

CSE 2301 Lab 8

Theory

Binary multiplication is the multiplication of two binary numbers. Binary multiplication can be simplified to the sum of multiplying the bits in from the second input with the first while left-shifting when needed. We can just use AND gates as each bit input is either a 0 or 1, making it so the first and second inputs will output the corresponding value between the bits. Afterwards we use the output from the AND gates added to the value generated by multiplying by the second LSB, with a left-shift of 1 bit, and repeatedly doing this until we reach the MSB of the second term, while having the left-shifts for each term we are summing.

Deliverables

A	B	A*B
0000	0000	0000000
0000	1111	0000000
1111	0000	0000000
1011	0110	0011110
1111	1111	1101001

C0	A1	B1	D	E	P1	S1	C0'D	C1
0	0	0	1	1	0	0	1	0
0	0	1	1	0	1	1	1	0
0	1	0	1	0	1	1	1	0
0	1	1	0	0	0	0	0	1
1	0	0	1	1	0	1	0	0
1	0	1	1	0	1	0	0	1
1	1	0	1	0	1	0	0	1
1	1	1	0	0	0	1	0	1

Discussion

I learned more about multiplying binary values and how to implement it. I used LogicWorks to design and then implement a hardware design of it.

Questions

In this lab we use a 74LS83 chip or a binary full adder. The adder has a 3 gate level system with each chip having 4 input accounts. Since we use 2 of these chips there are $3*4*2=24$ levels of gates. Each AND gate has a delay and there are 25 levels of gates and an inverter making 26 gates creating a 260 ns propagation delay.