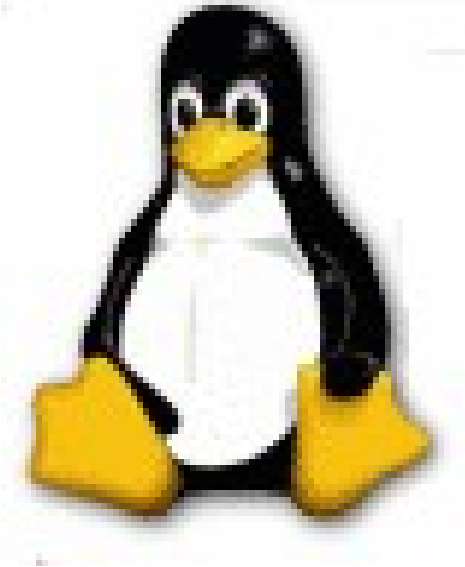
Massey University



Linux:
Getting Started

Andre Barczak
Chris Messom, updated 29/02/08
Martin Johnson updated 26/03/09

Massey University
Te Kunenga ki Purehuroa

Objectives

- This unit provides basic information about **Linux**
- After completing this unit, you should be able to:
  - Logon
  - Execute basic tasks
  - Describe the basic structure
  - Edit files
  - Manage the file system
  - Submit batch jobs

Contents

- 1 - Introduction.
- 2 - Login, work, logout.
- 3 - Structure: file system, process.
- 4 - Commands.
- 5 - Editors.
- 6 - Compile and run a program.
- 7 - Finding help.

1 - Introduction

Where to get more information...

- www.linux.org
- www.redhat.com

What is Linux?

- Open Source Operating System.
- Freely distributed
- Based on Unix
- Being developed by programmers all over the world.
- Very popular Unix brand

History

- 1991 - Linux is created as a hobby by Linus Torvalds, a student at University of Helsinki (Finland)
- 1992 - First public version
- 1993 - First prefabricated Linux distributions
- 1996 - Support for non-Intel processors
- 1999 - Linux 2.2 (sisters' cluster original system)
- 2001 - Linux 2.4 (helix & sisters'current version)
- 2003-2004 Linux 2.6…
- 2004-2008 Rocks cluster

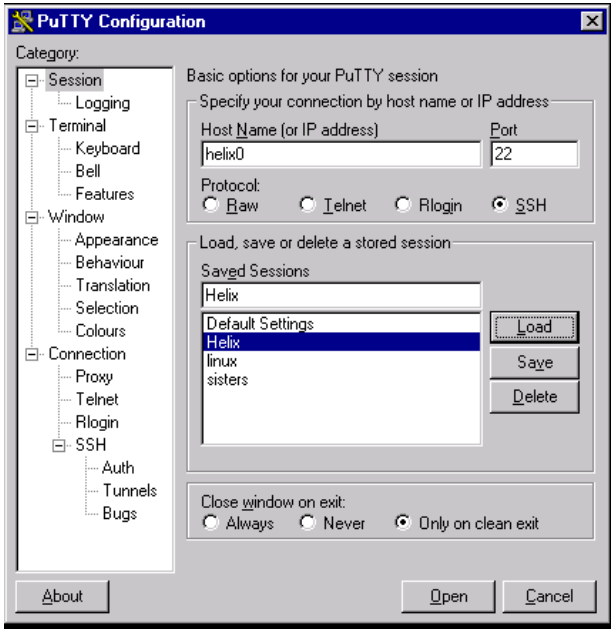
2 - Login, work, logout….

Logging onto iimscluster

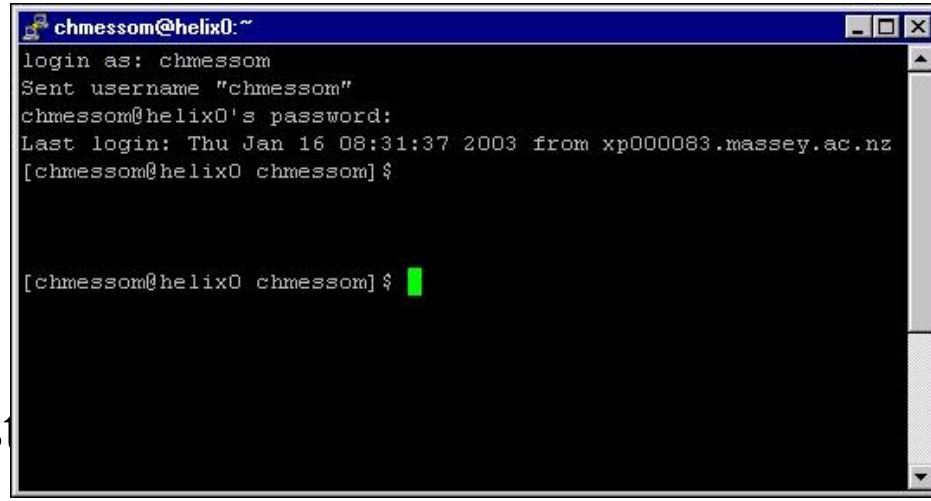
- Remotely login using a secure shell (ssh)
  - can start several sessions and also open up Xwindows as long as your terminal can accept connections
- Or
- Login using VNC
  - Start a remote VNC session
  - get a view of your desk top running on the stcluster

