{POWER.CODERS}

Intro to the Command Line

Morning

- Introduction to the internet
- Quick intro to search engines
- Command line
- Why and how use the command line?

Afternoon

- Practical exercises with command line
- Our project over the next 7 weeks

Introduction to the Internet

KEY FACTS

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- 82% of traffic video streams

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In 2017 one google engineer made a mistake resulting in a loss of internet for Japan for a couple hours

What is the internet?

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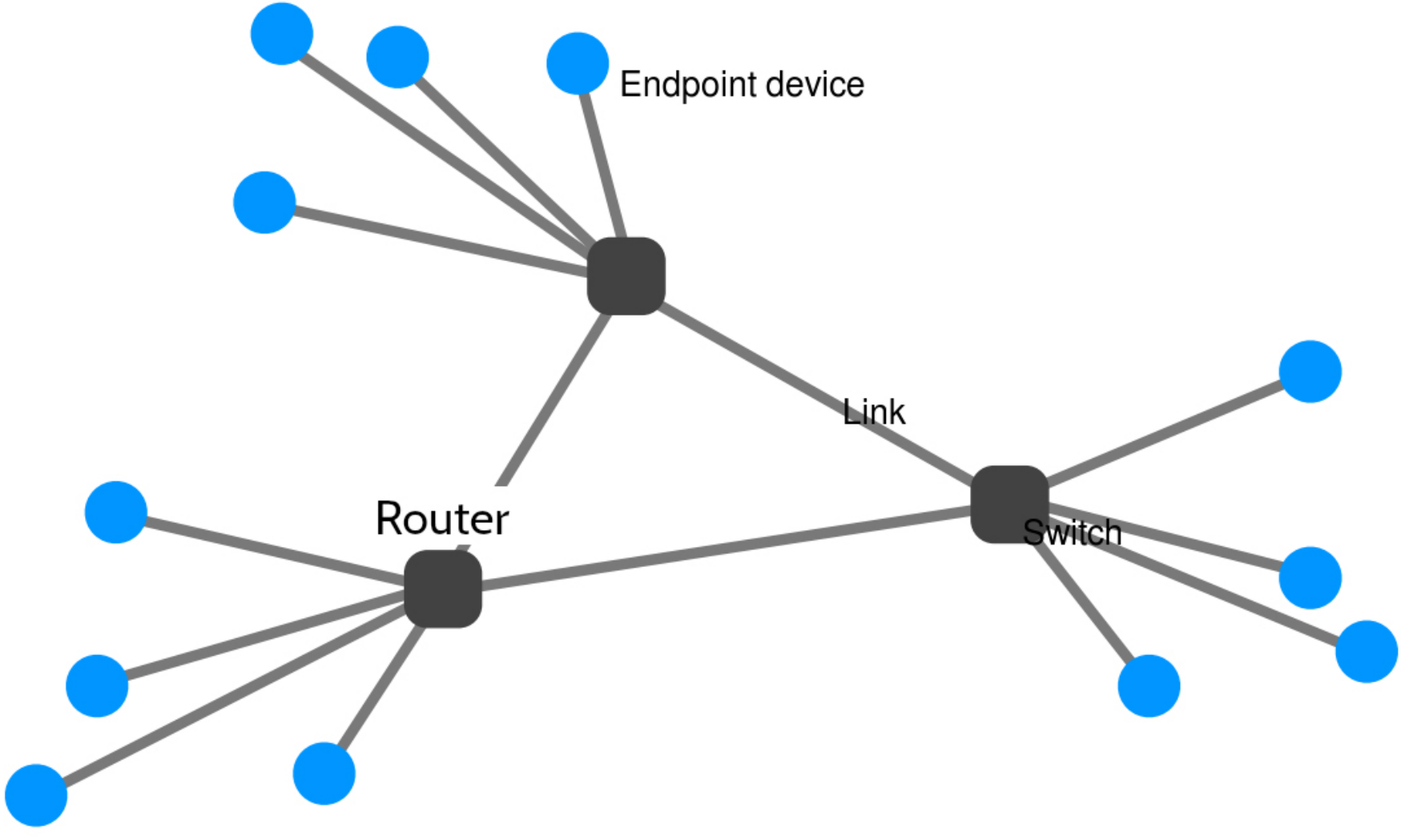
... and it is HUGE.

What is a network made of?



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submarinecablemap.com

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Why do we care how the internet works?

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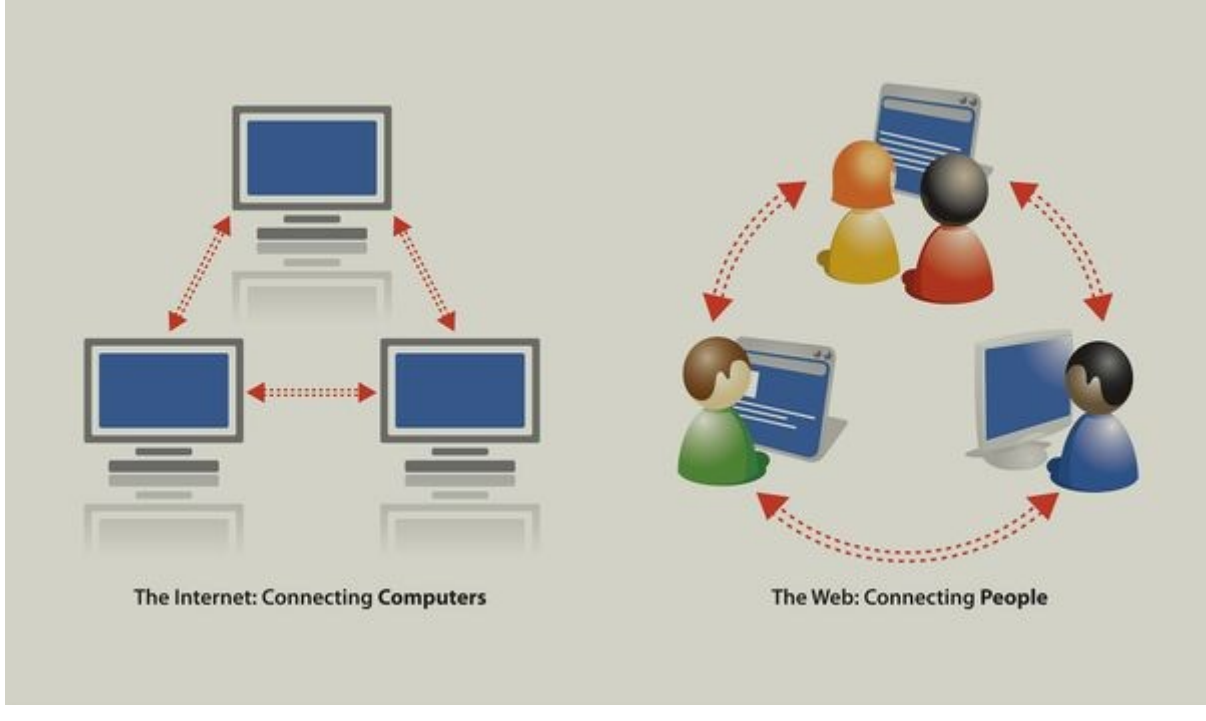
When you create websites you should have basic knowledge of the environment you build it for. And you should be aware how important security and performance are.

Browsing the web

Internet vs Web?

Internet vs Web?



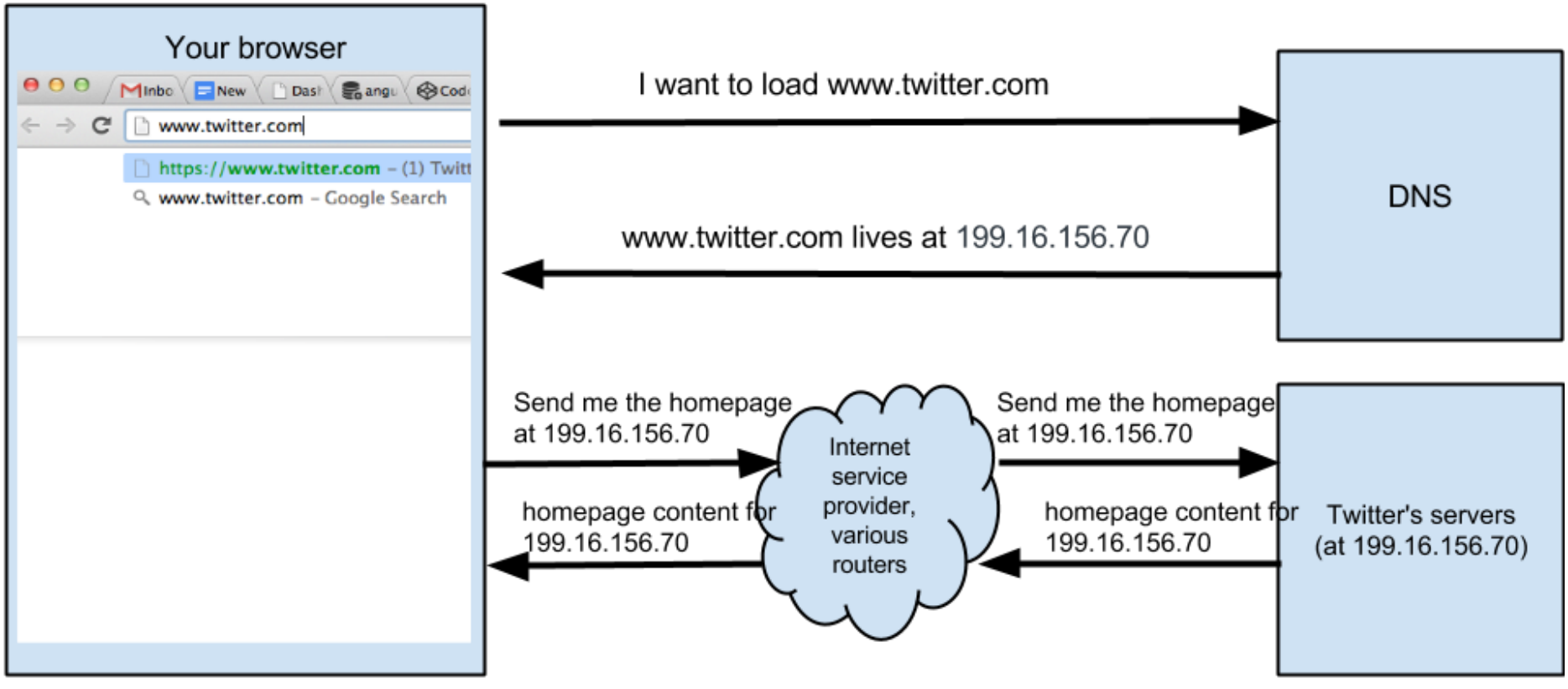
Internet vs Web?

