University of British Columbia
Electrical and Computer Engineering
Digital Design and Microcomputers
CPEN312

Lab 3 - Counters

For this lab you will design and test a clock using Quartus Prime.

Tools and Equipment Needed

1. Altera DE0-CV board.
2. Quartus Prime version 16 or newer.

Activities

Design, code, and test a clock that displays hours, minutes, and seconds using the 7-segment displays available in the Altera DE0-CV board. The clock should be capable of displaying time using both the 12H format and the 24H format; the format should be selectable during normal operation using SW9. The hours, minutes, and seconds must be settable, using any method of your choice. For the 12H format use LEDR9 as AM/PM indicator (for PM turn LEDR9 on). You can use any of the components available in the schematic editor of Quartus Prime/Lite (flip-flops, counters, decoders, etc.) or create your own components using VHDL. If you prefer, you can code your clock completely in VHDL. On power on, the clock must display a valid time, for example 12:00:00PM or 01:00:00AM.

Upload to Canvas the Quartus project folder as well as a video demonstration of your clock operating. Please show in the video how to set up the clock time, how the clock switches between 12H and 24H format, as well as how the time transitions between 11:59:59PM and 12:00:00AM.