Login using ssh

- Get a copy of ssh
  - http://www.chiark.greenend.org.uk/~sgtatham/putty/download.html for windows
  - Linux
    - should already have a copy
  - Hostname iimscluster
  - ssh
  - open the connection and login



Logging in



- Login
  - Type in username
  - Type in password
  - start using the iimsclust
- To open up an xwindow
  - run xwin32 on your windows machine
  - Type `export DISPLAY=<machinenumber>:0`
    - in the ssh terminal, where <machinenumber> is your station number e.g. it001480
  - type `xterm &` to start a new terminal
    - or type `gnome-terminal &`

Logging in using VNC

- Start a VNC server on iimscluster
  - vncserver
  - Note the DISPLAYID
- Start a VNC viewer on your machine (google for vncviewer)
- you'll need to type in

  iimscluster : DISPLAYID

  this gives you a login dialog box

  type your password

  For Logging in to VNC from home see ssh tunneling

  http://freesco.no-ip.org/VNC/

Exiting VNC

- Close the VNC window
- Or log out

- Exiting ssh
- Logout from your ssh session

```
logout
```

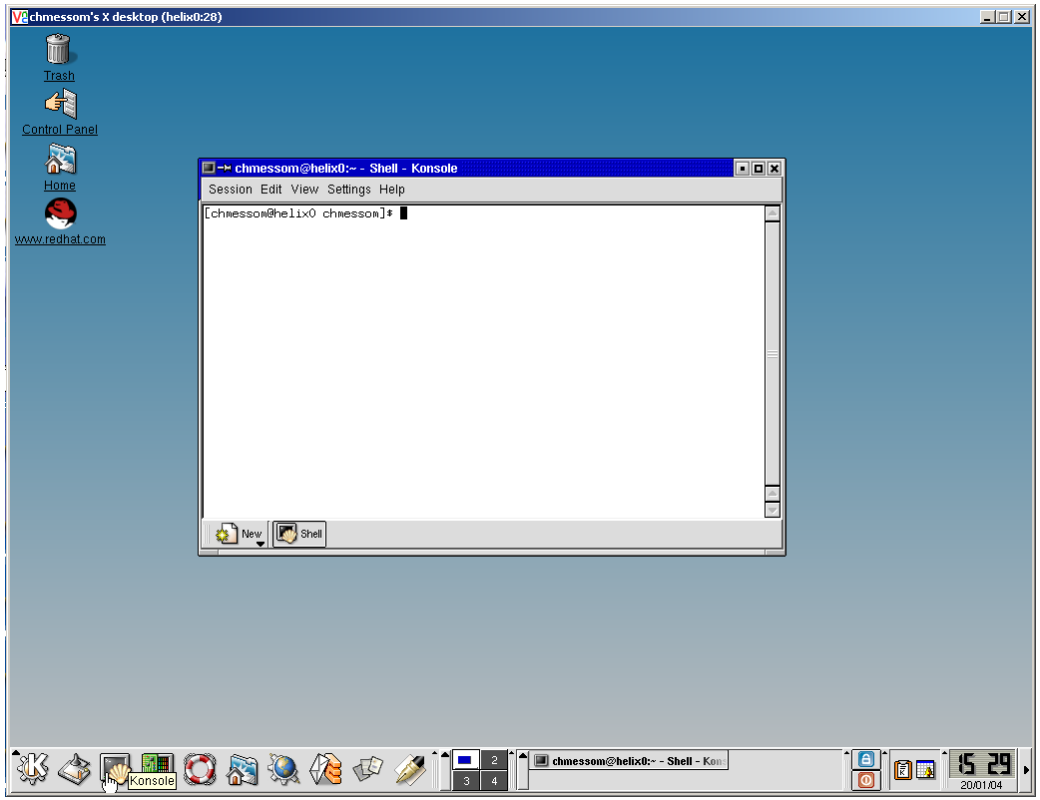
Or

```
exit
```

The desktop

- Several desktop environments available to Linux (Gnome and KDE among others).
- Xwindow compatible.
- Drag and drop capabilities.
- Easily customized.

Open a new console window...