Internet:

Network of networks. Global network of interconnected computers that communicate via **TCP/IP**.

Web:

The world wide web is an information system where documents and other resources are available over the internet. Documents are transfrerred via **HTTP/S**.



Clients and Servers

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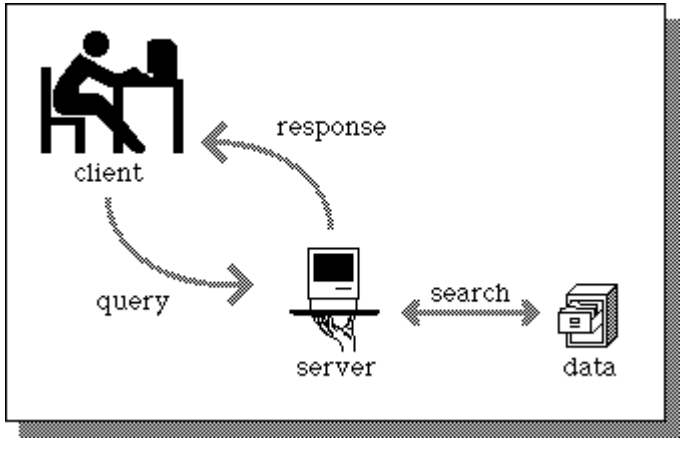

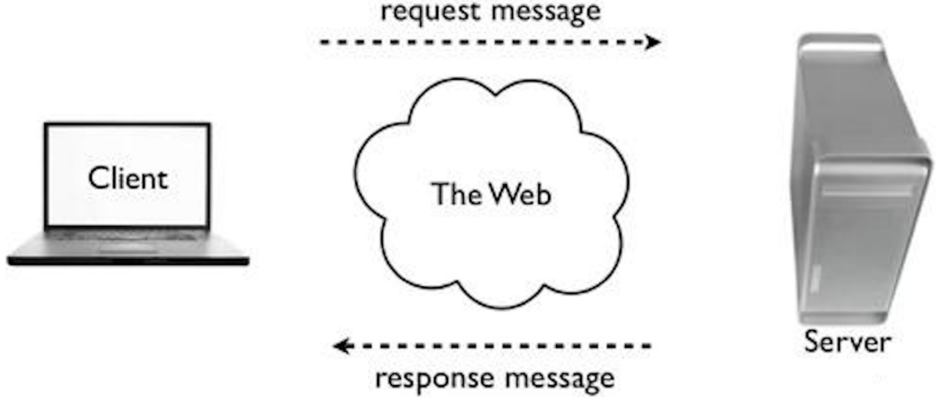

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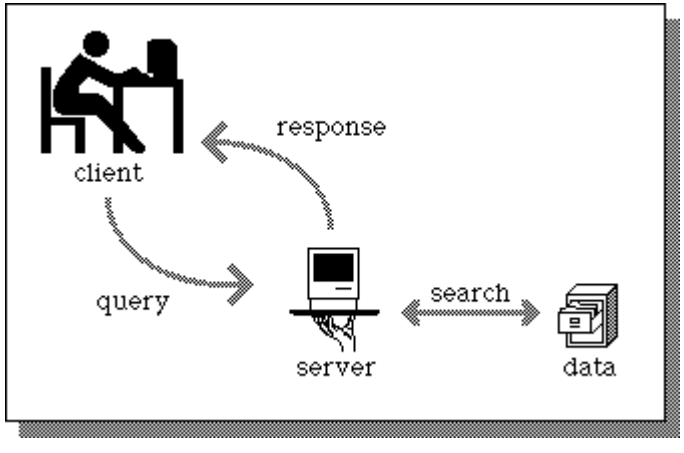

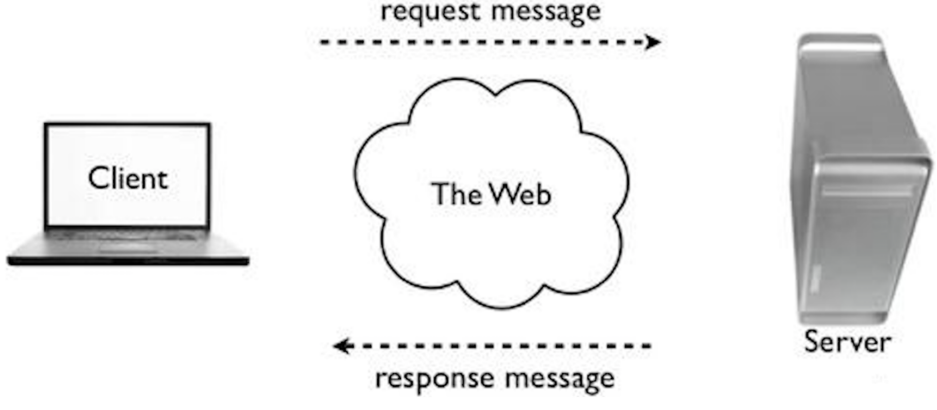

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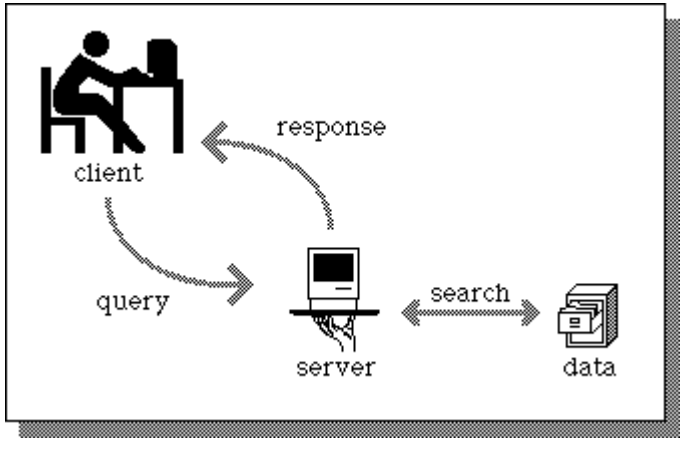

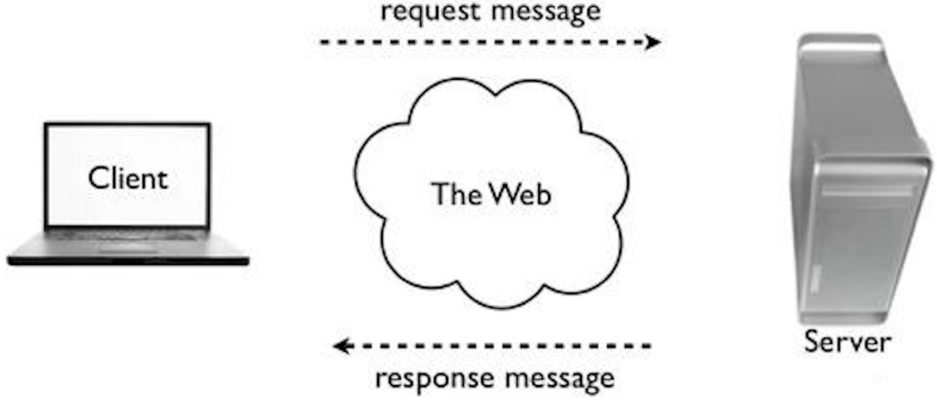

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- Computers can be **CLIENTS** or **SERVERS**

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results in an URL: https://powercoders.org/volunteer/it-trainer/

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- **tel**: phone protocol
  Triggers an external phone client and creates a new call via voice over IP

Domain

Anatomy of domain names:

subdomain.domain.topleveldomain

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- powercoders.org
- www.gmail.com
- calendar.google.com

