Because we will all be working off our own computers this semester, we would like to help you get your machine set up before the semester begins. We assume that you will be using a Mac or Windows machine or other operating system built on the unix platform. If you do not have access to one of these two operating systems, please contact an instructor, now, to make sure you can complete the work for this course on your machine.

Overview. We'll discuss installing and verifying the following aspects of your computer science “workflow”:

1. Getting access to a “terminal” or “shell”. In this course we will need to have access to a unix shell. On a Mac, you can access the shell through the Terminal application. On a Windows machine, you will use the Ubuntu application.

2. Your Computer Science “credentials”. Because the Computer Science department runs its own machines, you will be given a username and password to access our servers.

3. Python, Version 3. We will spend considerable time writing scripts in the Python programming language. It is important that the correct version of Python is installed before you attempt to do any programming.

4. The Git version control system. Git is a professional tool for keeping track of your work. It keeps track of the progress you make in developing your code, and it helps with the coordination of shared work. We will use git to securely store your work and to help us coordinate grading of assignments.

5. A programming editor. You are, no doubt, familiar with editors, like Microsoft Word or Google Docs. These tools are general-purpose editors that allow us to format human-readable documents. We will make use of a “text editor” that allows us to format Python-readable scripts. The choice of a text editor is entirely yours. We would like you to install one (or more!) text editors before you begin the semester.
Establishing access to a unix shell. Many of the commands we will use must be typed into a unix shell. We walk through the process of establishing that access.

Mac Users: On a Mac, the shell is accessed through the Terminal application.

1. Open the Applications folder and, within that folder, find and open the Utilities folder. You can access the Applications folder by going to Finder, clicking Go in the menu, and clicking on Applications.

2. Drag the Terminal application to your dock. This will allow you to access it easily.

3. Open the Terminal application and, at the prompt, type:

   whoami

   It should print the username you use on your personal computer.

4. Quit the Terminal application.

Windows Users: On Windows, if you have not already done so, you have to enable the Windows Subsystem for Linux (WSL) and install the Ubuntu operating system. Once that is installed, you should have access to all the features of unix, including the Ubuntu app, which provides a window into the unix side of your machine. This only needs to be installed once. (We assume you are running Windows 10. If you are not, you can upgrade (for free) before following these instructions.)

1. Turn on the Windows Subsystem for Linux.

   (a) Search for the Turn Windows features on or off in the search bar, at the lower-left corner of the screen. It will find this option in the Control Panel. Click to open.

   (b) Scroll down to Windows Subsystem for Linux and if not already checked, check the box. Press OK.

   (c) Restart your computer by pressing the button Restart Now.

2. Download the Ubuntu operating system from the Microsoft.

   (a) Start the Microsoft Store app, or go to microsoft.com in a browser.

   (b) In the search bar (upper-right) type: Ubuntu and hit return. You will have a choice of several versions; we suggest selecting Ubuntu 20.04 LTS. Click on the appropriate icon, taking you to the Ubuntu 20.04 App page.

   (c) Press Get, and download the App. (You may want to create a Microsoft account, or say "No, thanks.") Press Launch to begin the install.

   (d) During the installation process, you will be asked to create a “default Unix user account”. These are username/password credentials for accessing the Ubuntu part of the Windows operating system. Choose a username without spaces, and a secure password. It need not match your Windows account. We will refer to this identity as your “Ubuntu username and password”.

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3. Once installed, the Ubuntu app can be pinned to the Task Bar for easy access.

4. If you right click on the Ubuntu title bar, you can change the Properties. We suggest you check the box *Use Ctrl+Shift+C/V as Copy/Paste*. This will allow you to easily copy text between Windows and Ubuntu.

5. To exit the Ubuntu app, type either *exit* or *logout*.

If you have problems with these instructions, contact an instructor at cs134_staff@cs.williams.edu.
Establishing your CS credentials. Computer Science runs its own network of servers, with access limited to students with CS "credentials". These credentials will be sent to you via email, and you are expected to change your password by following the instructions in that email. Notice that your CS username is slightly different than your Williams username. It is an honor code violation to share your CS credentials with others.

In that same message, you will be given a two digit "anonymous id". All grading for CS134 is anonymous. We may ask you for your anonymous ID on written work; if you use the wrong ID, we cannot assign you credit or return your work. Please contact us if you forget your ID.

1. To verify your credentials, type the following into a shell:

   `ssh your-username@lohani.cs.williams.edu whoami`

   replacing your-username with your CS username.

   You may get the following message back:

   The authenticity of host 'lohani.cs.williams.edu' can't be established.
   RSA key fingerprint is ....
   Are you sure you want to continue connecting (yes/no/[fingerprint])?

   This is normal whenever you access a machine for the very first time. If this happens, type yes, and hit return/enter.

