MA50177: Working in Linux (Programming Class 1)

In this handout you will learn some basic commands you will need to work on the BUCS Linux machine LCPU. You can access this machine from the Windows machines in the BUCS PC lab or from any other PC on campus. The Linux environment is somewhat different from working in Windows as you did in MA50174. We use Linux for this course because (a) it is a standard environment for scientific computing; (b) much software is provided for Linux free of charge; (c) Under Linux, standard PCs may be linked together to form a single parallel computer.

You can find additional links and online information on the course homepage

`http://people.bath.ac.uk/masrs/ma50177/`

First Steps

- Start a Windows session in the BUCS PC Lab.
- Go to **Start** → **All Programs** → **Xming** and click on **LCPU**. This will start a window with the single line `-bash-3.2$`. This is a prompt to which you can type instructions. Type `xterm&` to the prompt and you will get another similar window (possibly different colour scheme). Its good to have a couple of windows open as you will want to do various things with them.
- To the Linux prompt you can type Linux commands, for example to copy files from other locations, to make a new directory (equivalent to "folder" in Windows), or to change the working directory. These replace some of the typical things you do by "pointing and clicking" in Windows. Linux also provides some "point and click" functionality but in this course we would like you to learn just a few commands which you will type to the command line.
- To a Linux prompt, type `mkdir␣ma50177`. This will make a directory called `ma50177`, where you can keep your work. Note that the *space* (marked with a ␣) in this statement is crucial. You will get an error if you leave it out.

  Then type `cd␣ma50177` to move into the directory `ma50177`, so that any files you copy or create will be left in there.
- Your lecturer (Rob Scheichl) has written some files which he wants you to copy to your own file space. For this week these are at the location

  `~masrs/ma50177/week1`

  In this address `~masrs` is Rob's home directory (on the BUCS Linux machines), while `ma50177` is a subdirectory of that and `week1` is a subdirectory of that, etc. The directories are arranged in a tree structure.
- There is more than one way to copy files and I'd like you to check that you can do at least one of them today:

Make sure you are in the newly created directory `ma50177` in your own home directory (use `pwd` to check and `cd` to change directory) and then type carefully

`cp␣-r␣~masrs/ma50177/week1␣.`

Note the full stop at the end. This means "recursively copy all of the files in Rob's `week1` directory over and put them in a directory called by the same name in the current working directory." The `-r` means recursively, so the contents of all subdirectories are copied too. The destination of the copy is your own MA50177 directory. Typing

Do this, then type

`ls`

to see what you have got. From now on spaces are not going to be marked explicitly as in `cd␣week1`

- Soon you will get used to Linux commands. A glossary is given below. The most important ones are

  `cd, cp, pwd, ls, mkdir, more`.

- Remember at the end of the session to exit from all your `xterm` windows by typing

  `exit`

  to the command line and then log off Windows at the very end. PLEASE DO NOT SHUT DOWN THE MACHINE AFTER YOU HAVE LOGGED OFF!

Glossary of Linux commands

Note that the *spaces* (marked with a ␣) in the statements of these commands are crucial. You will get errors if you leave them out.

Creating a file: Type `touch␣filename` to create the file `filename`. If this file already exists then the effect of the command will be to change the time when it was last updated to the present time. (You can also create a file using an editor such as the matlab editor.)

Copying a file: Use `cp` (see above).

Listing a file: Type `more␣hilb.f90` to list the contents of the file `hilb.f90` on the screen. You must be sitting in the directory in which `hilb.f90` is stored. If not you must type the full address of the file. e.g.
`more␣~masrs/ma50177/week1/hilb.f90`

Removing a file: Type `rm␣rubbish.m` to remove the file `rubbish.m`. (Make sure you get it right, as you will not get a chance to change your mind after removing it!)

Finding what directory you are in: Type `pwd` to find your current working directory.

Listing the contents of a directory: Type `ls` to get the names of all the files in the current directory. Type `ls␣-l` to get a listing of the files together with their read, write and execute permissions.

Creating a directory: Type `mkdir␣directoryname` to create a subdirectory of the current directory called `directoryname`.

Changing directory: Type `cd␣ma50177` to change to the directory `ma50177`. To change to directory `week1`, a subdirectory of `ma50177`, type `cd␣ma50177/week1`. By typing `cd` you can change back to your own home directory from any location.

Changing the permissions on a file or directory: Type `chmod␣u+x␣filename` to add execute (`x`) permission for the owner (`u`). Other versions of the same command can be constructed by replacing `u` by `g` (group) or `o` (others) or replacing `x` by `r` (read) or `w` (write). Change `+` to `-` to take away the permission rather than add it.