

User manual

CSCI 6461



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1. Summary

This project is a simulator of CPU.

We divide the CPU’s component into two categories.

For one part, we call it “chip”. Chip is the general term for all components that have operational capabilities.

For the other one, we call it cable. Cable is the components used to transmit data.

We use these two parts to simulate the processor from the hardware level.

For the clock cycle, we designed for two parts, ”tick” and ”evaluate”. “Tick” is the clock rising edge, registers load the value when “tick” is coming. “Evaluate” is the time for “chip” operating. Our registers change the output when “evaluate” is coming.

1. User Interface

A screenshot of a cell phone

Description generated with very high confidence2.1 Front Panel

Front panel is used to set the value to “chip” manual.

Front panel itself is a “chip”, we use some cables to connect it to our simulator.

The front panel has a total of 28 lights, divided into 2 lines, each with 12 and 16 respectively.

1)First line (12): the line with 12 lights is used to indicate the address of memory being manipulated.

2) Second line (16): the line with 16 lights shows the value we want to enter.

The Front panel has a total of 16 checkboxes. All the checkboxes are used to enter value.

Front panel have several functions.

1. Circle: Click the Circle button will run simulator a complete period of clock, which include a “tick” and an “evaluate”.
2. Pause: The Pause function is used to stop the simulator. When click the Pause button, the status will turn to pause, at this time, the pause light (bulb at the left of Pause button) will turn on, and the Control Unit’s Current Status will be paused. Tick and Circle have no functions at Pause status. And remember, we can load the value by front panel only if the simulator is in the pause status.
3. Load: we can load the value to the register by front panel. We use the switches to set the value. There are 8 checkboxes on the right of the panel. These checkboxes are used to setting the destinations. If you want to set the value to GPRF and IRF, please remember to choose the number behind. If you want to change PC and Memory, the numbers have no effect.
4. Load MAR: to set the value in memory, you should set the MAR first. Click Load MAR button will set the MAR.
5. Reset CU Status: Click Reset CU Status button will turn the CU Status to Initialized. This function won’t change any value in simulator.
6. IPL: Click the IPL button will do Initialize Program Load function. It will load the test program into simulator.

2.2 Magic Panel

A screenshot of a cell phone

Description generated with very high confidence

We use magic panel to load the document into simulator.

Control panel have 2 textboxes.

1)The text box - To Address beginning at, is used to set the beginning memory address.

2)The text box – Program, is used to put instructions.

Control panel have 1 button.

1. Load Program: Click the Load Program button will load the instructions into simulator.

2.3 Virtual Machine

A screenshot of a cell phone

Description generated with very high confidence

We use the panel to show the internal state of the simulator.

This panel has 4 buttons.

1)Tick: Click the Tick button will run the simulator for a half circle, which consist of a tick or an evaluate time. Note the difference between tick and cycle;

2)Auto tick on/off: Click Auto tick on/off button will automatically run the simulator, the cycle we set is 1s;

3) Show control panel: Click Show control panel button will open the control panel;

4)Show front panel: Click show front panel will open the front panel.

1. Precautions

3.1 LDX & STX

There are some differences in the handling of LDX and STX instructions.

We use the value stored in the IR when looking for a valid address.

1. Changelog
   * 09 Feb. 2018: the first version of User Manual.
   * 09 Feb. 2018: adjust the format
   * 10 Feb. 2018: rewrite the part of front panel
   * 10 Feb. 2018: change Control Panel to Magic Panel
   * 10 Feb. 2018: Add the Precautious, and maintenance the Index