

CS 101 Lab 4

Logic Gates

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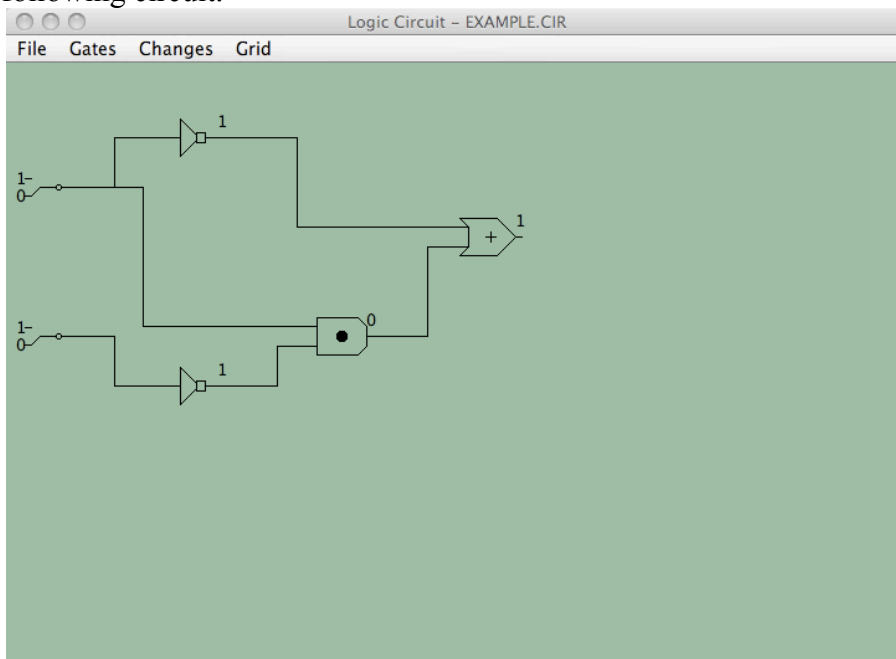
The lab report is due before class on Friday 2/25/2011. You need to write your answers for all the exercises in a word file. Submit your word file through the lab4 dropbox on angel.

Objectives

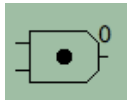
- Work with a logic circuit simulator to test the effects of logic gates.
- Get familiar with the idea of truth table.

Activity

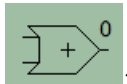
Run the software package and click the **Logic Circuits** button. In this exercise, we will practice on a circuit that has been drawn. Go to angel and in the lab 4 folder, you can find a file called example.cir.zip. Download this file to your desktop and unzip the example.cir onto the desktop. To get started, select **Open** under the **File** menu and then choose the example.cir from your desktop. You should see the following circuit.



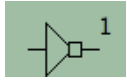
In this circuit, you can see different circuits and inputs. Their meanings are the following



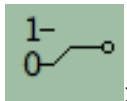
: 2-input AND gate



: 2-input OR gate



: NOT gate



: Binary switch (i.e. input).

These components are connected together and they form a **circuit**. Notice that initially both switches are in the 0 position. We will learn how to build a circuit from scratch in our next lecture. Today, we will study this circuit by building a **truth table** for it. The truth table of a circuit depicts the behavior of a circuit by listing the output of the circuit based on any inputs.

In this circuit, there are only two inputs. Since each of the input can take a value of 0 or 1, there are all 4 possible input values into the circuit. If we take the switch on the top as input A and the one on the bottom as input B, The possible inputs from A and B can be listed in the following table, aka, the truth table.

A	B	Output
0	0	
0	1	
1	0	
1	1	

What you need to do is to complete this table by observing the output of the table given a specific set of inputs. Before you do that, answer the following questions first.

Q1: In the initial state of the circuit, both switches are on 0. Explain why the output of the AND gate is 0? Why is the output of the OR gate is 1?

Q2: Change the position of the switch by select Set Switch from the Changes menu. By clicking on the switch at this time, you can change the value of the switch. Complete the truth table by setting the values of switches at corresponding positions.

Q3: From the table you have obtained from Q2, can you summarize what this circuit does (one hint: it is the opposite of one type of gate we have learned in this lecture)

When you are done with the lab, log out the computer.