Introduction to GWAS

Basic Linux and the Shell

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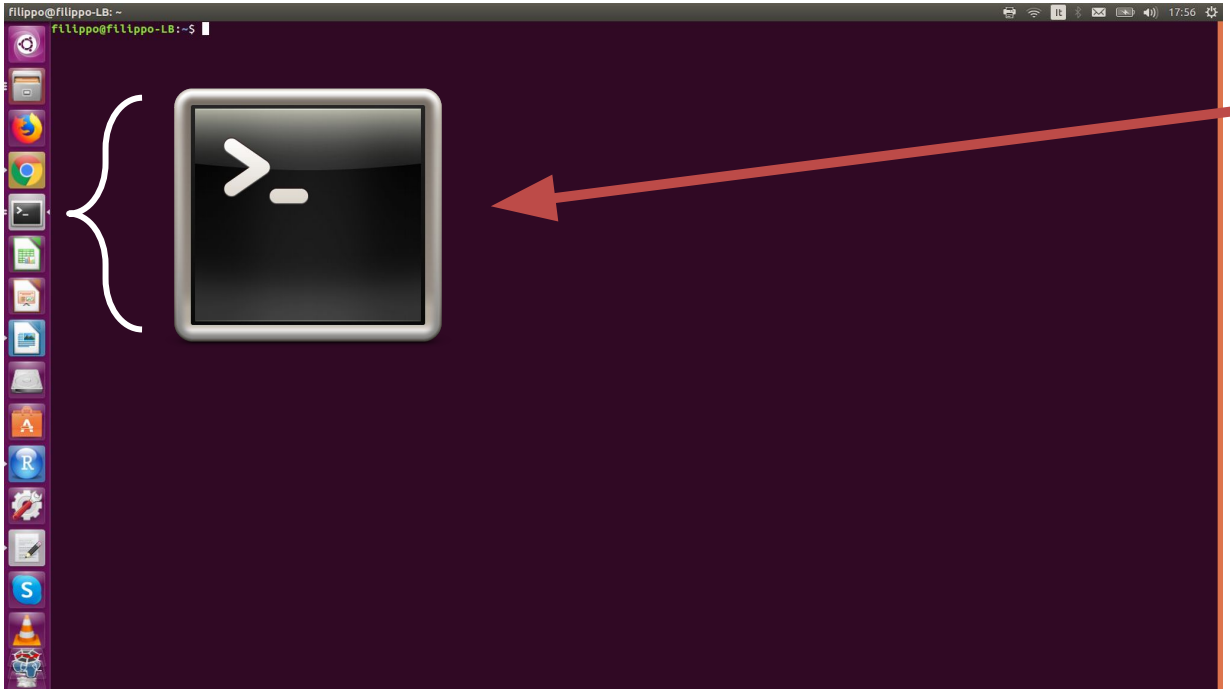
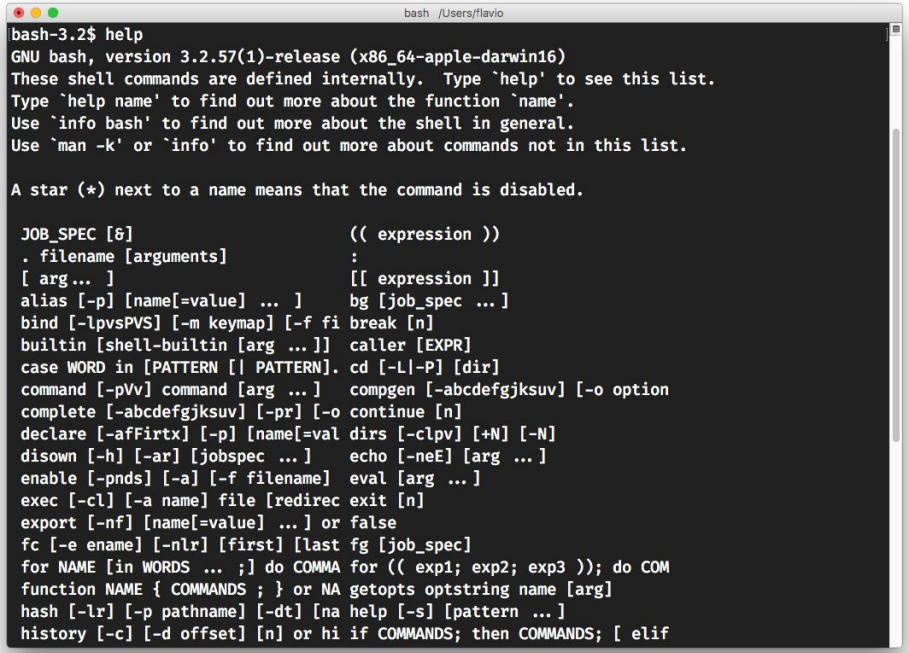
a light touch on Linux and the command line - let's start!