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```
nslookup powercoders.org
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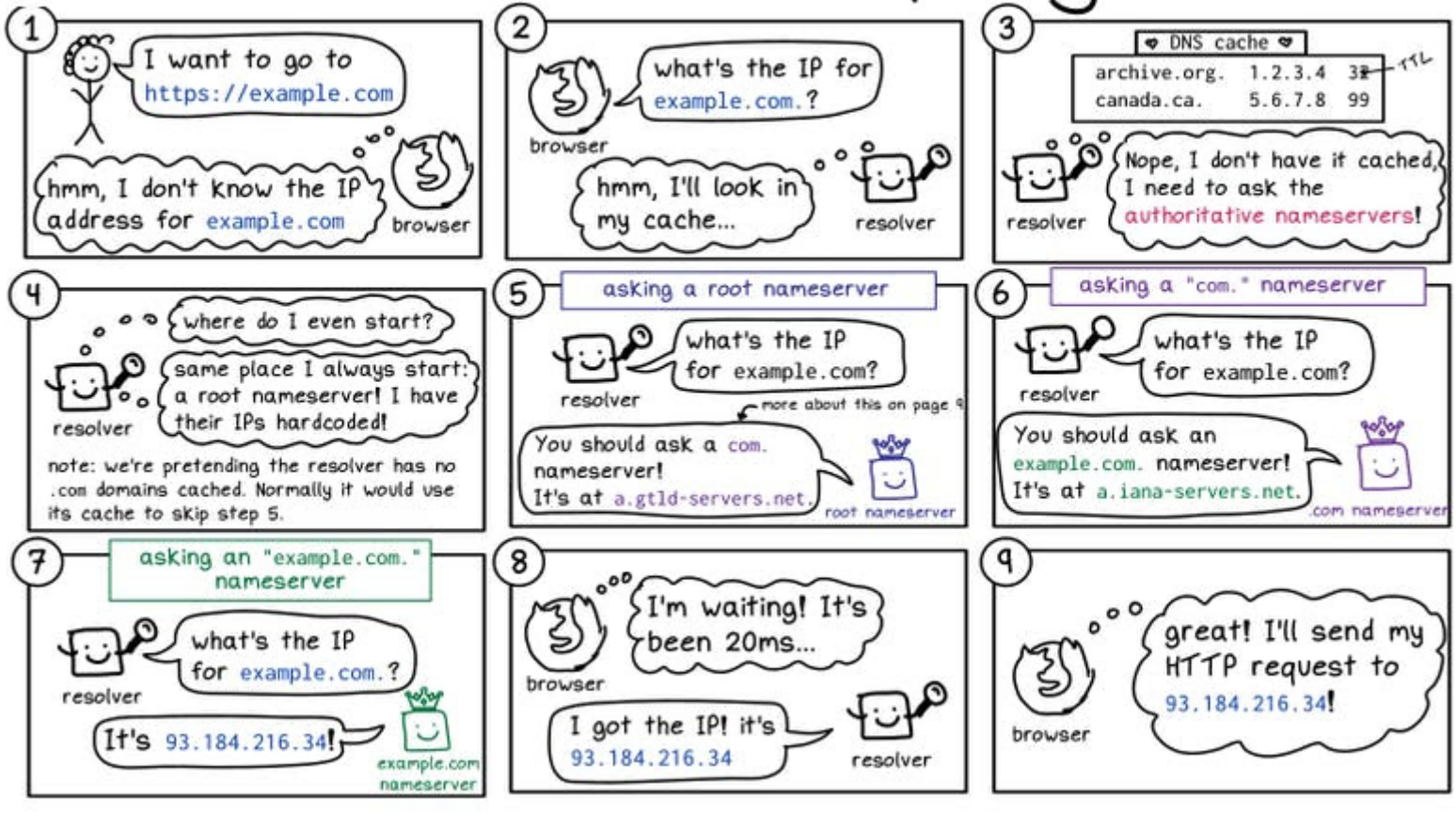
1. Type a web address (=URL) into the address bar
2. DNS connects you to the hosting server
3. Files are then sent back to your computer for display

life of a DNS query

Julia Evans
@b0rk



Intro to search engines: How to google

Search engines exist to **discover, understand, and organize** the internet's content in order to offer the **most relevant results to the questions** searchers are asking.

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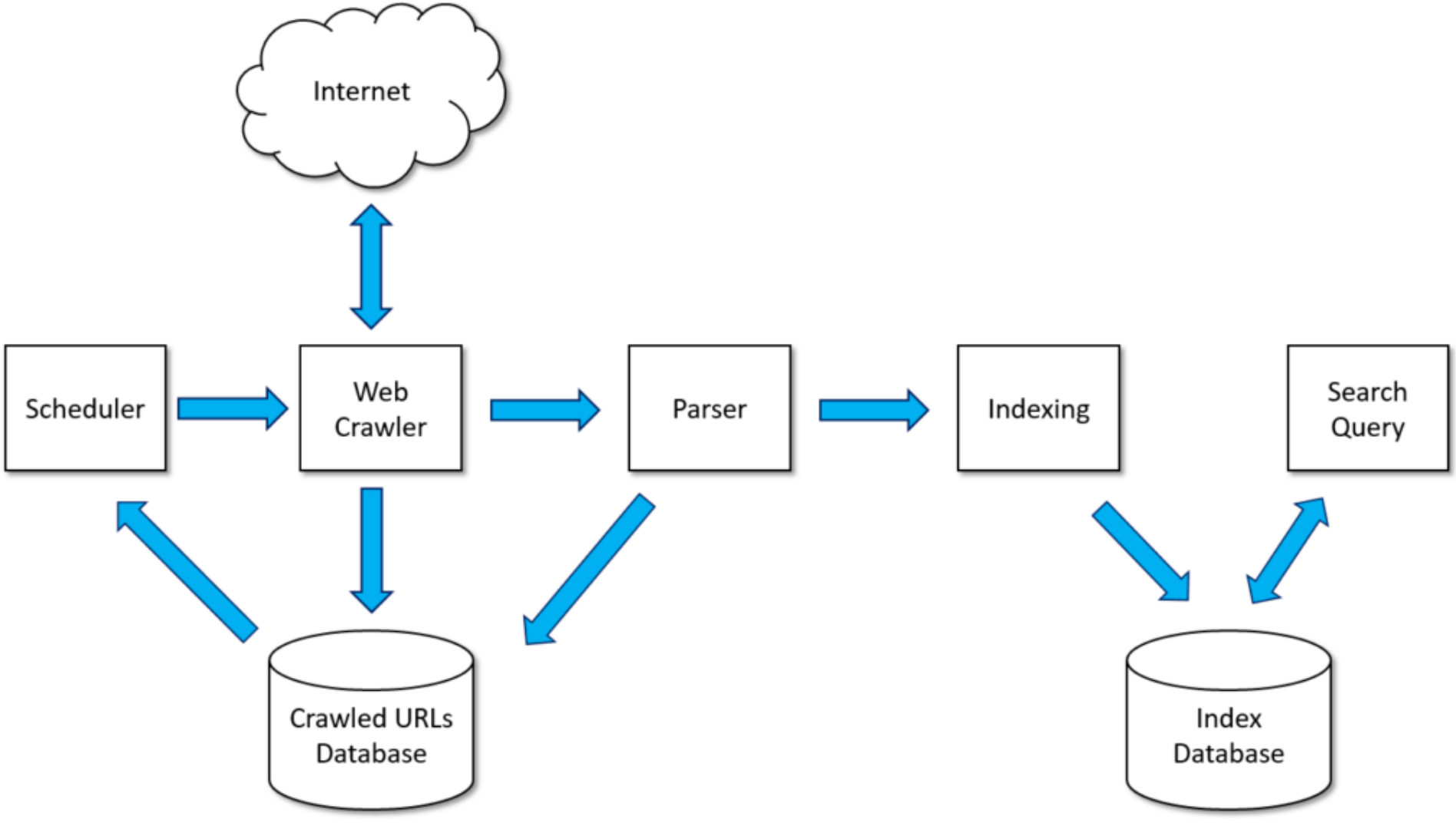
- **Ranking**: then the results of a search engine are ordered by relevance to answer the searcher's query.



How to search

- Search in English more results
- Use more than one word e.g. how to learn programming
- Give context e.g. go programming language
- Be precise e.g. go programming language for absolute beginners
- Use operators e.g. "math operators" javascript -jquery
- Check dates and up-to-dateness
- Use more than one source
- Search also images, scholar or books

Exercise 1

You want to find a co-working space nearby. You need to do some research online first.

Exercise 2

You want to learn Python and you are looking for the course / book / tutorial that fits your needs best.

Command line

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  - Terminal
  - Command prompt
  - Console
  - CLI

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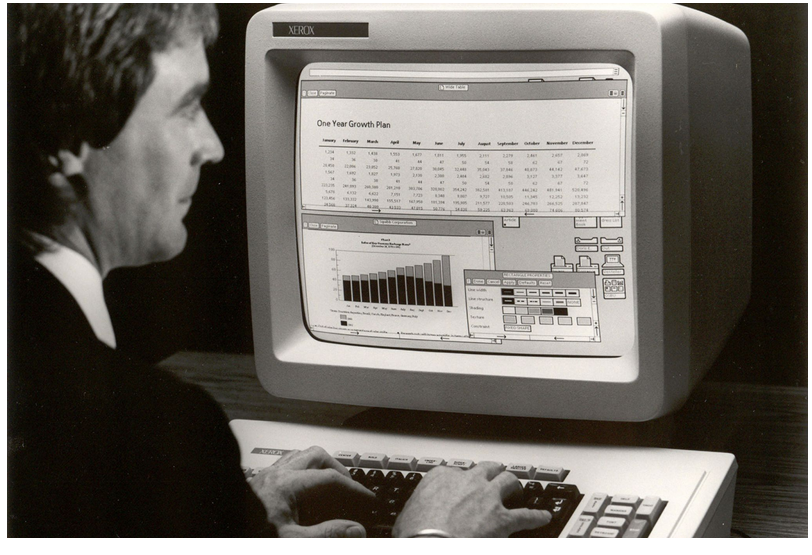
- CLI was the only way to communicate with the computer
- Wrong commands in the CLI often resulted in deleted data (= bad user experience)

?

