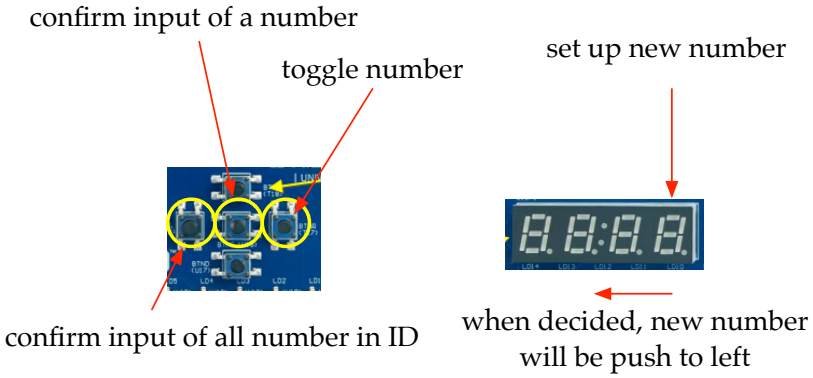
Final Exam

Exams

1. Use your 9-digit student ID to form the display pattern described below
   1.1. To set each number in the ID, push right button to toggle the number in the sequence of 0, 1, 2, 3, …, 7, 8, 9, and then back to 0 to continue counting up. Each push of the right button will increase the number by 1. The number to be determined is display in the right most digit of the seven-segment display. When the number is decided, push center button to confirm and the number will be push to left.



   1.2. When all the numbers in the ID are input completely, push the left button to confirm.
   1.3. After all the numbers in the ID have been input, the numbers will display as a marquee.
   1.4. Construct a frequency divider to provide frequency of 1 Hz (exact 1 Hz) for the marquee.
   1.5. Use push button to set the number into the ID.
   1.6. Your results will be the following two
      1.6.1. Your student ID will be display on the 7-segment display as a marquee.
      1.6.2. Use the last four digits of your student ID as the initial 16 bits into to the LED.
   1.7. You will have the two operation modes as
      1.7.1. mode 1: input your student ID
      1.7.2. mode 2: start the student ID marquees on 7-segment display.
   1.8. Use DIP switches as ‘reset’ and ‘mode selection’.

You can use all the resources in the FPGA board to implement the above mentioned functions.

Score:
1. Frequency divider: 5%
2. push button input:
   a. BCD up counter and display:5%
   b. FSM for push button input: 20%

c. whole integration: 10%

3. 7-segment display (9-digit marquee shift register, any pattern): 20%
4. 7-segment display (student ID marquee): 20%
7. All (include FSM control) 20%

