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Lab Section: MW 6:00-8:00 TA: Jay
Due: 4/14/2013
Lab Partner: None
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Title:

Lab 1: Introduction to Digital Logic

Purpose:

The purpose of this lab is to learn how to use MultiMedia Logic and simulate a logic schematic.

Procedure:

In this lab, we will use the program MultiMedia Logic to build circuits that gives us a better understanding on how logic works. For Part A: Using MultiMedia Logic, we had a simple tutorial that walked us through building and simulating a simple circuit. For Part B: Implementing Functions as Sum of Products (SOP) we designed two separate pieces of logic that implements the truth table given.

Algorithms and other data:

For Part B: (KEY)

IN(2)= A

IN(1)= B

IN(0)= C

Truth Table:

IN(2)	IN(1)	IN(0)	Output
0	0	0	1
0	0	1	1
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	0
1	1	0	0
1	1	1	0

DeMorgan's Law: $(AB)' = A' + B'$ // $(A+B)' = A'B'$

$AB = A \text{ AND } B$ // $A+B = A \text{ OR } B$

What went wrong or what were the challenges?

The challenges in this lab were trying to understand how part B part two worked. Applying the knowledge we knew about Demorgan's Law was complex. Keeping track on converting all the equations into NAND equations was difficult.

Other Information

How many transistors does the original design contain?

44 Transistors

How many transistors does the new (second part) design contain?

38 Transistors

Counting Transistors

AND & OR gates= $2n+2$

NAND & NOR gates= $2n$

Inverter= 2

AND Gate= NAND Gate With Inverter

OR Gate= NOR Gate

Part B: $A'B'C' \vee A'B'C \vee A'BC$

Why do AND and OR gates have more transistors than NAND and NOR?

NAND and NOR gates are known to be universal gates, you can implement NOT, AND, and OR using two gates.

Conclusion

Lab 1 had us familiarize working with transistors. We learned how to use AND and OR gates, and how to convert them into NAND gates. We used DeMorgan's Law and applied it into the circuits in order to convert them. Before lab 1, I was still unsure on how transistors work or what they even were, but after the lab I understood how to use them and how to count how many transistors are in the designs.