

Physics 302

Spring 2020

Getting Started

You find some of the following instructions either obvious or rather cryptic. If the latter, ask for help, either from your neighbor in class or from one of the instructors!

There are twelve terminals in the classroom for those who either do not have a laptop or do not choose to use their own laptop. We encourage you to use your own laptop if you have one – this frees up resources for those who need them and in the end is more convenient since you can then work from anywhere with an internet connection.

To begin, you will log in to nimoy.as.arizona.edu, the machine we will be using as a class. Your username is the same as your University of Arizona netid. To begin with, your password is your student ID number. This must be changed when first you log in.

If you are sitting at a terminal:

On the HP ThinPro computers in room 208, double-click on the “Nimoy Desktop” line in the chooser (*not* “Nimoy SSH”). When the Nimoy login screen appears, type in your username and password. Shortly, your desktop on Nimoy should appear. (If you also have a laptop, you may want to follow the instructions immediately below, later, to be able to connect to Nimoy from outside of the computer lab.)

If you are using your own laptop:

Open a browser and go to <http://wiki.x2go.org/doku.php/download:start>.

If you have a Microsoft Windows laptop, under “X2Go Client”, click on Download “mswin”. If you have a Mac laptop, click on “OS X 10.11 and higher DMG” or “macOS 10.13 and higher DMG” (as appropriate). Perform the default installation as instructed.

Next, fire up the X2Go client. Under “settings”, choose “New Session”. In the “Session preferences” window which appears,

- change the session name to something useful (like “Nimoy”)
- beside “Host” enter the fully-qualified domain name: nimoy.as.arizona.edu

- beside “Login” enter your username on Nimoy
- under “Session type” choose “XFCE”

Now click “OK”. There will now be a “Nimoy” window on the right side of the X2Go window. If you click on “800x600” you can choose a larger initial window size, e.g. 1280x1024. In any case, you should be able to resize the connection later.

Click on Nimoy in the white window; it will move to the left, and you can type in your password (initially your student ID). A new window will open, giving you a desktop on Nimoy. (You may see a window open complaining about “ssh” – you can ignore it.)

From now on, you can simply fire up X2go and repeat the login procedure, connecting from anywhere you have internet access.

(It is possible to set up an environment identical to that on Nimoy on your own computer so that you will not need an internet connection at all to work. If this interests you, please contact one of the instructors.)

Preliminaries

Open a terminal window (aka a “shell”) by clicking on the black icon at the bottom of the desktop or by right-clicking on the background and choosing “Open Terminal Here”.

The first thing to do is to change your password. Do this by typing: `passwd`

You will be asked for your current password (your student ID), and then asked to type in a new password. This must be more than 8 characters in length and not based upon a single dictionary word. Good passwords have mixed case, numerals, and punctuation, but the most important way to increase the security of a password is to make it long. A password like “Gauss was good at math!” is in fact much more secure than the seemingly more cryptic “W!ldKatz4EvR”. It is also much easier to remember.

Once this is done, there are a few things we must do to set up your account. First, make sure you are in your home directory (and not your Desktop directory) by typing `cd`

The directory `/home/cbender/astr302files_2020` will be used to distribute files for the class.

You can make your desktop more friendly by changing the Window Focus. Click **Applications – Settings – Window Manager – Focus – Focus follows mouse**

Now you do not need to click in a window before typing. Just move the mouse over it.

The Python Distribution

We have decided to have each of you install your own, custom installation of Python rather than using the one supplied with the system on Nimoy or your laptop. This way, you will always be able to have the same Python environment no matter what machine you may be using. We will be using the Anaconda Python distro for Linux, available at www.anaconda.com/download.

To avoid having everyone in the class trying to download the installation file at the same time, we have downloaded it and placed it in the `/home/cbender/astro302_2020` directory for you to copy.

Thus, start by copying the Anaconda Python3 installation file into your home directory:

```
cp /home/cbender/astro302files_2020/Anaconda3-2019.10-Linux-x86_64.sh.
```

and execute the file using the Bash shell:

```
bash Anaconda3-5.0.1-Linux-x86_64.sh
```

You will first be asked to review the license agreement. Hit “enter” and page down with the space bar until you are asked to approve. Type “yes” and hit “enter”. Next you will be asked for a location into which to install the distribution. I use the default (`/home/username/anaconda3`).

All of the Python packages we will be using will be installed into your account under the directory you specified. This will take quite some time to complete. When you are asked “Do you wish the installer to initialize Anaconda3 by running `conda init`?”, answer “yes”. This will add code to your `.bashrc` file which initializes Anaconda Python whenever you open a new terminal window.

Now close the terminal and open another (so that the new `.bashrc` takes effect). Type

```
conda --version
```

to check that the installation is really there – it should print “conda 4.7.2.”.

Next update the installation to the latest version by typing:

```
conda update conda
```

Answer “y” when asked if you wish to update, and wait for the update to finish. You now have a working Python distribution installed in your account.

ASTR302 Working Environment

Open a new terminal. The prompt should be prefaced by [base]. This indicates the 'environment' that you are running in.

Create a working directory for ASTR302:

```
mkdir ~/astr302
```

If you keep course files in this directory, you will be better organized and avoid substantial clutter later on.

You can establish multiple virtual environments, which allow you to create local installations of your python environment for specific purposes. If you do something undesirable in a virtual environment, you can delete it and start over, without having to reinstall conda.

To create a virtual python3 environment for use with ASTR302, type the following:

```
cd ~/astr302  
conda create -name py3
```

This creates a directory ~/astr302/py3, which contains a local copy of your python directory. You can modify the python environment in here without risk of damaging the base install.

To 'activate' your custom environment, type:

```
conda activate py3
```

The beginning of your terminal prompt should change from (base) to (py3).

UNIX Tutorial:

If you are not familiar with the unix terminal, and/or were confused by any of the earlier steps in this document, review the UNIX tutorial here:

<https://tutorials.ubuntu.com/tutorial/command-line-for-beginners>

The processes described in there should become second nature for you. You will use them in every 302 lab and at the telescope.

Python Jupyter Notebooks Tutorial:

If you are not familiar with python, you should work through the tutorials in `~cbender/astr302files_2020/python_notebooks/`. These are Jupyter Notebooks, which are a handy interactive way of tracking your work.

First, copy the files to your astr302 working directory:

```
cd ~/astr302/  
mkdir tutorials  
cd tutorials  
cp /home/cbender/astr302files_2020/python_notebooks/*.ipynb .
```

Then launch jupyter notebooks by typing:

```
jupyter notebook
```

This will launch jupyter notebooks in a local web browser. Select `var_string_num.ipynb`

Work your way through the notebook. Interactive code is indicated by this:

Example

```
message = "Hello Python world!"  
print(message)
```

You can modify the commands in the shaded box. To re-run the code, type CTRL-Enter

When you are done, click on the jupyter icon in the upper left. This will return you to the file-lister interface. Select the `lists_tuples.ipynb` notebook.

If you are unfamiliar with python, you should work through these tutorials before the next lab session.