

## **Steps to develop and run a VHDL program on the Altera DE-2 board – Ver. 1**

**CDA 3200 Digital Systems – Spring 2012 – Instructor: Dr. J. Zalewski**

Before the program development starts, one has to make sure about the following:

- The board is connected to the computer on which Altera Quartus II software is running (make sure that the USB cable on the board is connected to the connector next to the power supply connector).
- The board is turned on.
- The device in Quartus II, from Assignment's Device menu choice, is selected as the right Cyclone II chip (with respective version); the chip designation can be read from the board – currently: EP2C35F672C6); opening a Project may be needed to accomplish this.
- In Tools Menu choice, Programmer's Hardware Setup, a USB Blaster is selected (a sort of board driver). If the USB Blaster choice is not visible, it means that Device Support has to be installed – to do this, please read instructions from the USB Blaster Driver Installation file (linked to the class website or to be found on the Altera website).

Then, the following steps need to be pursued to successfully run the program on the board:

- 0) Develop some form of a circuit design, according to the Problem Specification (problem description). It can be an informal drawing, a pseudocode, or a more formal design.
- 1) If you haven't started that yet, start a new project in Quartus II.
- 2) Write a VHDL program for the design from (0) above.
- 3) Compile the program, using Start Compilation button from the Programmer menu.
- 4) Assign pins to the input and output signals from the program. The list of pins is provided in the Altera board documentation and on the class website. Assignments menu in Quartus II is used for this activity.
- 5) Save the configuration, in the Hardware Setup window, in a file with .CDF extension (Chain Description File), under the same name as your project name.
- 6) Recompile the program (with pin assignment previously done); normally (in this class), you should not worry about the compiler warnings.
- 7) Upload the program to the board using the START button from the Tools' Programmer menu.
- 8) If the program has been written correctly and the above steps exactly followed, you will see the circuit actions executed by the FPGA chip on the board, as prescribed in your design.