# Files & Directories

# *Overview*

We’ve covered how to interact with Files for both input and output. But how are files stored/organized on our computer?

# *Learning Objectives*

- Be able to navigate directories and use them to organize files
- Describe how a computer may search through a directory
- Gain some understanding for the terminal, and what it does

# *Poll:*

Do you know what a “folder” is on a computer?

# *Poll:*

Do you know what a “directory” is on a computer?

# *Definitions pt.1*

What is a file:

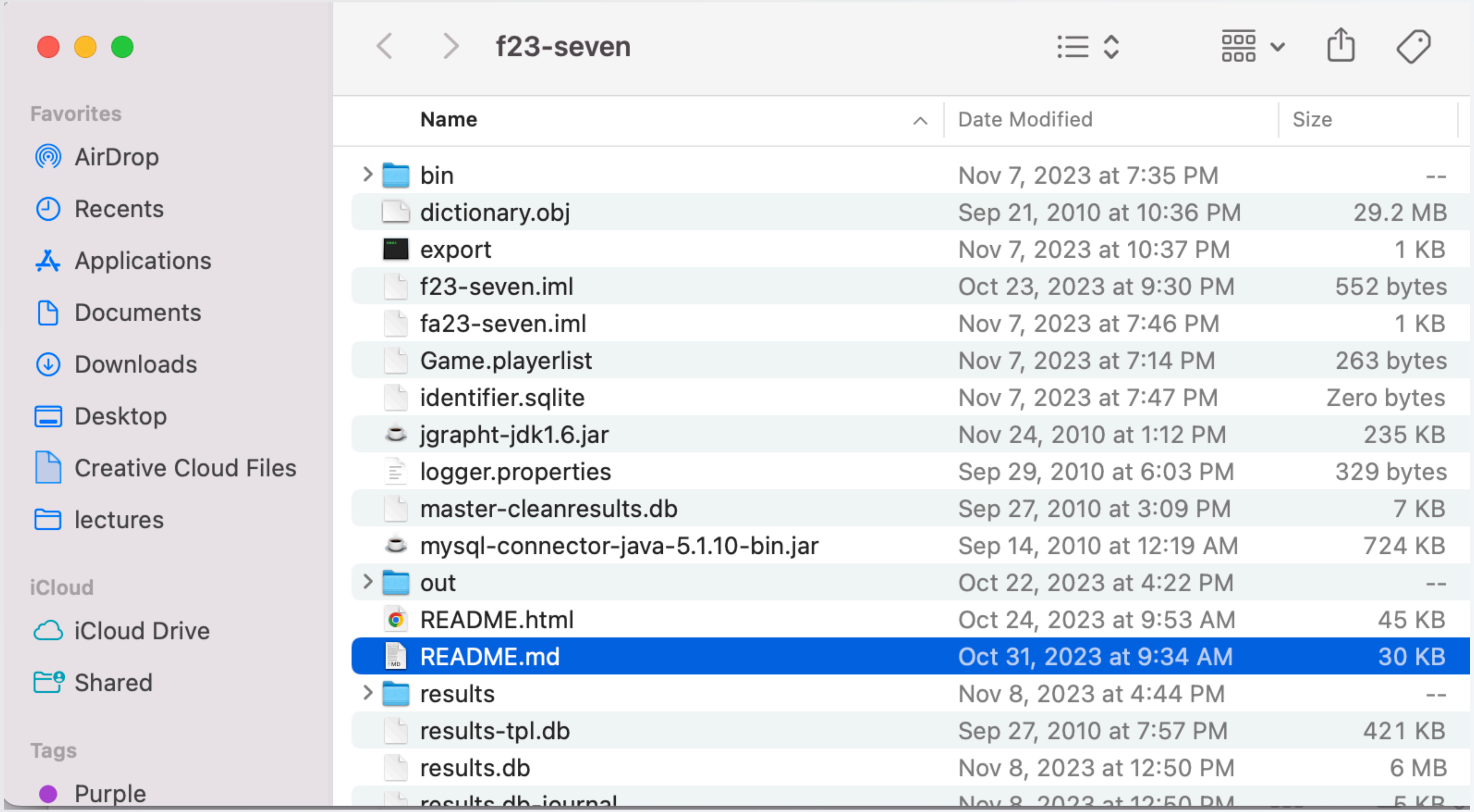
- A “resource” on a computer that holds data.
    - This data is held even when the computer is turned off.
- Files have names to identify them e.g. `Hello.txt`
- Files can be opened, read, written to, saved, deleted, etc..
- A file can store image data, programs, text, etc.
    - Anything that can be represented by a sequence of bits

