COMP 2421 Computer Organization

Lab 1

Objectives: The objectives of this lab is to show you some components (mainly pieces of hardware) of a computer (including some I/O devices). In addition, *QtSpim*, a MIPS simulator would be introduced and which would be used in your programming assignments (*assembly language*).

1. [Device Manager] under [Windows] platform

If you are using the [Windows] machine, it is not difficult to retrieve a list of hardware components from the system. Simply go to [Control Panel] → [Hardware and Sound]. Under [Devices and Printers], choose [Device Manager] (see diagram below).
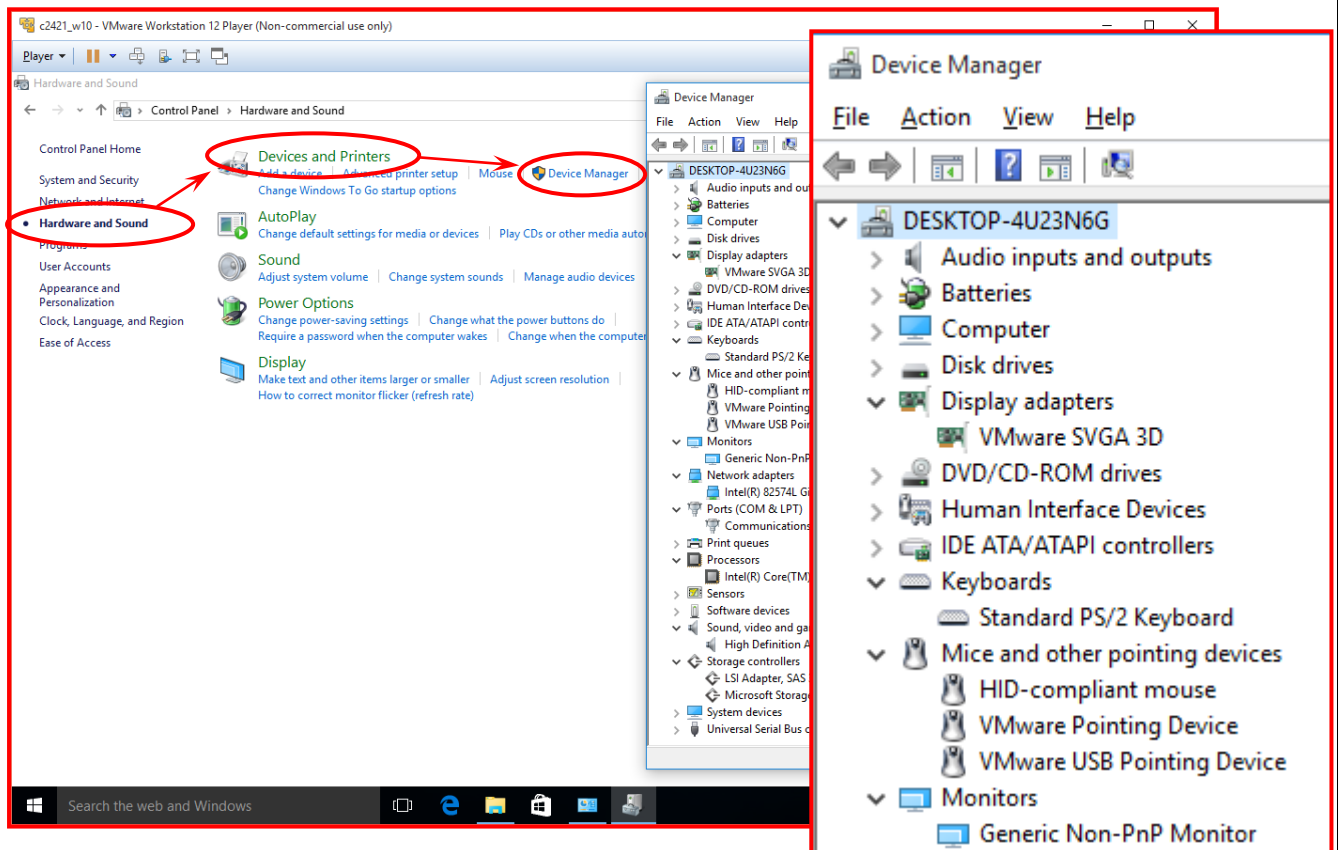
2. Check details of hardware by using software application, HWiNFO

