

Lab. 2

Using VHDL sequential coding style design, synthesize, simulate, implement and download to the prototyping board the following combinational circuit.

The circuit must be capable of comparing two 2-bit unsigned numbers A and B, have three outputs AGTB, AEQB, and ALTB, corresponding to $A > B$, $A = B$, $A < B$, respectively, and display the result of the comparison using 4 seven segment displays.

Use 4 switches on the board as inputs, three LEDs as your outputs AGTB, AEQB and ALTB, and four 7-segment displays to display the result of the comparison.

1. Write a short report documenting the main characteristic and performance of the circuit you designed (think of the document as the “data sheet” of your circuit)
2. Submit VHDL code for both design and testbench.
3. Submit the waveforms used for the testbench. Comment the waveforms: make sure to illustrate that the system works as expected
4. Submit the schematic of the circuit synthesized
5. Analyze carefully the synthesis and implementation reports (what are the timing and area performance?)
6. Demonstrate the operation of the circuit on the prototyping board

Grading will be based on:

- A. Correctness of the design [40 pts]
- B. Coding style quality [20 pts]
- C. Effectiveness of testing [30 pts]
- D. Quality of the report [20 pts]

You will need to lookup the DE115 User manual to decide which switches, LEDs and 7-segment displays to use (and find out the FPGA pins mapping to the switches, LEDs and 7-segment displays you used).