# *Definitions pt.2*

What is a Directory (Folder):

- A directory is a special type of file that contains a list of other files (and directories)
- A directory is still named
- For most cases, we can use the word Directory and Folder interchangeably

## Is `README.md` a regular file or is it a directory?

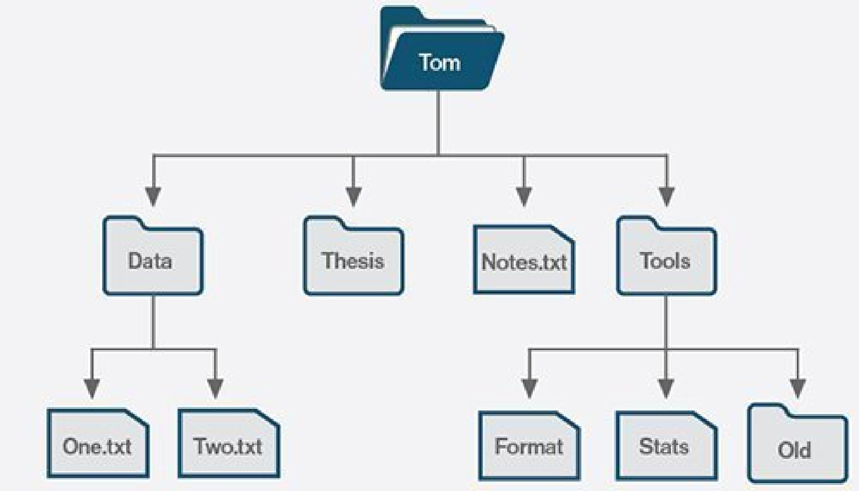


| Name | Date Modified | Size |
|---|---|---|
| bin | Nov 7, 2023 at 7:35 PM | -- |
| dictionary.obj | Sep 21, 2010 at 10:36 PM | 29.2 MB |
| export | Nov 7, 2023 at 10:37 PM | 1 KB |
| f23-seven.iml | Oct 23, 2023 at 9:30 PM | 552 bytes |
| fa23-seven.iml | Nov 7, 2023 at 7:46 PM | 1 KB |
| Game.playerlist | Nov 7, 2023 at 7:14 PM | 263 bytes |
| identifier.sqlite | Nov 7, 2023 at 7:47 PM | Zero bytes |
| jgrapht-jdk1.6.jar | Nov 24, 2010 at 1:12 PM | 235 KB |
| logger.properties | Sep 29, 2010 at 6:03 PM | 329 bytes |
| master-cleanresults.db | Sep 27, 2010 at 3:09 PM | 7 KB |
| mysql-connector-java-5.1.10-bin.jar | Sep 14, 2010 at 12:19 AM | 724 KB |
| out | Oct 22, 2023 at 4:22 PM | -- |
| README.html | Oct 24, 2023 at 9:53 AM | 45 KB |
| README.md | Oct 31, 2023 at 9:34 AM | 30 KB |
| results | Nov 8, 2023 at 4:44 PM | -- |
| results-tpl.db | Sep 27, 2010 at 7:57 PM | 421 KB |
| results.db | Nov 8, 2023 at 12:50 PM | 6 MB |
| results.db-journal | Nov 8, 2023 at 12:50 PM | 5 KB |

# *Organizing Files and Directories*

Files on a computer are structured as a **Hierarchical File System** built of directories can contain other directories.

- **Subdirectory** is used to describe a directory contained in another
- **Parent** and **Child** are often used to describe the relationship between a subdirectory and the directory it is in.
- a few directories are the "overall root" or "overall parent"



# *Poll:*

Can a file system have two files that are the same name?

# *Working Directory*

You can have two files that are the same name, but they must be in *different directories*.

To help with managing files when in the terminal (or file explorer), there is a **working directory**

- Working Directory is where we start when searching for files
- “The directory we are currently in”
  - `pwd` prints this out from a terminal
  - on Finder or File Explorer, it's listed at the top of the window.

