

# INTRODUCTION TO COMPUTER SCIENCE I

## LAB 1: A FIRST PROGRAM

Friday, January 26, 2018

### 1 Getting started

The following steps will get you started with this lab. You will be introduced to the programs and tools that you will need to complete the lab and project assignments. Please ask questions!

1. **Login to your workstation:** Our lab is full of Windows desktop computers. These are run by our Information Technology department, and you must begin by logging into them using your college username and password. These workstations won't do much themselves: they will primarily be used to connect to different systems on which the real work will happen.
2. **Login to a server:** The computer systems that we will use for our projects are `romulus.amherst.edu` or `remus.amherst.edu`, (henceforth, `remus/romulus`), which are UNIX (Linux) systems. To use these systems, you must login to them from your workstation using *Remote Desktop*, software that allows you to connect graphically to these servers. To do so, click on the search icon on the toolbar and search for “Remote Desktop,” then click the first result. Under “Computer” enter either `remus.amherst.edu` or `romulus.amherst.edu` (it does not matter which; they are interchangeable). Enter your Amherst College username and password. This will enable you to log onto the department systems from any of the Windows machines in Seeley Mudd 014 or elsewhere on campus.<sup>1</sup>
3. **Open a terminal:** Once you have logged into `remus/romulus`, you will see the graphical interface for that server, which looks very much like the desktop that your own computer presents. Click *Applications*, then *System Tools*, then *Terminal*. You will then see a *terminal window* within which there is a *shell*—a prompt at which you can type commands to the system. The prompt should look something like:

```
[kgardner@romulus ~]$
```

The shell is the place from which you will launch the program that allow you to edit your source code, to compile that source code, and to execute (run) your programs.

4. **Make a directory:** When you first login, you will be working in your *home directory*—the UNIX analog of your *My Documents* folder. Within this directory, you should make a *subdirectory* (a folder) for your work for this lab by using the `mkdir` (*make directory*) command (shown below). Once you do that, you can `cd` (*change directory*) into that new folder. Using those commands looks like the following, where the dollar sign (\$) is the

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<sup>1</sup>You may find that you'd prefer to work on your own computer than on the public computers on campus. If you run Windows 10, Remote Desktop comes installed (search for “Remote Desktop” and click on the first result). If you use a Mac, you will need to install the Remote Desktop software on your machine. There are instructions on how to do so on the IT department's Remote Desktop Connection instructions at:

[https://www.amherst.edu/offices/it/knowledge\\_base/network-wifi/Remote.Desktop.Connection](https://www.amherst.edu/offices/it/knowledge_base/network-wifi/Remote.Desktop.Connection)

*prompt*—what the shell prints before stopping to wait for you to type a command (do not type the dollar sign; it is not part of the command):

```
$ mkdir lab1
$ cd lab1
```

5. **Get some starting source code:** Use the following command to obtain a sample Java source code file:

```
$ wget -nv --trust-server-names https://goo.gl/VpHlpr
```

To ensure that you have copied the file into your `lab1` subdirectory, use the `ls` (*list directory*) command to list the files in the current directory, noting that the character following the dash (`-`) is a lowercase letter `L`, and **not** the numeral `1`. The `-l` part of the command indicates that you want to list the directory using the *long format*:

```
$ ls -l
```

You should see an output that looks something like this:

```
total 4
-rw-r----- 1 kgardner kgardner 623 Jan 18 10:55 Messages.java
```

You have now set yourself up to work with some Java source code. Move on to the next section.

## 2 Your assignment

Perform the following steps in order to see, use, and change your code:

1. **Examine the source code:** Run *Emacs*, a programming text editor, to examine the `Messages.java` file. In the following command, be sure to include the trailing ampersand (`&`), causing the text editor to run in the *background*—that is, to run while allowing you to enter more commands:

```
$ emacs Messages.java &
```

A new window will open, showing you a handful of lines of Java code (along with *code comments*—lines that begin with two forward slashes (`//`)—that provide some human documentation and commentary. This code shows a program named `Messages` that will start on the line beginning `public static void main (String[] args)`, ask the user a question, read in the user's answer, print a message, and then end. For now, examine the code, but leave it as is.

2. **Compile the code:** The source code must be translated into a form that the computer can execute. Leaving your *Emacs* window open, click over to your terminal window again. In it, use the following command to *compile*—that is, translate into machine code—your source code:

```
$ javac Messages.java
```

In this case, **no news is good news**. That is, if the computer simply presents the shell prompt to you after you issue this command, then **the compilation succeeded**. The compiler—the `javac` program—will print messages into your terminal window only if it was unable to translate your program. Given that you've changed nothing from the original code, it should compile without error.

3. **Execute your program:** Once you have successfully compiled your program, it is time to run it and see what happens. Go to your shell window and issue this command:

```
$ java Messages
```

The first question that you saw in the code should be printed into your terminal window. Type an answer in the terminal window, then press enter. You should now see the second question in the code printed in your terminal window. Continue answering the questions until you see the final set of messages print to the screen. At this point you should again see the prompt in your terminal window.

4. **Change something:** Alter your program slightly, and then test that your alteration did what you expected. Specifically:

- (a) **Edit:** Go back to your *Emacs* window. **Add your own print statement or two**, using the existing print statements as templates. Be sure to **save** your changed source code. You can do this either by clicking the File menu and then Save, or by using the *Emacs* shortcut `Ctrl+x Ctrl+s` (that is, hold down the Ctrl key and hit x, release both buttons, then hold down the Ctrl key again and hit s).
- (b) **Compile:** Issue the `javac` command to your shell, just like you did above. If there are error messages, you will need to return to *Emacs*, fix whatever is incorrect, save the changed code, and try to compile with `javac` again. Repeat until your code compiles with no error messages.
- (c) **Execute:** Issue the `java` command to your shell, just like you did above. Your program should run, this time printing the additional message(s) that you added into the code.

5. **Change something else:** Make some more changes to the program, using the code we saw in class this week as examples. Here are some ideas that you might want to try:

- (a) Ask the user more questions. Use the existing code as an example for how to read the user's response from the keyboard.

- (b) Declare some variables of type `int` or `double`, do some arithmetic, and print the results.
- (c) Read numeric input from the keyboard. You can do this using the `keyboard.nextInt()` and `keyboard.nextDouble()` commands.

After each change that you make, be sure to **save** your work, **compile** your program using the `javac` command in the terminal window, and **run** your program using the `java` command in the terminal window. It is in your best interest to compile and run your code often as you make changes, as this will allow you to catch errors early.

Ta-da! You've just done some programming. You have also begun to use the tools on which your work will depend in this course: remote desktop, remus/romulus, the shell, the *Emacs* text editor, the `javac` compiler, and the `java` executor.

### 3 How to submit your work

Submit your modified `Messages.java` file. You may use either of the following two methods to use the CS submission system:

- **Web-based:** Visit the submission website (<https://www.cs.amherst.edu/submit>). If you did your work on your own computer, open this link in your computer's browser; if you did your work on remus/romulus, then open this link in a browser opened within *remote desktop*.
- **Command-line based:** Use the `cssubmit` command at your shell prompt. This command works only while connected to remus/romulus. Type:

```
$ cssubmit Messages.java
```

and then follow the instructions to complete your submission.

**This assignment is due on Thursday, February 1, 11:59 pm.**