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# Introduction to command line

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*RAGE workshop, NCDC, Abuja*

*12-16<sup>h</sup> Feb 2024*





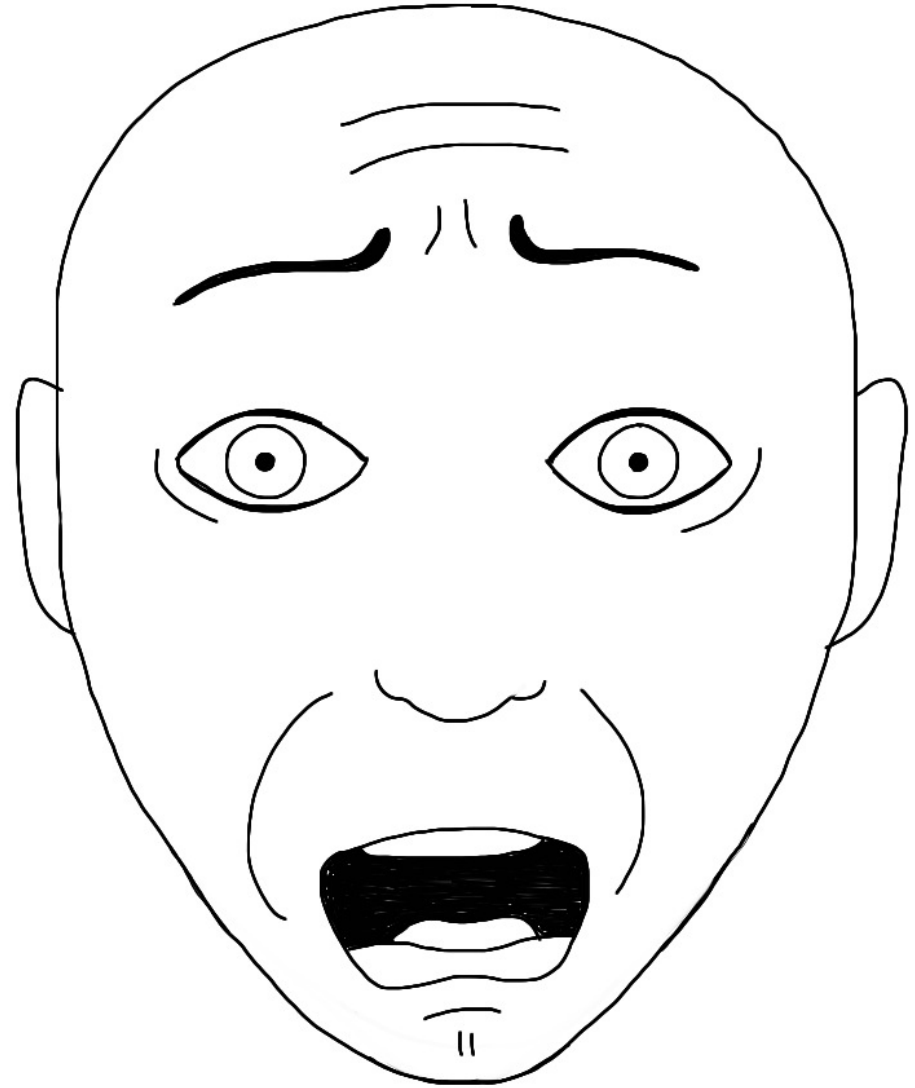
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```
<tr class="row-1 row-first row-last">
  <td class="col-1 col-first">
    <div class="views-field views-field-title"> <span class="field-content"> <a href="/yellowleather/products/shoes/comfy-leather-shoes">
    <div class="views-field views-field-uc-product-image">
      <div class="field-content">
        <a href="/yellowleather/products/shoes/comfy-leather-shoes"> 
      </div>
    </div>
    <div class="views-field views-field-display-price"> <span class="views-label views-label-display-price">
    </div>
  </td>
  <td class="col-2">
    <div class="views-field views-field-title"> <span class="field-content"> <a href="/yellowleather/products/belts/embossed-spread-wing-eagle-belt">
    <div class="views-field views-field-uc-product-image">
      <div class="field-content">
        <a href="/yellowleather/products/belts/embossed-spread-wing-eagle-belt"> 
      </div>
    </div>