GUI (Graphical User Interface)

- 10 years later the computer mouse changed everything



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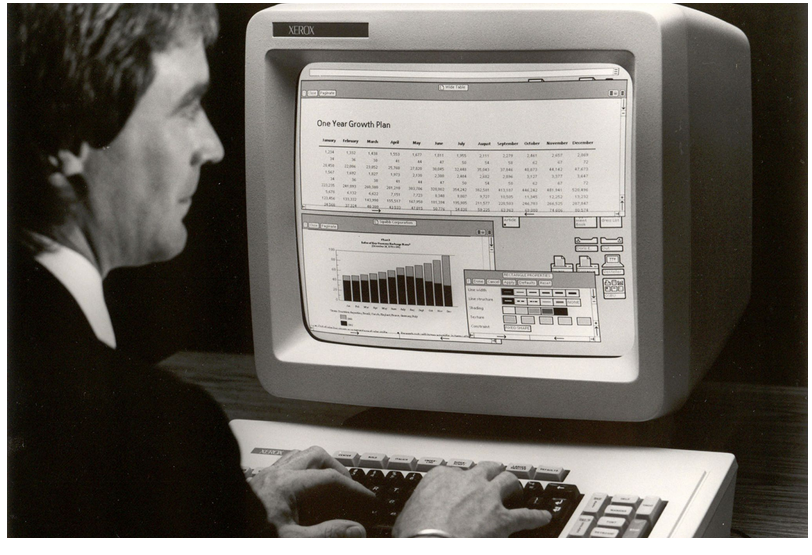

GUI (Graphical User Interface)

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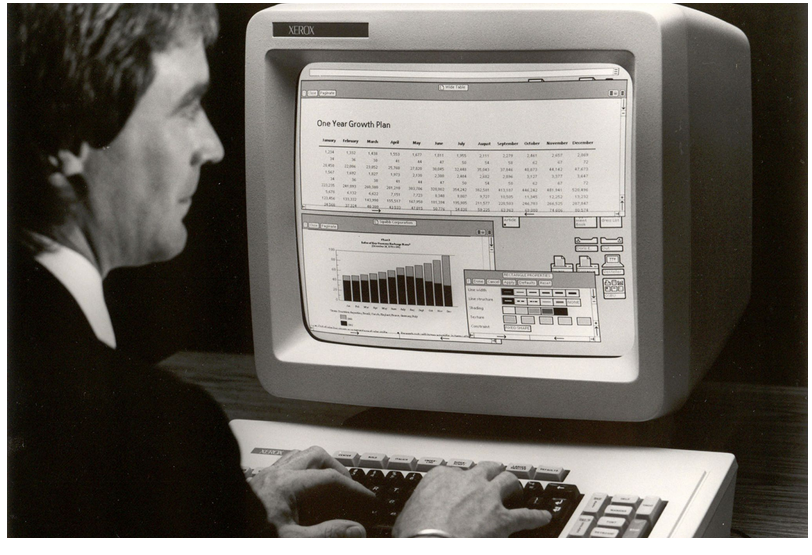
- Operating systems started to offer a **G**raphical **u**ser **i**nterface



And so when will I use CLI?

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In general you might use the command line to...

- Work with files and directories
- Open and close programs
- Manage computer processes
- Perform repetitive tasks
- Handle networking (remember `nslookup`)
- Use version control (like Git)

CLI on Windows vs. Mac

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- Windows uses `PowerShell` and `cmd.exe`, 2 different shells with their own syntax.
- We already installed `zsh` as our preferred shell.

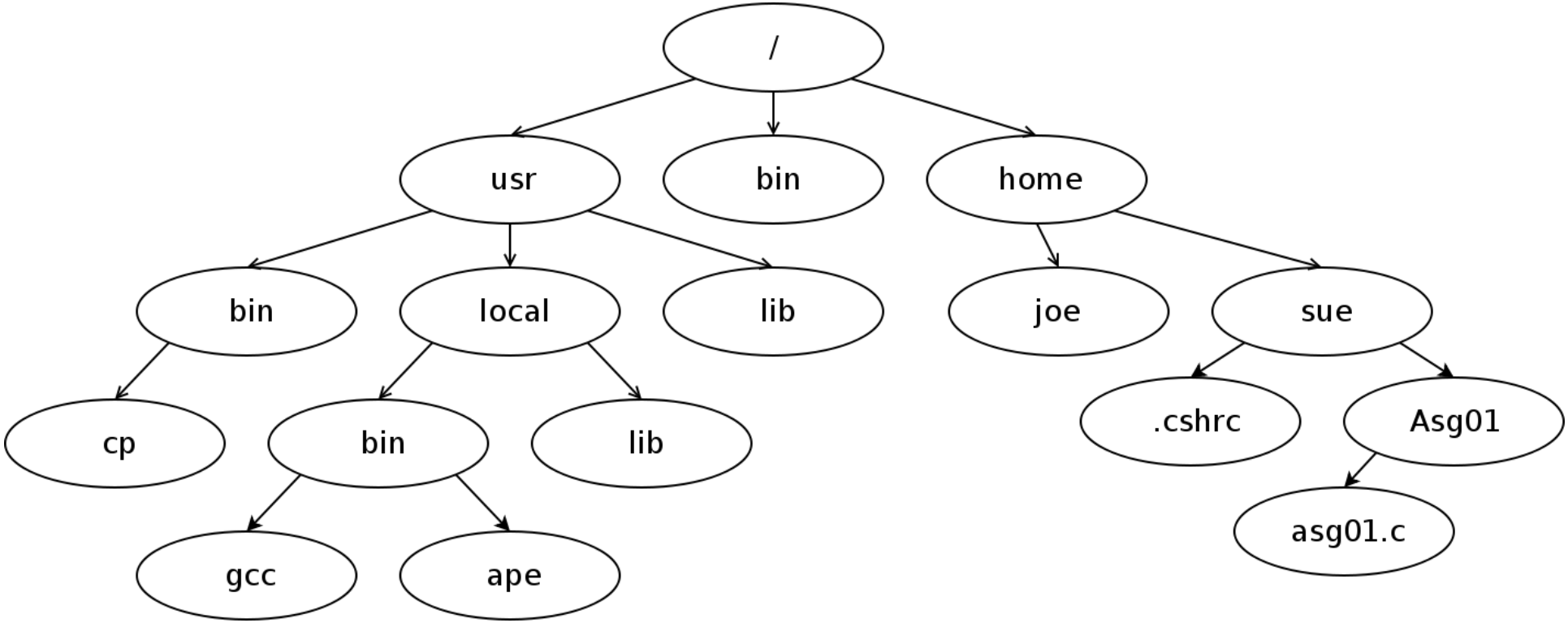
Directories

Also referred to as "folders".

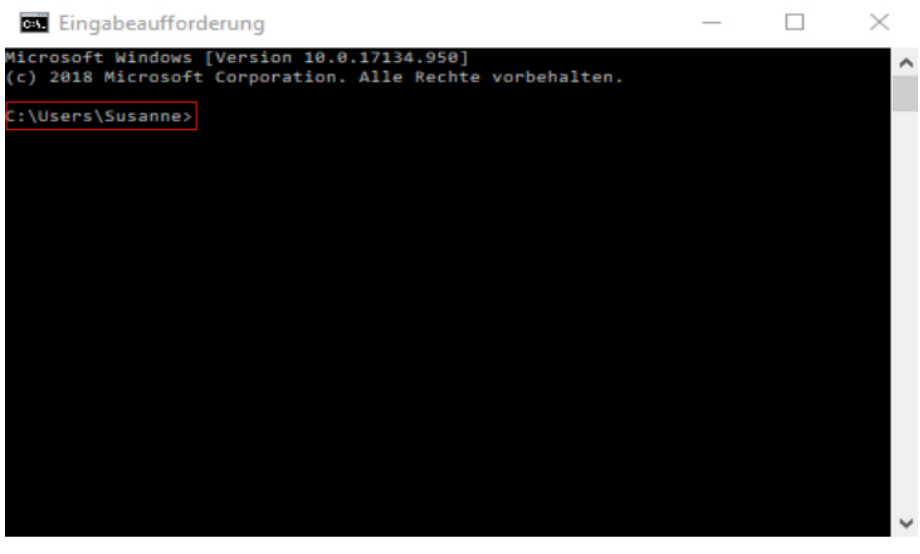
A directory is a container for files or other directories.

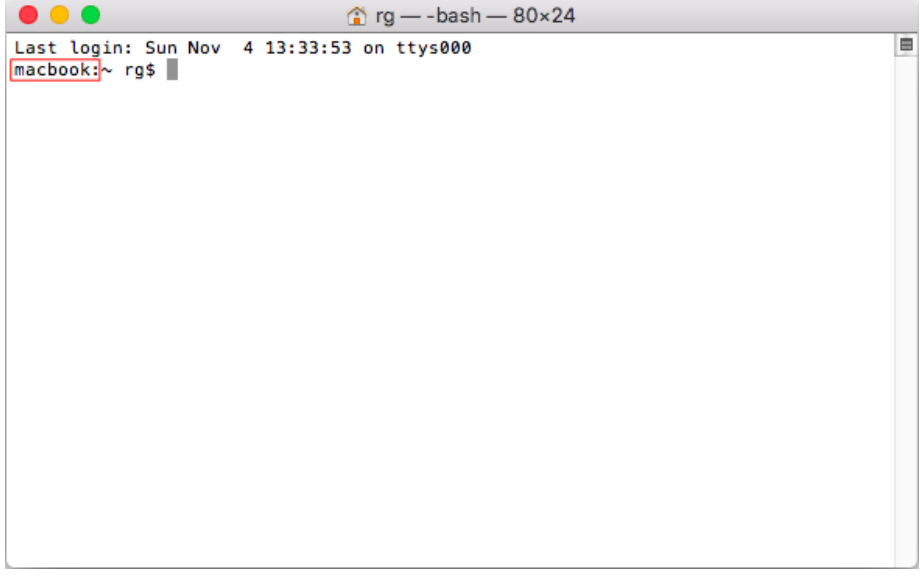
Directory Trees

At the very top of the tree is the root folder.



Prompt





Prompt

Usually shows your username and computer name.

Indicates that the terminal is ready for a command.

Cursor

Indicates your current spot in the terminal.

Shows you where the stuff you type will go.

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- `rm`: remove a file
- `pwd`: find out the file path of current directory you are in, from the root

Commands & Arguments

Many commands take one or more **arguments**, which come after the command, and give detail about what the command should do.