Since our department uses 64-bit machines, simply use the 64-bit version (*either [installer] or [portable] is fine*). Execute the application and you would have the following boxes appear on the screen.
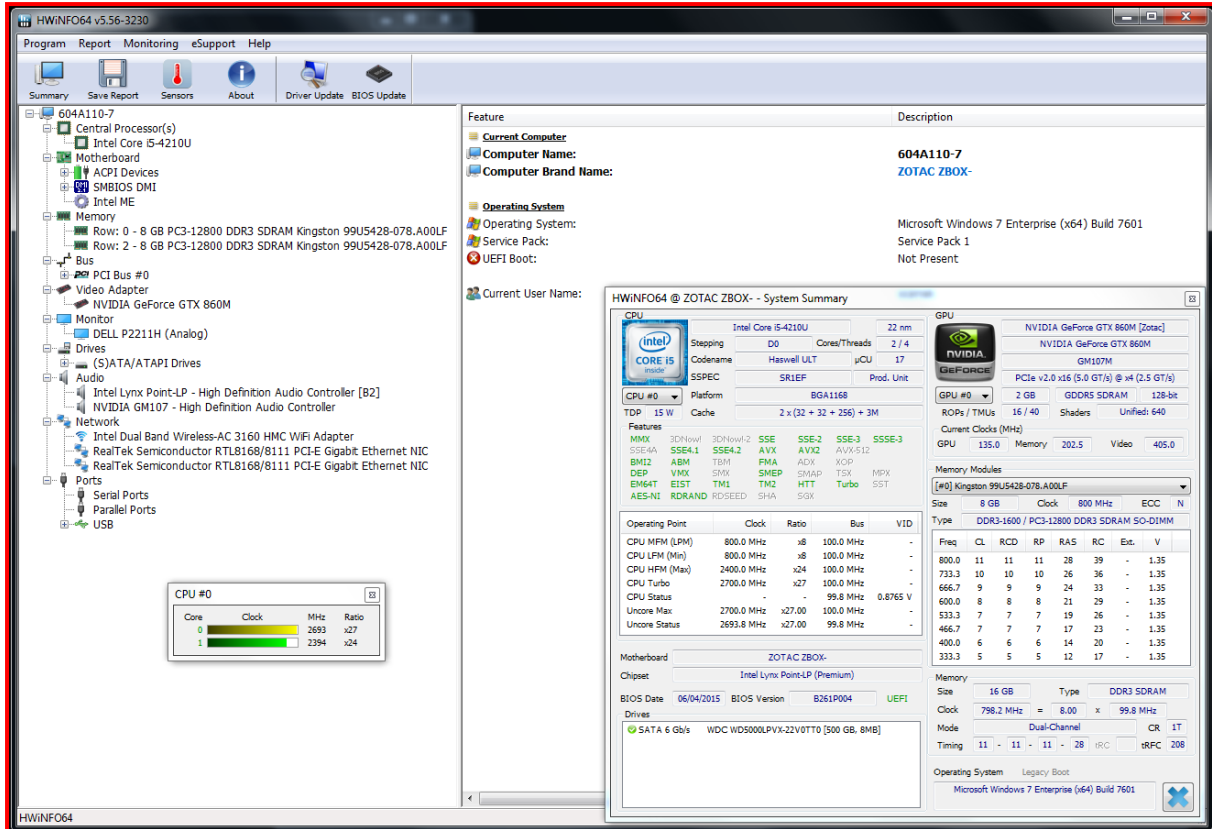
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Figure 2 - Execution of HWiNFO64