Changing Passwords

- Use the passwd command

  `passwd`

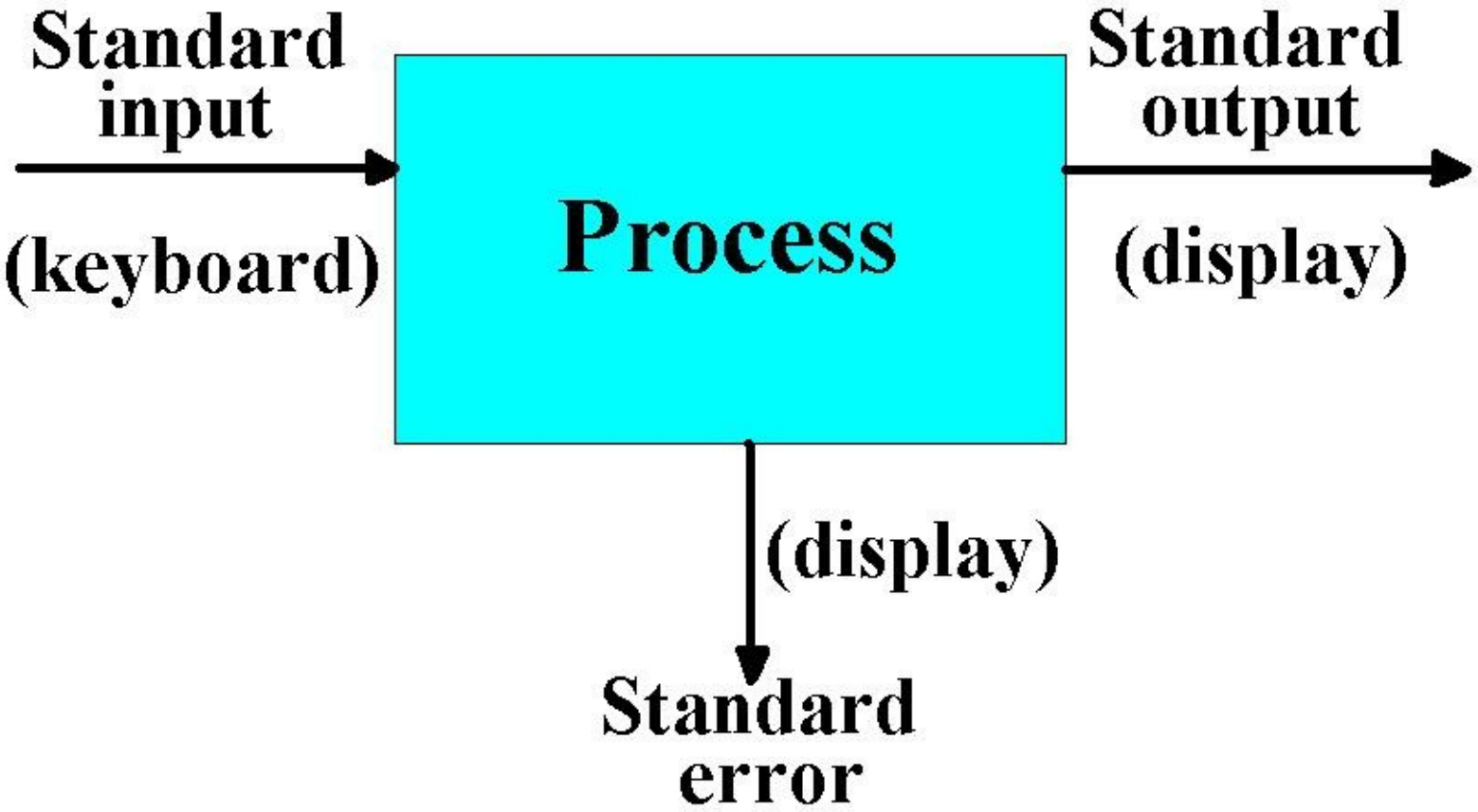
  – note you'll have to type your old password first

3 - Linux Structure

Shells

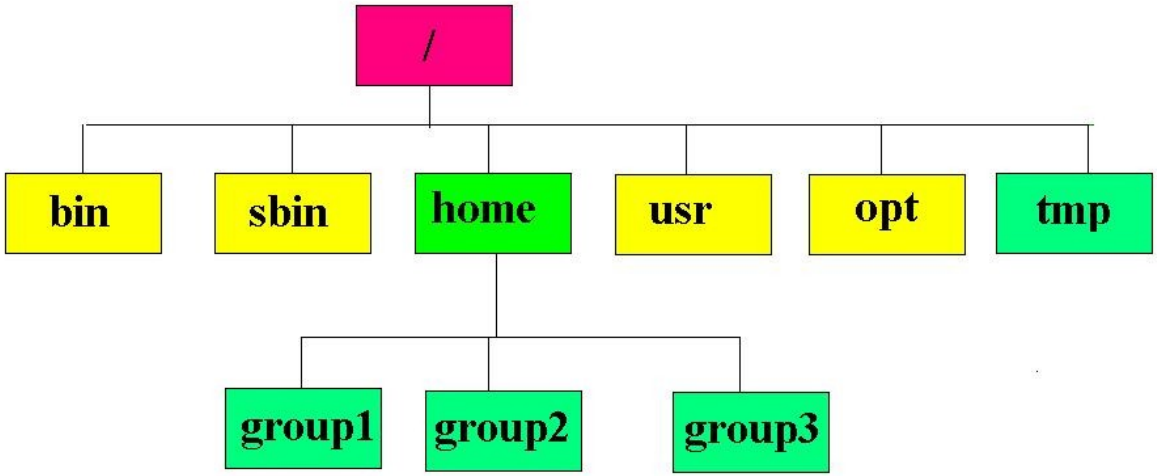
- Command Interpreters
  - Several ‘shells’ available: `ksh,csh, bsh...`
- Linux ==> `bash`
- Shell Scripts
  - collections of shell commands that can be run

standard input/output



The File system

- Notice the similarities with other OS.
  - But no concept of drives, everything goes from the root directory
  - Look for the cdrom or the floppy under /mnt
    - the cdrom & floppy directories will be empty until they have been



