

A Crash Course in OS X

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Objectives

- To learn some of the basics of the OS X operating system - including the use of the login panel, system menus, the file browser, the desktop, and Terminal.
- To learn the process of compiling and running Java programs with BlueJ.

Step by step assignment

Directions are highlighted in

gray boxes.

1. Logging in

The computer systems in the Computer Science Department laboratory (room 16 Wing Communication Center) are Apple G5 and Intel Core Duo dual-processor systems, and they are using an **operating system** called OS X. (The operating system is the standard software that controls basic computer functions, including interacting with the user.)

If the screen is dark or a screen saver is displayed, then strike the space bar. This should cause the login panel to appear.

Type your user name (first five letters of your last name then underscore then first initial then middle initial), followed by the *tab* key, and your password (9-digit student ID number), followed by the *return* key. If the login panel shakes side-to-side, then you have made an entry error. In case of an error try again. Ask for help if the error persists.

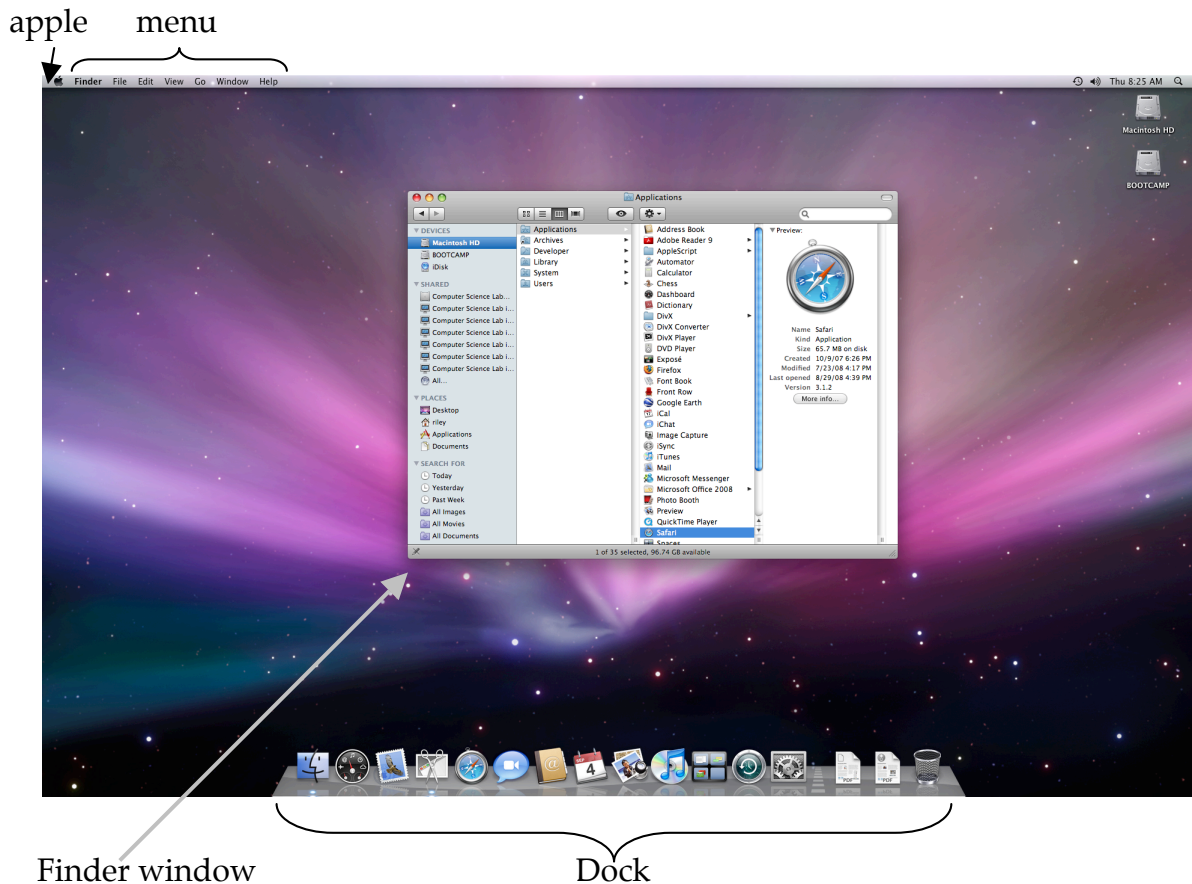
2. The display

The image on your screen is called a **desktop**. Each time you log in the OS X operating system displays the desktop retained from the last time you logged out. Your desktop will appear roughly similar to the one on the next page. There are three portions of the desktop that deserve special explanation:

Menu bar – This is the light bar across the very top of the screen. This menu bar always displays the menu of commands that are available for the particular application that is running in the foreground. For the desktop pictured on the next page the OS X desktop (Finder) program is running, so the menu bar is labeled *Finder* on the left. (You can return to this menu at any time by clicking on an unoccupied portion of the desktop or one of the Finder's file browser windows.) Pull-down menus are activated by clicking on any of the words in the menu bar. The black apple icon at the far left activates a submenu that is available regardless of which application is in the foreground.

Dock – The row of icons across the bottom of the screen is called the **dock**. The dock icons provide quick access to selected applications or files. You can customize your own dock.

Finder – The Finder is the OS X mechanism for accessing files, and will be described shortly in more detail.



You will also notice that, like other modern operating systems, OS X uses **windows** as the primary way to display information to the user (you).

At any time only one window and its associated application will be in the **foreground**. You can identify the foreground window, because it is more vivid and has colored highlights. Clicking on a window brings it, and its associated application to the foreground.

In the upper left side of the foreground window's title bar are three buttons that look like colored beads. The left of these three buttons (red) is clicked to close¹ the window (permanently). A click to the middle (yellow) button minimizes (hides) the window into the Dock. Clicking the right (green) button maximizes the window.

Two other important manipulations of windows are accomplished as follows:

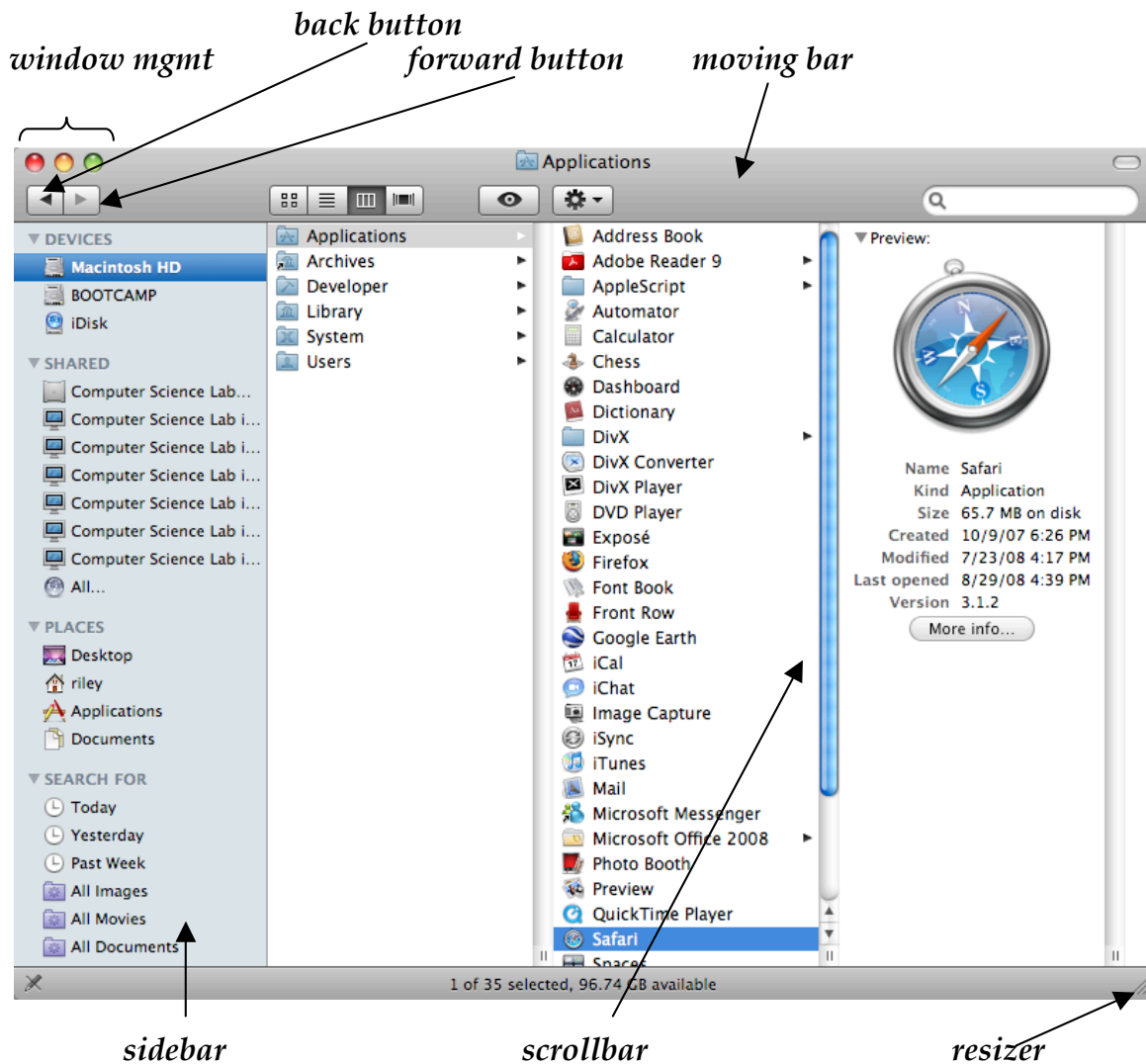
- Moving* – the foreground window is moved by dragging anywhere on its top bar.
- Resizing* – the foreground window can be made larger or smaller by dragging on the lower right corner resizer (see picture on next page).