Try the application on other machines (e.g. a notebook pc).   Check the differences of the components being used. For example, the model of CPUs, number/model of RAM, etc.
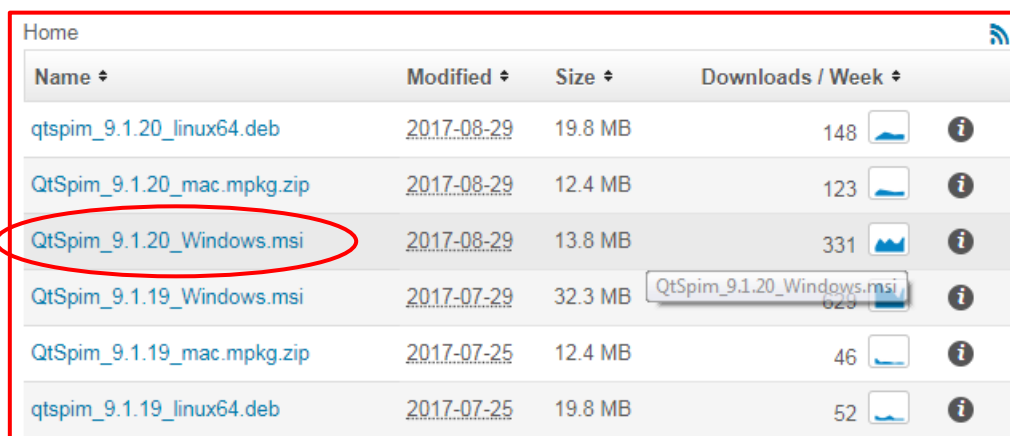
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3. QtSpim – Installation

Download the application through the web page: http://pages.cs.wisc.edu/~larus/spim.html. You may check related materials through that page.   Or, you may go to the *Sourceforge* Web Site, http://sourceforge.net/projects/spimsimulator/files/ to download the application directly.

Note that we use the latest version, "**QtSpim_9.1.20_Windows.msi**" and we use that version to test all your programming assignments.

In addition, if you want to read something more about the MIPS Assembly Language Programming, use the following link to read the textbook online.

http://www.scribd.com/doc/3577342/MIPSassemblylanguageprogramming

Figure 3 - QtSpim Download Page

After download, just follow the instructions to install the program as shown below.

Figure 4 - Installation Start

Click "Next".

Figure 5 - Accept Agreement and Go on

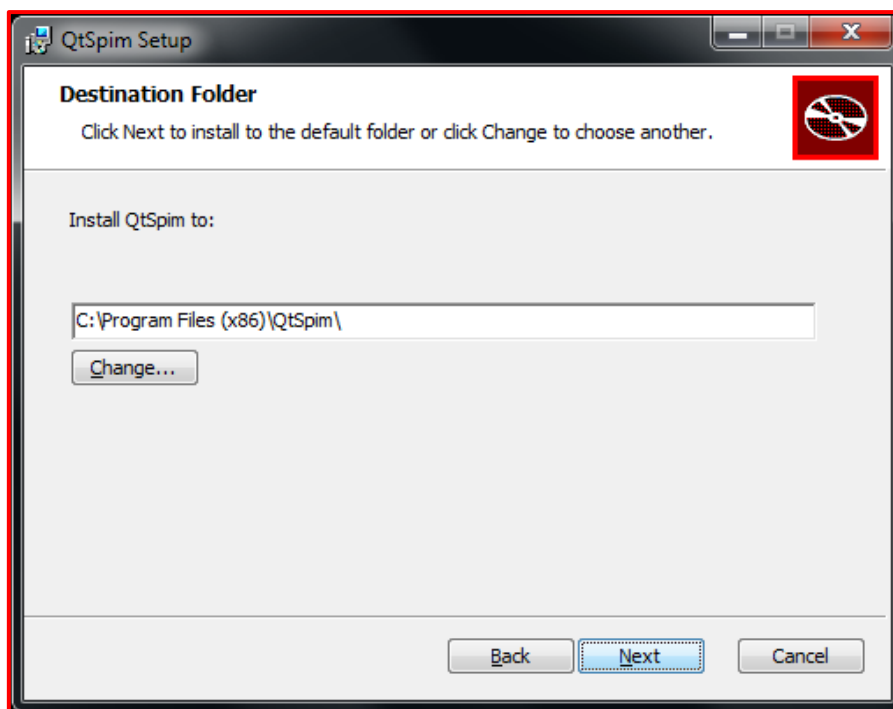Check the box to accept the agreement.   Click "Next".