For example, `echo` takes an argument representing the text to be repeated.

```
$ echo "This is an argument."
```

Shortcuts

- Current Directory: `.`
- Parent Directory: `..`
- Home Directory: `~`
- Previous Directory: `-`

Bonus: Drag a folder into the terminal to show its path.

(Only works in Visual Studio Code in Windows.)

Tab Completion

Tab completion autocompletes commands and filenames.

- Pressing **tab** once autocompletes a unique instance.
- If there's more than one possible completion, pressing **tab** twice gives you all the options available.

Tutorials

- Windows: 1 hour playlist of tutorial videos
- OS X: Learn the command line
- Both: Introduction to the CLI

Try it yourself!

But first...

Your project over the next 7 weeks

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For absolute beginners in web development, it is recommended to do the project in web dev.

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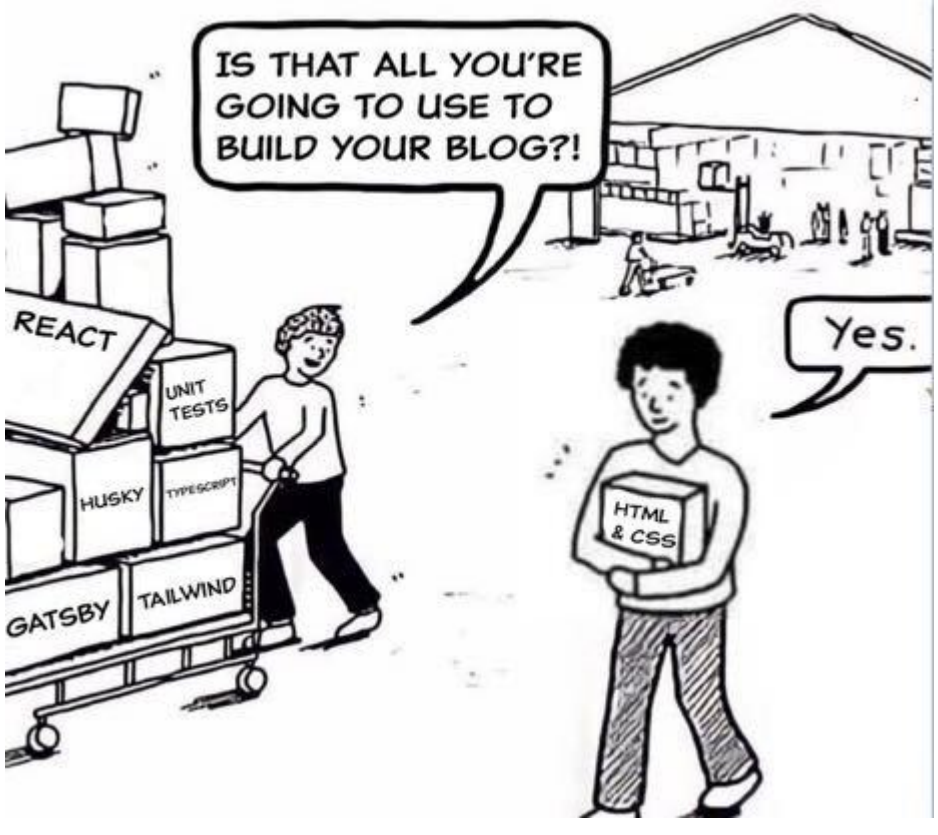
In web development, you could build a portfolio website. Or any other website, blog or even shop.

Goal should be to use what you learn during the bootcamp.



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Any questions?

Back to CLI...

Try It: Your First Commands

1. Open your terminal.
2. Type `echo hello` into your terminal and press **enter**.
3. Type `pwd` into your terminal and press **enter**.
4. Type `clear` into your terminal and press **enter**.

If you are stuck somewhere, try `Ctrl + C` to get back to your entry cursor.

`clear`

The `clear` command clears the contents of the terminal and issues a prompt.

This is good for removing previous output that is unnecessary to the task at hand.

Feel free to use this whenever things get too cluttered.

Working with Directories

The Current Directory

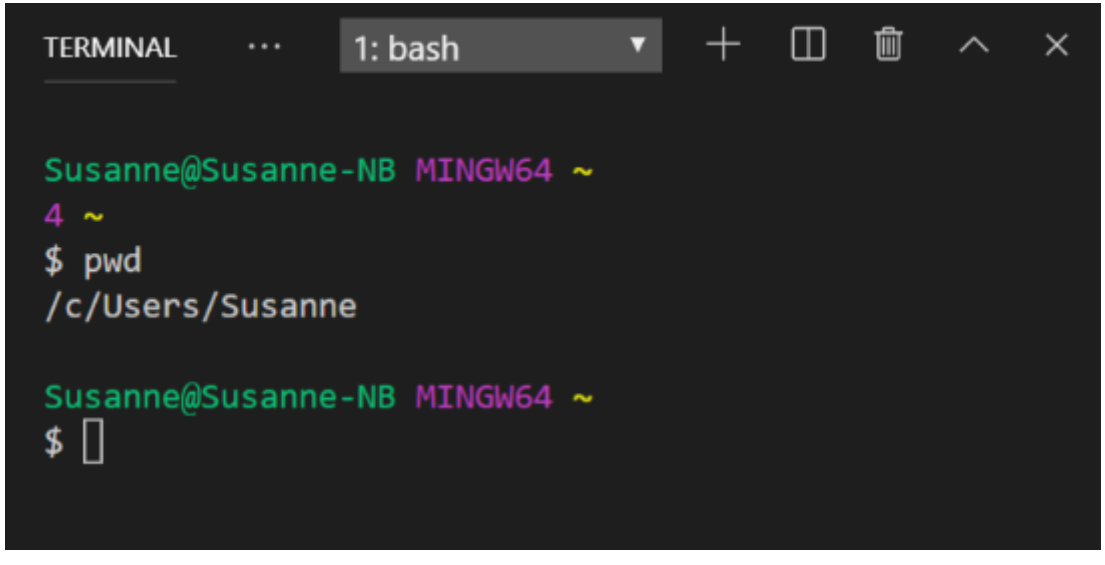
`pwd`

(Print Working Directory)

Type it whenever you want to see what directory (folder) you're in.

pwd

(Print Working Directory)



Paths

Nested files and directories can be referenced using **paths**.

Each directory or file is separated by a forward slash `/`

There are two kinds of paths:

- Relative: `Desktop/the_project/overview.txt`
- Absolute: `/Users/Susanne/Desktop/logo.png`

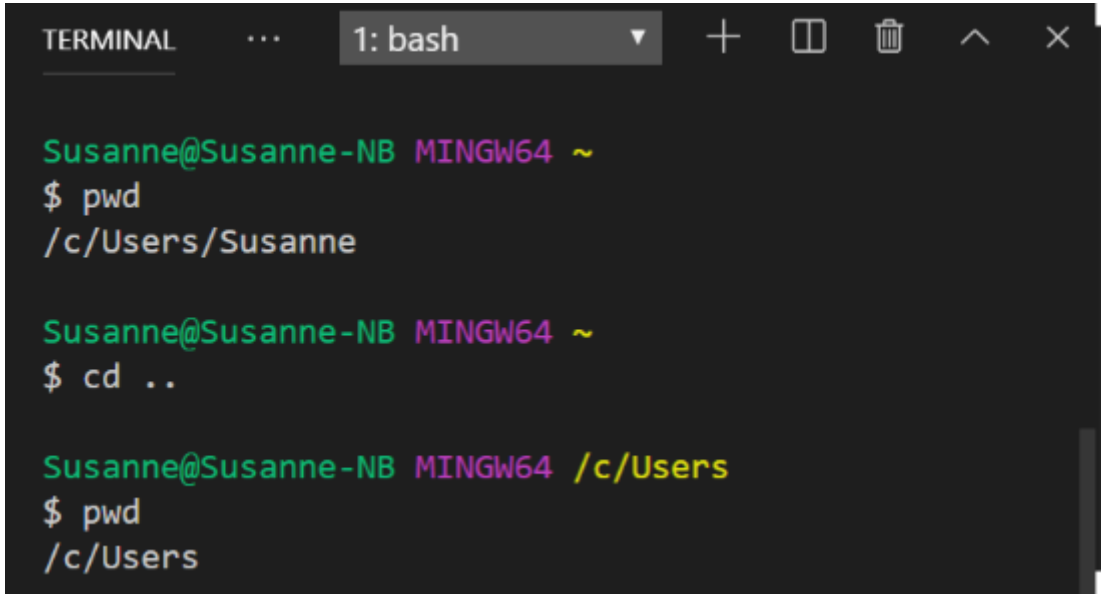
`cd`

The `cd` command changes the current working directory.

It expects a file path as an argument.

If no file path is given, it assumes your home directory by default.

cd



Shortcuts

- Current Directory: `.`
- Parent Directory: `..`
- Home Directory: `~`
- Previous Directory: `-`

Bonus: Drag a folder into the terminal to show its path.

(Only works in Visual Studio Code in Windows.)

