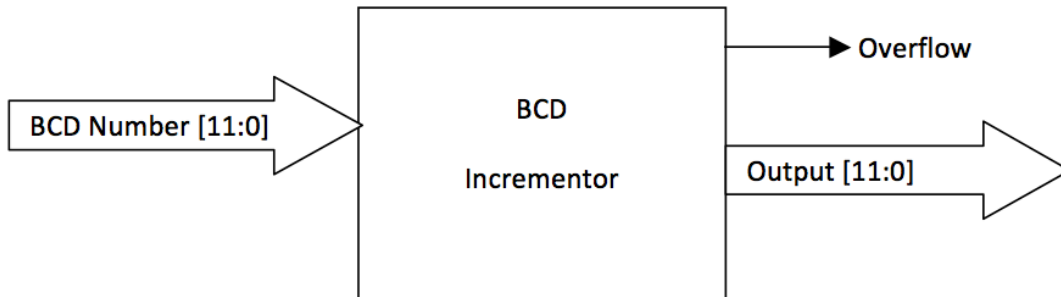The studies will be presented after 1 week (Lab sections). **Each group must present their own study. The group members have to work together and each member must know each step of the study.**

For this laboratory assignment, you will use Altera Quartus II software and DE-115 FPGA kit and design a BCD incrementor that has the Input/output definitions below.

The binary-coded-decimal (BCD) format uses 4 bits to represent 10 decimal digits. For example, 259_{10} is represented as "0010 0101 1001" in BCD format. A BCD incrementor adds 1 to a number in BCD format. For example, after incrementing, "0010 0101 1001" (i.e., 259_{10}) becomes "0010 0110 0000" (i.e., 260_{10}).

Signal Definitions:

- Input&output signals has 12 bits => 3-digit BCD Number.
- Overflow signal represens the result cannot expressed using 12 bits. It is a one-bit signal (zero/one).

1. Design a three-digit (12-bit) incrementor and derive the FPGA code.

2. Use simulation to verify operation of the code.

3. Design a testing circuit that displays three digits on the seven-segment LED display and derive the code.

4. Synthesize the circuit, program the FPGA, and verify its operation.