Demo: navigating files & duplicate files

# *Paths*

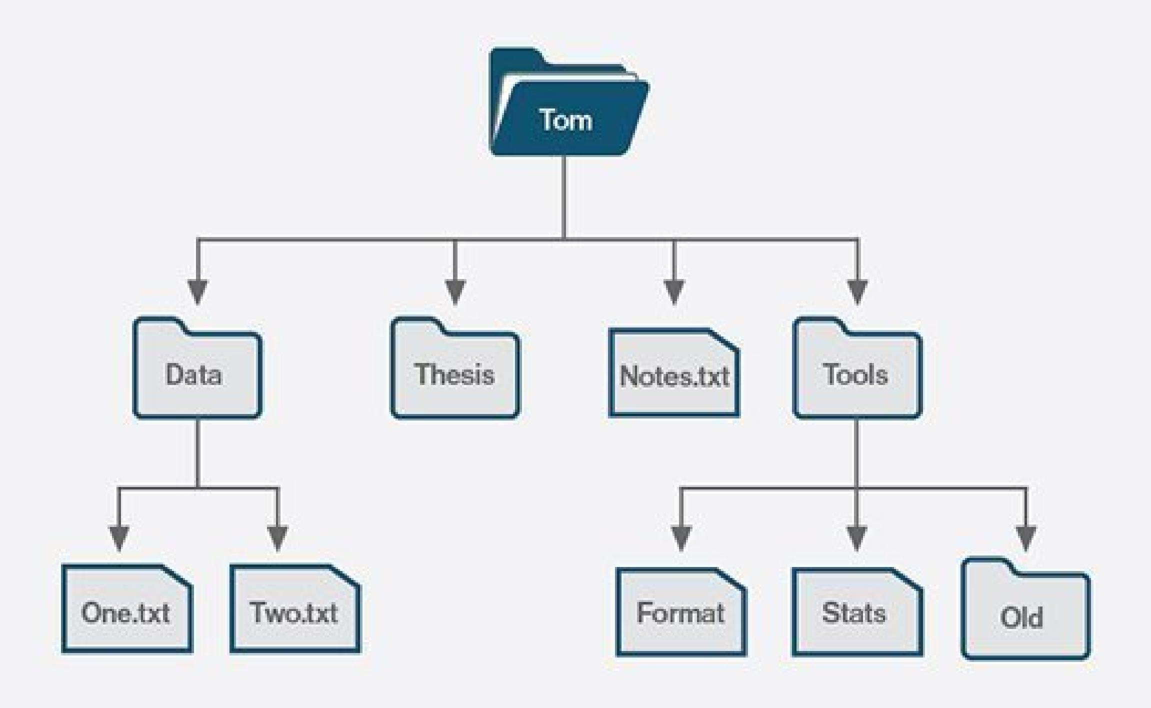
To specify a specific file, we have the concept of a path. A **path** describes the location of a file inside of a file system structure

- "Starting from a directory, how would I get to your file through other directories?“
- Relative path: starting from the current directory, e.g. `examples/Hi.java`
- Absolute path: starting from the root directory, e.g. `/home1/s/sharry/directory_demo/Hi.java` (starts with `/` or `\`)

A path comprises a list of directories seperated by either a `/` or a `\` character, depending on operating system (Windows, Mac, Linux)

# Path Work

- What's the root of this file system?
- If our working directory is `Data`, what's the *relative* filepath for the file called `Two.txt`?
- If our working directory is `Data`, what's the *absolute* filepath for the file called `Format`?



# *Java: File*

Java has a File object we can use for navigating Directories

Construct with `File f = new File(path);`

| Name | Description |
|---|---|
| `listFiles()` | Returns a `File[]` containing all entries in the directory |
| `getName()` | Returns the name of the file as a `String` |
| `isFile()` | Returns `True` if it is a normal file |
| `isDirectory()` | Returns `True` if it is a directory |

# *Demo: Ls.java*

Given a specified directory name, list all of the contents of that directory. This mirrors the `ls` command in the terminal.

# *Demo: Search.java*

Given a specified directory name, and a word print all of the files in that directory (or any subdirectories) that contain that word.

```
grep -rlw "path/to/directory/" -e "search string"
```