    <div class="views-field views-field-display-price"> <span class="views-label views-label-display-price">
    </div>
  </td>
  <td class="col-3 col-last">
    <div class="views-field views-field-title"> <span class="field-content"> <a href="/yellowleather/products/hats/leather-hat">
    <div class="views-field views-field-uc-product-image">
      <div class="field-content">
        <a href="/yellowleather/products/hats/leather-hat"> 
      </div>
    </div>
    <div class="views-field views-field-display-price"> <span class="views-label views-label-display-price">
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  </td>
</tr>
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<tr class="row-1 row-first row-last">
  <td class="col-1 col-first">
    <div class="views-field views-field-title"> <span class="field-content"> <a href="/yellowleather/products/comfortable-leather-shoes">
    <div class="views-field views-field-uc-product-image">
      <div class="field-content">
        <a href="/yellowleather/products/shoes/comfortable-leather-shoes"> 
      </div>
    </div>
    <div class="views-field views-field-display-price"> <span class="views-label views-label-display-price">
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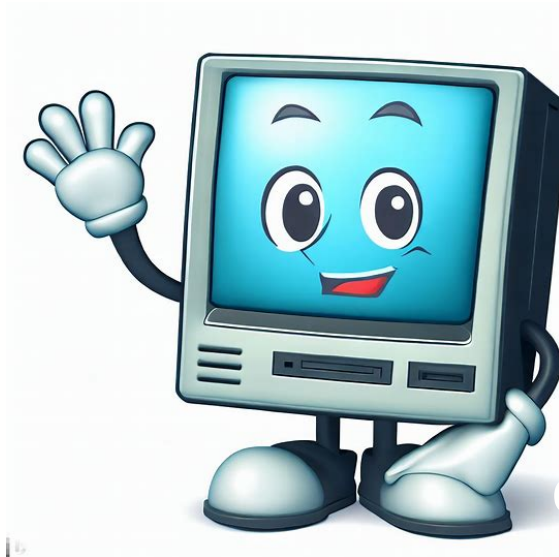




