Ramaiah Institute of Technology
(Autonomous Institute, Affiliated to VTU)

Department of CSE

Programme: B.E **Term: Jan to May 2019**
Course: Computer Organization **Course Code: CS45**

Activity V: Designing an ALU to perform arithmetic and logical functions using Logisim simulator.

Name:PRAMOD	**Marks: /10**	**Date:20-05-2020**
USN:1MS18CS093	**Signature of the Faculty:**	

Objective: To simulate the working of Arithmetic and Logical Unit using simulator.

Simulator Description: Logisim is an educational tool for designing and simulating digital logic circuits. With its simple toolbar interface and simulation of circuits as you build them, it is simple enough to facilitate learning the most basic concepts related to logic circuits. With the capacity to build larger circuits from smaller sub circuits, and to draw bundles of wires with a single mouse drag, Logisim can be used (and is used) to design and simulate entire CPUs for educational purposes.

Activity to be performed by students:

List out the steps in designing ALU

Step 1: **Add the two input pins**

Drop two East-facing input pins on the canvas 4-bits each. Label A and B, and ensure that each input is 4-bits.

Step 2: **Add the Adder/ Subtractor and Gates**

Now we add the sub-circuits creadted earlier. Select the circuits under the main

project folder.

Step 3: **Add the Multiplexers**

These take on or more data inputs and generate a single output. In Logisim,

multiplexers are under the Plexers folder. Click the Multiplexer icon and drop two of them onto canvas.

Step 4 : **Add Controls**

Drop two pins on the canvas, north-facing, with 1 data bit. Label them 0 and 1 , respectively.

Step 5: **Add a Splitter**

Next, we add a splitter into our circuit that takes one line from the second multiplexer and split to 4 inputs to an OR gate – for a 4-bit ALU.

Step 6: **Add another OR gate And a NOT Gate**

Now we add an OR gate after the splitter, which has 4 inputs . To

the right of the OR gate, add a NOT gate.

This arrangement accounts for Zero output when All of the bits result in zero.

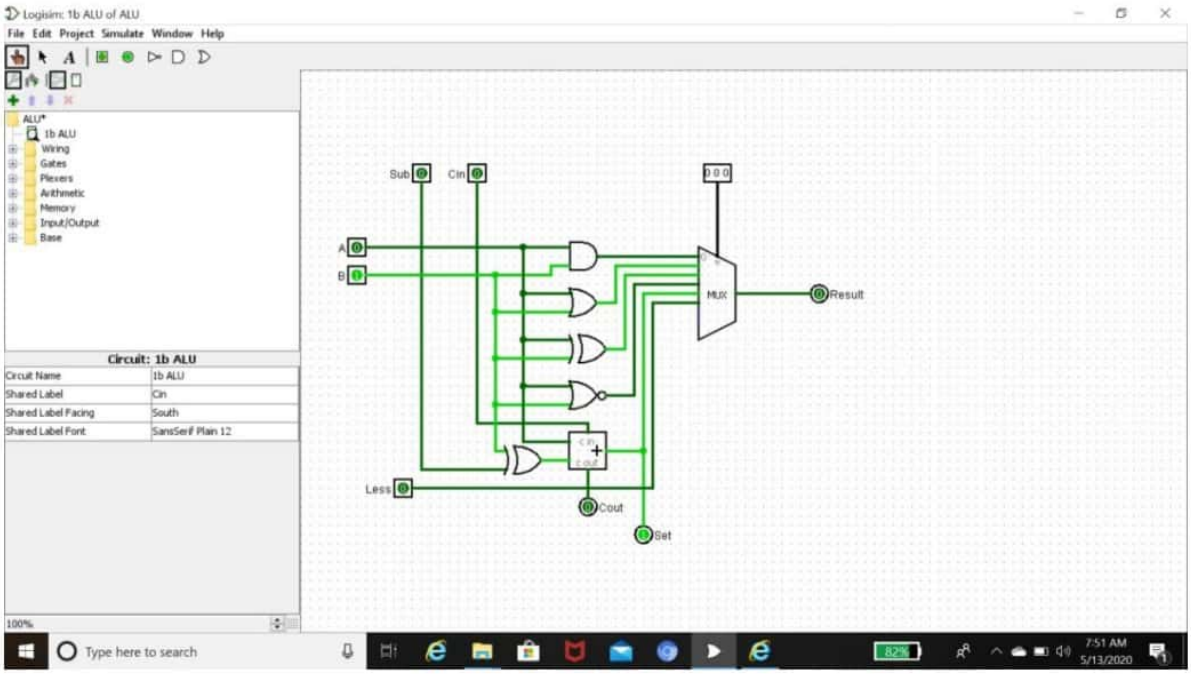
The NOT gate following the OR gate achieves this.