click on the **terminal icon** to launch **"the shell"**

- similar in Mac OS
- On Windows we use MobaXterm

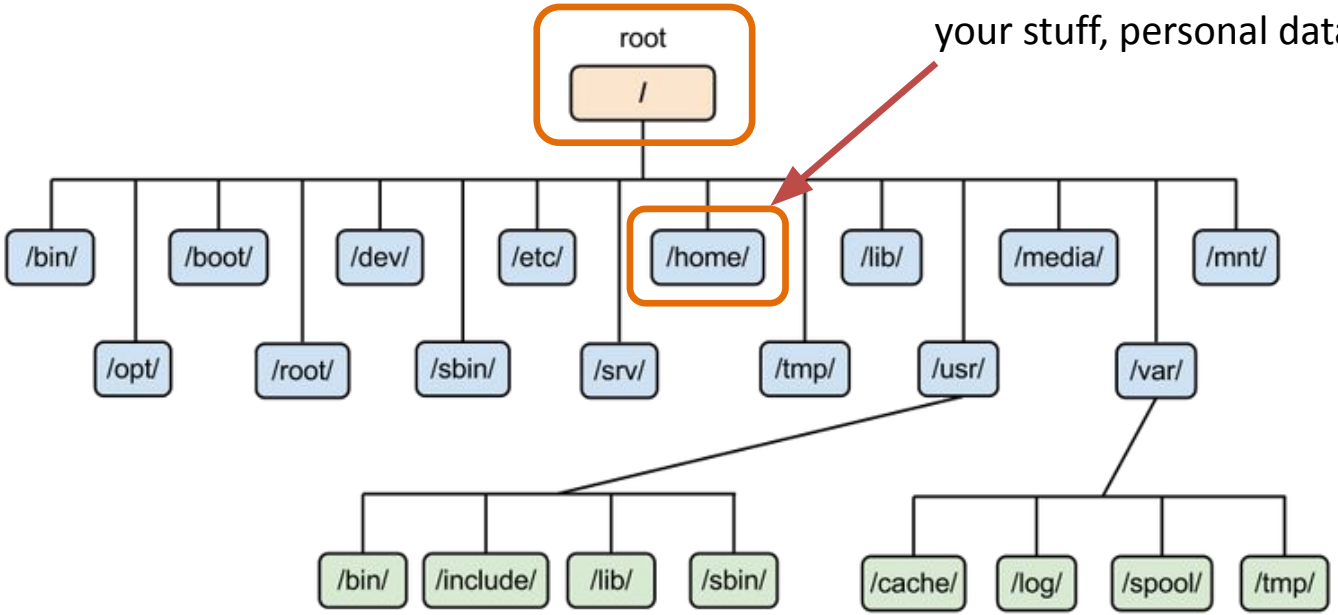
a light touch on Linux and the command line - let's start!



the shell takes commands from the keyboard (the "**command line**"), interprets them and passes them on to the **operating system**.

Linux file system - hierarchy

Home directory: contains your stuff, personal data etc.



Linux file system - hierarchy

A Path in Linux is a unique location to a file or a folder in a file system

Absolute Path

- Specified location of a file or directory from the root directory (/)
- “Complete path” from the start of the file system
- cd /home/**christian**/music/Slayer

Relative Path

- path related to the present working directory (pwd)
- Starts from the directory you are in at the moment
- cd music/Slayer

print ***w***orking ***d***irectory

$~ pwd

Overview

- Change directory
- Check directory content
- Create and remove directories
- Copy and move directories and files
- Check files
- Create, modify and remove files

Linux file system - change directory

***c**hange **d**irectory*

$~ cd

cd has different flavours …

- `cd ..` (relative path - one directory up)
- `cd ../..` (relative path - two directories up)
- `cd music/Slayer` (relative path - only move down)
- `cd /user/music/` (absolute path - up and down)

Tab key

1x autocomplete path (if unique)

2x show all path options

Linux file system - directory listing

Check out what is in your folder:

list ***s***creen

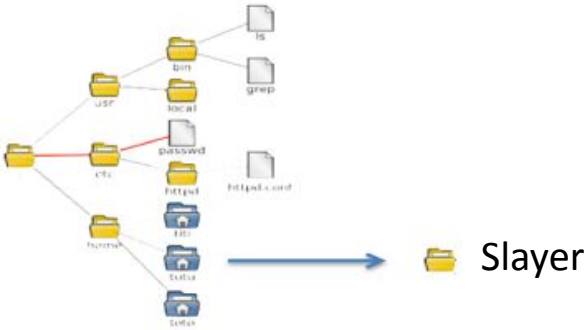
$~ ls *directory* (relative or absolute path)