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# What is the command line?

A line of communication  
between you and the computer





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## Why use it?

More powerful than a graphical user interface

- Control and flexibility
- Quick and efficient
- Automate repetitive tasks
- And... you can't escape it if you want to do bioinformatics!



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**WITH GREAT POWER**



**COMES GREAT  
RESPONSIBILITY**

[makeameme.org](http://makeameme.org)



## A word of caution

- Learning curve
- Accidental system modification
- Data loss
- No “undo”
- Security risk
- Be cautious about using powerful command like ‘sudo’ and ‘rm’







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## Command line

Text-based interface where users  
input commands



Image: Apple

powershell  
console  
command  
command\_line  
shell  
cli  
line  
terminal  
prompt



# Command line and the shell

## Command line

- textual interface where users input commands

## Shell

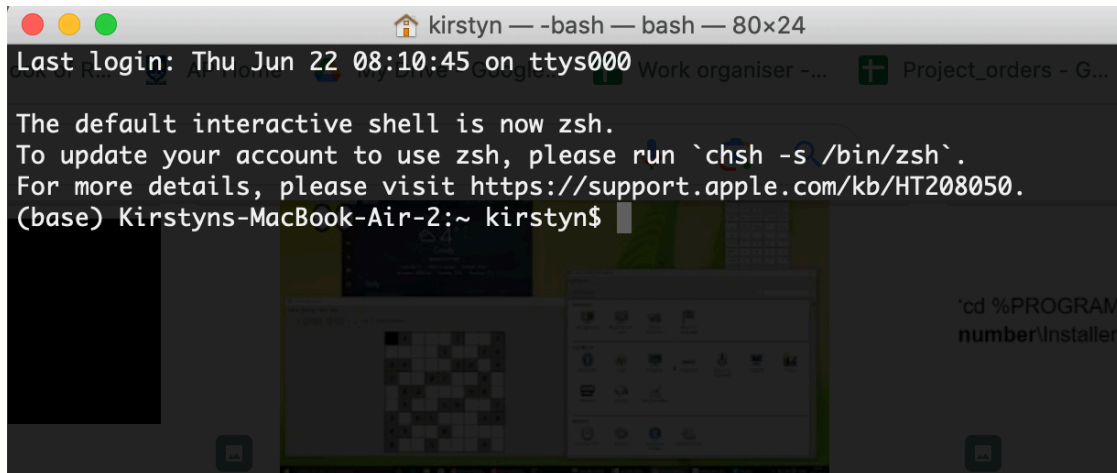
- the program that interprets those commands, executes them, and provides the appropriate output
- intermediary between you and the operating system
- Different shells: bash, zsh, powershell



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# Command line interface (CLI)

Mac OS: Terminal

A screenshot of a Mac OS Terminal window. The title bar shows 'kirstyn — -bash — bash — 80x24'. The terminal text reads: 'Last login: Thu Jun 22 08:10:45 on ttys000', 'The default interactive shell is now zsh.', 'To update your account to use zsh, please run `chsh -s /bin/zsh`.', 'For more details, please visit https://support.apple.com/kb/HT208050.', and '(base) Kirstyns-MacBook-Air-2:~ kirstyn\$'.

```
kirstyn — -bash — bash — 80x24
Last login: Thu Jun 22 08:10:45 on ttys000

The default interactive shell is now zsh.
To update your account to use zsh, please run `chsh -s /bin/zsh`.
For more details, please visit https://support.apple.com/kb/HT208050.
(base) Kirstyns-MacBook-Air-2:~ kirstyn$
```

Windows: Command prompt

A screenshot of a Windows Command Prompt window. The title bar shows 'C:\Windows\system32\cmd.exe'. The terminal text reads: 'Microsoft Windows [Version 6.1.7601]', 'Copyright (c) 2009 Microsoft Corporation. All rights reserved.', and 'C:\Users\Mrhope>'.

```
C:\Windows\system32\cmd.exe
Microsoft Windows [Version 6.1.7601]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.

C:\Users\Mrhope>
```



## Opening the command line

- Search for it
  - Windows: cmd or command prompt or powershell
  - Mac/Linux: terminal
- Use shortcuts:
  - Linux: Ctrl + Alt + T





## RAGE-on-SSD

- A software image containing a complete Linux operating system
- Is run directly from a bootable drive

*SSD*= solid state drive

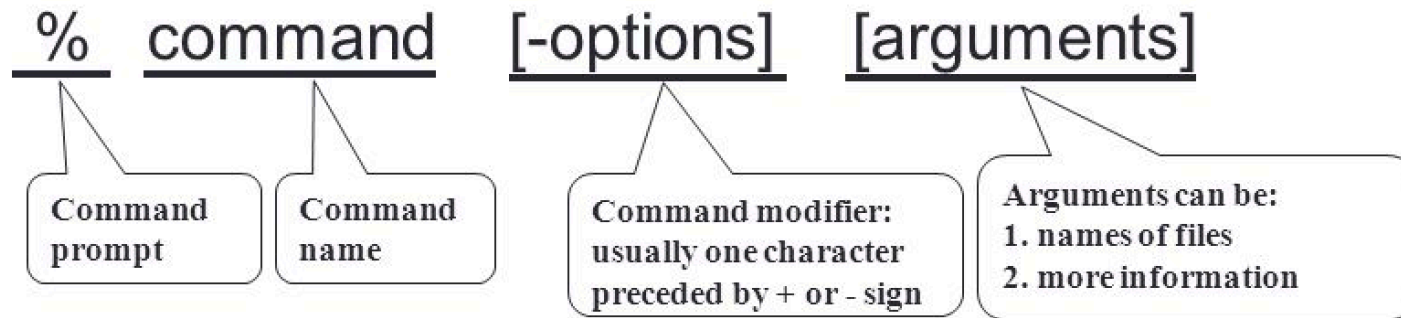
*Ubuntu*= a Linux-based operating system



# A command

- a basic command structure consists of a command name followed by optional options/flags and required arguments.

