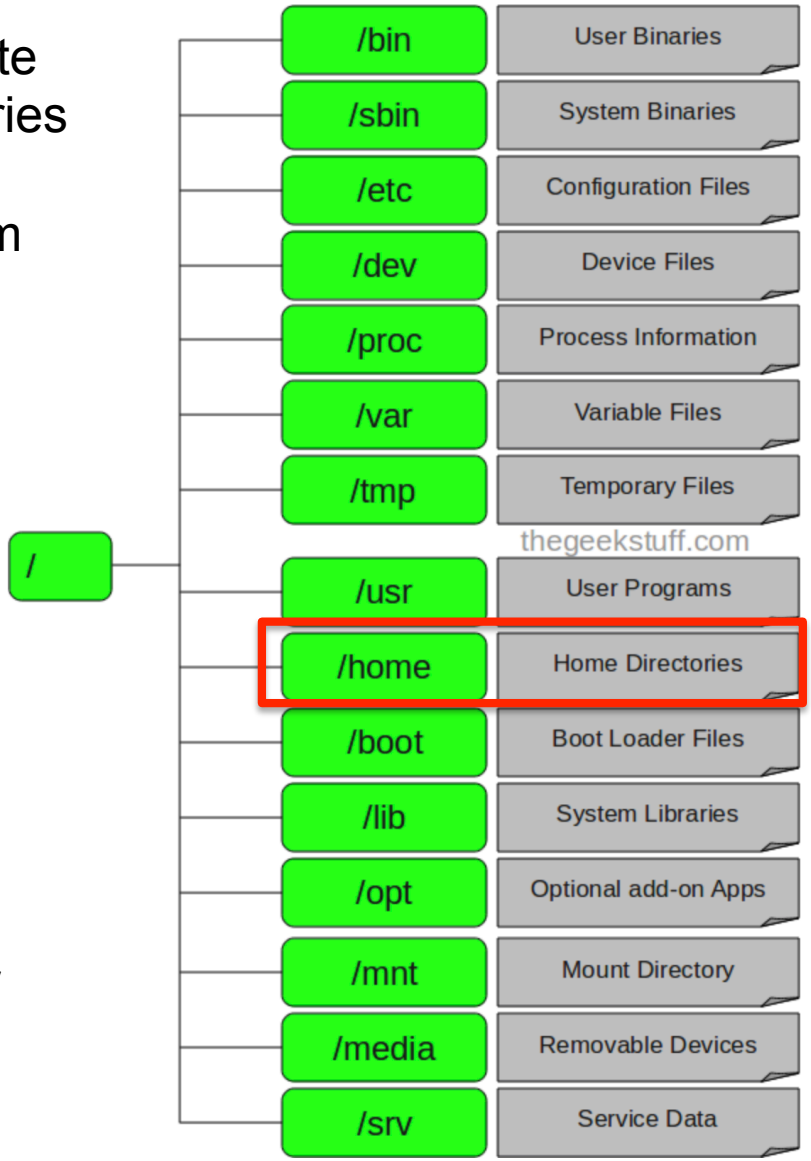
Linux Tutorial
A quick guide to the main commands

Outline

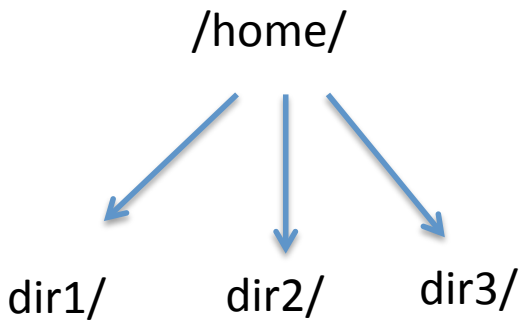
- General help + instructions
- Managing files and directories
- Searching files/pattern in a file
- Archiving and compressing files
- Information about the system
- Other useful commands
- Editors for text
- Remote connection

Directory tree

Main suggestion: create several working directories and separate raw/ reprocessed data from your own products



where you will work
(or in a similar directory)



