

# UNIX You Need to Know

## Basic Commands

There are hundreds of commands and applications available on the departmental computers. The following is a list of some of the basic and frequently used commands.

```
mkdir dirname           # Create directory called dirname
rmdir bigdir/subdir bigdir # Remove (empty) subdirectory bigdir/subdir and then bigdir
cd myjunk              # Make directory myjunk the current working directory
cd                          # Return to your home directory
cp file1 file2         # Make a copy of file1 into file2
rm file1 file2 file3   # Remove file1, file2, file3
mv oldname newname    # Rename file oldname to newname
mv file1 file2 dir1    # Move files file1 and file2 to directory dir1
ls dir1                # List files in directory dir1
ls -al                  # List files in current directory (long listing), including "hidden" files
ls -lrt                # List files in current directory, reverse sorted by date
man ls                  # Show the UNIX manual page for command ls
man -k compress        # Show list of available manpages including keyword compress
quota -v                # Show disk block consumption
```

System commands are stored in several directories scattered around the filesystem. You may explore more commands by looking in directories `/usr/bin` and `/usr/local/bin`. Try the following to see a partial listing of available commands:

```
cd /usr/bin; ls -C | more
```

## Password Maintenance and Etiquette

You may have been issued separate accounts on several computers: `huey.met.fsu.edu`, `metlab`, `atmos`. An account on `metlab` allows you to log onto any terminal in LOV307 (MetLab). You may change your password at any time by typing `passwd username` at a shell prompt while logged onto any machine. You will first be prompted for your current password, and then prompted for a new password twice. What you type is not echoed to the screen. This will only change the password for the machine on which you're logged in. When changing your `metlab` password, you will need to log onto one of the MetLab workstations and change your password from there, as well as changing your password on the server `metlab` itself. At present, there is no easy way to change your password on the mail server yourself; you will need to see one of the SysAdmins in LOV407 to have that password changed for you.

**Do not share your password with others.** Log off before leaving the room, even if only for a short time. **Do not enable lockscreen.** Should you find a terminal logged in and unattended, log the person out. **DO NOT** mess with the wayward user's files or send obnoxious e-mail messages: your own user privileges may be suspended. If you find a MetLab terminal in lock-screen mode, you may terminate the session by typing `CTRL-ALT-BACKSPACE` (hold down `CTRL` and `ALT` and then type `BACKSPACE`).

## The Shell and Metacharacters

UNIX has many features which can simplify file manipulation. For a start, you may want to keep homework for different classes in separate directories (*folders* in Windows parlance). You may create directories within directories to an arbitrary depth.

The shell is your command-line interface to the operating system. Most of the characters you type — letters and numbers — have no special meaning to the shell. However, some characters do have special

meanings, and these characters should not be used in filenames. UNIX is case-sensitive for command and filenames, i.e., `MyFile` and `myfile` are not the same. By convention and convenience, filenames are usually lower case.

Some metacharacters modify how commands work: `;` `|` `>` `&`. The semi-colon (`;`) acts as a command-line separator, allowing you to type sequential commands on the same line:

```
mkdir mydir; mv file1 file2 file3 mydir
```

which creates `mydir` and then moves files `file1`, `file2`, and `file3` into the directory. The vertical vergule `|` is the “pipe” character, routing the output of one command to the input of another:

```
ls -C | more
```

which runs the `ls` command with the column option, directing the output to the `more` command, which pauses output at every screenful. The `>` character redirects *stdout* to a file:

```
ps -ef | grep $USER > myprocs
```

which retrieves a list of running processes (`ps`), filters out those that belong to the current user ID (`grep $USER`), and sends the results to a file named `myprocs` in the current directory. The ampersand (`&`) runs the command in the background, returning a system prompt right away. You might use this to start a long-running command, such as a web browser, from the command line:

```
mozilla &
```

A command prompt is returned immediately, and the browser will (eventually) open on the screen. (On the MetLab workstations, you might run the browser `firefox` instead.)

