Computer Science CS134 (Spring 2021)
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Setting up your Computer

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 (Catalina or Big Sur) or Windows (Windows 10) machine. If you do not have access to one of these two operating systems, please contact an instructor (cs134_staff@cs.williams.edu), 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 programming "workflow":

1. What we are assuming. We describe our assumptions about your computer.

2. 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.

3. 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.

4. The Git version control system. Git is a professional tool for keeping track of your work. We will use git to securely store your work and to help us coordinate grading of assignments.

5. Python, Version 3. We will be writing scripts in the Python programming language. The correct version of Python must be installed before you do any programming.

6. A programming editor. You are, no doubt, familiar with general-purpose editors, like Microsoft Word or Google Docs, that allow us to format human-readable documents. We will make use of a “text editor” that allows us to format Python-readable scripts. We would like you to install one (or more!) text editors before you begin the semester.

What we are assuming. If you work off campus, you must the Cisco VPN installed (see oit.williams.edu). Remote users must turn on the VPN to download or turn in homework.

Mac users: We expect that you will be running MacOS 10.15 (“Catalina”) or MacOS 11 (“Big Sur”). We do not suggest Catalina users upgrade to Big Sur; there may be compatibility issues with the Williams VPN software (“Cisco AnyConnect”) if you are off campus.

Mac users will occasionally find it useful to know which type of processor they have. To determine this, click on the Apple icon in the upper-left corner of your screen and select About This Mac. In the dialog box that appears, look at the Processor or Chip line: if it mentions “Intel”, you have an Intel-based Mac. If it mentions “Apple M1”, you have Apple's new M1 processor. All Mac users should follow the Mac instructions, with those running M1 processors following additional instructions marked "M1-users."

Windows Users: We assume you are running some version of Windows 10. If not, you can upgrade (for free) before following these instructions. Our approach will be to install a Linux operating system within Windows. This works quite well, but please be patient with us if you have problems. We are not Windows users ourselves!
Establishing access to a unix shell. Many of the commands we will use must be typed into a unix shell. Below is the process of establishing that access.

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

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

   M1-users only: Click once on the Terminal application to select it. Then select Get Info from the Finder’s File menu. In the dialog box that appears make sure you check the box Open using Rosetta. Close the info dialog box and continue with the next step. The first time you open the Terminal application it will trigger an install of Apple’s “Rosetta” Intel-to-M1 translator. When that happens, proceed with the install.

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 computer.

4. Quit the Terminal application by pulling the Terminal menu down to Quit Terminal (or, press Command-Q).

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.

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 Store.

   (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. (If Microsoft asks you to create an account, you do not need one. Simply dismiss the window by pressing “No Thanks” or the X in the upper-right.) Press Launch to begin the install. It suggests this “May take several minutes.” If it seems to be taking a long time (5 or more minutes), press Enter to trigger the next step.

(d) 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 may be helpful to use a different name than your Windows account name. We will refer to this identity as your “Ubuntu username and password”. You can read more about this identity—and the Windows Subsystem for Linux, in general—at https://aka.ms/wslusers.

3. Once installed, we suggest you pin the Ubuntu app to the Taskbar for easy access: right-click on Ubuntu’s Taskbar icon and select “Pin to taskbar.”

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 (with the Subject Line “Williams Computer Science Account Information”), 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 (i.e. the Terminal application for Mac users, or the Ubuntu application for Windows users):

   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.
   ECDSA 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.
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. It may respond with a dialog box with the message

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

   These tools are important. Press Install, agree to the license agreement, and then press Done when the installation is finished. (It may take some time, so make sure your machine is attached to power.)

   **M1-users: If you are prompted to install Rosetta; please do so.**

3. Repeating the

   `git --version`

   This should report a version of 2 or greater.

4. 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
   ```

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.
Installing Python, Version 3. We'll be using the Python programming language, version 3.

Mac Users: You must install Python, version 3.

1. In a browser, go to python.org. Under Downloads, select Mac OS X. Download the highest numbered “universal2” installer under “Stable Releases.”

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 Mac password, if necessary.

   M1-users only: If you are asked to install Rosetta, please do that. Please make sure that you checked Open using Rosetta during the Terminal install. We believe that Rosetta is important to successfully installing Python. If you have problems, please contact one of us at cs134_staff@cs.williams.edu.

5. After the installation, a Python 3.9 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. When it is finished, dismiss the window.

   (b) Click on Update Shell Profile.command. This will make sure this version of Python is the preferred version. When it is finished, dismiss the window.

6. Close the Python 3.9 Window and the installer window. If it asks “Do you want to move Python installer to the Trash?” you may.

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. Upgrade the Python installer, pip3. In the Terminal window type:

   sudo -H pip3 install --upgrade pip

   On occasion, sudo will ask you for your Mac password. Please provide it. Whenever you install a package, if the last line is

   Successfully installed ... <the package you wanted>

   then the install was successful.
9. Install the various packages we will use throughout the semester:

    sudo -H pip3 install jupyter
    sudo -H pip3 install matplotlib
    sudo -H pip3 install turtle

    Each install will be relatively quick.

Windows Users. Ubuntu comes with python3 installed, but it is worthwhile getting the latest available version.

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

    sudo apt update

    If you are asked for a password, provide your Ubuntu password. It will take 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. Whenever you’re asked whether to proceed, type yes. It may take a few minutes.

4. Now install other supporting software:

    sudo apt install python3-pip python3-tk ghostscript gv

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

    sudo pip3 install jupyter
    sudo pip3 install matplotlib

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

6. Go to https://sourceforge.net/projects/vcxsrv/ and download the VcXsrv Windows X Server. Follow all the default installer instructions. In particular, you do want it to be downloaded on “normal” Windows (e.g. C:\Program Files\VcXsrv).
7. The installed VcXsrv is a Windows app. We need to change some settings. Go to the Search bar in the bottom left and type XLaunch and open the app. Click through until you get to the Extra Settings page and make sure to check the Disable access control box. If, after you press Finish, you get a warning from the Windows Defender Firewall, make sure you click both checkboxes (Private networks and Public networks), and then press Allow access.

If you have problems with this installation process, 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 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 Aquamacs, 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.