Permissions

- All directories are special files
  - The read/write/execute scheme is used
  - User (owner), group and others

```
[group1@it001484 group1]$ ls -la jo*
-rwxr--r--    1 group1   group1       529 Feb  1 09:05 job.pbs.old
-rwxr--r--    1 group1   group1       526 Feb  8 13:19 job1.pbs
-rw-------    1 group1   group1       382 Feb  1 10:32 job1.pbs.o462
-rw-------    1 group1   group1       382 Feb  1 10:34 job1.pbs.o463
-rw-------    1 group1   group1       382 Feb  1 10:37 job1.pbs.o464
-rw-------    1 group1   group1       382 Feb  1 15:33 job1.pbs.o470
-rw-------    1 group1   group1       382 Feb  1 16:10 job1.pbs.o472
-rw-------    1 group1   group1       382 Feb  8 13:06 job1.pbs.o610
-rw-------    1 group1   group1       424 Feb  8 14:17 job1.pbs.o670
-rw-------    1 group1   group1       424 Feb  8 14:17 job1.pbs.o671

jobdir:
total 8
drwxrwxr-x    2 group1   group1      4096 Feb 12 15:39 .
drwx------   15 group1   group1      4096 Feb 12 15:14 ..
```

4 - Commands

Command format

- *<command> <options> <arguments>*
- ***Examples:***

```
ls -la /home/group1
```

(this enables the user to see the file structure with dates etc, including hidden files, that is files that begin with a dot '.')

```
who
```

(it shows who is logged in the same machine)

```
ps -ef
```

(it shows what processes are running specifically for this session)

Command format

- Pipes and filters:
- Pipes makes the output of the command to become the input for the next command
  - Filters read from input and write to standard output
  - command | filter

Command format

- ***examples:***

```
ps -ef | grep group1
```

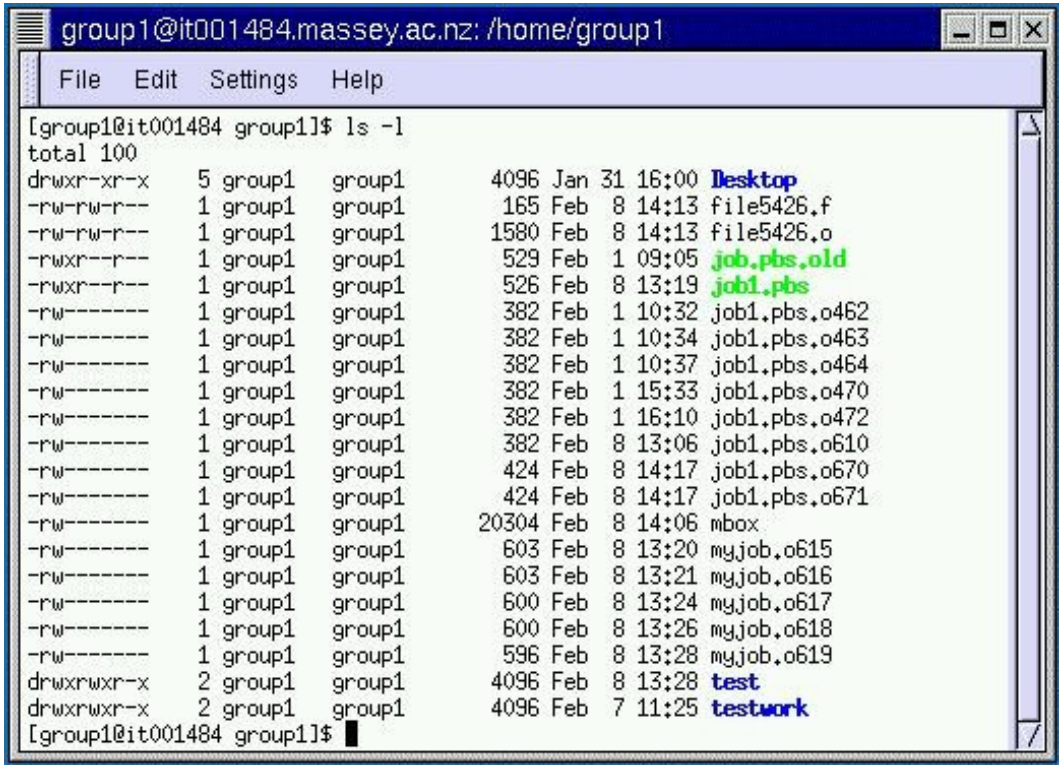
(this shows all processes related with userid group1)

```
ps -ef | grep group1 | wc -l
```

(this will count the number of processes related with group1)

Basic Command...

- List files: `ls -la`



Four important tips:

- 1 - Double <tab>
  - Get file or command names with a few characters
- 2 - Arrows
  - Retrieve commands using ⇑ or ⇓
- 3 - ctrl-C
  - stop programs at once
- 4 `kill -9 <pocessID>`
  - to kill processes,
  - use ps -e to find the process ID number

File commands

`ls -la`	shows all files
`mv` <name1> <name2>	to rename a file, **m**ove
`cp` <name1> <name2>	**co**p**y** a file or directory

File commands (cont.)