Figure 6 - Location of Installation

Simply use the default location.   Click "Next".
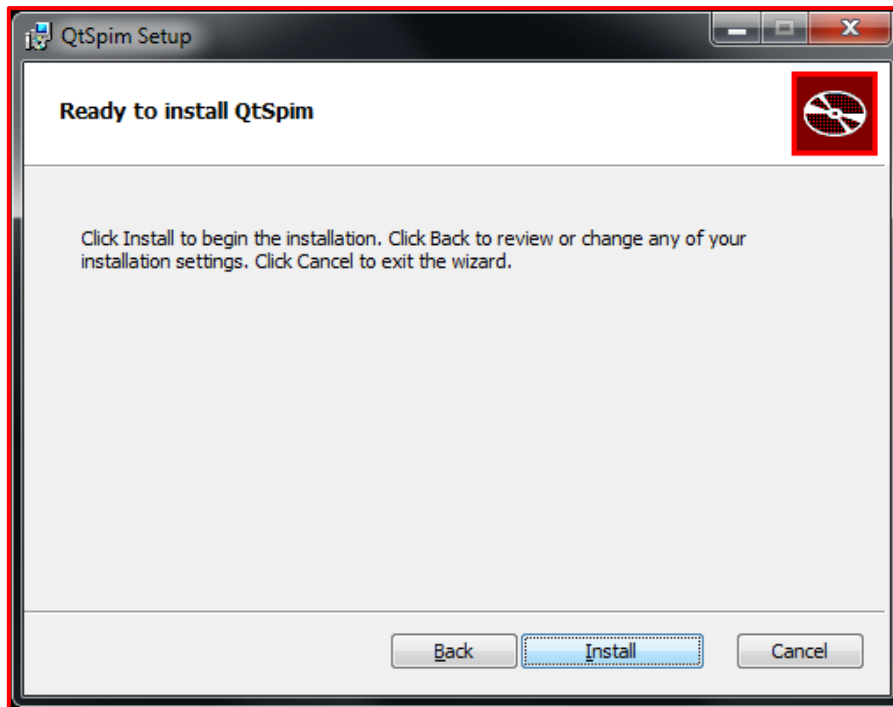
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Figure 7 - Setup Ready

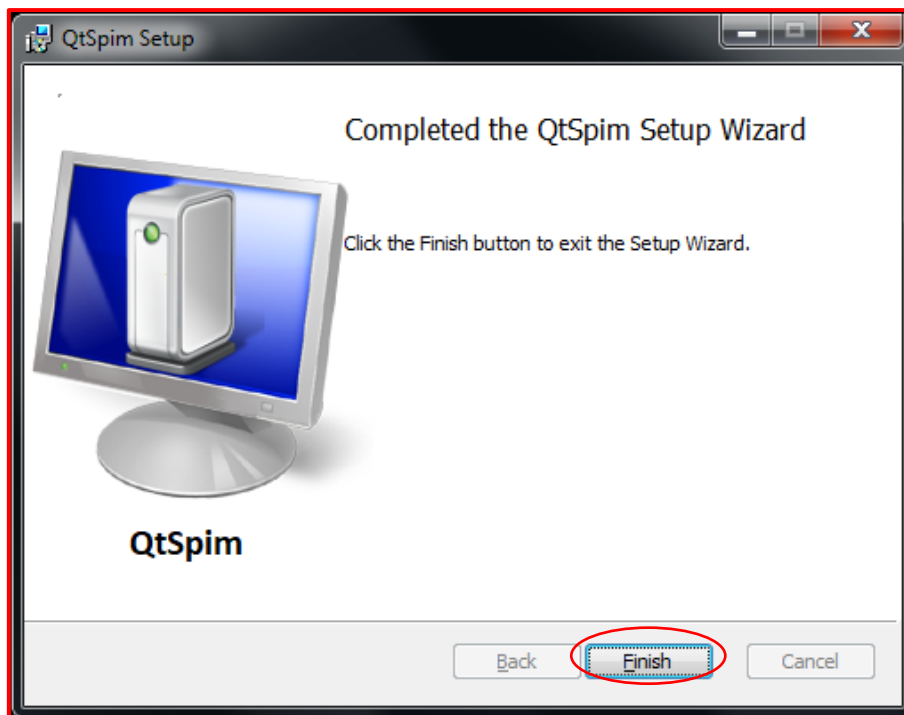Click "Install".   Wait unit the installation is done.

Figure 8 - Installation Completed

Click "Finish".

