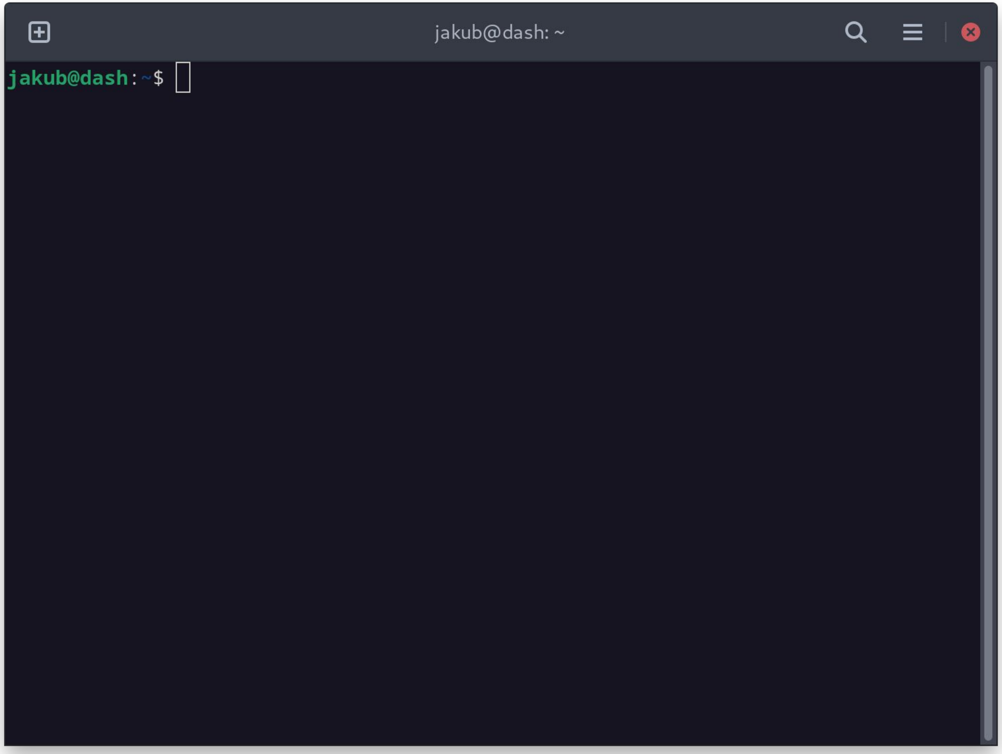
Using the terminal

Jakub Kaczmarzyk
MD-PhD student
Koo Lab (CSHL) and Saltz Lab (SBU)

June 2023

We use the terminal to interact with and control our computer



```
jakub@dash:~$ 
```

This is my terminal. Yours might look different but we can all do similar things!

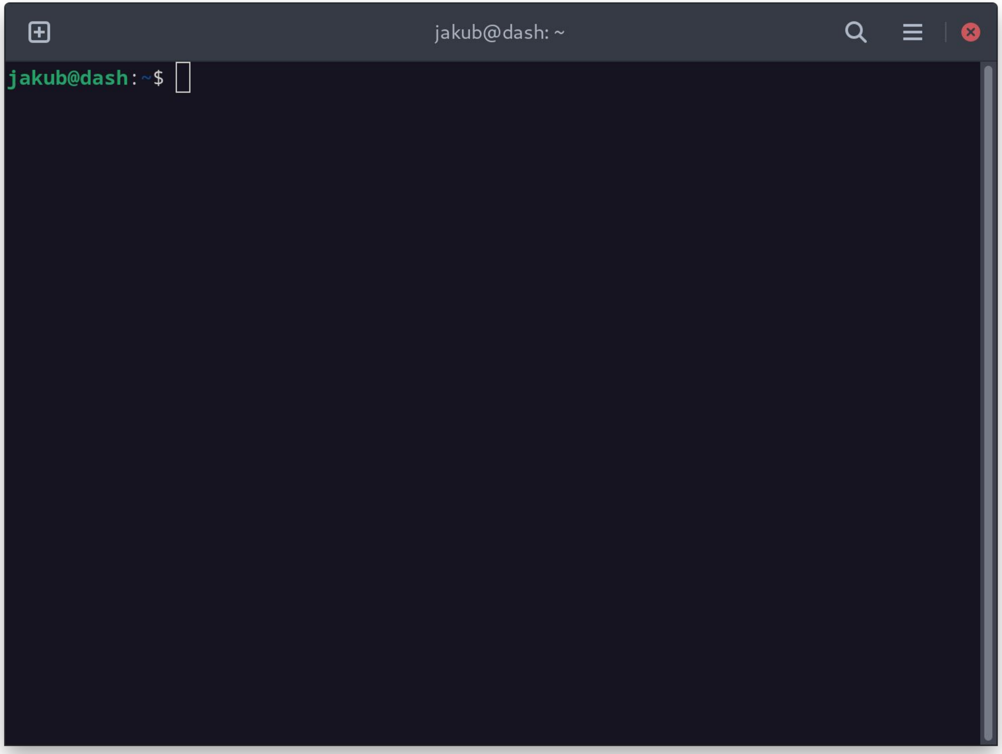
- Browse our files
- Move through folders
- View and edit files
- Run scripts
- Install things
- Access high performance computers
- And so much more!