`rm` <name>	**rem**ove a file or dir
`rm -Rf <dir>`	remove directory and all contents
`touch` <name>	creates a zero size file or if already exists, updates the time stamp
`more`	shows the file
`less`	similar to `more`
`cat`	dumps the file to terminal

Directory commands

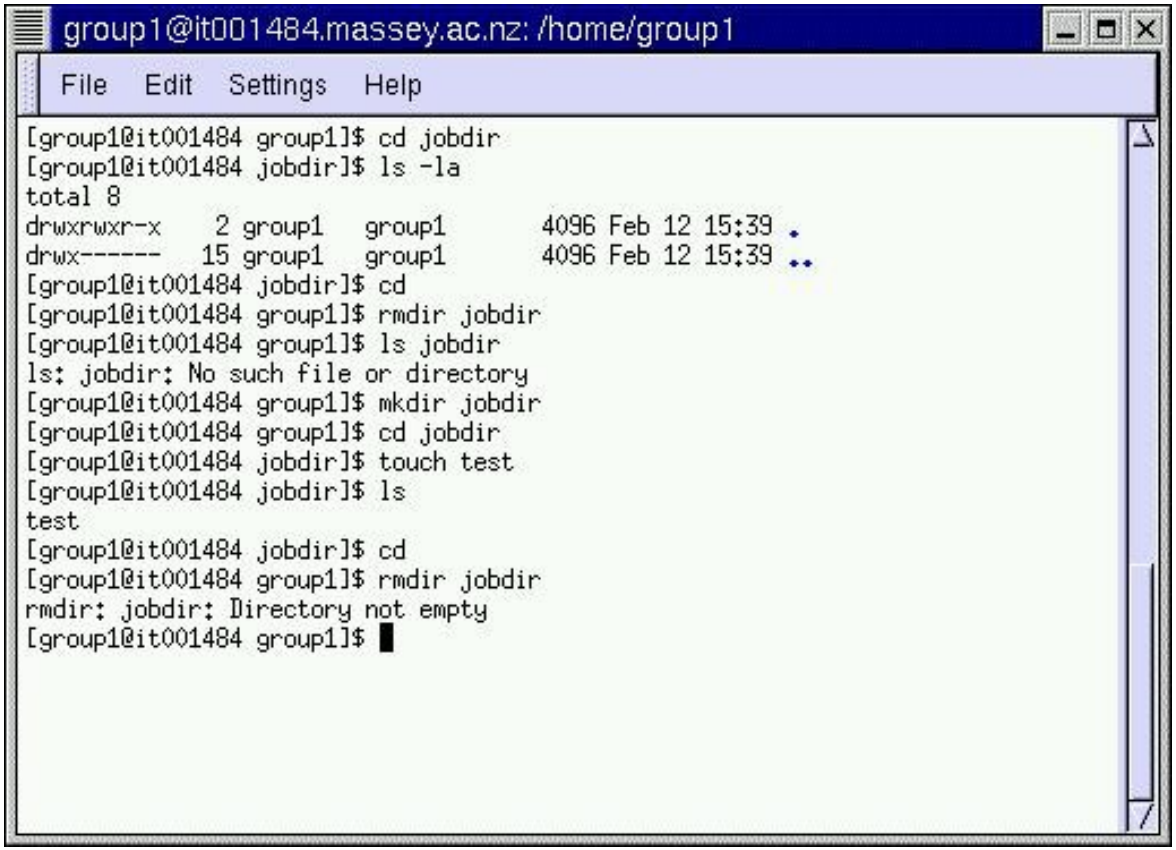
`cd` (**c**hange **d**irectory)

`mkdir` (**m**ake **dir**ectory)

`rmdir` (**rem**ove **dir**ectory)

`pwd` (which directory?)

cd, mkdir, rmdir



Changing Permissions

- Use chmod command to change the permissions on a file
  - remove write permission for others

    ```
    chmod o-w <file_name>
    ```
  - add read permission for user (owner) and group

    ```
    chmod ug+r <file_name>
    ```
  - make executable for all users

    ```
    chmod a+x <file_name>
    ```

Searching

- Finding files by name: ‘find’ command

```
find ~ -name "filename"
```

  - looks for the file under the home directory (~)

```
find ~ -name "*.zip"
```

- Finding Text in file

```
fgrep -R "myText" .
```

  - Looks for “myText” in all files and directories under the current directory (.)

Uploading and downloading files

- sftp is the recommended way to copy and retrieve files
  - linux users will already have a copy,windows users get psftp.exe
- run sftp or psftp
  - open a connection to the helix

