Digital Design and Computer Architecture

Lab 3: Seven-Segment Display [IN-LAB ASSIGNMENT]

0. Introduction

Total points assigned to ALL lab 2 assignments- <u>10 points</u>

In Lab 1, you became familiar with the Quartus schematic editor and how to run your code on the Terasic board. Follow the same instructions to run your code from Lab 2 prelab assignment on the Terasic board in the lab. The only thing that is new here is the pin locations that you will use for this Lab assignment.

1. Pin Locations and Assignments

Like always, refer to the instruction manual for the Terasic board to find which pins you need to use. For this lab, you can use any of the 18 slide switches for the input and any of the eight Seven Segment Displays as the output. Note that the LEDs for the Seven Segment Display are active low. This means applying a low logic level signal will light up the LED and applying a high logic level signal will turn it off. So you might need to update your code appropriately to account for this behavior.

You can find the information about how the slide switches work in section 4.2 on printed page 32 of the Terasic board instruction manual on Sakai. Pin locations for the slide switches can be found in Table 4-1 on printed page 35 in the manual.

You can find information about the seven segment displays in section 4.4 on printed page 36 of the manual. Pin locations for these can be found in Table 4-4 on the same page.

Please also note that the lab assignment assigns letters 'a' through 'g' to the seven LEDs in the Seven Segment Display but the Terasic board manual uses numbers '0' through '6' for the same. Take care of this slight change in notation.

2. Running the code on the board

After you are done assigning appropriate pin locations to the inputs and outputs, save the Assignments and compile the code. Then download it to the board. Now you are ready to test your code on the Terasic board and see whether it works as expected.

Try all the possible input combinations and verify whether your output is displayed properly. If not, go back to your code and pin assignments to debug the error.

Once you are satisfied with your design and its working, have the lab instructor assess your design. This completes your in-lab assignment.

3. What to Turn In

Due Date- One week from when the experiment is performed (that means week of September 26)

Points assigned to in-lab Assignment- 8 points for Lab 2 come from in-lab assignment report submission. Out of these 4 points are for simulation waveforms and 4 points for implementing the design on the board.

You must submit an electronic copy of the following items via Canvas. Submit to the Lab 2 In-Lab Assignment. These should all be included in a single "pdf" file. Be sure to label each section and organize them in the following order. Messy or disorganized labs will lose points.

1. To the pdf document from your prelab assignment, just add a section for the in-lab assignment.
2. ~~In the in-lab section, write a short paragraph describing briefly how you adapted your code from the prelab assignment for the in-lab assignment.~~
3. In the in-lab section, add a table describing the various inputs & outputs and the pin locations that you used for each of the inputs & outputs.
4. Add a few pictures of the code running properly on your board.

Some Terasic Tips

*   If downloading the code to the board fails for unexplained reasons, try unplugging the board from the USB and repeating the entire process.

*   Some slider switches or LEDs or push buttons might be faulty on your Terasic board and therefore may not work as expected. DO NOT handle the board in a rough manner to debug this issue. This will only damage the board further.

*   Instead, try using another slider switch or LED or push button. If the problem persists, your design may be at fault.