Keyboard only 🙅🐁

We use our keyboard to interact with the terminal.

It is not point and click like most other parts of our computer.

But we can scroll. As we use the terminal more and fill up the window, you can scroll like you do in other programs.



```
jakub@dash:~$ 
```

Start up your terminal 🚀 💻

Windows users

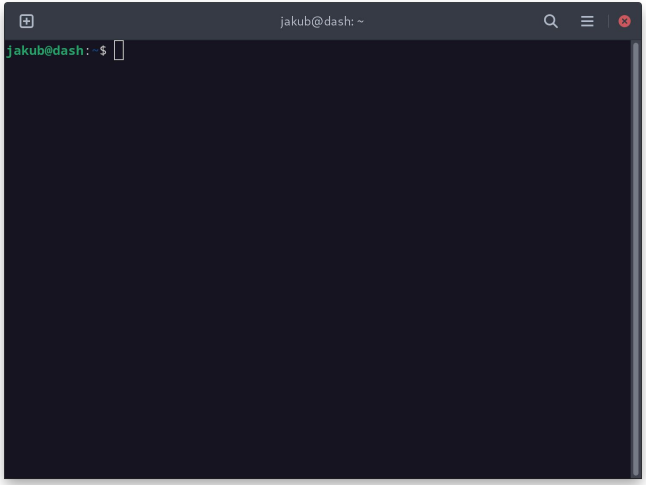
- Install the Windows Subsystem for Linux (WSL). Open Command Prompt or Powershell *as an administrator* and run `wsl --install`. Then open up the "Ubuntu" program. Ubuntu is a Linux distribution.

macOS users

- Open the Terminal app.

Linux users

- Open the Terminal app.