Try moving and resizing this Finder window.

¹ Note for Windows users: Closing a window does not usually quit an application, you still need to use the "Quit" command to quit any running application.

3. Using file browsers (Finder)

The OS X file browser (Finder) is different from MS Windows file browser windows, and it can be far more efficient if used properly.



Clicking the third button segment from the left (as shown below) on the Finder places the Finder in column mode. This is highly recommended. (The other three options are much more like older Apple and Microsoft Windows systems.) You may also find it helpful to keep two finder windows on your desktop.

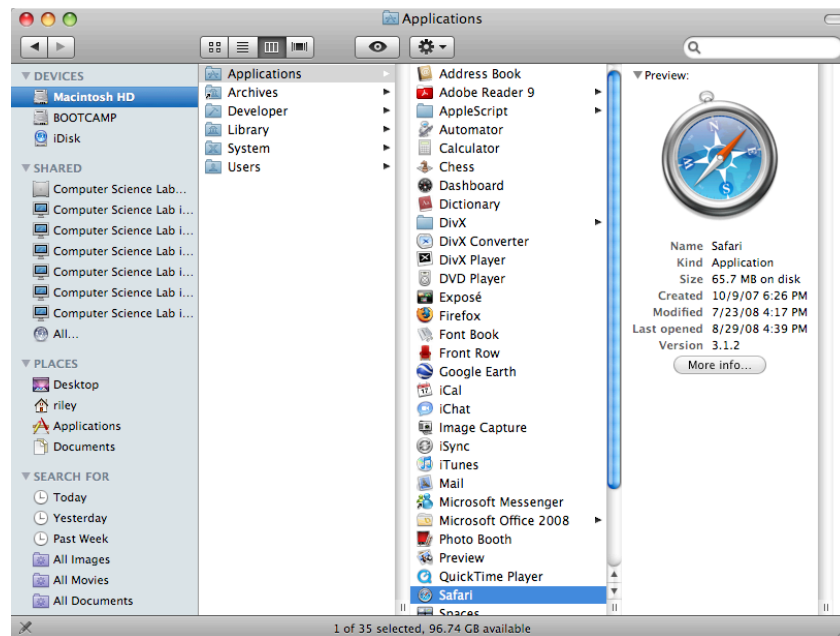


Files are stored in **directories** (also called **folders**) which form hierarchical structures. A Finder reflects the structure of folders within folders.