2. You will be asked for your CS password; provide it.

3. If the server prints your CS username, your CS credentials are working correctly.

   If you have trouble with establishing access, please email csaccounts@cs.williams.edu.
Installing Python, Version 3. We'll be using the Python programming language, version 3.

Mac Users: You must install python3.

1. Go to python.org. Under Downloads, download the suggested Python 3 version.
2. If you are asked to verify the download from a website, press Allow.
3. In your Downloads folder, open the .pkg file.
4. Agree to the terms of installation by pressing Continue several times, Agree, and Install. Provide your password, if necessary.
5. After the installation, a Python 3.8 window opens. It contains two useful scripts we suggest you run.
   (a) Click on Install Certificates.command. This will be helpful in establishing secure connections.
   (b) Click on Update Shell Profile.command. This will make sure this version of Python is the preferred version.
6. Close the Python 3.8 Window.
7. Close and reopen the Terminal window. (It's important you reopen the shell so it uses your new configuration.) Typing
   
   python3 --version
   
   should report the version of Python you installed.
8. Install a number of Python packages we will use. In the Terminal window, type:

   sudo pip3 install jupyter matplotlib

   This should take a couple of minutes. It may end with a suggestion to upgrade pip. Perform the upgrade, if you wish.

Windows Users. Comes with python3 installed, but it is worthwhile reinstalling.

1. Start the Ubuntu app. In the Ubuntu window, type:

   sudo apt update

   If you are asked for a password, provide your Ubuntu password. Will a few seconds to update the package databases.
2. Now type:

   sudo apt upgrade
If prompted if you want to continue, type Y to approve the upgrade downloads. This brings your Ubuntu software up-to-date. This may take a few minutes, and is worthwhile.

3. We can now install Python:

```
sudo apt install python3 python3-pip
```

Installing python3 may not be required, but it is safe to try. When asked whether to proceed, type yes. It may take a few minutes.

4. Once Python’s installer—pip3—is available, we can install particular Python packages. Type:

```
sudo pip3 install jupyter matplotlib
```

These are packages we use directly in our work. They do not take very long to install.

If you have problems with this installation process, contact an instructor at cs134_staff@cs.williams.edu.
Verifying the Git Version Control System. Git is an important tool for keeping track of changes you make to your software and for submitting your work.

Mac Users: Git is installed with the operating system. It may, however, identify a need to turn on various programming features on the Mac.

1. In the Terminal window type:

   `git --version`

2. If this responds with a dialog box with the message

   The "git" command requires the command line developer tools. Would you like to install the tools now?

   Choose to install the command line developer tools. These are important programming tools. Attach your machine to power, make sure it's connected to the network (internet), and press Install. Agree to the license agreement.

3. It will then download and install the appropriate software.

4. Repeating the

   `git --version`

   Should report a version of 2 or greater.

5. Tell git who you are. Replacing Joe Cool's name and email with your own, type:

   `git config --global user.email 'jc5@williams.edu'
   git config --global user.name 'Joe Cool'
   git config --global push.default simple
   git config --global core.editor nano
   git config --global http.sslbackend schannel`

Windows Users: Git should be installed with the Ubuntu app.

1. In the Ubuntu app type

   `git --version`

   This should report a version 2 or greater.

2. Tell git who you are. Replacing Joe Cool's name and email with your own, type:

   `git config --global user.email 'jc5@williams.edu'
   git config --global user.name 'Joe Cool'
   git config --global push.default simple
   git config --global core.editor nano`

If you have problems installing git, contact an instructor at cs134_staff@cs.williams.edu.
Install a Text Editor. Different Operating Systems provide OS-specific text editors, but we encourage you to consider popular cross-platform editors, such as Geany or Atom. Here's how they might be installed:

1. To install Atom, go to https://atom.io in a browser. This page will allow you to download the version of Atom for your particular operating system. Proceed with the installation, as you would with other applications. On a Mac: if necessary, drag the Atom app from the Downloads folder to the applications folder.

2. To install Geany, go to https://geany.org in a browser. This page will allow you to go to a page to download the version of Geany for your particular operating system. Proceed with the installation, as you would with other applications. On a Mac, drag the Geany app into the Applications folder. You may find it useful to add it to your dock.

On Windows machines, these applications run within Windows, and not the Ubuntu system. When you want to access files within the Ubuntu app's file system, you must navigate first to \wsl\ which will expand to Ubuntu 20.04. From there, you can access to your Ubuntu through the directory /home/user, where user is your Ubuntu username.

Other popular editors are specific to either the Mac or Windows. These emacs-style editors are worth considering:

1. Mac users: To install Acquamacs, go to https://aquamacs.org in a browser. This page will allow you to go to a page to download the version of windowing emacs for Macs. Proceed with the .dmg installation, as you would with other applications.

2. Windows users: To install emacs, open the Ubuntu app and type:

   ```
   sudo apt install emacs-nox
   ```

   To use this editor, you invoke the command

   ```
   emacs
   ```

   within the Ubuntu app window.

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