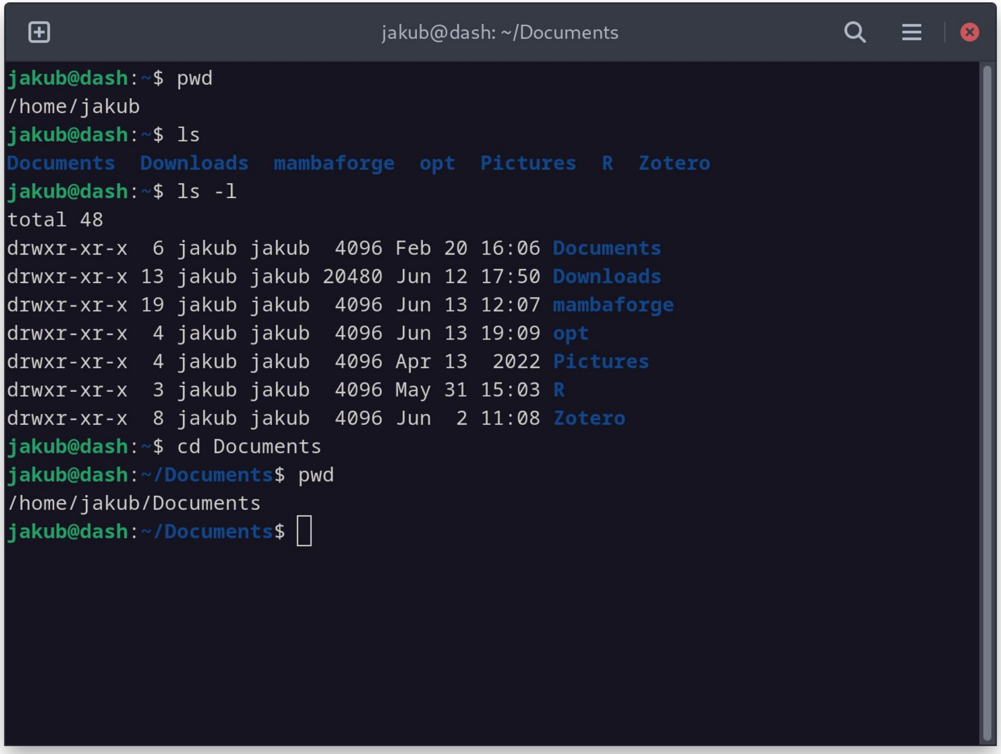


```
jakub@dash:~$ 
```

How to work with folders (aka directories)

Command	**Description**
`pwd`	Print working directory (the current folder)
`ls`	List the contents of the current directory
`ls FOLDER`	List the contents of the folder named FOLDER
`cd FOLDER`	Change directory (move to a different folder)
`mkdir NEW_FOLDER`	Make directory named NEW_FOLDER
`rmdir FOLDER`	Remove directory (folder must be empty first). Beware that this does not ask for confirmation! The directory will be gone and this cannot be undone!
`rm -r FOLDER`	⚠️ DANGER ⚠️ This removes the folder and everything inside it. It does not ask for permission and the files will not be recoverable. You cannot undo this.

