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Lab 03 - NAND Only Logic

In this lab, you've learned how to convert arbitrary logical equations into NAND only circuits, and why that might be a good thing.

Rubric

Item	Description	Value
Summary Answers	Your writings about what you learned in this lab.	25%
Question 1	Your answers to the question	25%
Question 2	Your answers to the question	25%
Question 3	Your answers to the question	25%

Lab Summary

Summarize your learnings from the lab here.

Lab Questions

1 - Write down DeMorgan's Law and the truth tables proving it out.

~(A & B) = ~A | ~B

A	B	~(A & B)	~A | ~B
0	0	1	1
0	1	1	1
1	0	1	1
1	1	0	0

~(A | B) = ~A & ~B

A	B	~(A | B)	~A & ~B
0	0	1	1
0	1	0	0
1	0	0	0
1	1	0	0

2 - What is the value in converting circuits to NAND only?

NAND and NOR gates are universal gates, meaning they can be combined and reorganized to produce the effect of any other logic gate. Also, using solely NAND or NOR gates is cheaper to manufacture since FPGA chip designers have to guess as to what their customers will end up designing.

3 - How does what you did in lab with the breadboard relate to the FPGA?

Working with the breadboard and the FPGA follow the same logic but the breadboard is more of a physical implementation than the FPGA. The FPGA involves simulating a circuit design and then applying it to the hardware. There's no guessing how the circuit should behave with the breadboard other than having the circuit diagram. It's also harder to debug and diagnose issues.

Code Submission

Upload a .zip of all your code or a public repository on GitHub.