EEL-4713 Assignment #1
Spring 2011
Assigned: 1/10/2012
Due: 1/21/2012 @ 11:55pm Via Sakai

Overview:
The EEL-4713 assignments this semester will have 3 main sections: setup, textbook questions, and laboratory. Setup (section 1) provides information on how to setup software tools and environments, when applicable. Textbook questions (section 2) cover theory material presented in the lectures. Laboratory (section 3) covers practical aspects of this class, including the design of a VHDL-based MIPS microprocessor, simulation of the behavior of caches, etc.

Section 1: Setup
In this assignment, you will perform the following setup tasks:
> *1.1: Install Quartus II on your laptop*
> *1.2: Go through the Quartus II/VHDL tutorial*
> *1.3: Install a virtual machine appliance in your laptop and go through its tutorial*
> *1.4: Go through a tutorial of the SPIM simulator*

1.1: Install Quartus II on your laptop
- Go to www.altera.com, select "download" and "Quartus II Web Edition". Follow the instructions to download and install the software.

1.2: Go through the Quartus II/VHDL tutorial
- Once Quartus II is installed and you are able to execute it, select "Tutorial" from the "Help" menu and follow the tutorial.

1.3: Install the virtual machine "Grid appliance" in your laptop
- This will create a Linux-based virtual environment in your computer that will be used for various kinds of simulations throughout this class.
- Browse www.grid-appliance.org and follow the "quick start guide" instructions: install a virtual machine appliance on your laptop and go through its tutorial.
- Change the default password ("password" without the quotes) for your appliance with the command: passwd

1.4: Go through a tutorial of the SPIM simulator
- Within a command-line terminal window in the Grid appliance, download the SPIM simulator with the following command: sudo wget http://www.acis.ufl.edu/~ipop/edu-docs/eel4713spim.tgz
- You'll be asked to type your password,
- Uncompress the SPIM simulator with the command:
    > tar xzf eel4713spim.tgz
- The goal of this assignment is for you to get acquainted with the SPIM simulator, which will help you familiarize yourself with the MIPS instruction set and debug simple MIPS programs. Browse the SPIM manual posted in the web site for a summary of its features and command syntax.
- In this assignment you will step through the execution of a simple example program, named larger.s, located in the spim-6.4/Examples directory. View the contents of this file with a text editor as explained in the appliance tutorial.
- Go inside the spim-6.4 directory and start the SPIM simulator:
    > cd spim-6.4
    > ./spim
- Within the SPIM console, load the larger.s example:
    > load "Examples/larger.s"
- To execute the test program, type run. The program will prompt you for a sequence of integer numbers. Once you enter the number zero, the program will display the largest of all numbers you entered.

- Enter a sequence of numbers of your choice, then the number zero. Once the program exits, inspect the value of register $5 with print $5. It should contain the largest value you entered.
- Step through the execution of this program instruction by instruction with the command step; inspect the values of individual registers (e.g. $1) with the command print $1; inspect the values of all registers with the command print_all_regs. Continue with this process until you are comfortable with the step-by-step simulation feature.

Section 2: Textbook questions
2.1: Chapter 1, questions 1.1.1 – 1.1.26 and 1.7.1 – 1.7.6.

Section 3: Laboratory
This assignment assumes you have gone through the SPIM tutorial of Section 1. Load the file "Examples/lab1.s".

3.1: Inspect the assembly code for the program "lab1.s" and simulate its execution to answer the following questions:
   a) What function is computed by this program?
   b) Which registers are used to hold operands and results?