    ```
    open helix0
    ```

  - type in your user name and password

Using sftp

- Get files

  ```
  get <file_name>
  ```

- Put files

  ```
  put <file_name>
  ```

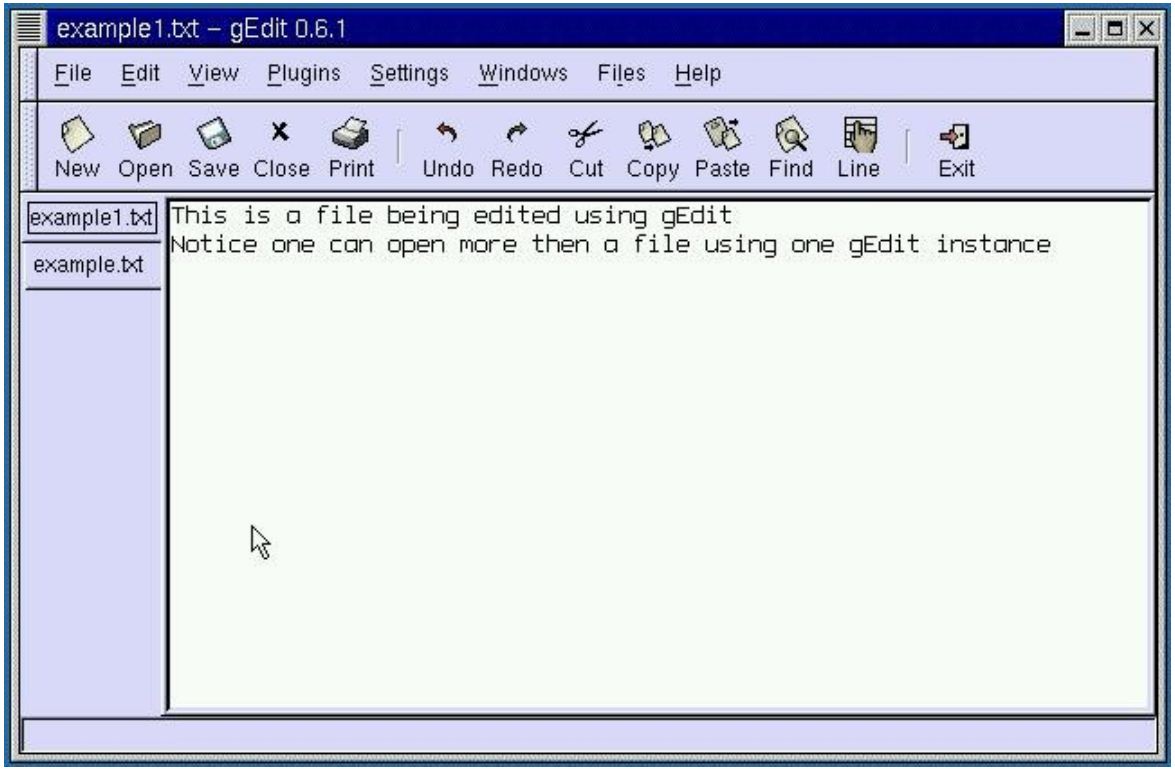
- getting and putting multiple files (not using psftp.exe)

  ```
  mget <file_name_start>*
  mput <file_name_start>*
  ```

5 - Editing files

Graphical Editors

- There are several editors available. gedit is an example:



Other editors….

- gxedit
- vim, gvim
- emacs
- joe
- jed
- pico, vi, etc…..

6 - How to compile and run a test program

Compile and run (C/C++)

`gcc <filename.c>`

- Creates a.out by default

- To run type `a.out`

`gcc <filename.c> -o <any-name>`

- Creates ‘any-name’ executable

- To run type that name

Problems Running

- If your program can't be found then the current directory (.) might not be part of your path.
  - Instead of just `<program-name>` type `./<program-name>`
- To see the current path

  echo $PATH
- To change path (add current directory)

  export PATH=$PATH:.

