Lab 0: Digital Design of a Multiplexor

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ELEN 248 – 501

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See policy_procedure.pdf for more details

Objectives:

In this lab I will learn about the multiplexor (MUX). I will also learn how to design a 2-input MUX and implement it using integrated circuits on a breadboard. The lab will also familiarize me with some of the lab equipment (power supply and multimeter) to test the circuit.

Design:

A 2-input multiplexor selects one of its inputs (A or B) and forwards it as its output (O). A select line (S) is used to "select" which input to send to the output. If S=1, then O=A. If S=0, then O=B

Truth Table for 2-input MUX

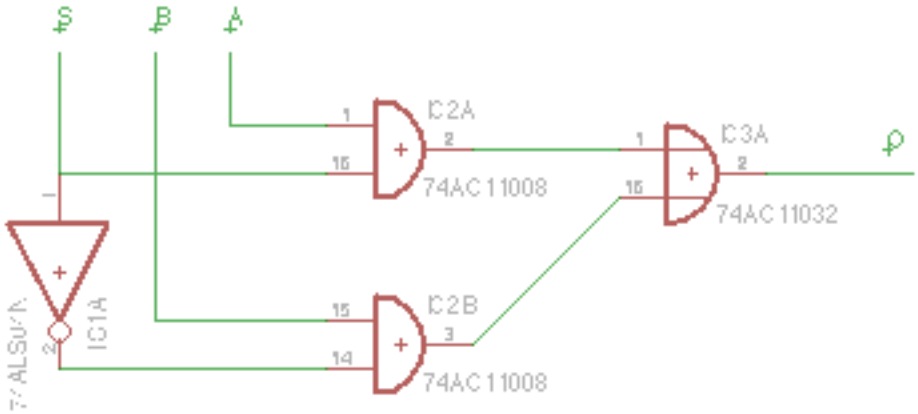
S	A	B	O
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	0
1	1	0	1
1	1	1	1

Minimized Boolean equation for 2-input MUX

O = S'A'B + S'AB + SAB' + SAB

O = S'B + SA

Schematic for 2-input MUX



Results:

The circuit behaved as expected and no changes were needed to fix the circuit. By changing the value of the select line (S), the circuit was able to send out the correct value from its input. The table below shows the correct output of the MUX as measured with the multimeter.

S (select)	A	B	O (volt)	O (low/high)
L	L	L	0.11 V	L
L	L	H	4.34 V	H
L	H	L	0.12 V	L
L	H	H	4.35 V	H
H	L	L	0.11 V	L
H	L	H	0.10 V	L
H	H	L	4.40 V	H
H	H	H	4.39 V	H

Note: Result section not required for pre-lab report

Conclusion:

In the lab I implemented the 2-input MUX on the breadboard with integrated circuits. To test that the circuit is working, I measured the output voltage and checked the circuit to the values on the truth table. By following the steps in this lab, I have learned how to use the lab equipment and how to design a circuit, which will allow me to go on to design and test larger circuit designs.

Note: Conclusion section not required for pre-lab report

Questions:

Answer post-lab questions here.