

- VHDL tasks -

Notes

- All tasks are dedicated for the PLOG1 complex programmable logic device (CPLD) and have to be written in VHDL.
- Probably you may use the Xilinx ISE design tools, namely Project Navigator and ISE.
- Please confer the project template within the file “plog1_tasks.zip” within the resource folder.

Task 1 (LED driver)

Design and test a circuit that has the following characteristics:

- Input : Two push buttons (1-bit each)
- Output : XOR function to drive an LED (1-bit)

Task 2 (LED driver)

Design and test a circuit that has the following characteristics:

- Input : Two push buttons (1-bit each)
- Output : State of the circuit to drive an LED (1-bit)
- Behaviour : If the first button is pressed the output drives and holds a logical “1”. If the second button is pressed, the output drives and holds a logical “0”, thus resets.

Task 3 (LED driver)

Design and test a circuit that has the following characteristics:

- Input : Push button (1-bit), clock signal (1-bit)
- Output : State of the circuit to drive an LED (1-bit)
- Behaviour : If the button is pressed the output alternates between logical “1” and “0”.
- Note : The button has to be **debounced** by the logic!

Task 4 (7-segment decoder)

Design and test a circuit that has the following characteristics:

- Input : Binary value from a DIP switch (4-bit)
- Output : State of the circuit to drive 7 LEDs of a 7-segment display (7-bit)
- Behaviour : The circuit decodes the binary input to the decimal system and drives the output accordingly to display the digit on a 7-segment display. If the value is larger than the number 9, it displays the letter “F”. **Alternative:** decode to hexadecimal system.

Task 5 (generic counter)

Design and test a circuit that has the following characteristics:

- Input : Clock(1-bit), reset (1-bit)
- Output : Value of the counter , (4-bit)
- Behaviour : The circuit should count synchronously upwards from a given minimum to a given maximum. The reset of the counter should be asynchronously.
- Note : To test the counter, connect it to a 7-segement display.

Have a lot of fun!