structure like a tree

my home directory:
*list of files and directories produced with the command **ls –ltr***

```
/Users/chris/home> ls -ltr
total 8
drwxr-xr-x   17 chris  staff    578 Feb 20  2006 COORDINATES_CONV_CORR
drwxr-xr-x   15 chris  staff    510 Feb 20  2006 CATALOGS_MANAGE
drwxr-xr-x   13 chris  staff    442 Jun  6  2011 CROSS-CORRELATION
drwxr-xr-x    9 chris  staff    306 Dec 17  2013 ALMA
drwxr-xr-x    6 chris  staff    204 Apr 15  2014 pallette1
drwxr-xr-x   47 chris  staff   1598 Nov 10  2015 Herschel
drwx------   43 chris  staff   1462 Dec  1  2016 Dropbox
drwxr-xr-x    7 chris  staff    238 Aug 24 09:57 moons_etc_v1.3_linux
drwxr-xr-x   18 chris  staff    612 Aug 28 09:31 FOTO
drwxr-xr-x   38 chris  staff   1292 Nov 17 13:05 Didattica
drwxr-xr-x   29 chris  staff    986 Dec  5 15:07 Talks
drwxrwxr-x    7 chris  staff    238 Dec  5 15:11 SOFTW
drwxrwxr-x   25 chris  staff    850 Dec  5 15:12 QUICK_FILES
drwxr-xr-x   52 chris  staff   1768 Dec  5 15:37 papers
drwxr-x---   64 chris  staff   2176 Dec  5 15:40 PUBS
drwxr-xr-x   47 chris  staff   1598 Dec  5 16:24 works_in_progress
-rw-r--r--    1 chris  staff     74 Dec 14 15:52 unibo_address_mail_calvin
drwxr-xr-x   31 chris  staff   1054 Dec 15 18:27 DATA
drwxr-xr-x   14 chris  staff    476 Dec 15 18:43 HOBBES_VARIE
drwxr-xr-x   30 chris  staff   1020 Dec 15 23:04 LESSONS
drwxr-xr-x   46 chris  staff   1564 Dec 16 00:41 SPITZER
drwxr-xr-x   62 chris  staff   2108 Dec 16 00:51 Travels
drwxr-xr-x   18 chris  staff    612 Dec 16 00:53 REFEREE
drwxr-xr-x   62 chris  staff   2108 Dec 16 02:07 XXL
drwxr-xr-x   49 chris  staff   1666 Dec 16 02:07 topcat_files
drwxr-xr-x  149 chris  staff   5066 Dec 16 02:07 Varie
drwxr-xr-x    6 chris  staff    204 Dec 16 02:07 XSPEC_CODES
drwxr-xr-x   14 chris  staff    476 Dec 16 02:08 NuSTAR
drwxr-xr-x   35 chris  staff   1190 Dec 16 08:46 CASA
drwxr-xr-x  203 chris  staff   6902 Dec 18 12:42 nellie
drwxr-xr-x   24 chris  staff    816 Dec 18 13:00 INSTRUMENTS
drwxr-xr-x  146 chris  staff   4964 Dec 18 13:03 utils
drwxr-xr-x   41 chris  staff   1394 Dec 18 13:05 PROJECTS
drwxr-xr-x   10 chris  staff    340 Dec 18 13:17 pallette2
```

Help/instructions about a command

- To get help/info about a command:

man [command]

Example: man *ls*

```
LS(1)                    BSD General Commands Manual                    LS(1)

NAME
     ls -- list directory contents

SYNOPSIS
     ls [-ABCFGHLOPRSTUW@abcdefghiklmnopqrstuwx1] [file ...]

DESCRIPTION
     For each operand that names a file of a type other than directory, ls displays its name as well as any requested, associated information.  For each operand
     that names a file of type directory, ls displays the names of files contained within that directory, as well as any requested, associated information.

     If no operands are given, the contents of the current directory are displayed.  If more than one operand is given, non-directory operands are displayed first;
     directory and non-directory operands are sorted separately and in lexicographical order.

     The following options are available:

     -@      Display extended attribute keys and sizes in long (-l) output.

     -1      (The numeric digit ``one''.)  Force output to be one entry per line.  This is the default when output is not to a terminal.

     -A      List all entries except for . and ..  Always set for the super-user.

     -a      Include directory entries whose names begin with a dot (.).

     -B      Force printing of non-printable characters (as defined by ctype(3) and current locale settings) in file names as \xxx, where xxx is the numeric value
             of the character in octal.

     -b      As -B, but use C escape codes whenever possible.

     -C      Force multi-column output; this is the default when output is to a terminal.
```

Managing files/directories. I.

- **pwd**

shows the directory where you are working

- **ls**

lists the content of a directory

Example: ls –ltr *(the most recent ones at the end)*, ls –a *(for 'invisible' files)*

- **cd**

used to move among directories

Example: cd .. *(one directory up);* cd *(to go to the home directory)*

cd /Users/chris/home *(moves following an absolute path)*

- **mkdir**

creates a directory

Example: mkdir data/

mkdir ~/data *(creates a directory /data)*

Managing files/directories. II.

