## Digital Logic Simulation

Every component, when it performs an operation, may cause an event at a later time, and is not instantaneous. The difference between the current time, and the time in which the event will occur is called the propagation delay, and this can be changed by the user for every component. The user may view these changes in two ways:

* The user may set the program to run by enabling “Run” in the simulation menu (ALT+R).
* Alternatively, the next series of simultaneous events may be seen by “Stepping”, by performing the “Step” action in the simulation menu (ALT+T). That is, the next event, and all simultaneous events will all be seen at once.

## Representing Digital Logic

Every component has at least one pin, and pins may either serve as inputs to the component, or outputs from the component, but not both. Therefore, no pin may connect to another pin of the same type.

Pins may exist in one of three states:

* X – The pin is in an unknown state. If the pin serves as output, then the corresponding component may not have received proper input.
* Z – The pin currently has no input.
* # – The pin displays a hexadecimal number representing its corresponding data.

## Components

### Standard Logic Gates

All logic gates may have an adjusted width. When the width is greater than one, then the operation is performed bit-wise. In other words, it can be considered as [width] operations occurring side-by-side.

#### AND

Returns the logical AND of all inputs. The input pin count may be adjusted from 2 to 4 in the context menu.

#### NAND

Returns the logical compliment of AND.

#### OR

Returns the logical OR of all inputs. The input count may be adjusted from 2 to 4 in the context menu.

#### NOR

Returns the logical compliment of OR.

#### BUFFER

Returns the input. In real-world applications, buffers are used to strengthen signals, or to introduce a delay. In LogicSim, buffers only serve to introduce a delay.

#### NOT

Returns the logical compliment of the input.

#### XOR

Returns the logical exclusive OR of both inputs.

#### XNOR

Returns the compliment XOR, also known as the equivalence function.

### Flip Flops

Flip flops to record previous input

## Context Menu Control

Every component or pin will open a context menu when right-clicked. Available action will depend on the component clicked.

Pins:

* Clear – Clears Pin name and disconnects it. If it’s an output pin, also clears the names of all connected input pins.
* Set Name… –The pin may be conveniently renamed. If the pin is an output pin, all connected pins will also be renamed. If the pin is an input pin, it will be disconnected from its current source. In addition, renamed pins are automatically connected to all pins with the same name. Connections to a named pin are always invisible.

Components:

* Delete – the component will be deleted
* Rotate… - the pin may be oriented to the user’s choosing.

Component-Specific Actions are listed with each component under Parts Menu.

## Selection Control

Once the Arrow icon in the toolbar is selected, the user may select any component or pin, and perform certain actions via hotkeys. The available actions depend on what is selected.

Components:

* Arrow keys – nudge the selection
* Delete – deletes the selection
* Drag – the selection may be dragged with the mouse.

Pins:

* Delete – Clears Pin name and disconnects it. If it’s an output pin, also clears the names of all connected input pins.
* Space – If a single pin is selected, the pin may be conveniently renamed
* W – Selects all pins with which the selected pin may be connected.
* Q – Selects all pins with which the selected pin may be connected without breaking another connection.

## Parts Menu

Each part performs a specific action based on its input.