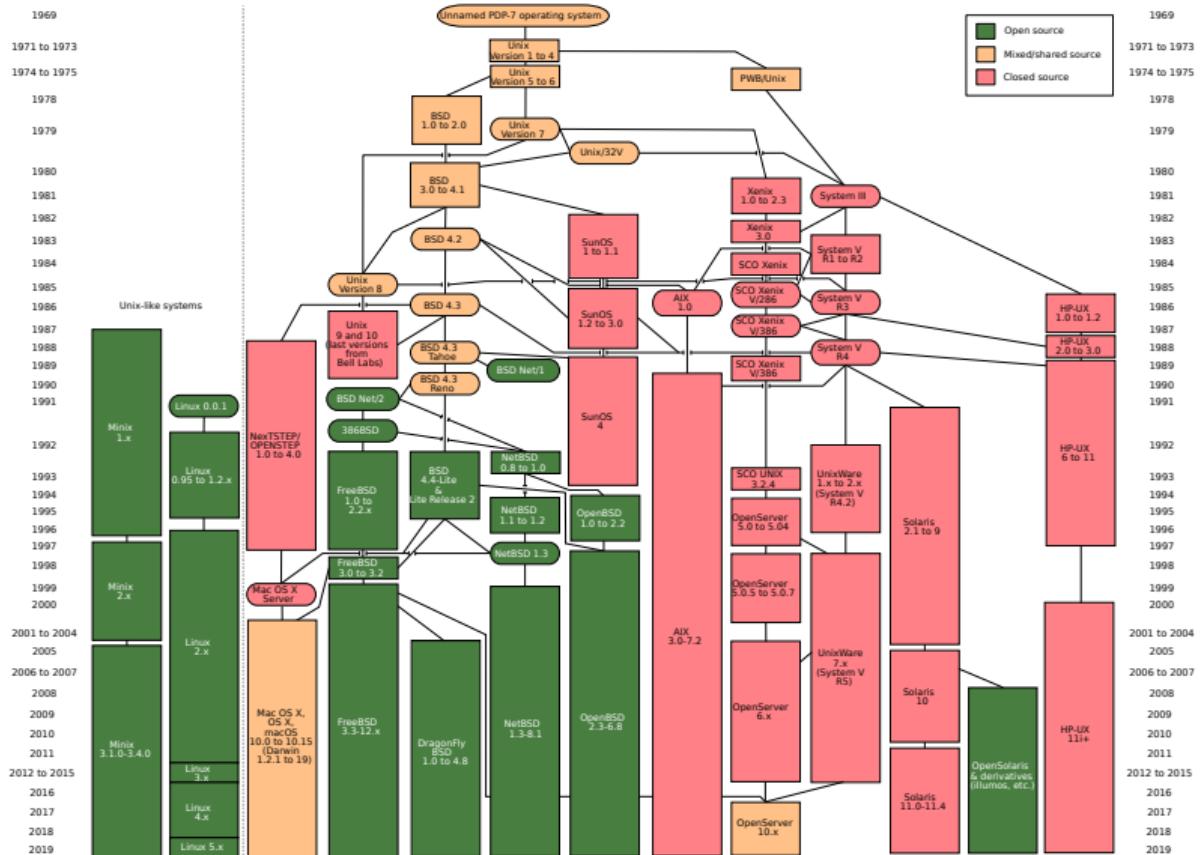


# A few bits of Unix

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**Linux** is the most popular Unix derivative.

**macOS** is a proper Unix system.

**Android** runs on a Linux kernel.

Even **Windows** is relenting, nowadays:

<https://docs.microsoft.com/en-us/windows/wsl/about>

## **Unix**

A family of operating systems

## **GNU**

A collection of free Unix-like tools (“GNU’s Not Unix!”)

## **Linux**

An open-source Unix-like kernel

## **Ubuntu**

A GNU/Linux distribution

## **Bash**

A shell and command language (“Bourne Again SHell”)



<https://w.wiki/392t>

<https://w.wiki/392w>

<https://w.wiki/392v>

<https://w.wiki/392y>

[https://w.wiki/392\\\$](https://w.wiki/392\$)

# The Unix philosophy

- ▶ Write programs that do one thing and do it well.
- ▶ Write programs to work together.
- ▶ Write programs to handle text streams, because that is a universal interface.



