

# Lab 1 Specifications

## Lab-specific Specifications

### Proficiency

- Development board is fully assembled (e.g., all parts soldered)
- Verilog module to control LEDs and a 7-segment display written
- FPGA programmed with Verilog code.
- 7-segment display can display all sixteen hexadecimal digits from 0x0 through 0xF
- All digits are unique (e.g., 0x6 and 0xb are different shapes)
- DIP switches to control the display are arranged so that each adjacent switch controls the next bit. (e.g., the switch for bit 0 is next to the switch for bit 1, which is next to the switch for bit 2, etc.)
- LEDs display the specified logic operations properly.

### Excellence

- Calculations provided to demonstrate that the current draw for each segment in the seven-segment display is within recommended operating conditions.
- ModelSim simulation (either manually force or automatic testbench) to demonstrate that the design is working properly.
- All digits are equally bright, regardless of the number of segments illuminated.

## General Specifications

### Proficiency

#### General Schematic Specifications

- All pin names labeled
- All pin numbers labeled
- Crossing wires clearly identified as junction or unconnected
- Neat layout (e.g., clear organization and spacing)
- All parts labeled with part number
- All component values present

#### Block Diagram

- Block diagram present with one block per SystemVerilog module
- Each block includes all input and output signals

#### HDL & Code Specifications

##### *General Formatting*

- Descriptive filename (e.g., lab2\_jb.sv)
- Descriptive variable names
- Neat formatting (e.g., standard indentation, consistent formatting for variable names (kebab-case/snake\_case/camelCase/PascalCase ))
- Descriptive and clear function/module names

##### *Comments*

- Comments to indicate the purpose of each function/module

#### Lab Writeup/Summary

- Brief (e.g., 3-5 sentence) description of the main goals of the assignment and what was done.
- Explanation of design approach. How did you go about designing and implementing the design?
- Explanation of testing approach. How did you verify your design was behaving as expected?
- Statement of whether the design meets all the requirements. If not, list the shortcomings.
- Number of hours spent working on the lab are included.
- Writeup contains minimal spelling or grammar issues and any errors do not significantly detract from clarity of the writeup.
- (Optional) List comments or suggestions on what was particularly good about the assignment or what you think needs to change in future versions.

## **Excellence**

### **General Schematic Specifications**

- Standard symbols used for all components where applicable
- Signals “flow” from left to right where possible (e.g., inputs on left hand side, outputs on right hand side)
- Title block with author name, title, and date

### **HDL & Code Specifications**

#### *General Formatting*

- Name, email, and date at the top of every file
- Comment at the top of each source code file to describe what is in it
- Clear and organized hierarchy (e.g., deliniation between top level modules and submodules)

#### *Testbenches*

- Testbenches written for each individual module to demonstrate proper operation
- Testbench output included in the report

### **Lab Writeup/Summary**

- Writeup is free of spelling and grammar issues