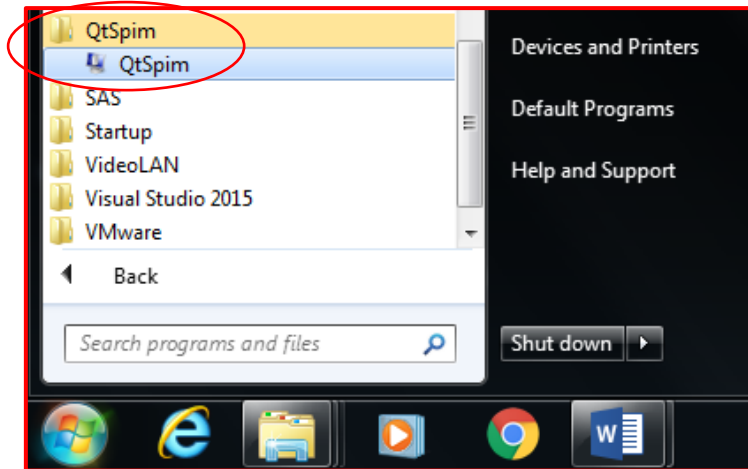To execute the application, go to "**Start**" → "**All Programs**" → "**QtSpim"**, then, **QtSpim** is found. Click on it and start the application.

Once the QtSpim starts up, there are two windows appear. One is the application's interface, (main window) and the other one is the "Console" (see below).
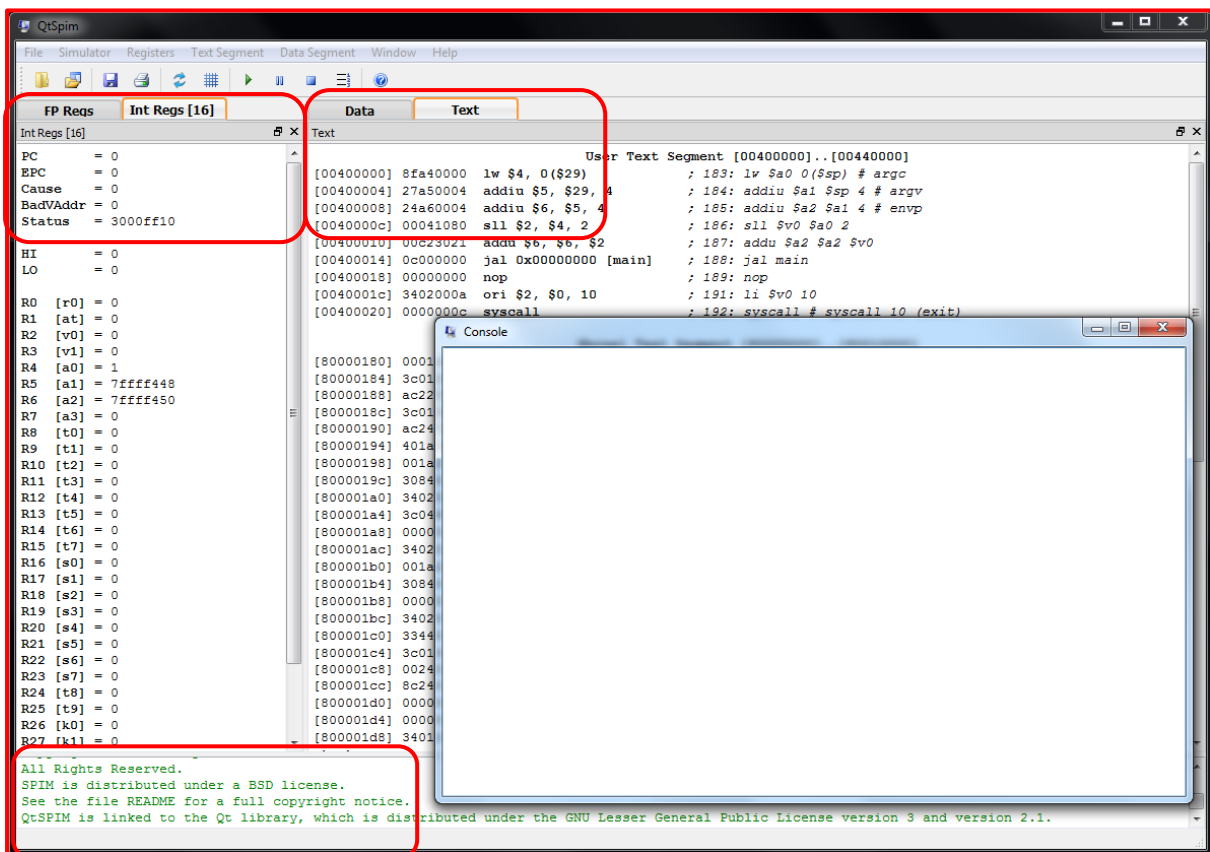