In the Finder above there is a folder called "Macintosh HD" (or "MacOSX" or something else on different machines) which contains a folder called "Applications" which in turn contains a file called "Safari". (Folders are identified by a small file folder icon to the left of the name, while files use other icons.) Note that in UNIX notation the pathname proceeds from left to right across the columns; in Unix this file would be written as follows

/Applications/Safari

To navigate a Finder window in column mode you generally work left to right across the columns until reaching the final file. Note that the column to the right of the selected file displays relevant information about the selected file.



To select a file, click on the corresponding folder/file name in a Finder window column. The leftmost column can be clicked to reset to some predefined position in the file structure. The so-called **root directory** that represents your whole disk drive is called *Mac OS X*. This root folder is the root directory that contains everything accessible on the computer's hard disk. The entry associated with the house icon is clicked to set a Finder window to your personal folder.



Use a Finder window to reach the Safari file. Next, click on the home button (the one with the house picture) and notice how the Finder resets to your personal home directory. Check out two other directories: */Mac OS X/Archives/Documentation/jdk1.5* provides useful Java documentation and */Mac OS X/Applications* the most commonly used applications.

4. **The Dock**

You will already have icons in your Dock; you will find some of the associated applications to be useful and others not. There are three ways for you to insert additional icons into your Dock.

- 1) You can insert new icons by dragging the smaller versions from the Finder and dropping them between any two existing icons in your dock.
- 2) When you click the yellow button on the top of the foreground window, it causes the window to be temporarily reduced into the Dock.
- 3) If you run an application (program), an icon is automatically inserted in the Dock during the time that the application is active.

You can remove any item from the Dock excepting the blue faces icon and the trash can. To remove an icon from the Dock drag it and drop it on an unoccupied region of the desktop. Dock items are activated by a single click. Clicking an application icon causes its program to execute (or be brought to the foreground if it is already executing). Clicking a reduced window restores it on the screen.

Dropping things on the trash can "puts them in the trash". If the file from the Finder is put in the trash, then the associated file or folder is moved to the trash folder. Files that are trashed can be recovered by double-clicking the trash can icon and dragging from the resulting window. Trashed files are not permanently deleted until you activate the Finder application (by clicking on the desktop background), select the *Finder* submenu followed by the *Empty Trash* command.



5. Useful icons to place on the dock

Applications can be placed into the Dock, along with file icons. Applications are also inserted in the Dock by dragging them from a Finder.

Be certain to include the following applications in your dock. Some may already be present. The others can be located as shown to their right.



Mail

File path: */Mac OS X/Applications/Mail*



Terminal

File path: */Mac OS X/Applications/Utilities/Terminal*



Safari

File path: */Mac OS X/Applications/Safari*



BlueJ

File path: */Mac OS X/Applications/BlueJ*
(or look in: */Mac OS X/Archives/Applications/BlueJ*)

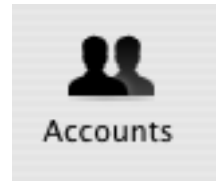


Firefox

File path: */Mac OS X/Applications/Firefox*

6. Changing Password

Several preferences can be set using the **System Preferences** entry under the Apple submenu (the black apple in the upper left corner of the screen). You can experiment with these preferences on your own, but for now it is important to change your password. To do this choose the “Accounts” icon (shown to the right). Next click the “Change Password” button on the account panel. To change a password you must click then type the new password in both the *Password* and *Verify* fields. To complete the operation click on one of the other tabs, such as the *Picture* tab. (NOTE: Passwords should be easy for you to remember, and difficult for other to guess. Strong passwords should be at least eight symbols, should contain non-alphanumeric symbols and should never, never be proper names nor words that could be found in a dictionary.)



Change your password and remember it.