MPI C compiler

`mpicc <filename.c>`

- Creates a.out by default

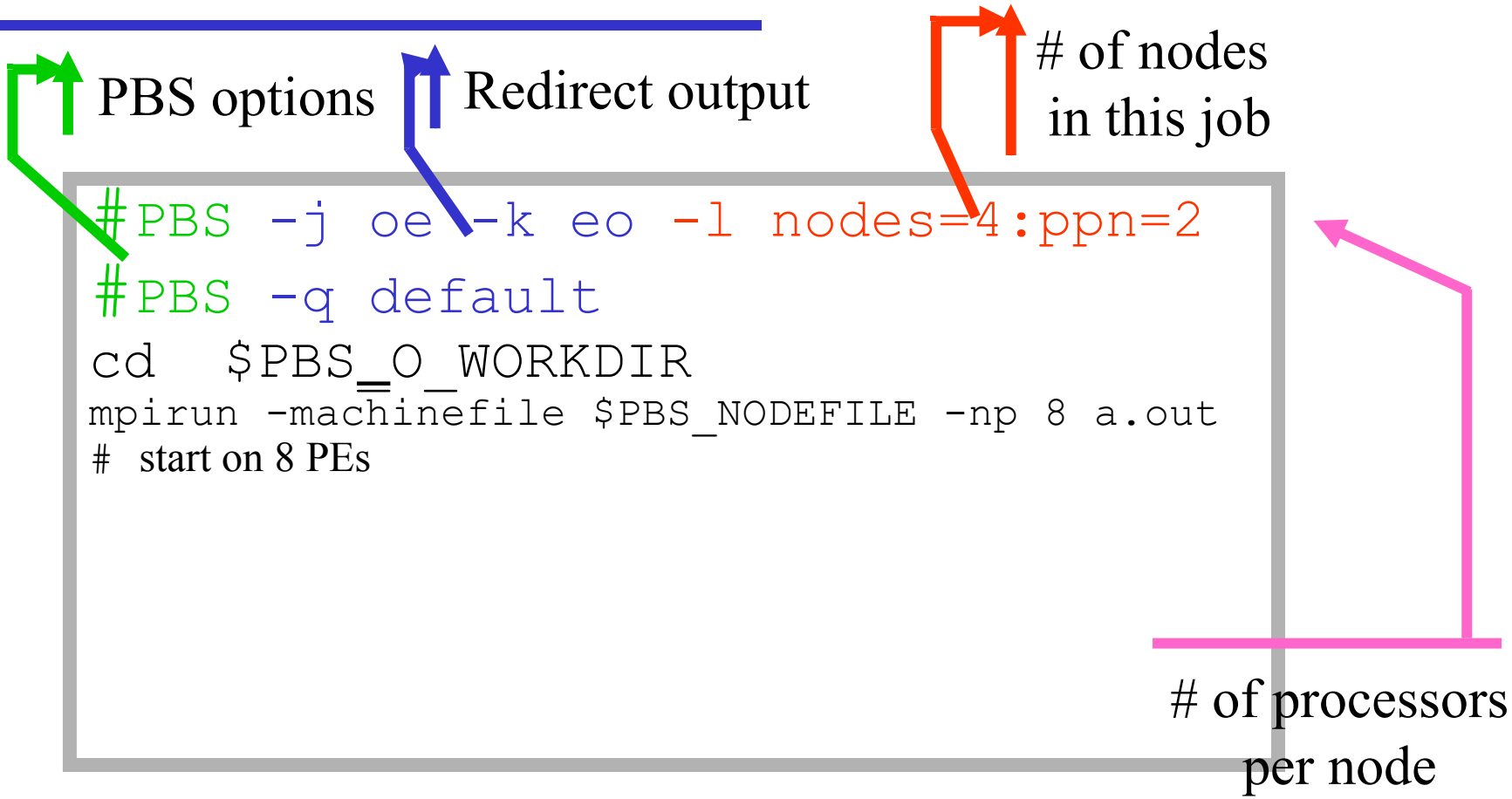
`mpicc <filename.c> -o <any-name>`

- Creates ‘any-name’ executable

- To run use mpiexec with the -n option, number of processors required

```
mpirun -np 2 any-name
```

Batch Processing (Scalable)



Monitoring the PBS queue

- Submit your PBS job file

```
qsub <pbs_jobfile>
```

- Use the qstat command to see the jobs in the queue

```
qstat
```

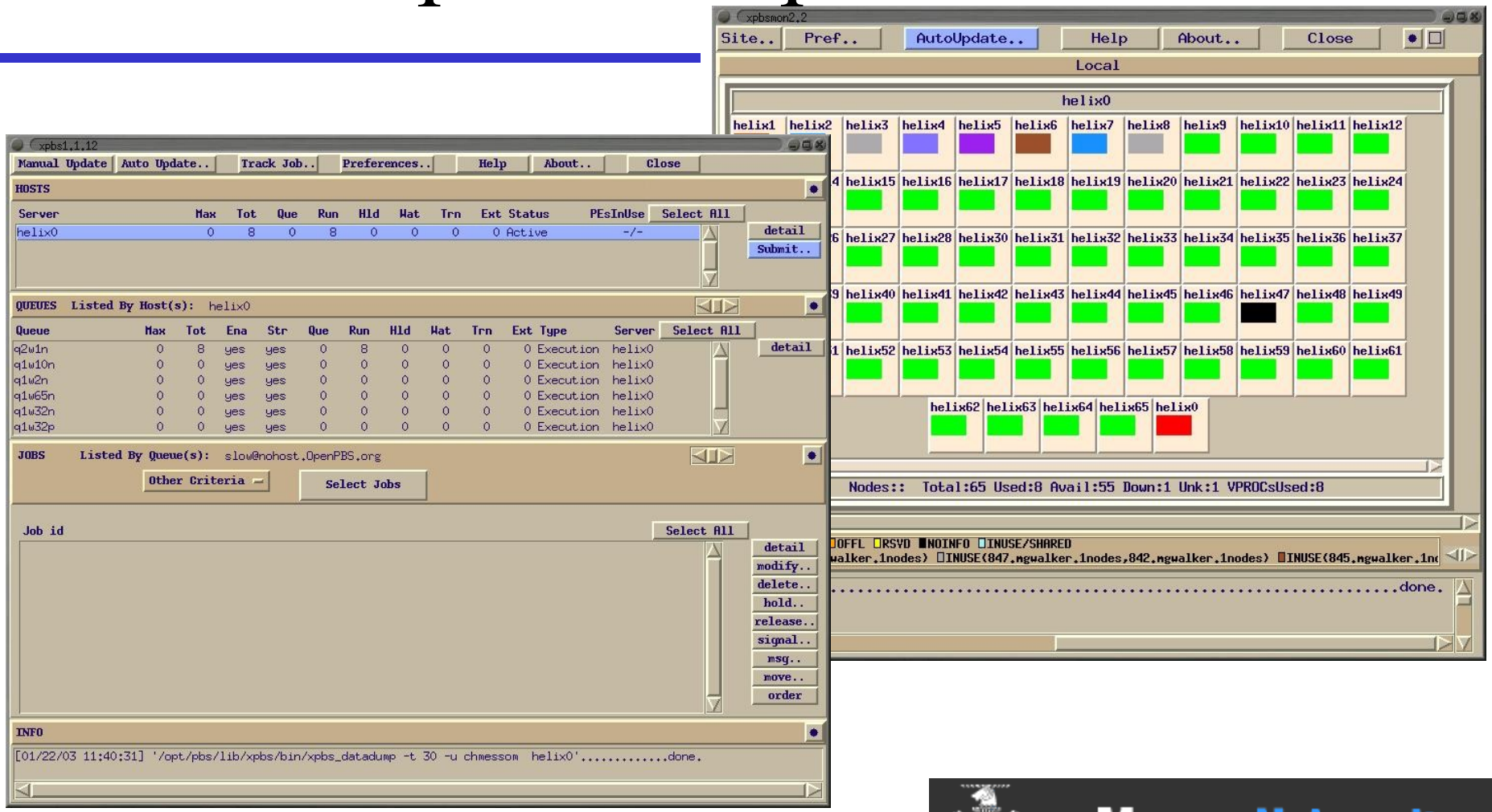
- Use the xpbs command to graphically monitor the queue

```
xpbs &
```