## Command Line Structure



- **UNIX is case sensitive**
- Must be a space between command, options and arguments
- No space between the plus or minus sign and option letter
- Fields enclosed in [ ] are optional



## Example command

The copy command (cp)

Syntax: **cp source(s) destination**

Where source is the file path to one (or more) files to copy

Destination is where you want to copy to

Copy a file to new location:

**cp /Users/Kirstyn/Downloads/test.txt /Users/Kirstyn/Documents/**

Copy an entire folder:

**cp -r /Users/Kirstyn/Downloads/results /Users/Kirstyn/Documents/**



## Common commands

Command	Description	Example
ls	List directory content	<i>ls -l</i>
cp	copy	<i>cp test.txt ~/Desktop/</i>
mv	move	<i>mv test.txt ~/Desktop</i>
mkdir	Make a new directory	<i>mkdir awesome</i>
rm	Remove	<i>rm ~/Desktop/file.txt</i>
touch	Make a new file	<i>touch workshop_results.txt</i>
pwd	Show the 'present working directory' i.e. location in the file system	<i>pwd</i>





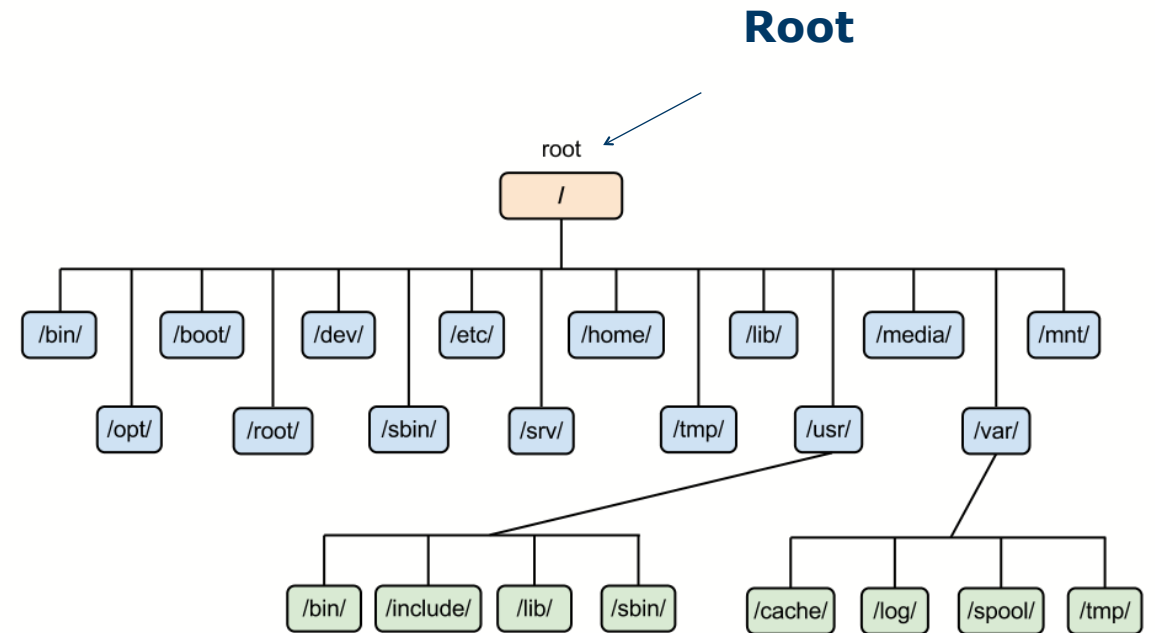
# Moving around the Filesystem

Tree



Root

Filesystem Tree





# Navigating the filesystem

## Directory terminology

---

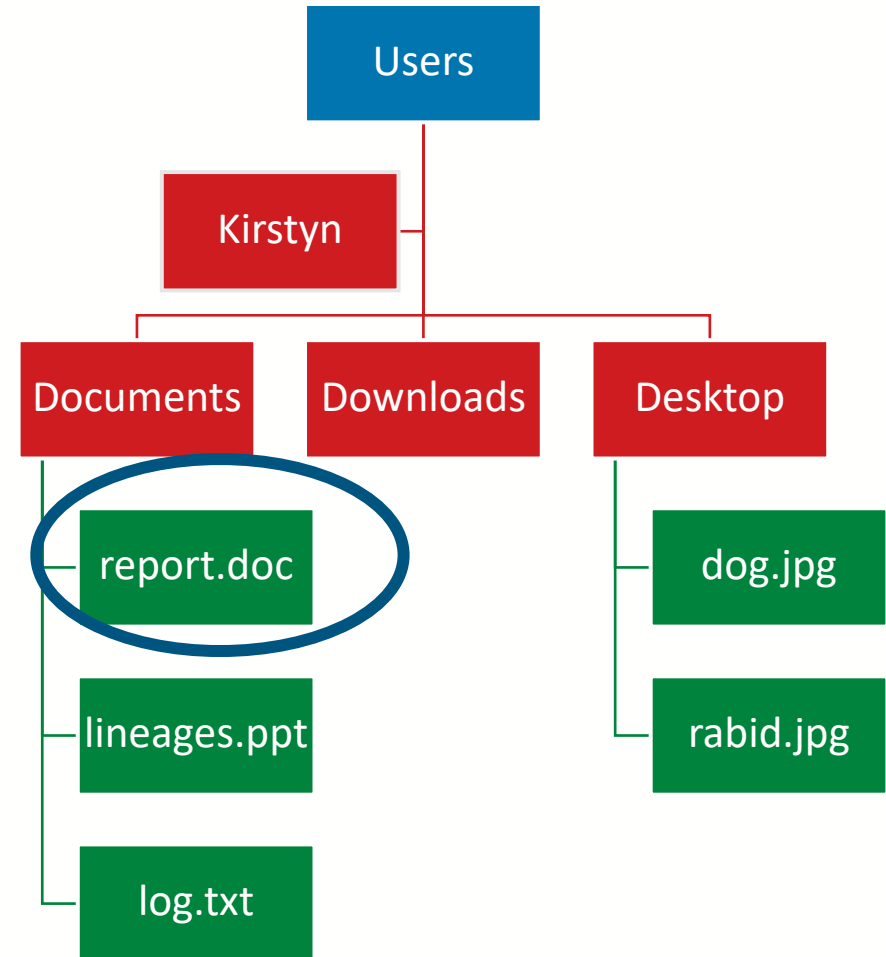
- Root Directory: `/`
  - top-most directory in any UNIX file structure
- Home Directory: `~`
  - directory owned by a user
  - default location when user logs in
- Current Directory: `.`
  - default location for working with files
- Parent Directory: `..`
  - directory immediately above the current directory

