Objective

The Objective of this lab is practice using modular design as well as build a 2 bit multiplier.

1 Introduction

In this lab we will be utilizing the modular design technique to helps us build and debug our circuit. This will be useful as we will be building a combination circuit, specifically a 2 bit multiplier.

The modular design technique used in this lab is simple, we build parts of the circuit and test them individually before inserting them into the circuit. This can help with debugging the circuit as it helps us isolate the issue rather than need to check everything at once.

The circuit being build in this lab is a 2 bit multiplier, which means that the circuit will accept 4 inputs, A1, A0, B1, and B0. It will then multiply the the binary number of A , with the binary number of B. This is shown in the truth table in Figure 1.1.

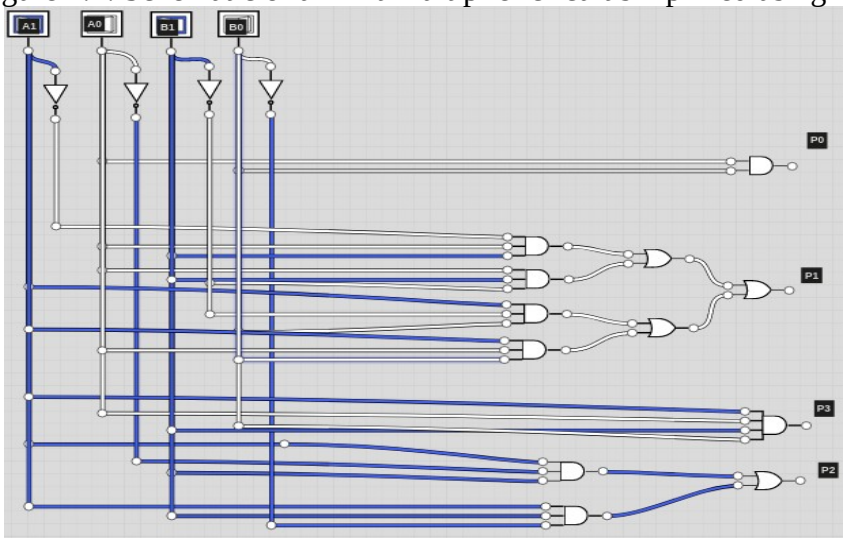
Figure 1.1: Truth table of a 2 bit multiplier.

Inputs				Outputs				
A1	A0	B1	B0	P3	P2	P1	P0	Decimal
0	0	0	0	0	0	0	0	0
0	0	0	1	0	0	0	0	0
0	0	1	0	0	0	0	0	0
0	0	1	1	0	0	0	0	0
0	1	0	0	0	0	0	0	0
0	1	0	1	0	0	0	1	1
0	1	1	0	0	0	1	0	2
0	1	1	1	0	0	1	1	3
1	0	0	0	0	0	0	0	0
1	0	0	1	0	0	0	1	2
1	0	1	0	0	1	0	0	4
1	0	1	1	0	1	1	0	6
1	1	0	0	0	0	0	0	0
1	1	0	1	0	0	1	1	3
1	1	1	0	0	1	1	0	6
1	1	1	1	1	0	0	1	9

2 Results

Figure 2.1 depicts the 2 bit multiplier circuit developed using k maps to simplify the boolean algebra. It outputs the same truth table as figure 1.1 which proves that our implementation was successful and effective.

Figure 2.1: Schematic of a 2 Bit Multiplier circuit simplified using k-maps.



3 Discussion

Figure 2.1 was implemented with modular design which helps us build the circuit and debug it at the same time. It proved very useful as when an error occurred in the circuit you were aware instantly of where it was located.

A condensed 2 bit multiplier can be made using a different technique not employed in our multiplier. The benefits of using the other circuit is that it uses less gates to achieve the desired results and as such uses less space, energy and delay, as such it is in fact better than out circuit.

4 Conclusion

We created a 2 bit multiplier combination circuit and simplified it by using k maps. Modular design proved to be very useful in our design of the 2bit multiplier as debugging the large circuit would be more difficult and inefficient if we did it all at once.