Other metacharacters are used for creating patterns to match file names. The `*` matches a string of zero or more characters, while the `?` matches a single arbitrary character. The construction `[abc]` matches a single character `a`, `b`, or `c`. Ranges of characters may also be specified, as in `[a-d0-5]`. The construction `{str1,str2,...}` allows one to specify string alternatives. Some examples may help:

```
file*           # This will match any filename beginning with file
*word*         # This matches filenames containing word: word foreword swordfish
fn.*           # This will match files named fn with any extension
myfile??       # This matches files starting with myfile followed by any two characters
fn0[1-5a-d]    # Matches files named fn01 fn02 ... fn05 fn0a fn0b ... fn0d
fn{one,two,46}.dat # Matches files named fnone.dat fntwo.dat fn46.dat
fn.{tex,dvi,log} # Matches fn.tex, fn.dvi and fn.log
lab?0[1-5r]*.{pdf,tex} # Matches files labA01.pdf labx0r.tex lab-05redo.tex
```

You don't need to learn how to use metacharacters (so long as you learn to avoid them when creating filenames), but if you do, they can be a great time-saver as a shorthand for typing commands:

```
mv lab0[1-5].ps Met3502
```

which will move all files named `lab01.ps` `lab02.ps` ... `lab05.ps` to directory `Met3502`.

## UNIX File Permissions

Each file or directory in the UNIX filesystem has a series of attributes which are collectively called *permissions*. The permissions on a file determine whether a particular user may read, write, or execute (or search, in the case of directories) a file or directory. The `ls -l` command lists file permissions on every file and directory in the current directory. UNIX recognizes three levels of access to a file or directory (user [owner], group, other), and three kinds of access to each file (read, write, execute/search).

A typical `ls -l` listing might look like this:

```
drwxr-x---  1 bret  staff    512 Sep 20  2001 junk
-rwxr-xr-x  1 bret  staff   4312 Jan 25  2002 test
-rw-r--r--  1 bret  staff    73 Jan 25  2002 test.f
-rw-r--r--  1 root  other    93 May 31 10:48 test.ps
```

The `d` in the first position indicates that `junk` is a directory. The next set of three fields show the *user/owner* permissions, then *group* permissions, then *other* permissions. The owner is shown to be user `bret`, and the group is `staff`. According to the listing, only the user `bret` can write to directory `junk` (i.e., add or remove files). Other users in group `staff` may read or search the directory, and all other users have no access to `junk`'s contents. The file `test` is a plain file with execute permissions set, which allows anyone to run the program by typing the file name.

Changing file permissions is done through the `chmod` command. (This command has many flavors: see `man chmod` for more complete information.)

```
chmod o+rx junk      # For other users, turn on read and search permission for directory junk
chmod go-rx test     # For group and other, remove read and execute on file test
chmod u-w test.f     # For user (owner), disable write access to test.f
```

## Logging In and Moving Data

If you are logged on to a machine at home, across campus, around the world, or across the hall, the department prefers you use the Secure Shell program `ssh` to log in to departmental machines. A secure shell client may be downloaded for your home PC from the User Services website at <http://sl.us.fsu.edu>. You must have an FSU IP number in order to download this software. From off-campus, you may download one of the free options from <http://www.openssh.org/windows.html>.

From `metlab` (for example), you may log onto `huey` or any other `ssh`-enabled machine as follows:

```
metlab> ssh huey
```

You will be prompted for your `huey` password, and then you'll be logged in. You can move files between your `huey` and `metlab` accounts using `scp`, the secure copy command.

```
metlab> scp huey:a_file mydir/a_file_copy
```

You will be prompted for your `huey` password, and then the file `a_file` from your home directory on `huey` will be copied to directory `mydir` with a file name of `a_file_copy` on `metlab`. You can also go the other direction, e.g.,

```
metlab> scp mydir/a_file huey:a_file_copy
```

which copies `mydir/a_file` to `a_file_copy` under your home directory on `huey`. You can move multiple files at once using metacharacters. If the multiple files are on the remote host, be sure to "single-quote" the string:

```
metlab> scp 'huey:labdir/Lab[0-5].pdf' .
```

which copies `labdir/Lab0.pdf labdir/Lab1.pdf ...` from `huey` to the current directory on the current machine (`metlab`, in this case). Whole directories may be copied at once by using the `-r` (recurse) flag:

```
metlab> scp -r huey:hw_dir .
```

will copy the directory `hw_dir` and all its contents to the current directory on `metlab`.