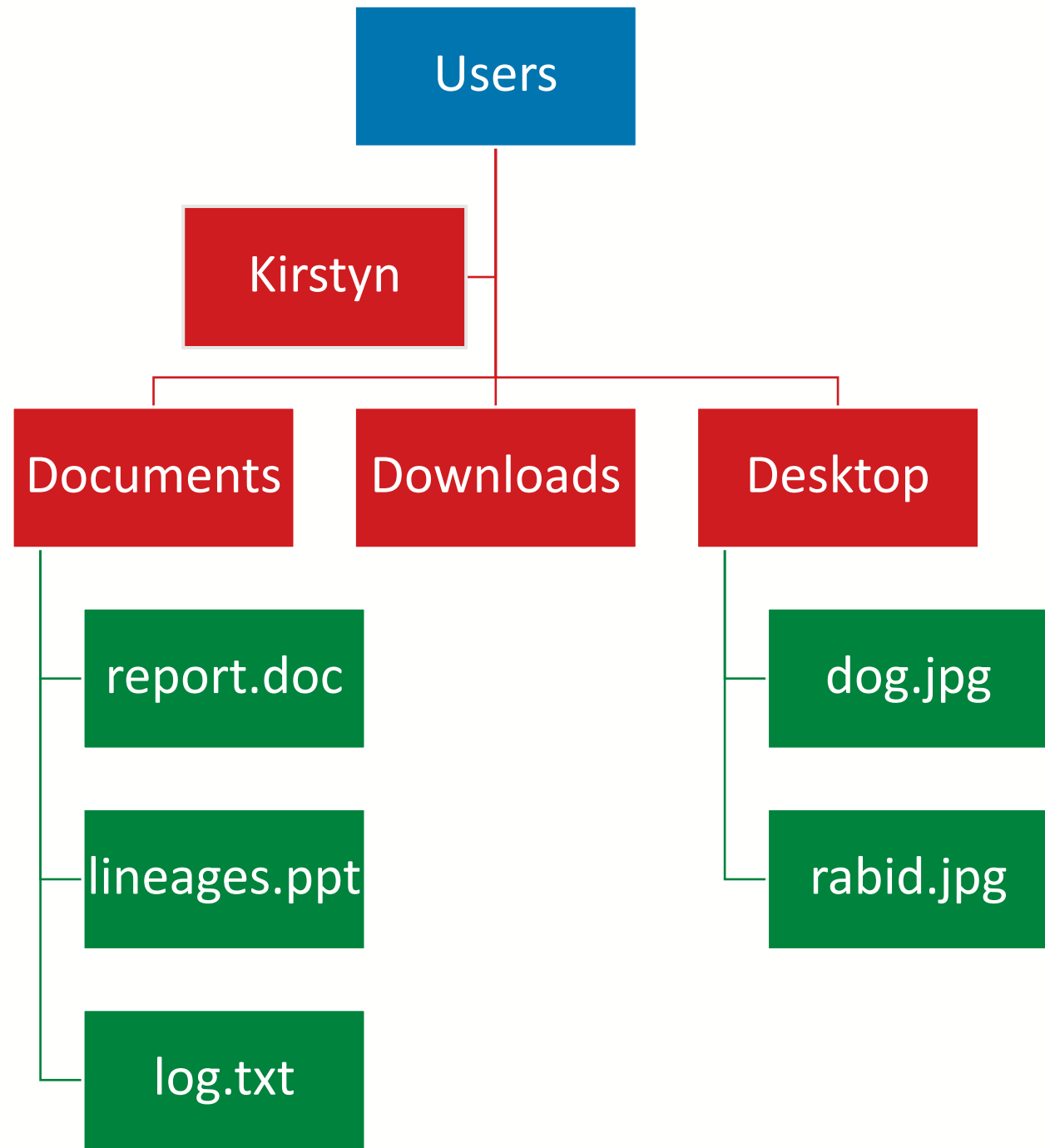


## A file path

- a unique address or location to each file
- helps you navigate through the folders and locate a specific file quickly

