COMP1711: Introduction to the Linux command line

The Unix operating system has been around since the 1970s, longer than many of it's users have been alive. It consists of many components and add-one programs that have been developed over the years, but one of the most important parts is the **Shell**.

The Shell is the command line interface that lets you type in commands to the Operating System and so control your computer.

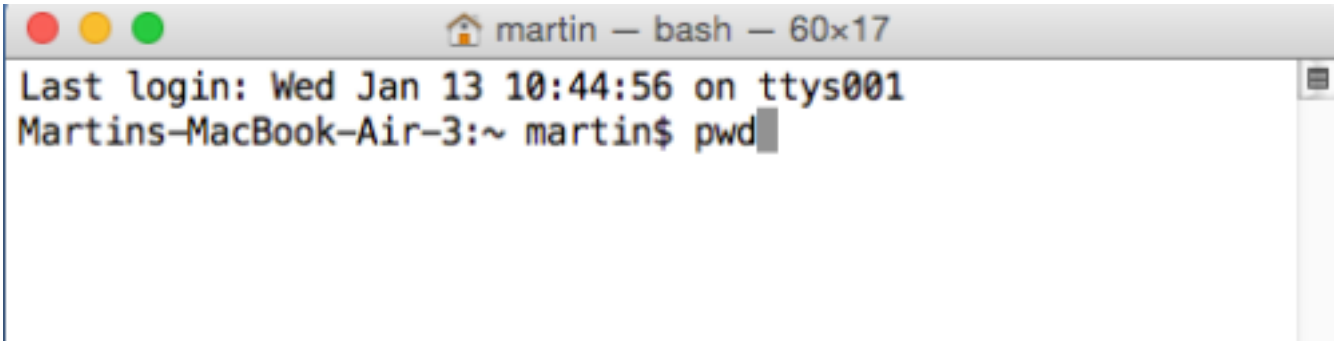

Figure 1: Shell image

This is a very different way of interacting with the computer than most people are used to, through a GUI (a Graphical User Interface) and with a mouse and keyboard.

There are some good reasons for learning about the shell though:

- Some programs only have a command line interface, particularly in areas like Bioinformatics and much of Mathematics and the Physical Sciences.
- The shell is much more powerful than a GUI. You can perform tasks much more quickly and rapidly automate common workflows.
- If you want to use HPC or Cloud (like Amazon Web Services or Azure) services for your computing, you'll need to use the Shell.

Although we talk about **the** Shell, most Linux and Unix systems give you a choice of which Shell program you use. In all these examples, we'll use the **BASH** (or **B**ourne **A**gain **SH**ell) shell, as it is the one most people use.

More information on the Shell

Many people find learning about the Shell a bit of a challenge. There is quite a lot to learn to become productive. Remember though that it is a **power tool** and a little time invested in learning the basics will pay you back many-fold later on.

Introduction to the Unix Command Line: Exercises

First, get hold of the sample data we will be using today. Type this in your command shell:

```
wget https://github.com/callaghanmt/shell-training/blob/master/shell.tar.gz
tar -zxvf shell.tar.gz
```

(**wget** (short for 'web get') is a command that will download a file from somewhere else on the Internet and tar is a really useful command that compresses and uncompresses files and directories)

This will navigate to your Home directory folder and then download and create a new folder (called shell-training) full of other folders and data.

Make sure you type in these three lines **exactly** as shown. If not, you will get an error message. Or possibly several error messages!

Exercise 0

Finding help (other than by Google…)

Unix-like operating systems come equipped with a built-in help system called **man** (short for manual) pages. Most commands or instructions have a man pages entry:

```
man ls
```

would give you the manual page for the ls command, for example.

If the manual page is longer than a screen in length, you'll see a continuation symbol : at the bottom left of the screen. Use [SPACE] to go to the next page of the q key to quit.

Exercise 1

Create the following directory tree in your home directory (~):

```
work
work/input_data/
work/results/
work/program/
```

Create the file `input.txt` with a text editor and put some text in it.

Move the file to work/input_data and rename it in the same command to `control01.txt`

Create this directory tree in one line only: `work/experiment/results/report`

Delete the **work** directory and all of its contents with one single command.

Exercise 2

Let's introduce two new commands:

- The `sort` command will sort lines alphabetically (or numerically…)
- You can use the `cut` command to split lines of text based on a given character e.g. cut -d ',' -f 2 will split lines around the comma and give you the second part

Combine cat, cut, and sort to print out the Latin names from **birds.txt** in alphabetical order

Save the output to a new file

Exercise 3

List all the animals on the Isle of Mann **alphabetically** and find the 50th item in that list

Exercise 4

shell-training/data/ contains 300 data files, each of which should contain 100 values. One of these files is missing some data though…

Use a series of commands connected by **pipes** to identify the file with missing data

hint wc -w will tell you the number of values in a file, sort -n will sort numerically

Exercise 5

Create a “Hello world”-like script using a text editor and **execute** it.

Redirect the output from your script to a file or another program.