## Mail and Spam

The department's main e-mail machine is called `mail`. Unlike other servers, you don't log into the machine directly. Instead, you connect to the mail server by protocols known as IMAP or POP3 (IMAP is preferred). If you are logged into one of the three main department servers, you may read your e-mail by running `pine`, a menu-based text-only e-mail client. You will be prompted for your password to log into the mail server. You may also read your e-mail by pointing a web browser at the following URL: <http://www.met.fsu.edu/webmail>. Undergrads are not issued e-mail accounts on the department server by default: instead, e-mail from the department is routed to your FSU e-mail account.

All incoming and outgoing e-mail is spam- and virus-filtered. If you suspect that you are missing messages, or if you're still receiving too much spam, you may tune the behavior of the filters by visiting Maia, the

e-mail guard dog, at the following URL: <http://www.met.fsu.edu/mailguard>. To log in, use your full e-mail address (not just your user ID) and e-mail password.

You will find more information on configuring e-mail clients and spam control under the “Computing” section of the department website.

## Editing Files

There are several text editors available on the system. Which one you use may depend on familiarity or application. On the `atmos` desktop, there is a basic text editor available from the control panel under the “note” icon. The MetLab workstations have an editor with MS-Word-like features under the *Applications/Office/OpenOffice Writer* menu. Editors available from the command line include

- `vi`
- `pico`, type CTRL-G for help
- `emacs`, type CTRL-H t for tutorial

## Printing

Departmental printers will only render PostScript files (typically, these are files with extensions `*.ps` or `*.eps`). Printing PostScript files is easy:

```
lp TheFile.ps
```

will send PostScript file `TheFile.ps` to the default printer. You may direct a file to a different printer using the `-d` option:

```
lp -d jet407 TheFile.ps
```

which sends the file to the laser printer in LOV407. Other options are `'jet307'` or `'jet364'`, which send files to printers in LOV307 or LOV364, respectively. (Option `'jet364'` is not available to the machines in MetLab.) Plain text files (such as program source code) should first be converted to PostScript before being printed:

```
a2ps myprogram.f90 | lp -d jet407
```

which converts `myprogram.f90` to PostScript and then forwards the file to the LOV407 printer in one step. Images need special attention before they can be printed. On the Sun's, use the `xv` command to convert `*.{jpg,gif}` images to PostScript for printing:

```
xv pretty.jpg
```

Once the `xv` window opens, right-click on the image window, and click “Print” from the menu. Change the print command from `lpr` to `lp`, select the `Grayscale` or `B/W` option, size and orient the image on the pop-up window, and click OK. On the MetLab terminals, use `gimp`, a Photoshop-like program, to print images. You may fire up `gimp` from a shell command line, or you may start it from the *Applications/Graphics/The Gimp* menu item.

Printer status can be determined by running `lpstat`, which will list the currently active jobs. Cancel a job using the job ID shown in the first column of `lpstat` output:

```
cancel jet307-16801
```

Should the printer appear to be misbehaving, press the “Cancel Job” button on the printer *after running the cancel command*.

## For More Information

<a href="http://www.met.fsu.edu/computing">www.met.fsu.edu/computing</a>	Basic info on services, data and rudimentary help
<a href="http://sl.us.fsu.edu">sl.us.fsu.edu</a>	Download Eudora and SSH here
<a href="http://www.us.fsu.edu">www.us.fsu.edu</a>	FSU User Services: info on FSU accounts and help

Send problems or questions to [support@met.fsu.edu](mailto:support@met.fsu.edu).

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