<https://www.cs.dartmouth.edu/~doug/>

Doug McIlroy, as quoted in Peter H. Salus. *A Quarter-Century of Unix*. Addison-Wesley. 1994. ISBN 0-201-54777-5.

# `ls` list directory contents

Useful options:

- ▶ `ls -a, --all` do not ignore entries starting with a dot
- ▶ `ls -l` use a long listing format
- ▶ `ls -h, --human-readable` print sizes like 1K, 234M, 2G, etc.
- ▶ `ls -1` list one file per line
- ▶ `ls -S` sort by size, largest first

And more! To find out, use: `man ls`.

# cd change directory

- ▶ `cd ~` go to home directory (`cd` by itself also does that)
- ▶ `cd -` go back to previous directory
- ▶ `cd .` go to the current directory (i.e., do nothing)
- ▶ `cd ..` go up to the parent directory level

Shortcuts can be combined:

- ▶ `cd ~/.../..tmp/./..home/nicolas`

and tab-completion is your friend.

**history** prints a list of the previously used commands

- ▶ **!n** refer to command line **n**.
- ▶ **!-n** refer to the current command minus **n**.
- ▶ **!!** refer to the previous command. This is a synonym for **!-1**.
- ▶ **!string** refer to the most recent starting with **string**.
- ▶ **?string?** refer to the most recent containing **string**.
- ▶ **^string1^string2^** repeat the last command, replacing **string1** with **string2**.

Common use case:

- ▶ **!! | less**

**Ctrl + R** reverse search — just start typing and feel the magic.



# Pipes |

A pipeline is a set of processes chained together by their standard streams, so that the output text of each process (**stdout**) is passed directly as input (**stdin**) to the next one.

Example:

```
▶ process1 | process2 | process3
```

Processes are started in parallel and outputs are buffered.

You can also redirect outputs to files:

```
▶ echo "Hello world!" > hello.txt
```

**cat** concatenate and print files on the standard output

- ▶ `cat file1.txt file2.txt file3.txt`
- ▶ but more commonly just `cat file.txt` to take a quick look

**more** or **less** can scroll through input

- ▶ Remember that “less is more,” and use `less`
- ▶ `cat my_file.txt | less` is equivalent to `less myfile.txt`

**head** or **tail** outputs the first or last part of files

- ▶ `head my_big_data_file.csv` is useful to just check the headers
- ▶ `tail running_simulation.csv -f` will follow (-f) the file as it's updated

Also useful:

- ▶ `column data.csv -t -s`, outputs a table (`-t`) using comma separator (`-s`,)
- ▶ `cat data.csv | wc -l` counts the number of lines in the file

Search and replace:

- ▶ `grep` find regular expressions in files
- ▶ `find -name *.png -exec convert {} {}.jpg \;` find files and act on them
- ▶ `sed -e 's/more/less/' unix_intro_slides.tex | grep less`  
edit files as text streams

Editors:

- ▶ `vi` modal editor — exits with `:q`
- ▶ `nano` as simple as it gets

## Network connections:

- ▶ **ssh** connect to a server via Secure SHell
- ▶ **scp** copy files over **ssh** connection
- ▶ **wget** and **curl** download files over network
- ▶ **screen** and **tmux** manage your sessions

## System info:

- ▶ **top/htop** manage your processes
- ▶ **free -h** display free *memory* in human readable format
- ▶ **df -h** display free *disk space* in human readable format
- ▶ **nproc** display how many processors you have

# Other basic stuff, just for reference

- ▶ **cp** copy files
- ▶ **ln -s** create a soft link
- ▶ **mkdir** create a new directory
- ▶ **mv** move files and/or rename them
- ▶ **rm -rf** remove files and directories (**-r**) without prompting (**-f**)
- ▶ **touch** change the time stamp of the file, creating it if needed