Emaline Lawler
Annika Camarillo

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

We started with the equation F=(A&!B) | (C&D) and used DeMorgan's Law to change the equation into something that only uses NAND gates. Then we used the resulting equation to wire up the 7400 Quad 2 input NAND and turn on an LED to prove you can wire circuits using NAND gates.

Lab Questions

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

DeMorgans's Law: ~(A & B) = ~ A | ~B and ~(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**
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 only uses 4 transistors and therefore it saves space in a circuit or wafer. From a cost perspective the less transistors you have the less expensive it is to build the circuit.

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

The FPGA board allows for more NAND gates so what was done in lab today allows for a more simplified setup. Since the NAND gates do not take up as much space with the FPGA you can do more things with limited space.

Code Submission

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