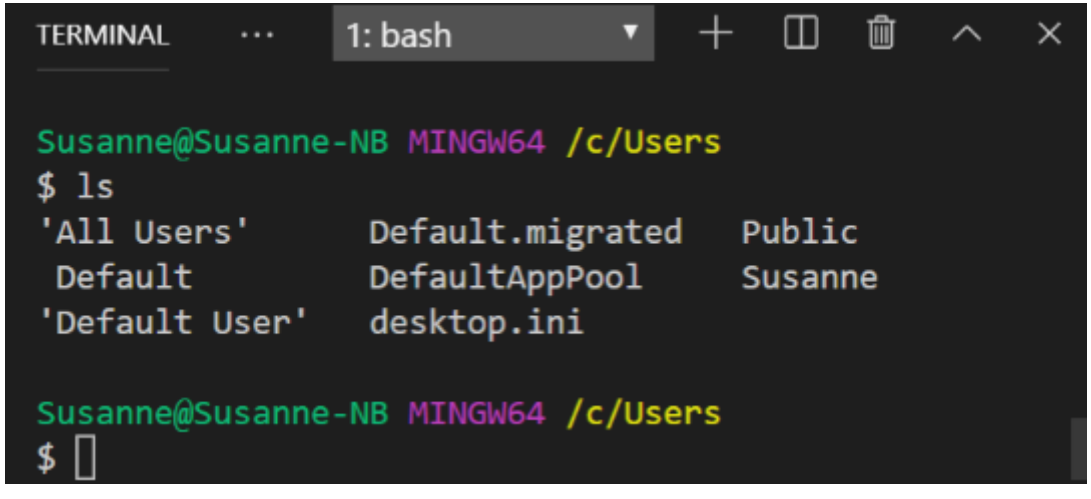
List

The `ls` command lists the contents of a directory.

It expects a file path as an argument.

If no file path is given, it assumes the current directory by default.

ls



Flags

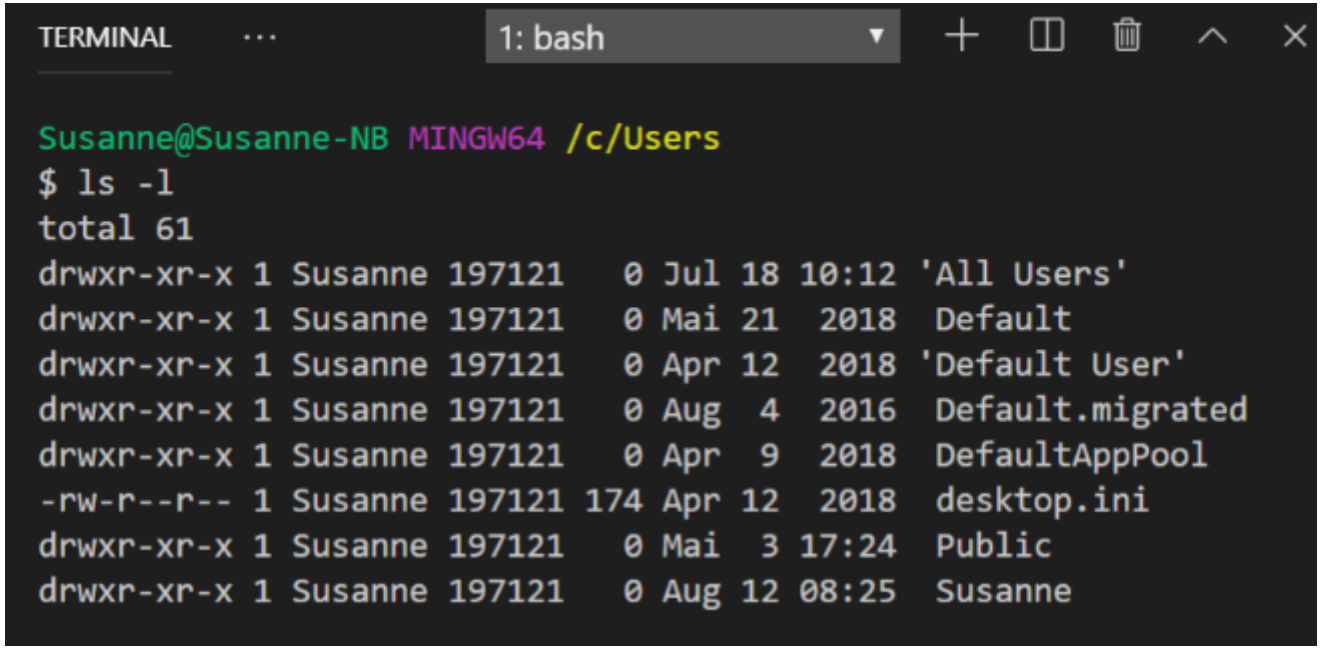
The `ls` command accepts several option flags.

A **flag** is a special argument that is used to set an option for the command.

These are commonly a hyphen followed by a single character (e.g. `-g`)

`ls -l`

Setting the `-l` flag on the `ls` command causes it to provide more verbose (long) output.



Hidden Files

Filenames that begin with a period are hidden from normal output.

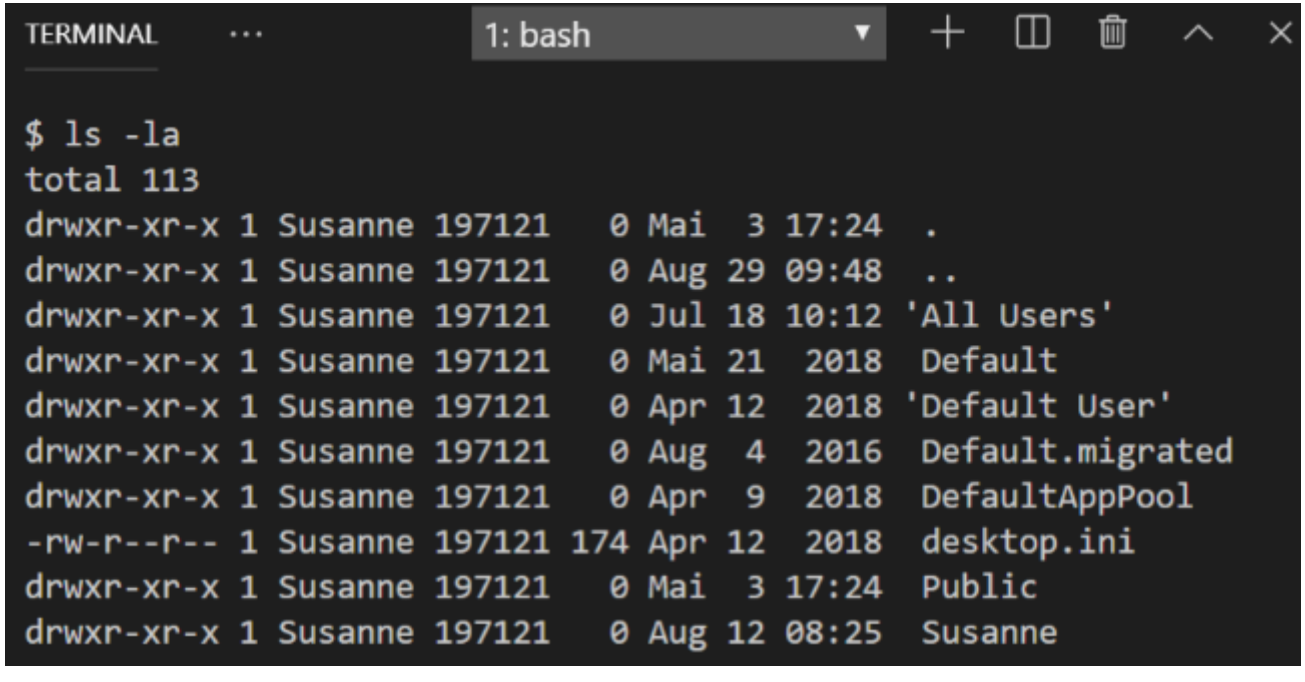
e.g. ".bashrc"

Use the `ls` command with the `-a` flag to see hidden files in addition to the usual output.

Type `ls -la` into your terminal.

Use the `-h` flag to get human readable file sizes.

`ls -la`



Tab Completion

Tab completion autocompletes commands and filenames.

- Pressing **tab** once autocompletes a unique instance.
- If there's more than one possible completion, pressing **tab** twice gives you all the options available.

Try It Yourself

Play with the `cd` and `ls` commands.
Be sure to incorporate:

- relative and absolute file path
- the `.` shortcut
- the `..` shortcut
- the `~` shortcut
- `cd` without an argument

Use `pwd` to check your location periodically.

Use Tab completion to autocomplete commands and filenames.

Make a Directory

Use `mkdir` to create a new empty directory.

Pass the path of the directory name as the first argument.

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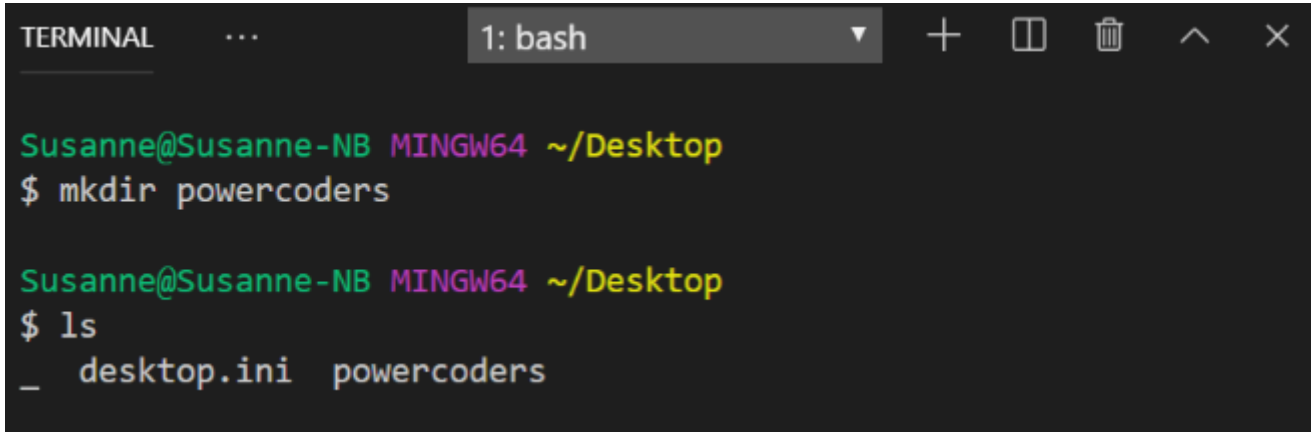
Use the `-p` flag to create the full path if non-existent.