Enhanced options

- `ls -a` (including hidden files)
- `ls -l` (long format: more details)
- `ll` (alternative to ls -l)
- `ls -lr` (long + reverse order)
- `ls -lt` (long + sorted by time)

Check manual!
$~ man ls

Linux file system - create and remove directories



***m**ake **dir**ectory*

$~ mkdir Slayer

***rem**ove **dir**ectory*

$~ rmdir Slayer

or

$~ rm –R Slayer

***rm** is more general*

- removes each file specified in the command line
- by default, it does not remove directories (-R is necessary)

Linux file system - move (rename) and copy files

***move** (rename) a file or directory*

$~ mv <path_to_file> <path_to_destination>

Danger of overwriting!!

Ask if file should be overwritten

$~ mv -i <path_to_file> <path_to_destination>

Do not overwrite file

$~ mv -n <path_to_file> <path_to_destination>

Do overwrite file

$~ mv -f <path_to_file> <path_to_destination>

***copy** a file*

$~ cp <path_to_file> <path_to_destination>

Danger of overwriting!!

$~ cp -i <path_to_file> <path_to_destination>

$~ cp -n <path_to_file> <path_to_destination>

$~ cp -f <path_to_file> <path_to_destination>

Linux file system - check files without opening

$~ more <path_to_file> {scroll down with Enter/Space; quit with q}

$~ head -n <path_to_file> {n = number or rows to show; e.g. -10}

$~ tail -n <path_to_file> {same as head but from the end}

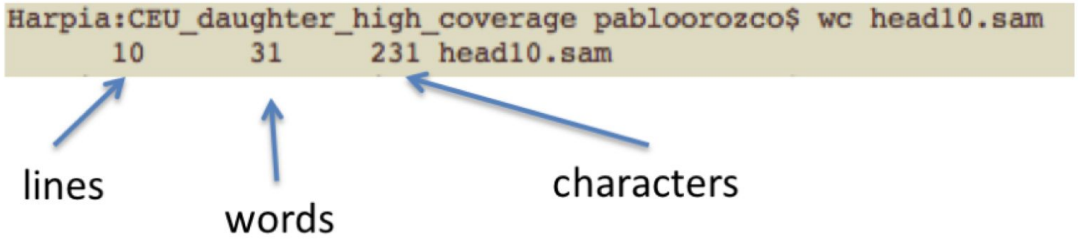
```
tail -n +2 my_file
```

(view everything but first line)

Linux file system - word count

***w**ord **c**ount*

$~ wc <path_to_file>



$~ wc –l <path_to_file> how many lines?

$~ wc –w <path_to_file> how many words?

$~ wc –m <path_to_file> how many characters?

Text editors in the command line

Various text editors to choose from…

vi / vim
gedit
textpad
emacs

Text editing in the shell is much more powerful than graphical text editors like notepad.

- Notepad++ is a nice graphical text editor

Create and open a file using vim

$~ vim <my_file>

Exiting Vim

```
:w  - Write (Save)
:wq - Write and quit
:q  - Quit, fails if unsaved
:q! - Quit, even if unsaved
```

Movement

```
$      - Jump to end of line
^      - Jump to start of line
h      - Move left
j      - Move down
k      - Move up
l      - Move right
```

Modes

```
ESC    - Return to normal mode
i      - Insert at cursor position
a      - Insert after cursor position
o      - Insert on line below cursor
v      - Enter visual mode
ctrl+v - Enter visual mode (vertical)
V      - Enter visual mode (full lines)
```

Text editors in the command line

bash scripts

- plain text file which contains a series of commands
- Anything you can run normally on the command line can be put into a script and it will do exactly the same thing

```
#!/bin/sh

pwd
ls

COURSE="introduction to GWAS"
echo $COURSE
```

Always starts with the "**shebang**" (which shell to use)

… followed by commands

Running bash scripts $~ ./<my_script>

Connect to our instance on Amazon Web Services (AWS)

AWS: on-demand cloud computing platform

```
filippo@filippo-LB:~$ cd Dropbox/cursos/laval2019/
filippo@filippo-LB:~/Dropbox/cursos/laval2019$ ssh -i GWAS2019.pem ubuntu@ec2-54-190-27-29.us-west-2.compute.amazonaws.com
```

We will set up your connection now.

Windows first, then Mac / Linux.