Figure 10 - QtSpim User Interface

There are three different panels in QtSpim's main window:

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a. Register Panel - A narrow pane on left displays integer or floating-point registers. To read the set of registers, click the tab at the top.
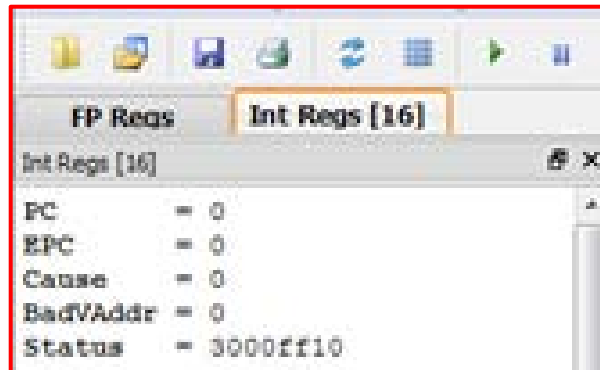
b. Memory Panel - A wider pane on right shows the "Text" segment or the "Data" segment. For Text segment, it lists the instructions (program statements), which have been loaded into the simulator. Again, click the tab to read the content.
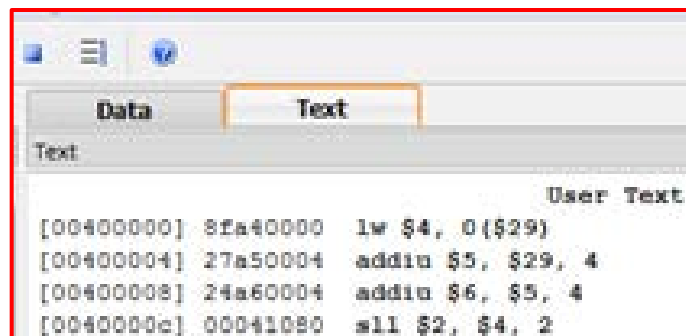

Figure 12 - Memory Panel

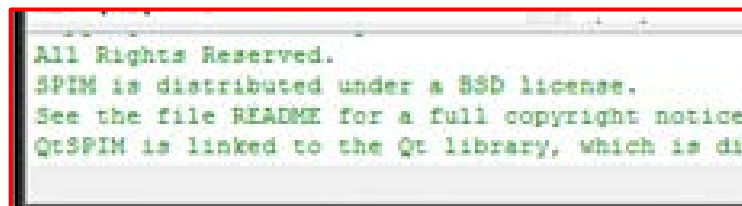c. The smallest one is on the bottom. It is the Messages Panel. It shows the system's messages.

Figure 13 - Messages Panel

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4. QtSpim – First 'HelloWorld' Program