7. Manipulating files

As mentioned previously, the menu bar across the top of the screen reflects the menu for the currently foreground application. The Finder is treated like any other application. You can always activate the Finder by clicking on a Finder window, clicking an unoccupied portion of the desktop, or clicking the blue face on the left end of the Dock. One Finder submenus is of particular importance, namely the *File* submenu, which includes the following options.

New Finder Window	⌘N
New Folder	⇧⌘N
Open	⌘O
Open With	▶
Close Window	⌘W
Get Info	⌘I
Duplicate	⌘D
Make Alias	⌘L
Show Original	⌘R
Add to Sidebar	⌘T
Create Archive of ...	
Move to Trash	⌘⇧⌘
Eject	⌘E
Burn Disk...	
Find	⌘F

Some of these menu options appear in black and some in light gray; the colors change, depending upon what you are doing. The light gray options are temporarily non-functional for the selected file or folder. For example, *New Folder* will create a new folder within the currently selected folder, and *Duplicate* causes the currently selected file or folder to be cloned. (This duplication is an especially useful feature that Windows users rarely use.)

You should also notice the shortcut keys (keystroke chords) that are indicated to the right of some of the menu options. Using these keystroke chords tends to be more efficient than selecting the option with a mouse. For example, selecting a file and typing ⌘D will cause a file to be cloned. (Note that on some keyboards the command key displays two symbols: ⌘ and ⌘, while on other keyboards this key has the word "Command" and the ⌘ symbol; this key behaves like a shift key, so it must be held down at the same time as the “D” key to achieve a ⌘D chord.)

Select your home directory in a Finder then create a new folder, and give this new folder the name *cs120* by typing the new name in place of "untitled". Changing file names requires that you highlight the name. If it's not already highlighted this is accomplished by two consecutive clicks on the word "untitled".

8. Creating/copying files/folders

Obviously, you will be creating many files during the semester. You will probably also want to organize these files into folders. A wise approach to this organization is to place the files for each programming project into a separate folder. For now the *cs120* folder you just created is a good place to save such program folders.

Files can generally be created using a *New* command under a *File* submenu of an application. However, it is usually more efficient to duplicate a file or a folder. Duplicates can be created either by using the *Duplicate* command (or associated ⌘D chord) from the *File* submenu or by dragging and dropping the appropriate icon.

Actually, if you drag and drop a file or folder within your personal folders, it generally is moved from one location to another using a second Finder window (created with the *New Finder Window* command). You can force a copy to be performed instead of a move by holding down the *option* key while dragging and dropping (a small plus sign near the cursor is a reminder that this is copying, instead of moving).

- + **to copy** ... hold down the *option* during drag & drop
- to move** ... just drag & drop

Warning: please don't copy files unnecessarily. In particular you should not copy or install shared applications, since this is a waste of disk space and makes it impossible to ensure that applications are properly upgraded. (Make an alias if you **MUST** have your own copy of shared applications. You can use the *Make Alias* command from the Finder File submenu to create an alias for any selected file.)

Run one of the two optional web browsers (Firefox or the Safari) by double-clicking the associated icon from the Dock. Now proceed to the class home page at the URL: <http://cs.uwlax.edu/~mallen/index.php/cs120.html>. From that page, select the "Assignments" tab up top, and click on one of the links to the course Moodle page (where you will be able to download and submit your assignments, as well as view your grades). The links will take you to the Moodle site, where you can register, as described on the "Assignments" page. (Short version: use your **full UWL email address** as a username, and your **EagleApps password** to log in.) On the Moodle, you will be able to sign up for the CS120 course using the course password and fill out your information. Once you've signed up for CS120, you can download the lab assignment zip-file at the link on Moodle. See the "Assignments" page for information about decompressing the file if necessary. Once your file is downloaded and unzipped (opened), you can move it to your *cs120* folder, inside your home directory. You can Trash the zip file if you like.

Similar to most modern Microsoft operating systems, to compress files/folders use a right-click (*ctrl*+click on an Apple) and select *compress* from the pop-up menu, and zip files are uncompressed with a double-click.