How to work with folders (aka directories)



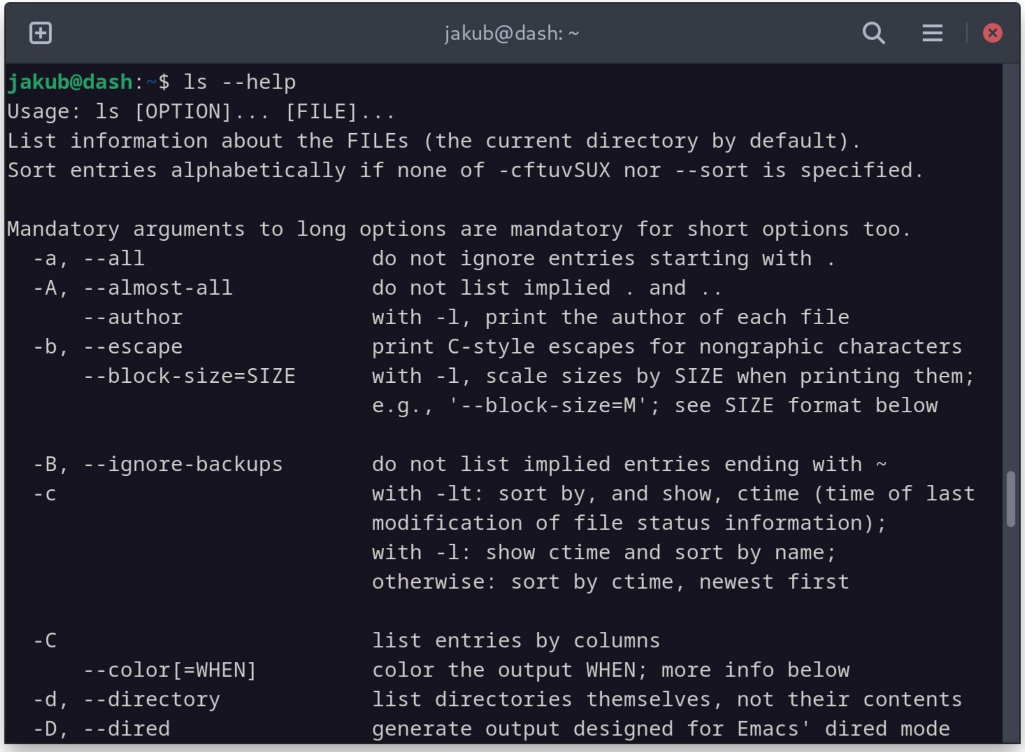
```
jakub@dash:~$ pwd
/home/jakub
jakub@dash:~$ ls
Documents  Downloads  mambaforge  opt  Pictures  R  Zotero
jakub@dash:~$ ls -l
total 48
drwxr-xr-x  6 jakub jakub  4096 Feb 20 16:06 Documents
drwxr-xr-x 13 jakub jakub 20480 Jun 12 17:50 Downloads
drwxr-xr-x 19 jakub jakub  4096 Jun 13 12:07 mambaforge
drwxr-xr-x  4 jakub jakub  4096 Jun 13 19:09 opt
drwxr-xr-x  4 jakub jakub  4096 Apr 13  2022 Pictures
drwxr-xr-x  3 jakub jakub  4096 May 31 15:03 R
drwxr-xr-x  8 jakub jakub  4096 Jun  2 11:08 Zotero
jakub@dash:~$ cd Documents
jakub@dash:~/Documents$ pwd
/home/jakub/Documents
jakub@dash:~/Documents$ 
```