Load the program file by selecting [File] → [Reinitialize and Load File].   Navigate to the application folder [Program Files (x86)] → [QtSpim].   Choose the program file, [HelloWorld.s].   Once the file is loaded, click [Play].
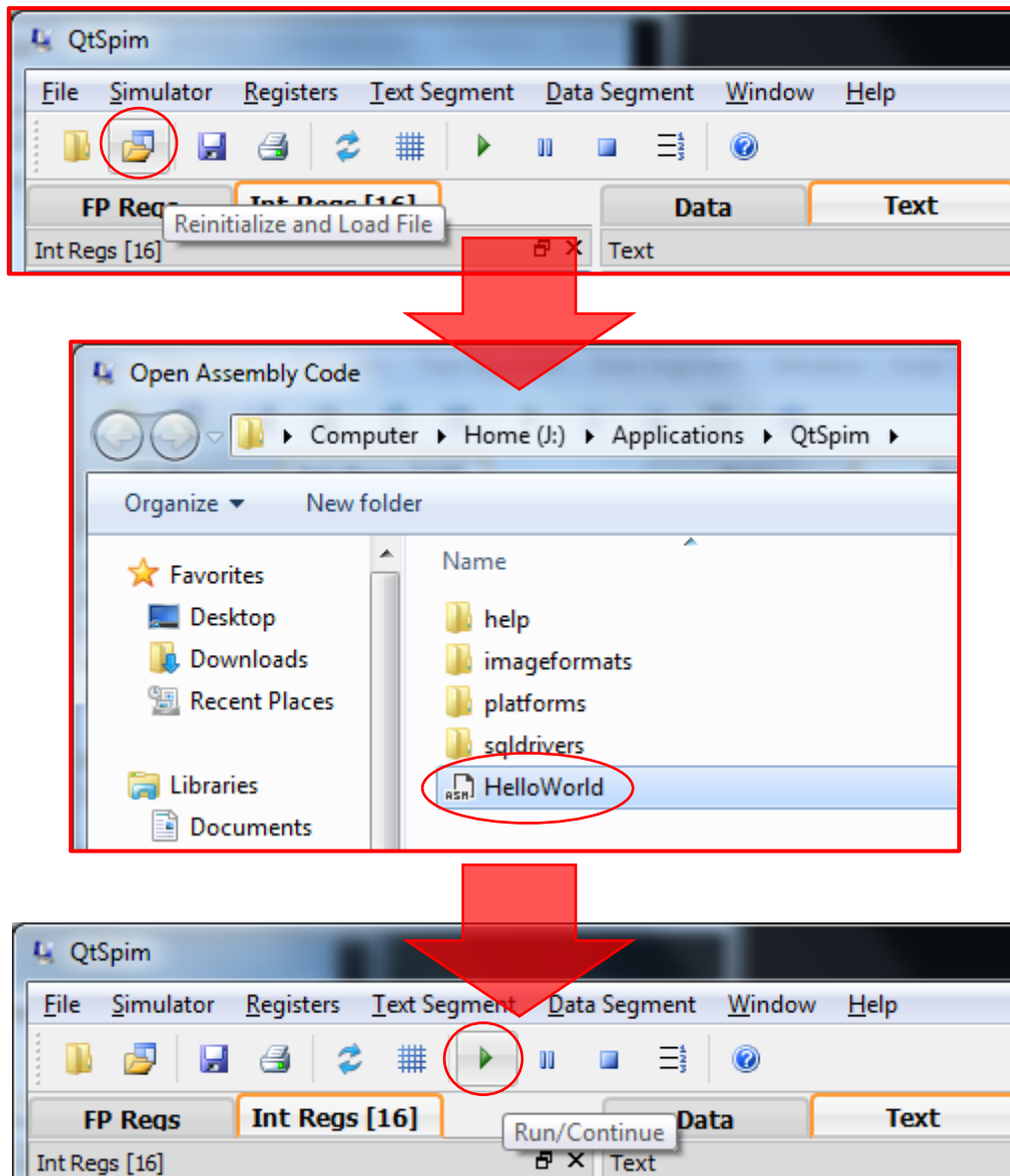
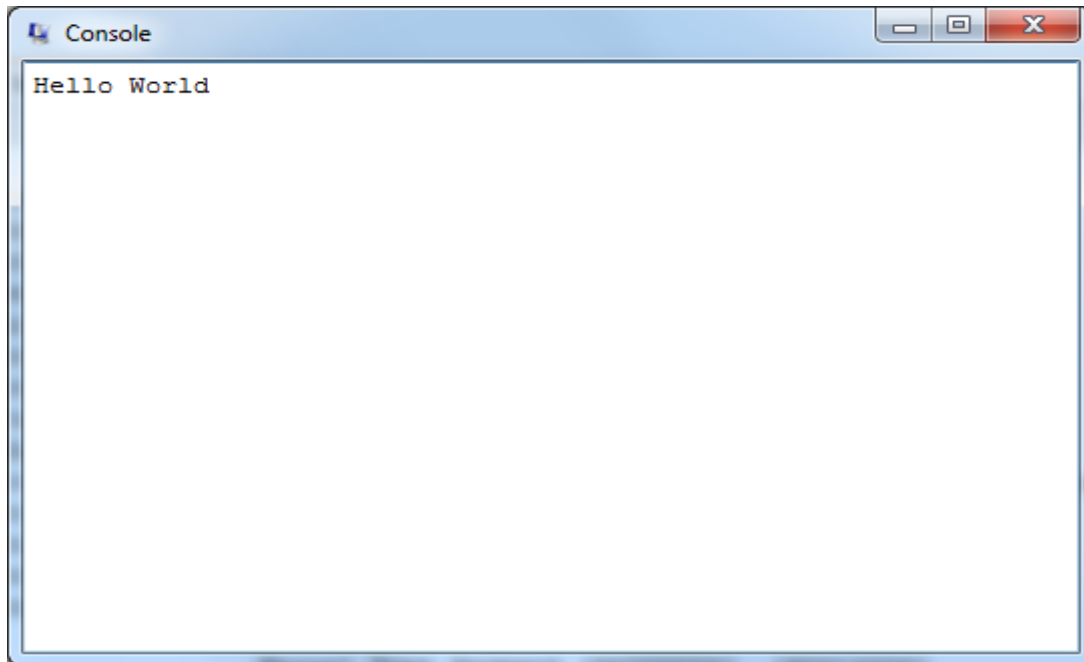Once the program is executed, the message [Hello World] appears on the [Console] window.