mkdir

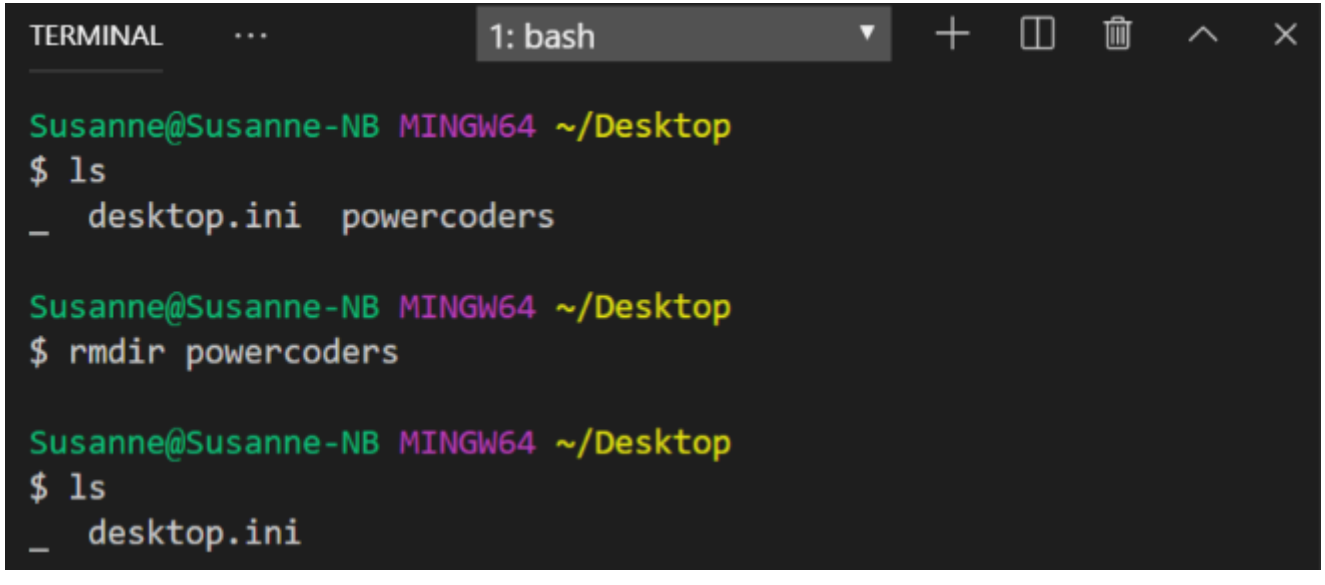


Remove a Directory

Use `rmdir` to remove an empty directory.

Use `rm -r` to remove a non-empty directory.

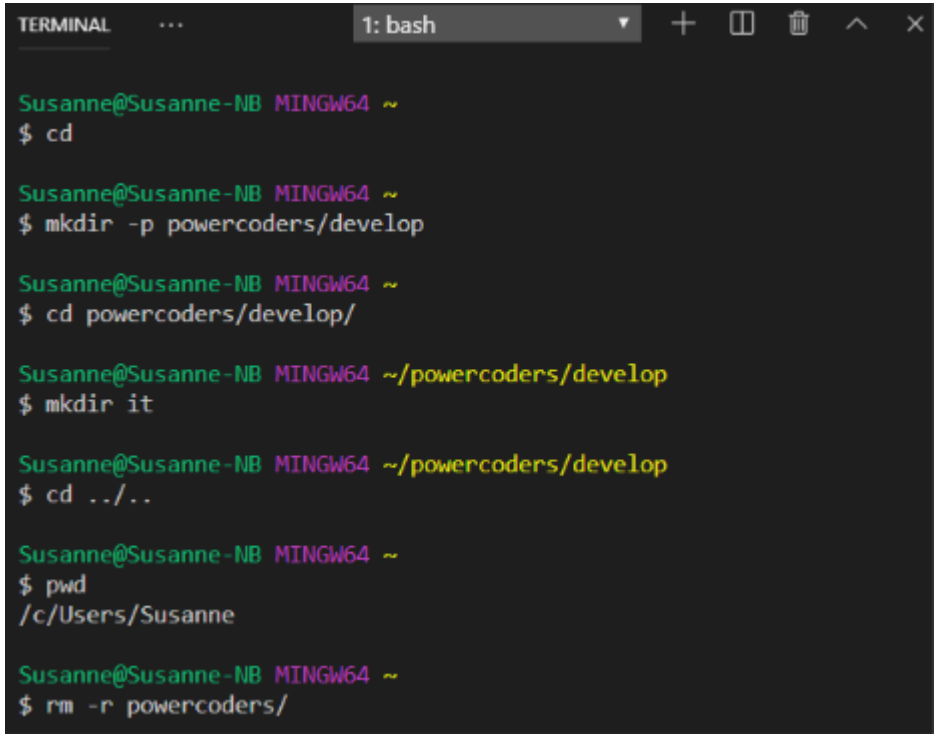
rmdir



Try It Yourself

1. `cd` to your home directory.
2. Create the **powercoders/develop** directory path.
3. Navigate into the **powercoders/develop** directory.
4. Create the **it** directory.
5. Navigate up two directories.
6. Use the `pwd` command to verify you are home.
7. Remove the **powercoders/develop/it** path.

Try It Yourself



Working with Files

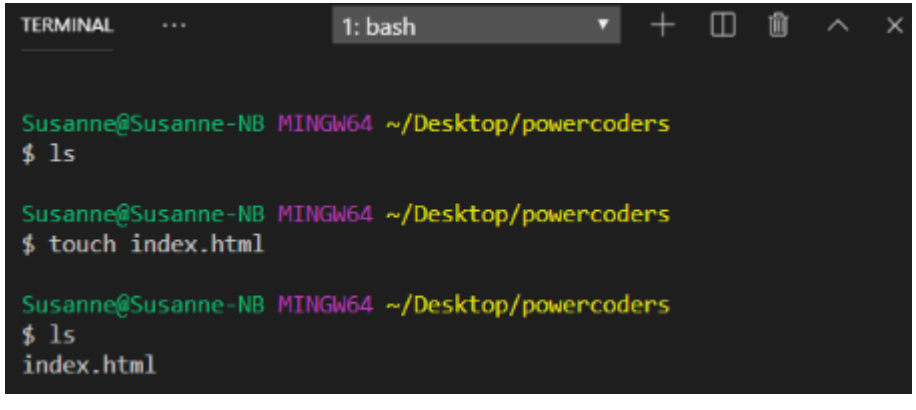
Create a File

Use `touch` to create a new file.

The `touch` touch command expects the name of your new file as an argument.

touch

(create a file)



Copy a File

Use `cp` to copy a file.

The `cp` command takes two arguments:

- 1st argument = the "origin" file
- 2nd argument = the "destination" file

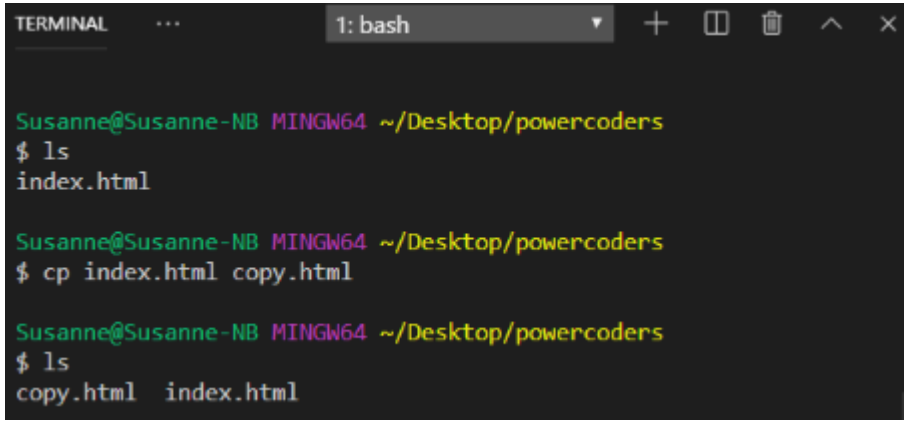
```
$ cp resume.txt resume-copy.txt
```

Use `cp -R` to copy a whole directory and all files in it.

cp

(copy a file)

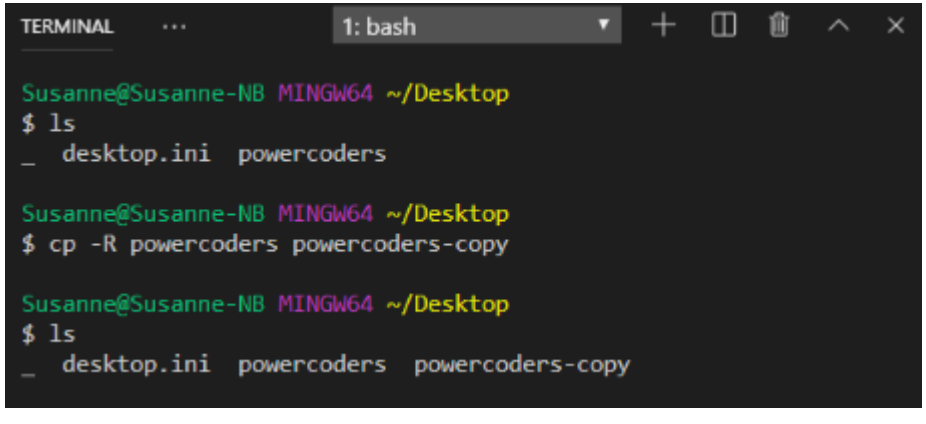
```
cp origin destination
```



cp -R

(copy a whole directory)

```
cp -R origin destination
```



Moving (or Renaming) a File/Directory

Use `mv` to move a file or directory.