- **cp**

makes a copy of a file (in another file, in another directory) and of a directory

Example: cp readme.txt save.dat

cp readme.txt data/

cp –r data/ new_data *(copies an entire dir)*

- **mv**

mv files/directories, rename files/dirs (does not make a copy)

Example: mv readme.txt data.txt

- **rm**

removes files and dirs

Example: rm readme.txt

rm –r data/ *(removes the entire directory)*

rm –i readme.txt *(asks confirmation before deleting)*

Managing files/directories. III.

- **ln**

makes a symbolic link (which does not "contain" data, but refers to a file/directory). It avoids copying the same files in many locations

Example: ln –s /path_file/linked_file /path_link/link_name

existing file "new" file

- **rmdir**

removes a directory (if no file is inside it)

Example: rmdir data/

- **chmod**

Changes the privileges of files

Example: chmod u+x file1 *(the file can be executed by the owner)*

Meaning: u: owner; g: group; o: others; x: execution; w: writing; r: reading

Use 'man chmod' to know how to use it properly

Searching files/pattern in a file

- **find**

finds a file among directories

Example: find . –name “readme.txt” –ls *(searches for the file redme.txt in all subdirectories; multiple entries if the file is present multiple times in the working directories)*

- **grep [options]**

searches a given pattern in a file (set of files)

Example: grep ’AGN’ readme.txt *(selects lines from the file where the word AGN is present)*

Example: cat readme.txt | grep AGN *(alternative way to do the same)*

Archiving and compressing files

- **tar**

makes an archive of a given list of files/directories, etc.

Example: tar cvf archive.tar * *(prepares an archival file with all the content of a given directory (*); c: creates; v: verbose; f: with filename)*

tar cvf myarchive.tar xmm* *(prepares an archival file with all the files whose name starts with 'xmm')*

Example: tar xvf archive.tar *(the opposite: x: extracts from an archive)*

- **gzip/gunzip**

compresses/de-compresses files

Example: gzip spectrum.pi *(compresses the file, which becomes spectrum.pi.gz)*

Example: gzip –d spectrum.pi.gz *(de-compresses the file)*

See also bzip2/bunzip2 (files in format .bz2), zip/unzip, etc.

Getting information about the system. I.

- **du**

provides a visualization of the space occupied by a file/directory
Example: du –ms * *(lists the content in Mbyte, m, of the current directory)*

- **df**

provides a visualization of the space remained in the partitions of the disc
Example: df –h *(lists in Gbyte)*

- **uname**

provides information about the system
Example: uname –a (all the information on the system, including the computer type, the node name, the kernel, the operating system…)

- **whomi**

shows the name of the connected user

Getting information about the system. II.

- **echo $SHELL**

provides the name of the shell you are using (e.g., tcsh, bash, etc.)

Other useful commands. I.

- **ps**

shows the active processes

- **top**

shows all of the active processes interactively with their pid

- **kill [pid]**

kills the process with id pid

- **cat [namefile]**

shows the content of a file
Example: cat readme.txt

- **less [namefile]**

shows the content of a file and allows to move through it
Example: less readme.txt

Other useful commands. II.

- **more**

shows the content of a file/directory with one screen at a time
Example: more readme.txt
ls | more *(lists the files in the directory)*

- **tail [file]**

shows the last ten lines of a file
Example: tail –f readme.txt *(shows the content of a file while it is being updated – e.g., the log file produced by the installation of a program – starting from the last 10 rows)*

- **head [file]**

shows the first ten lines of a file

- **clear**

clears the current screen

Other useful commands. III.

- **Ctrl+C**

interrupts the current process

- **Ctrl+Z**

stops the current process. To keep on, use **fg** (foreground) and **bg** (background)

- **history [number]**

lists the last N=number commands.
Example: !number *(to run the command = number again)*

Text editors

- **emacs/xemacs/vi/gedit**

allows you to write into files

Example: emacs readme.txt *(&: the terminal can be used while you are still editing the file)*

CTRL+X S: saves the file
CTRL+X C: quits

IT IS IMPORTANT TO SAVE INTO A TEXT FILE ALL THE NOTES REGARDING THE COMMANDS YOU HAVE RUN AND THE PROCEDURE YOU HAVE USED

COMMAND-LINE INSTRUCTIONS ARE VERY USEFUL ALSO FOR CUT&PASTE

Remote connection

- **ssh/sftp**

connects your laptop to a remote computer

Example: ssh –X chris @137.204.68.17 *(connects to the machine identified by the number 137.204.68.16; 'chris' is the name of the user on the remote machine; 'X': allows you to open graphical windows)*

Example: sftp chris @137.204.68.17 *(connets and allows the user to put and retrieve files using 'put' and 'get', respectively)*