ECSE 323 Group 48
Gregory Rohlicek - 260516980
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Circuit: g48_Barrel_Shifter

Description:

The function of this circuit is to take a 14 bit binary input called “UNSHIFTED”, and to shift it to the right by a value specified by a 3-bit input called “SHIFT_AMOUNT”; this yields a maximum shift amount of 7 bits. The circuit then uses three bus-multiplexers and a permanently grounded 14 bit signal to shift UNSHIFTED by SHIFT_AMOUNT in up to 3 separate operations. Each of these 3 operations is built on its predecessor. This results in a correctly shifted 14 bit output, called “SHIFTED”.

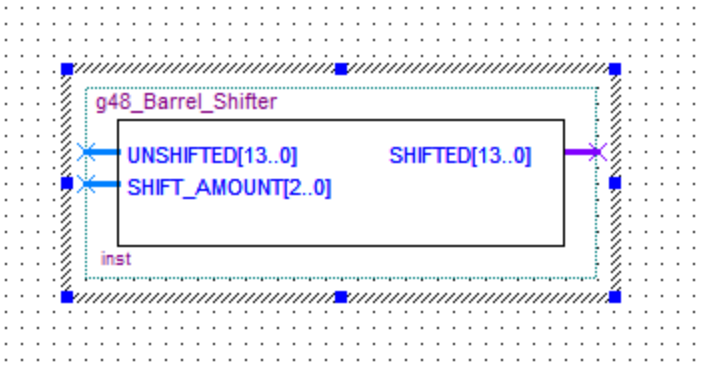

Fig 1: 14-bit Barrel Shifter with a max shift of 7 bits

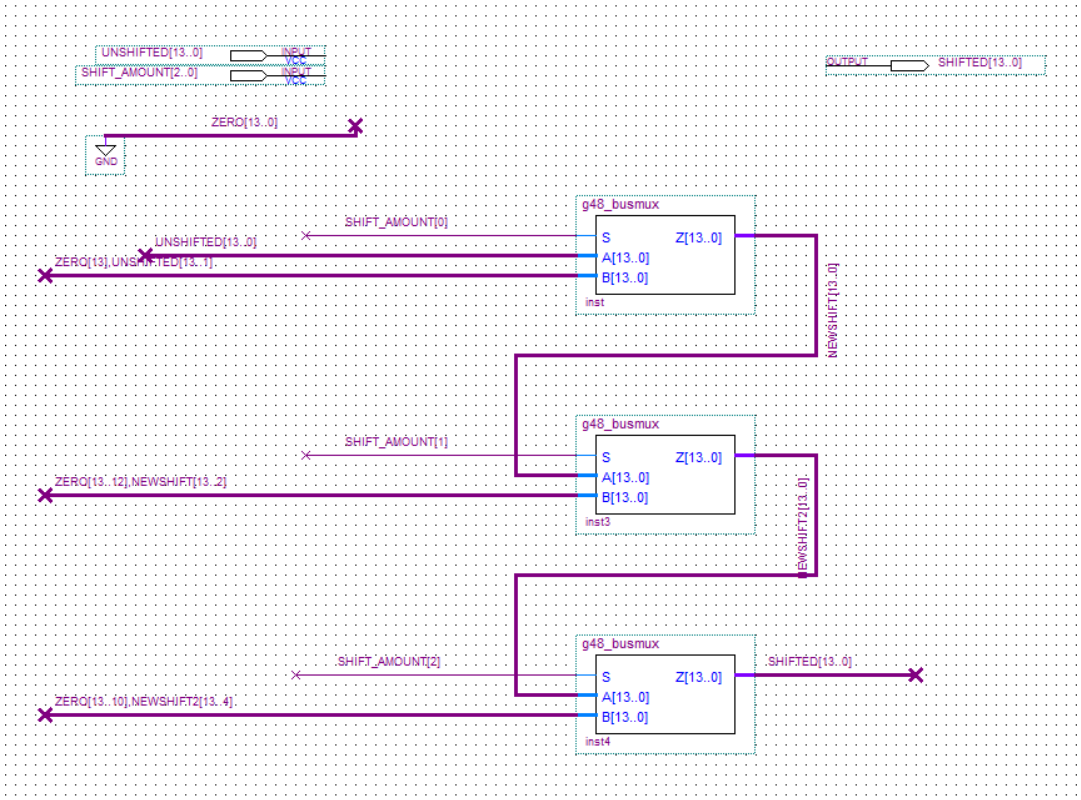

Fig 1.1: Gate schematic diagram of a 14-bit Barrel Shifter with a max shift of 7 bits