How to ask our benevolent terminal for help 🙋

To ask for help about a program, you have at least two options:

1. Use the **--help** flag. The vast majority of programs have this flag.
   a. For example, **`ls --help`**
   b. If that doesn't work, try `-h`
2. Use the **`man`** command (short for manual or manual pages)
   a. For example, **`man ls`**
   b. Press the q key to quit and exit the manual page.
   c. If you get an error like ‘command not found’, you can install the ‘man’ command. That process differs by operating system (and can even differ across versions of a single operating system), and we will not be covering that here.
3. Last but not least, Google.

How to ask our benevolent terminal for help 🙋

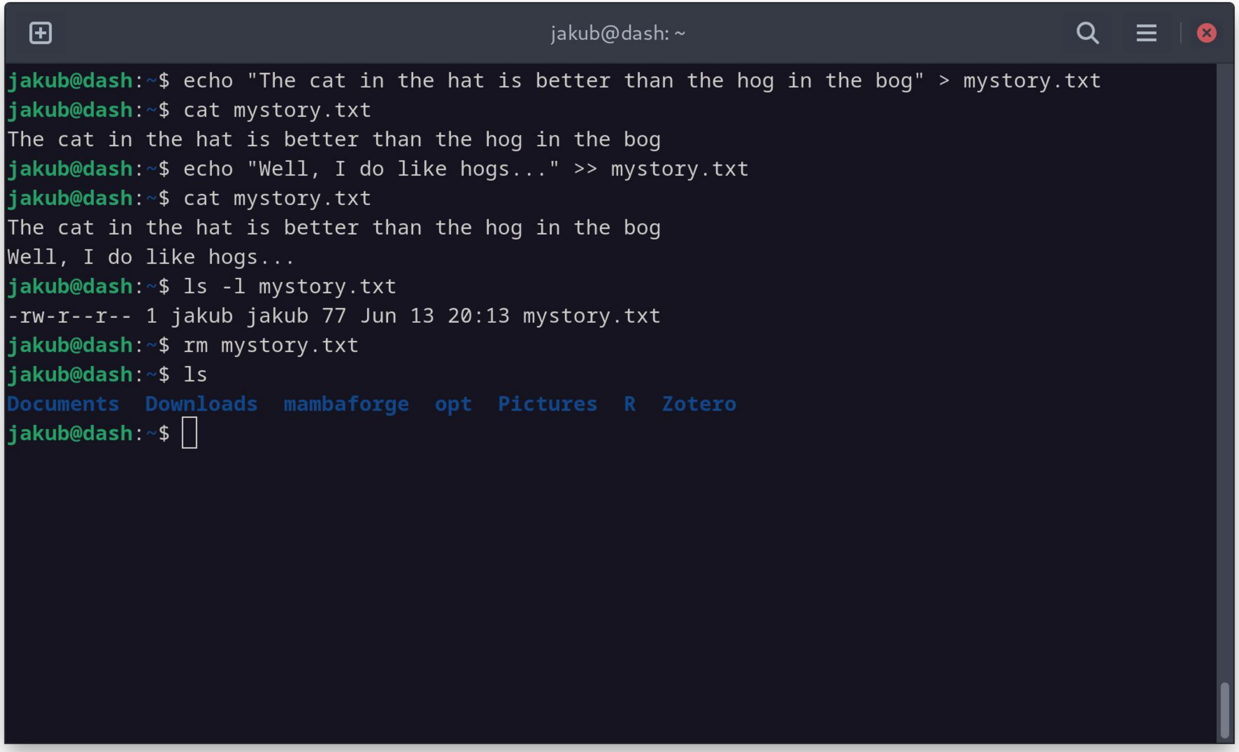


```
jakub@dash:~$ ls --help
Usage: ls [OPTION]... [FILE]...
List information about the FILEs (the current directory by default).
Sort entries alphabetically if none of -cftuvSUX nor --sort is specified.

Mandatory arguments to long options are mandatory for short options too.
  -a, --all                  do not ignore entries starting with .
  -A, --almost-all           do not list implied . and ..
      --author               with -l, print the author of each file
  -b, --escape               print C-style escapes for nongraphic characters
      --block-size=SIZE      with -l, scale sizes by SIZE when printing them;
                             e.g., '--block-size=M'; see SIZE format below

  -B, --ignore-backups       do not list implied entries ending with ~
  -c                         with -lt: sort by, and show, ctime (time of last
                             modification of file status information);
                             with -l: show ctime and sort by name;
                             otherwise: sort by ctime, newest first

  -C                         list entries by columns
      --color[=WHEN]         color the output WHEN; more info below
  -d, --directory            list directories themselves, not their contents
  -D, --dired                generate output designed for Emacs' dired mode
```