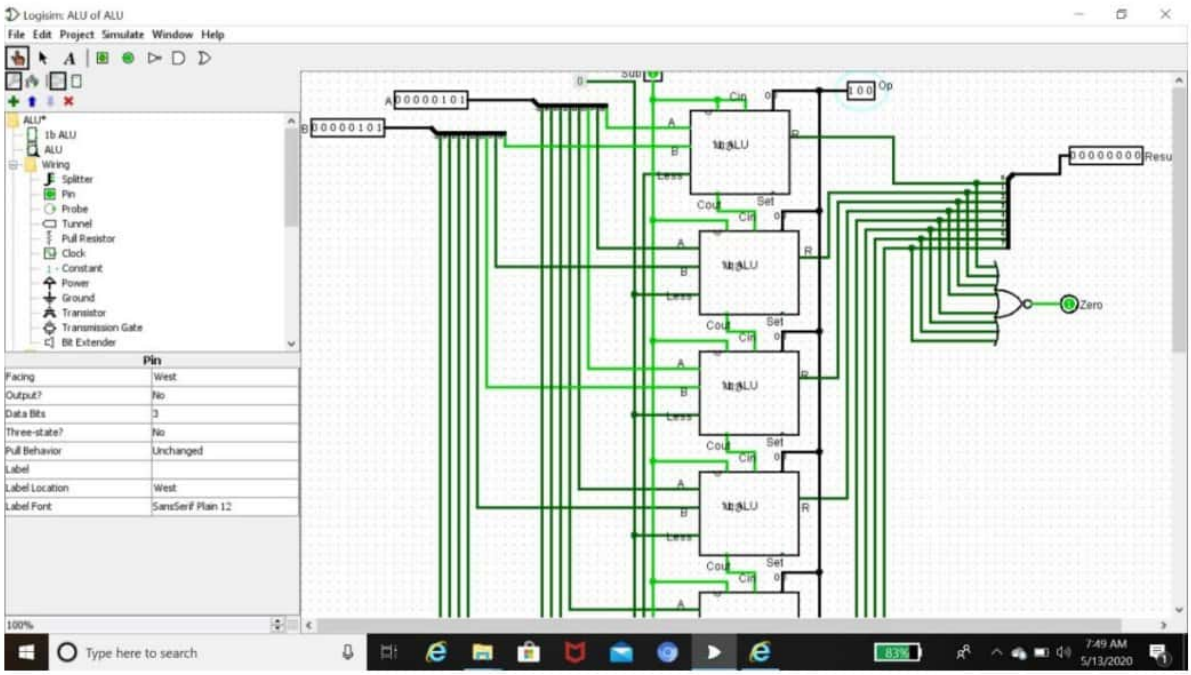
Finally, add a single-bit pin after the NOT gate to store the result,Label it ZERO.

Step 7: **Add a Result Pin for the MUX**

We handled the zeros coming from the MUX, but we also need to account for valid combinations inputs from A, B, and the Control inputs.

SNAPSHOTS





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Activity VI: Designing memory system using Logisim simulator.

Name: PRAMOD	**Marks: /10**	**Date:20-05-2020**
USN: 1MS18CS093	**Signature of the Faculty:**	

Objective: To simulate the writing operation on memory.

Simulator Description: Logisim is an educational tool for designing and simulating digital logic circuits. With its simple toolbar interface and simulation of circuits as you build them, it is simple enough to facilitate learning the most basic concepts related to logic circuits. With the capacity to build larger circuits from smaller sub circuits, and to draw bundles of wires with a single mouse drag, Logisim can be used (and is used) to design and simulate entire CPUs for educational purposes.

Activity to be performed by students:

List out the steps in designing memory system

Step 1 : Add RAM

Select a separate load and store operation for RAM

Step 2 : Add Counter

Connect Counter , Clock and Controlled Buffer to the RAM

Step 3 : Add TTY

To display the data

Step 4 : Add Random Generator

To generate different address location. Add input and another Controlled Buffer to the Random Generator.

Step 5 : Add Button

Connect Button to Counter.

Observations and Snapshots: