EECS 140: Pre Lab 6 Lab

VHDL Design 7-Segment Display

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Date submitted: 10/18/2023

1. **What is an FPGA used for?**

An FPGA stands for field programmable gate arrays and can be used to build a processor or digital circuit board so they it can allow for logical expressions to be implemented on.

2. **How many different combinations can be generated with 4 bits?**

2^n different combinations, thus with n= 4 bits there are 16 different possible generated combinations allowed.

3. **A building has 40 floors. The elevator displays the floor number in the decimal system. How many seven segment displays do you need? How many bits to code the floor number?**

There needs to be a 7 segment display for all of the digits

[0, 1, 2, 3, 4]

[0, 1, 2, 3, 4, 5, 6, 7, 8, 9]

Each of the 7 segmented displays needs 4 bits and thus we need an bit code for the floor number

4. **In the example above: Does the seven segment display have any "don't care" conditions? Why or why not?**

Yes, because the second segment can only show digits from 0 - 9, however with using 4 bits we are able to derive 0 - 15. The following are don't care conditions,

1010 == 10

1011 == 11

1100 == 12

1101 == 13

1110 == 14

1111 == 15

5. **What is the difference between 'ENTITY' and 'ARCHITECTURE' in a VHDL module?**

The ENTITY defines the interface of the module and the ARCHITECTURE defines the function of the model. The architecture statement describes that underlying functionality of the entity, and is alway related to the entity's behavior and thus the internal aspect of the entity, however the ENTITY is the interface for which the external view of the component is described and defined.