How to work with files

Command	**Description**
`cat`	Show the contents of the file (concatenate)
`touch FILENAME`	Create a new empty file with name “FILENAME”
`echo 'Hello World!'`	Print Hello World! to the terminal.
`echo foobar > FILENAME`	Overwrite the file FILENAME with ‘foobar’
`echo baz >> FILENAME`	Append a new line to the file FILENAME with ‘baz’
`rm FILENAME`	⚠️ DANGER ⚠️ Remove the file. This does not ask for confirmation and it cannot be undone.
`mv SRC DST`	Move (or rename) a file from SRC to DST.
`cp SRC DST`	Copy a file from SRC to DST. Use the -R flag for directories.

How to work with files



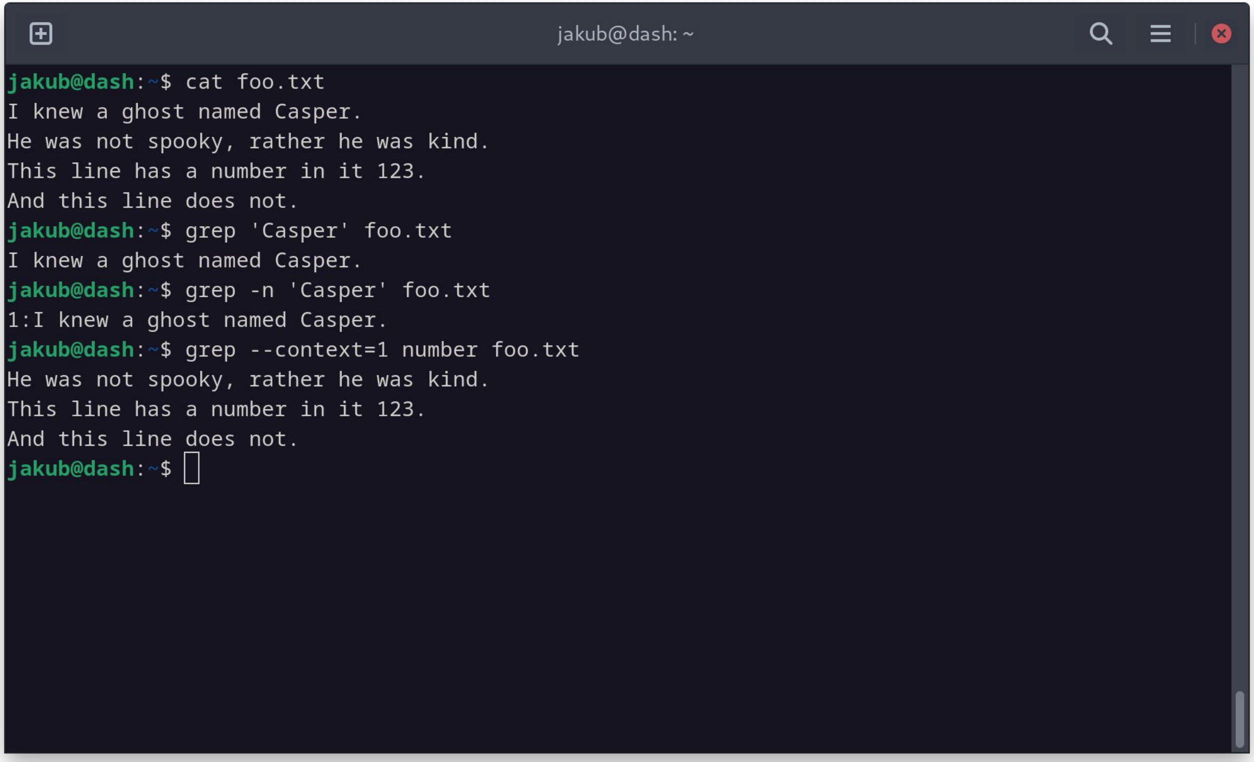
```
jakub@dash:~$ echo "The cat in the hat is better than the hog in the bog" > mystory.txt
jakub@dash:~$ cat mystory.txt
The cat in the hat is better than the hog in the bog
jakub@dash:~$ echo "Well, I do like hogs..." >> mystory.txt
jakub@dash:~$ cat mystory.txt
The cat in the hat is better than the hog in the bog
Well, I do like hogs...
jakub@dash:~$ ls -l mystory.txt
-rw-r--r-- 1 jakub jakub 77 Jun 13 20:13 mystory.txt
jakub@dash:~$ rm mystory.txt
jakub@dash:~$ ls
Documents  Downloads  mambaforge  opt  Pictures  R  Zotero
jakub@dash:~$ 
```

“Globbing” files and directories

Use globbing to find files and directories named with certain patterns

Pattern	**Description**
foo*	Matches files or directories beginning with “foo”
*.txt	Matches files ending with .txt
dog*.png	Matches files beginning with dog and ending with .png
?og.png	The ? means any single character here, so matches include “dog.png”, “hog.png”, and “jog.png” but *not* “mydog.png”.

Use grep to search inside files



```
jakub@dash:~$ cat foo.txt
I knew a ghost named Casper.
He was not spooky, rather he was kind.
This line has a number in it 123.
And this line does not.
jakub@dash:~$ grep 'Casper' foo.txt
I knew a ghost named Casper.
jakub@dash:~$ grep -n 'Casper' foo.txt
1:I knew a ghost named Casper.
jakub@dash:~$ grep --context=1 number foo.txt
He was not spooky, rather he was kind.
This line has a number in it 123.
And this line does not.
jakub@dash:~$
```

Working with remote servers / cluster computers

The command **ssh** logs you into the server (secure shell)

```
ssh username@server
```

- Example: `ssh jakubk@myserver.cshl.edu`
- Type ‘exit’ to log out.

To copy files to and from the server, use **scp** (secure copy).

```
scp nicedog.jpg jakubk@myserver.cshl.edu:/home/jakubk/
```

```
scp jakubk@myserver.cshl.edu:/home/jakubk/myscript.py .
```

Pro tips 💯

- Pressing `control+C` interrupts the running program and also moves to a new line on the terminal
- Use the up arrow key to go through your terminal history. (Use the up and down arrow keys to navigate that)
- The `history` command will show your terminal history
- Pressing `control+L` will wipe the terminal clean. You can scroll up to find your previous commands.

Questions?

I wish you success and happiness in your future with the terminal!