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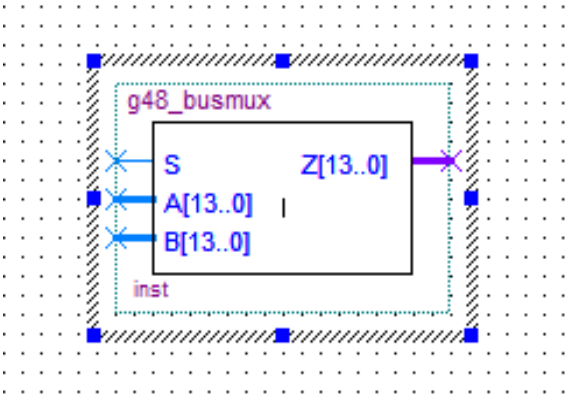


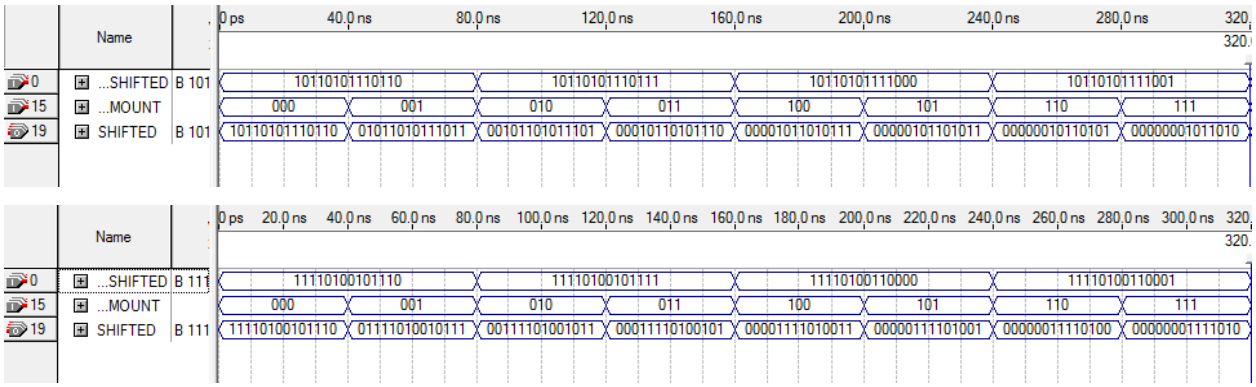
The Bus-Multiplexer that we used in our Barrel Shifter Design, chooses either bus A or bus B depending on the value of S.

If S == 0 then Z = A
If S == 1 then Z = B

This was used in the Barrel Shifter to determine whether or not to apply a shift operation.

Discussion:

The analysis we performed on the barrel shifter was two separate simulations each of 4 different combinations of 1s and 0s and each combinations was 2 different shift values ranging from 000 to 111. The Simulations are shown below.



Although it is impossible to perform analysis on all possible combinations of inputs, by selecting several random inputs and then checking their solutions by hand we are able to extrapolate that the circuit will work for all inputs. This extrapolation can be done since the circuit is designed in a fashion that is highly unlikely to yield incorrect results at specific inputs.

Grade Sheet for Lab #1

Winter 2015.

Group Number: 48

Group Member Name: Stephen Carter. Student Number: 260500858

Group Member Name: Greg Rohlicek. Student Number: 260516980

Marks			TA Signatures
2	1.	Schematic diagram for the 7-bit comparator	
2	2.	Simulation results for the 7-bit comparator	
2	3.	Schematic diagram for the busmux circuit	
2	4.	Schematic diagram for the Barrel-Shifter circuit	
2	5.	Simulation results for the Barrel-Shifter circuit	

Each part should be demonstrated to one of the TAs who will then give a grade and sign the grade sheet. Grades for each part will be either 0, 1, or 2. A mark of 2 will be given if everything is done correctly. A grade of 1 will be given if there are significant problems, but an attempt was made. A grade of 0 will be given for parts that were not done at all, or for which there is no TA signature.

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