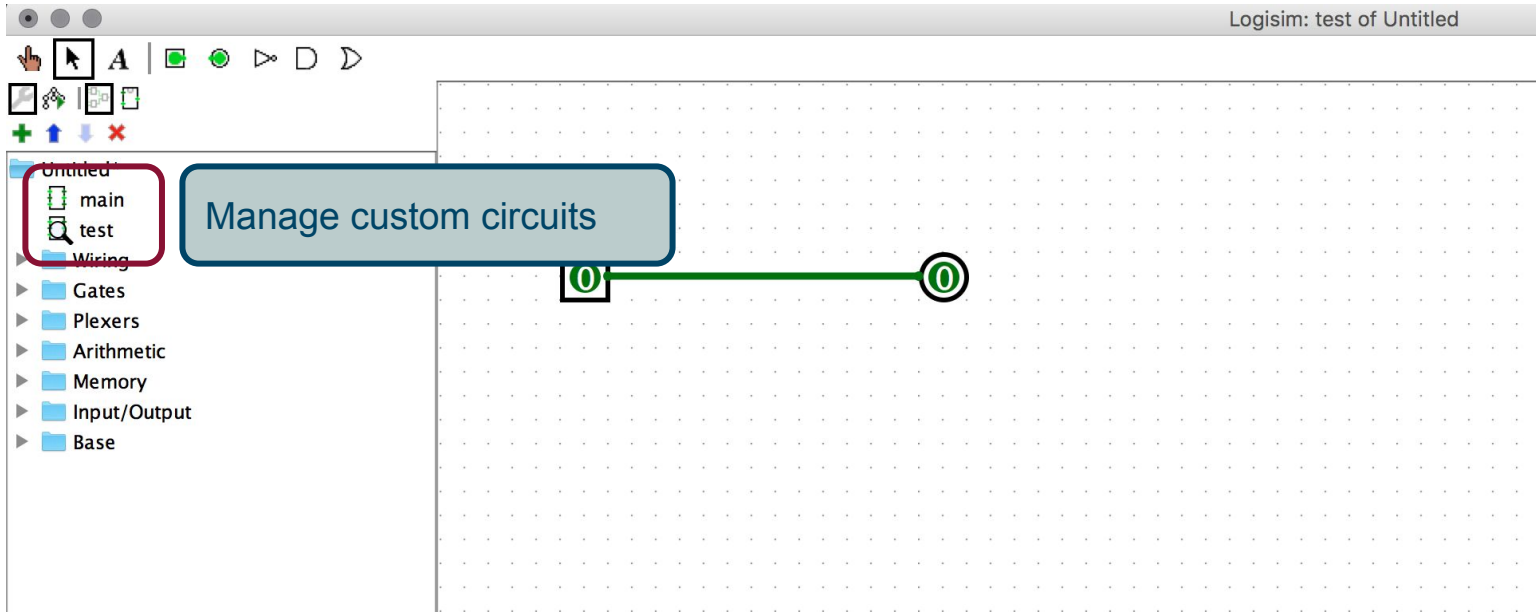
Logisim



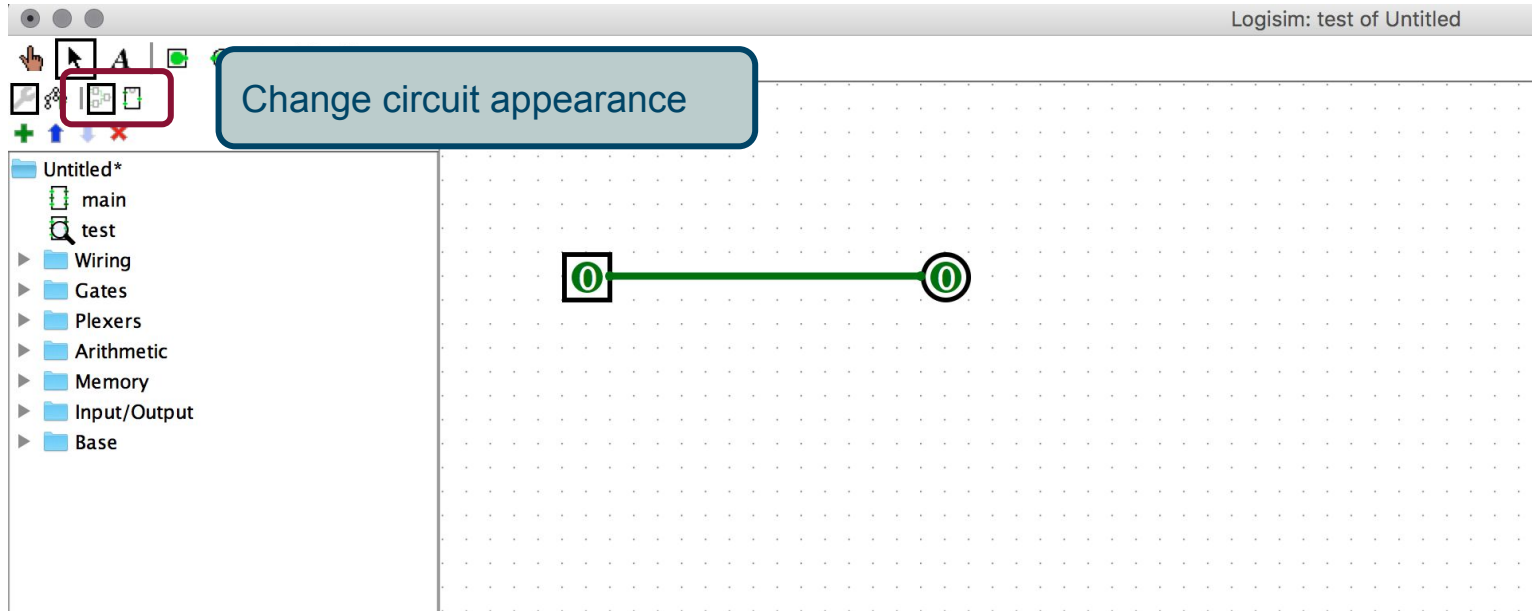
Logisim



Logisim



Logisim



Logisim

Logisim: main of Untitled

Selection: Pin

Use custom circuit in other circuits to introduce abstraction layers.