- Use xpbsmon to see the state of the cluster

```
xpbsmon &
```

xpbs and xpbsmon



7 - Finding help

‘man’ command

- ‘`man`’ stands for **manual**
- available in most Unix brands

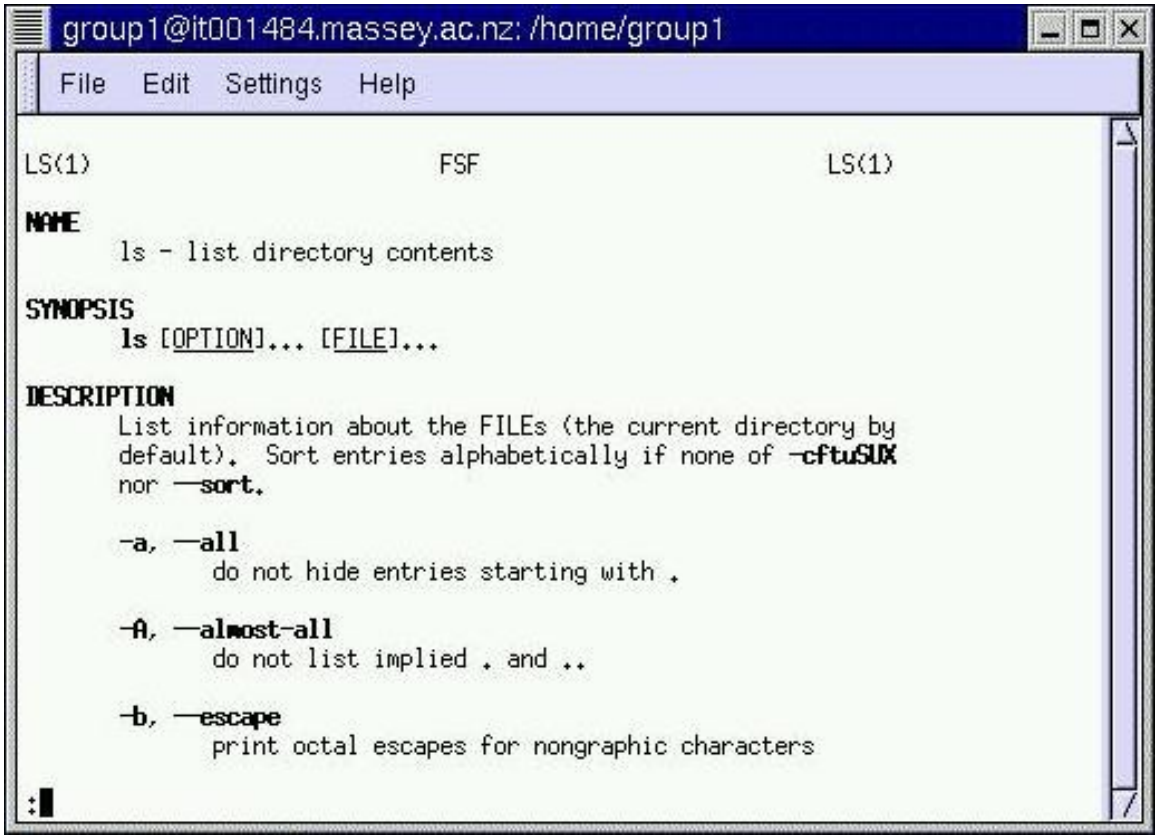
```
man <command>
```

‘man’ command

- To scroll forward and backward:
  - **press [**`space`**] or [**`page down`**] to forward**
  - **press ‘**`b`**’ or [**`page up`**] to backward**
  - **press ‘**`q`**’ to quit**

man example:

`man ls`



‘info’ command

- Slightly improved on ‘man’
  - hierarchical ‘menu’ based system
- type `info` for a tutorial on info
  - in tutorial type `C-h` means `<control>-h`
  - in tutorial type `M-x` means `<Alt>-X`

Inside Info System

- l Quit this help.
- q Quit Info altogether.
- h Invoke the Info tutorial.

– Selecting other nodes:

- n Move to the "next" node of this node.
- p Move to the "previous" node of this node.
- u Move "up" from this node.
- m Pick menu item specified by name.Picking a menu item causes another node to be selected.
- f Follow a cross reference.

Other Documentation

- Available in html, postscript and pdf formats
  - use `netscape` to view html
  - ghostview (`gv`) to view ps files
  - `xpdf` to view pdf files
- Compressed files
  - use `unzip <filename>` to unzip .zip files
  - use `tar xvf <filename>` to unzip .tar files
  - use `tar xvzf <filename>` to unzip tar.gz or .tgz files
  - use `gunzip <filename>` to unzip .gz or .Z files

Compressing Data

- Use tar to compress a directory

```
tar cvf <tar_filename> <directory>
```

- e.g.

```
tar cvf mywork.tar mywork
```

- To tar and gzip a directory

```
tar cvzf <tar.gz_filename> <directory>
```

Conclusions

- 1 - Introduction.
- 2 - Login, work, logout.
- 3 - Structure: file system, process.
- 4 - Commands.
- 5 - Editors.
- 6 - Compile and run a program.
- 7 - Finding help.