Figure 15 - [Hello World] message in Console

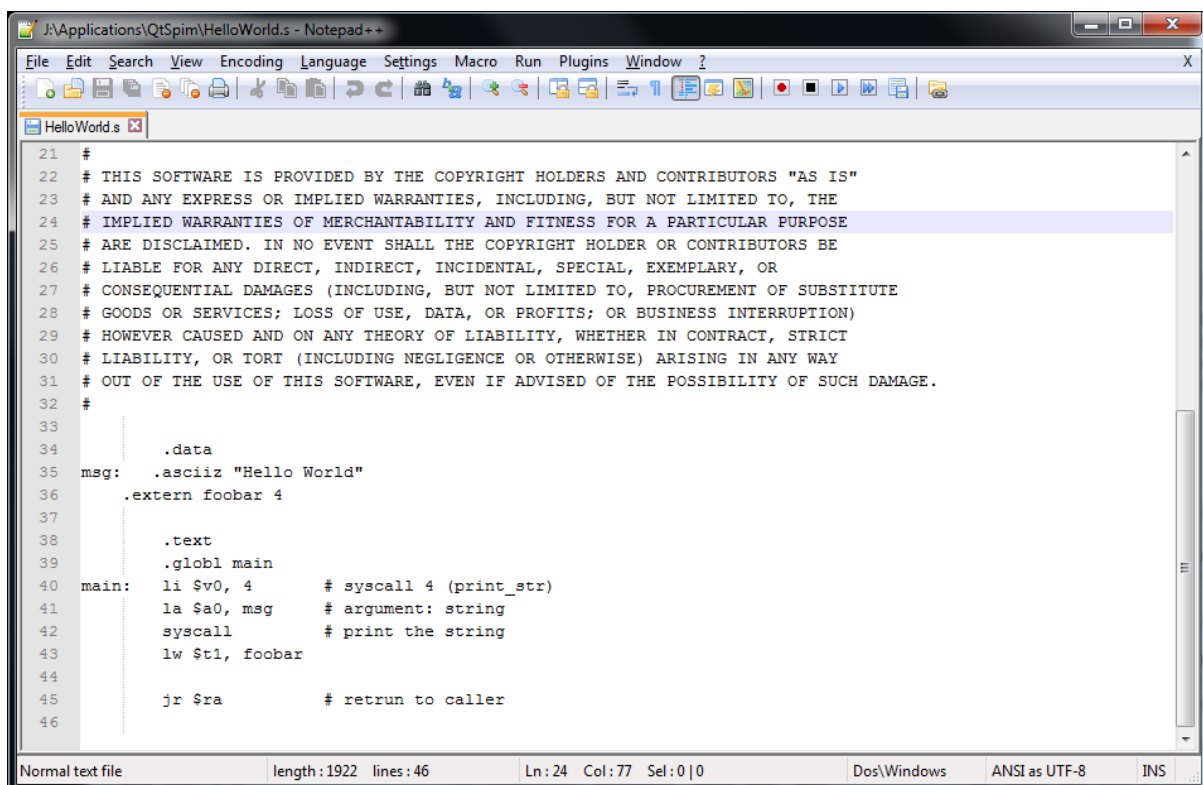Use a text editor to open the source code file, HelloWorld.s.   Program statements look like the following.

Figure 16 - Source Codes of [HelloWorld.s]

Read the statements and step through the program.   Actually, there are only ten program statements.   Other lines are comments.

Can you figure out what each statement does?