9. Running Terminal (Optional Section)

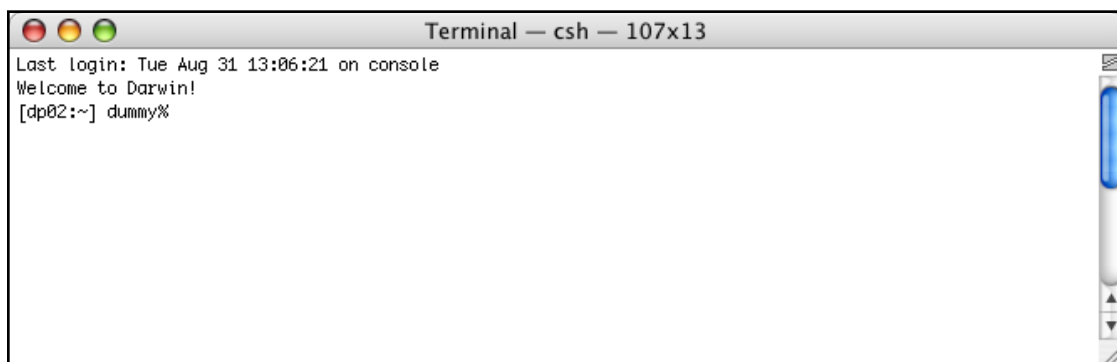
The folder you just copied contains a Java program. You will be writing such programs throughout this semester, but first let's see how to use another software tool that is the Unix alternative to the Finder.

The **Terminal** application is activated by clicking the icon representing this application on your Dock. (See the icon to the right.)



Click the Terminal icon to start executing this application.

Terminal will open a white window and replace Desktop application menu with the Terminal menu. The white window is a **UNIX shell**. Unix shells allow the user to interact with the operating system by typing commands. Unix shells are especially important tools for many computer scientists. Initially, your Unix shell window will look something like the window shown on the next page.



The % sign serves as a prompt from the shell to inform you that it is ready for you to type a shell command. A complete study of shell commands is beyond the scope of this course, but a few key commands are useful.

- ls** ... used to display a list of all file/folder names from the current directory
- cd** ... this changes the current directory (allowing you to move about the file system much like a file browser)
- cat** ... used to display the content of a text file
- javac** ... causes a program to be compiled
- java** ... used to executed a previously compiled Java program

(An important thing to keep in mind is the shells are sensitive to case. Commands don't work if you use a small letter in place of a capital, or vice versa. In addition you should also be certain to strike the *return* key at the end of each shell command.)

Type

```
cd ~
```

in order to set the current directory to become your home directory. (The tilde symbol, *~*, is UNIX short hand for your home Directory.) Type the following command to get a list of all files and folders in the current directory.

```
ls
```

Next type the following command to change the current directory to the cs120 folder that you created in Step 7.

```
cd cs120
```

The shell locates the cs120 directory because it is within the current directory. You could also have accomplished the same thing by typing `cd ~/cs120`

Next, type the following.

```
cd lab1
```

This last command sets the current directory to the lab1 folder that you copied from the archives. (If this fails, then return to Step 8 and repeat.)

(An even more efficient way to avoid all of the above `cd` commands is to type `cd` followed by a space, then drag and drop a `~/cs120/lab1` icon from the file browser onto the Terminal window. You must finish this command by striking the *return* key.)

Type the following.

```
ls
```

You should now see a list including the following files: *bluej.pkg*, *bluej.pkh*, *DrawingGizmo.class*, *Driver.java*.

10. Compiling a Java program from the command line (Optional Section)

The *Driver.java* program is in textual form (i.e., just the way it was created by the programmer. This textual form of a program is often referred to as **source code**. Note that by convention Java source code is stored in files named with a suffix of ".java" and these files have the same name as the class. In order to **run** (execute) the program it is first necessary to **compile** this file. A Java compiler translates the program from source code into a form known as **bytecode**. It is the bytecode form of the program that can be run to observe the program's behavior.