**/Users/Kirstyn/Documents/report.docx**



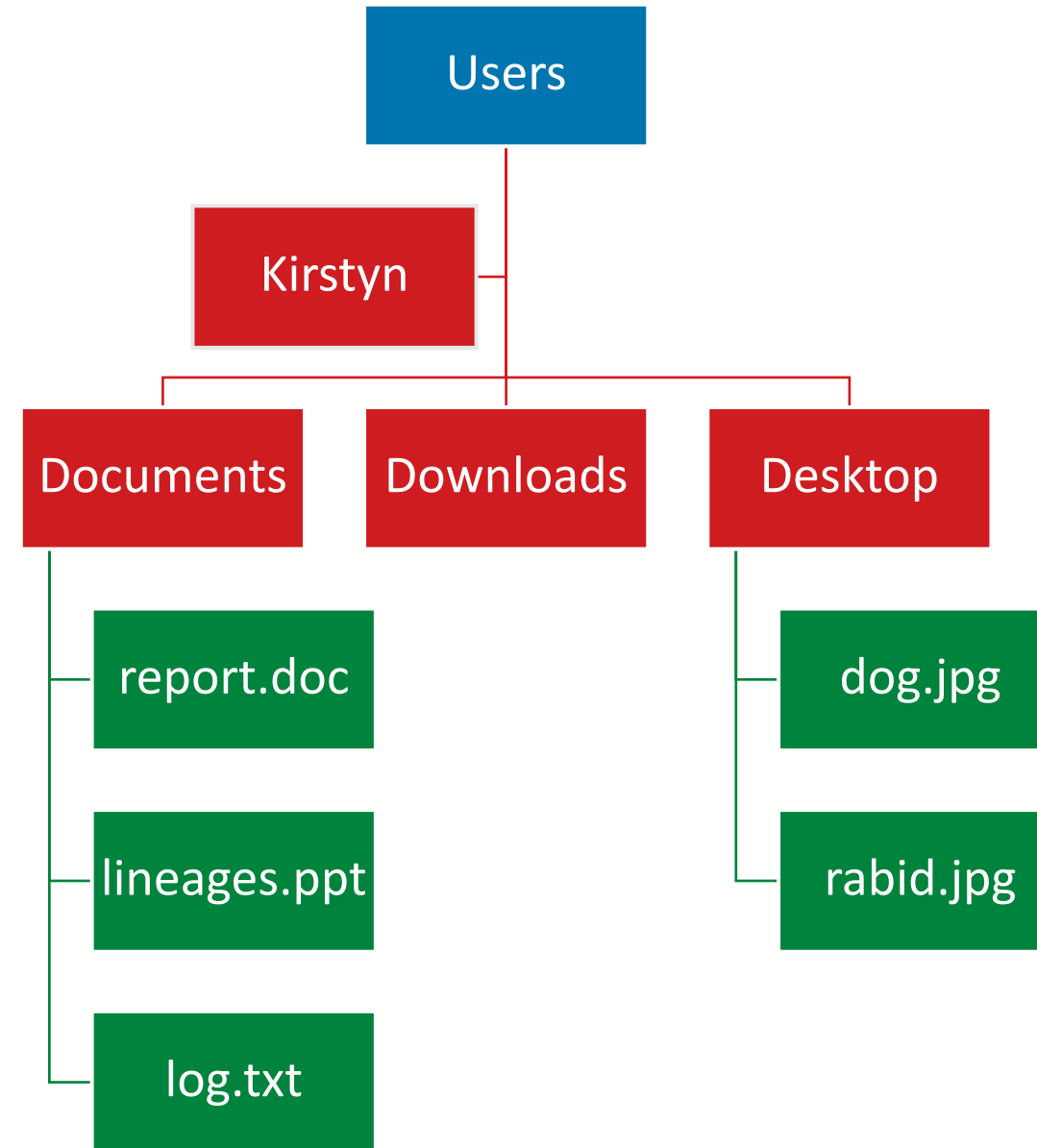






## File paths

- Absolute path
  - Traces from the root (/) to a file/directory
  - **/Users/Kirstyn/Documents/report.docx**
- Relative path
  - Traces from current directory
  - No initial forward slash
  - cd Kirstyn
  - **Documents/report.docx**





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## Hints and tips



Do not use spaces in filenames  
and folders



Folders are called **directories**



# Use manual pages (man pages)

'man command\_name'

replacing "command\_name" with the name of the command you want to learn more about