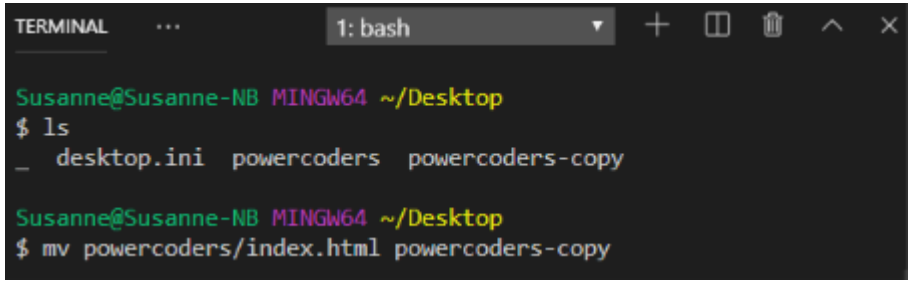
The `mv` command takes two arguments:

- 1st argument = the "origin"
- 2nd argument = the "destination"

If the destination is a filename, the file will be renamed.

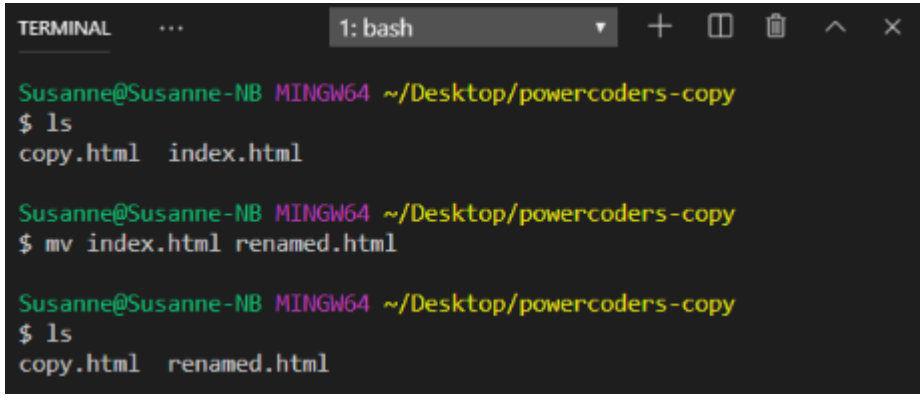
Move a File/Directory

```
mv origin destination
```



Rename a File/Directory

```
mv origin destination(filename)
```



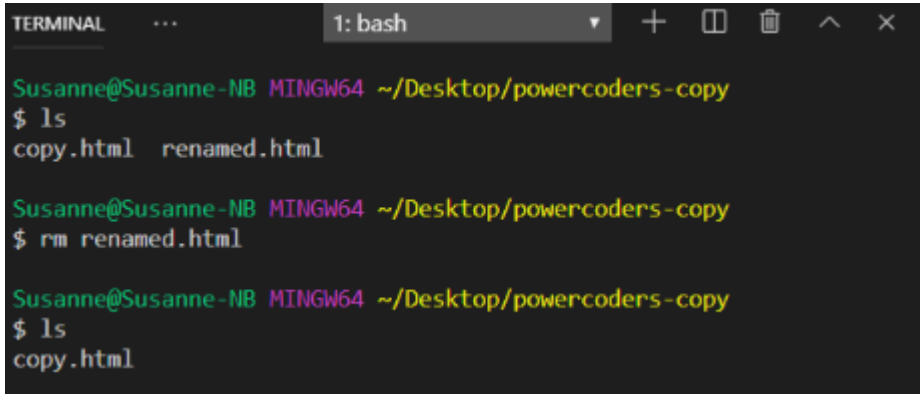
Remove a File

Use `rm` to remove a file.

The `rm` command takes the name of the file you are removing as an argument.

rm

(remove a file)



Try It Yourself

1. Create a folder called **cli**.
2. Make that folder your current working directory.
3. Create two files: **file1.txt**, **file2.txt**.
4. Copy **file1.txt** and call the copy **file3.txt**.
5. Create a directory called **folder1**.
6. Move **file1.txt** into **folder1**.
7. List the contents of **folder1** without going into it.
8. Rename **file1.txt** to **myfile.txt**.
9. Remove the directory **folder1**, including the file inside.

Read a File

Use `cat` to output the contents of a file to the console.

Use `more` to step through the contents of a file one screen at a time.

Use `less` to step backwards or forwards.

Use `q` to get out of the `less`.

Open a File/Directory

Use `open` to open a file or directory in its default app—the equivalent of double-clicking it.

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Use `open` to open a file or directory in its default app—the equivalent of double-clicking it.

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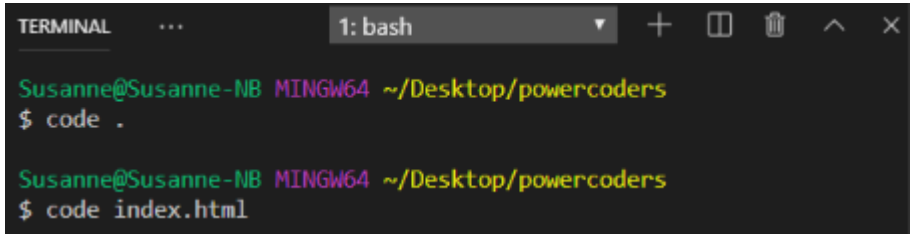
Pass the path of the file or directory name as the argument.

Open a File/Directory

Use `code .` to open the current directory in VSC.

Use `code` plus filename to open a specific file of the current dirctory in Visual Studio Code (VSC).



Edit a File

You can use various editors built into bash, including `vi` and `nano`.

Enter the editor command and the file path:

```
$ nano myfile.txt
```

Or on a Mac, you can open with any desktop app:

```
open -a TextEdit myfile.txt
```

Or with the default editor:

```
$ open -t myfile.txt
```

Try It Yourself

1. Navigate to the **powercoders** directory you made before.
2. Use `vi` or `nano` to add a few sentences to **file2.txt**, then exit and save.
3. Mac users, read the new contents of **file2.txt** in your terminal.
4. Everyone, try using `code` to open **file2.txt** in Visual Studio Code.

Working with Commands

Command Line Movement

- **ctrl-a**: jump to beginning of line
- **alt-f**: jump forward a word
- **alt-b**: jump back a word
- **alt-d**: delete word
- **alt-t**: transpose two words

More Command Line Movement

- The ← and → arrow keys let you edit within a command
- The ↑ and ↓ arrow keys let you select previous commands
- `tab` auto-completes filenames and directories

```
$ cd ~/pr[TAB]ojects/ac[TAB]medesign/doc[TAB]umentation/
```

Command Line History

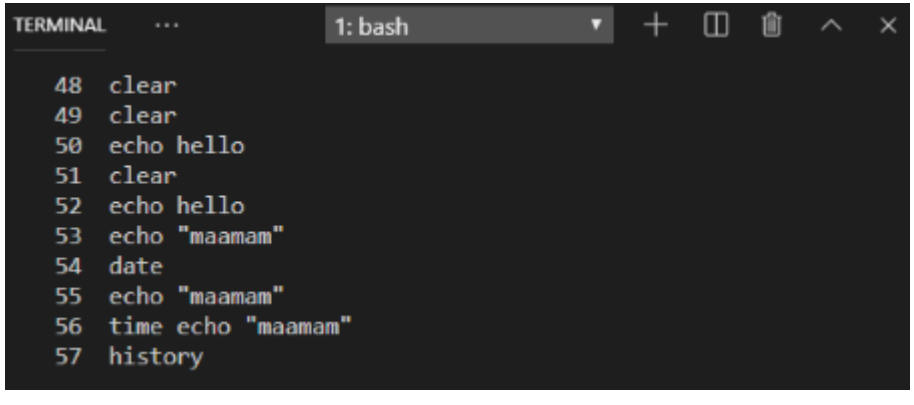
Use the `history` command to see a list of all your previous commands.

Each command will be listed next to a line number.

A few history-related commands:

- **!!**: Latest command
- **!54**: Command by line number
- **!code**: Command matching a string

history



Try It Yourself

1. Use your `up` and `down` arrows to locate a past command with one or more arguments.
2. Move your cursor to the beginning of the line.
3. Move your cursor from word to word to the end of the line.
4. Change one of the arguments and run it.
5. Run the `date` command.
6. Re-run the command from step 4 using `!`.
7. Time the execution of your original command by running `time !!`.

TROUBLESHOOTING

What can go wrong?

- Mis-spell a command: `aaaaaaaa` ('a' x 8)
- `cd` in to a directory that does not exist
- `cd ...`
- `cd .`
- `cd filename`
- `rmdir aaaaaaaa`

Where's the prompt?!

Different processes have different ways of exiting back to the prompt. If you're stuck, try one of these:

- **ctrl + c**
- **ctrl + x**
- `q`
- `:q`
- **esc** key, then `:q`

`command not found`

If you receive a `command not found` error message, check for typos!

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Otherwise, you may need to install the software that uses the command.

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Otherwise, you may need to install the software that uses the command.

Try searching online for:

> how to install [command-name-here] on [Mac/Windows/Linux]

CHEATSHEET

Action	Windows	OS X
Print working directory	`cd`	`pwd`
List directory contents	`dir`	`ls`
Change to a subdirectory	`cd dir`	`cd dir`
Go up a directory	`cd ..`	`cd ..`
Create a directory	`mkdir dir`	`mkdir dir`
Delete a directory	`rmdir dir`	`rmdir dir`

... and many more on following cheat sheet

Further material

- CLI Challenge
- Networking in detail
- BGP visualized