There are two ways to compile and execute programs:

- 1) using a command line (Terminal)
- 2) using an IDE like BlueJ

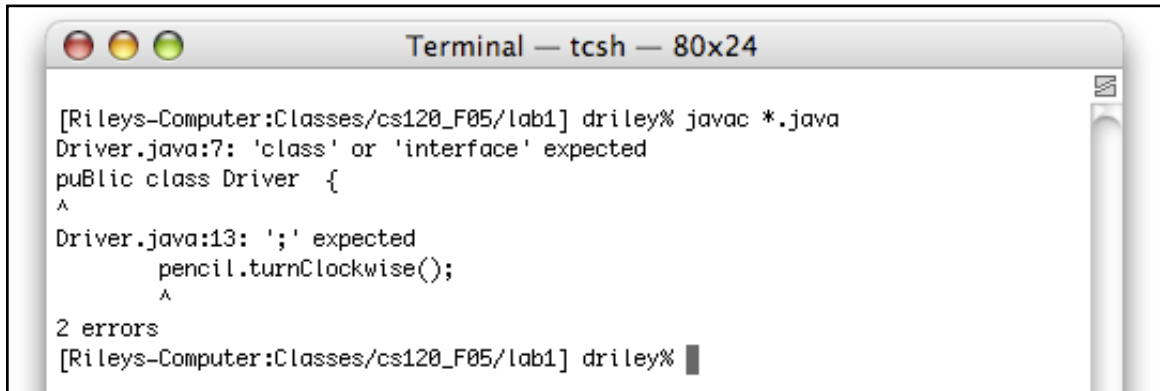
The rest of this section will detail how to perform this task from the Terminal command line. The first lab handout explains more about using the BlueJ IDE.

10.1 The command line approach to Java programming (Optional Section)

The command line approach requires that you type commands within a terminal, console. The commands to compile and run programs, respectively are *javac* and *java*. For example, typing the following command after the commands shown in Section 9 will attempt to compile the Java files in the lab1 folder.

```
javac *.java
```

Below is a copy of the resulting window.



```
Terminal — tcsh — 80x24

[Rileys-Computer:Classes/cs120_F05/lab1] driley% javac *.java
Driver.java:7: 'class' or 'interface' expected
public class Driver {
^
Driver.java:13: ';' expected
    pencil.turnClockwise();
    ^
2 errors
[Rileys-Computer:Classes/cs120_F05/lab1] driley%
```

The screen is demonstrating that the program contains syntax errors. If you follow the instructions in the first lab handout, you can fix those errors, and then running *javac* will in fact work properly.

11. Quitting an application

One way to quit the foreground process is to select the *application* submenu (this is the leftmost submenu from the menu bar) and the *Quit* command from this submenu. The other method is to strike the “Q” key while holding down the ⌘ key. When running a BlueJ program you may also need to quit your Java program that BlueJ is executing; this is done with the “Quit” command under the Java Run menu (or by using the ⌘Q key chord.)

Be certain that BlueJ is the foreground application and quit this application. (Note that the *Quit* command is under the *BlueJ* submenu for BlueJ.)

CAUTION: Earlier versions of BlueJ sometimes got “confused”. If you sense that BlueJ is misbehaving, it is best to quit and restart BlueJ.

12. Logging off

After you finish using the computer you must log off, lest you leave your account open to corruption by the next person to use this computer. When you log off the computer will be left in a state that is ready for the next person to log in. PLEASE DO NOT TURN THESE COMPUTERS OFF.

From the OS X (Desktop) menu select black apple in the far upper right of the screen and then select *Log Out*. You will need to confirm this command by clicking the *Log Out* button or striking the *return* key.

13. A word about the Internet and email

The Computer Science lab shares the campus network connection to the Internet. As noted earlier, both Firefox and Safari are available in the lab as web browsers for access to the Internet. You may also use them to access your regular campus email to send and/or receive email within the lab.

14. More than you wanted to know

For a much more complete description of OS X, please point your favorite Web browser at the following location. There are many tutorials on this page for exploring.

<http://www.apple.com/findouthow/mac/>