Notes for Assignment #1

I have created an "Assignment 1" video that you should watch as part of this assignment. One of the things that you will be learning this term is how to program in MIPS Assembly Language. In order to complete some of your assigned work, you will need to install a MIPS Simulator, called QtSpim, on your computer. To install the QtSpim software, go to https://sourceforge.net/projects/spimsimulator/files/. Install the latest version of QtSpim for your particular computer. You may find it convenient to create a shortcut for the software on your desktop. The QtSpim software should execute if you double-click on that shortcut (after testing this, feel free to close the program; closing the program will also close the console window).

Now that you have QtSpim installed on your computer, let's learn a little bit about using it! Create a folder called CDA 3100 on your computer. You should make a habit of putting all of your class-related work in this folder. Using an editor like Notepad, create and save a text file called **hello.s** that contains the following small MIPS assembly program (in Notepad, specifically, you will need to select All Files under "Save as type:" in order to save a file with a ".s" extension, instead of the default ".txt" extension) :

```
# Stephen P. Leach -- 09/15/15  (use your name and current date)
# hello.s -- a traditional "Hello World" first program
# Register use:
#     $v0   syscall parameter and return value
#     $a0   syscall parameter

      .text
      .globl      main
main:
      la    $a0, msg    # address of "Hello World" message
      li    $v0, 4      # this is the print_string option
      syscall           # perform the system call

      li    $v0, 10     # this is the exit option
      syscall           # perform the system call

# Here is the data for the program
      .data
msg:  .asciiz      "Hello World\n"

# end hello.s
```

After creating and saving your program, get into QtSpim (double click the QtSpim icon on your Desktop). Load your **hello.s** program (select "Load File" from the File drop down menu or click the leftmost icon on the toolbar). If there are no errors in your file, the only change in the QtSpim screen is that your program will be loaded into the simulator, starting at address 00400024. If there were errors, you will get a message box indicating what the problem was; you should click "OK" and correct the error using Notepad (you will want to keep Notepad open

when working on a program; you can make a change, save the changes and then reload the program using QtSpim; simply repeat this process as you make changes to your code).

Once you have successfully loaded your program, execute the code by selecting "Run/Continue" from the Simulator drop down menu, pressing the F5 key or clicking on the "Run/Continue" icon on the toolbar (the seventh icon from the left; it looks like a green triangle, pointing to the right). "Hello World" should appear at the top of the Console window. You may close the Console window when the program has completed.

To execute the program again, you will need to select "Reinitialize and Load File" from the File drop down menu or click the "Reinitialize and Load File" icon on the toolbar (the second icon from the left). Then re-execute the program by selecting "Run/Continue"; you should once again see the "Hello World" message at the top of the Console window. Should the Console window not be visible, you may need to re-open it (using the Window drop down menu).

There is a short tutorial (QtSpim Manual) on the QtSpim MIPS Simulator inside the "View Help" option when you select Help from the menu bar in QtSpim. There are also a number of tutorials available on the web. One such is located at:

claws.eng.ua.edu/attachments/166_QtSpim Tutorial.pdf

Moving on for a moment to the reading in the text, I don't see where the authors have explicitly defined a "byte"; it is 8 bits. There is a green folding card at the front of your textbook (the "green card" is also available under Course Materials). At the bottom of page 4 on that card is a table showing various size terms and prefixes. A similar table appears at the top of page 6 in the text. Note the distinction between powers of 10 and powers of 2. Also, notice that the abbreviation for these various sizes is an UPPER CASE letter (corresponding to the name of the term), followed possibly by a lower case i (for the powers of 2). Also note that byte is abbreviated as an UPPER CASE B, whereas bit is abbreviated as a lower case b.

In the process of modifying the green card for the 5th edition, the authors have accidentally (it seems) omitted the terms that are used for negative powers of 10 (there is no need for the power of 2 counterparts). It is important that you are familiar with such terms (and their abbreviations) as well, since it will allow you to work with millimeters, nanoseconds, etc. By the way, meter is abbreviated with a lower case m and second is abbreviated with a lower case s.

These additional terms are listed below. Notice that each of the abbreviations is simply the first letter (very important that it be lower case) of the term with the exception of the abbreviation for micro-, which is μ (since m is being used for milli-).

Size	Prefix	Abbreviation	Size	Prefix	Abbreviation
10^{-3}	milli-	m	10^{-15}	femto-	f
10^{-6}	micro-	μ	10^{-18}	atto-	a
10^{-9}	nano-	n	10^{-21}	zepto-	z
10^{-12}	pico-	p	10^{-24}	yocto-	y