! To exit: Press q

```
NAME
  top -- display and update sorted information about processes

SYNOPSIS
  top [-a | -d | -e | -c mode]
      [-F | -f] our system. Practice using both absolute paths (starting from the root directory) and
      [-h]
      [-i interval] ve paths (relative to the current directory).
      [-l samples]
      [-ncols columns] nent with options and flags: Explore the available options and flags for different
      [-o key | -O skey]
      [-R | -r] ommands. Refer to the command's documentation or use the `--help` option to disc
      [-S]
      [-s delay-secs] nal functionalities that can make your tasks more efficient.
      [-n nprocs]
      [-stats keys] utious with powerful commands: Some commands have the potential to modify o
      [-pid processid]
      [-user username] files irreversibly. Exercise caution when using commands like `rm` (remove) and
      [-U username]
      [-u] `mv` (move) to avoid unintentional data loss. Always double-check your command bef

DESCRIPTION
  executing it.
  The top program periodically displays a sorted list of system processes. The default sorting key is pid, but
  other keys can be used instead. Various output options are available.

OPTIONS
  pages that provide comprehensive documentation. You can access them by typing `ma
  Command line option specifications are processed from left to right. Options can be specified more than once.
  If conflicting options are specified, later specifications override earlier ones. This makes it viable to cre-
  ate a shell alias for top with preferred defaults specified, then override those preferred defaults as desired
  on the command line. t to learn more about.
```



## Tab completion

- One of the most useful things on command line!
- Command line will try to autocomplete commands and filepaths
- Use tab to do this
- Double tap tab to see all the options





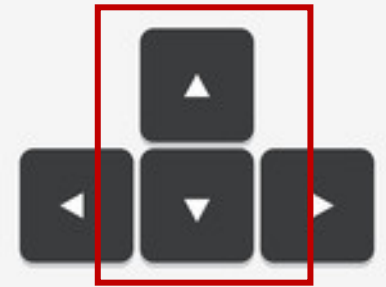


# Recycle commands

- Reuse previous commands without retyping them
- Pressing the up arrow key allows you to cycle through your command history

```
$ Terminal 2  X  $ Terminal 4  X  +

jovyan:~$ cd
.bash_history .conda/
red-public/ .viminfo .config/ .jupyter/ lost+fc
.cache/ .condarc .ipython/ .local/ .s3cfg
red-team/
jovyan:~$ cd shared-
shared-public/ shared-team/
jovyan:~$ man cp
jovyan:~$ cd
jovyan:~$ conda deactivate
```



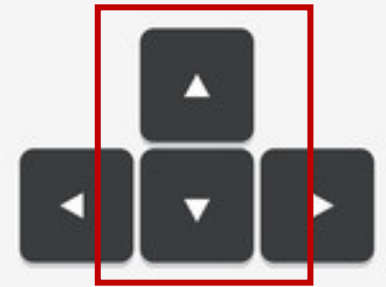


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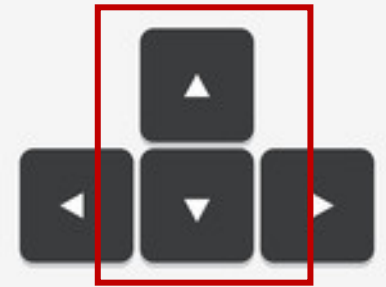


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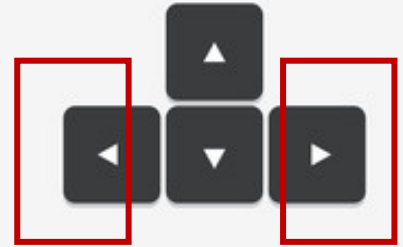


## Edit commands

- You might have a typo or need to edit just a small part of a long command
- Use the left/right arrow keys to get to the right point in the command
- Use your normal delete button to erase and replace text

### Shortcuts:

- Use ctrl+a to move cursor to start of command
- Ctrl+e to move to the end





## Another quick fix to correct a mistake

- use the caret character ( ^ ) immediately after an error to indicate correction

e.g.

```
cd Appppplications
```

*Error: No such file or directory*

```
^ppp^pp
```

This will reexecute the previous command with the correction



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# TUTORIAL