

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?

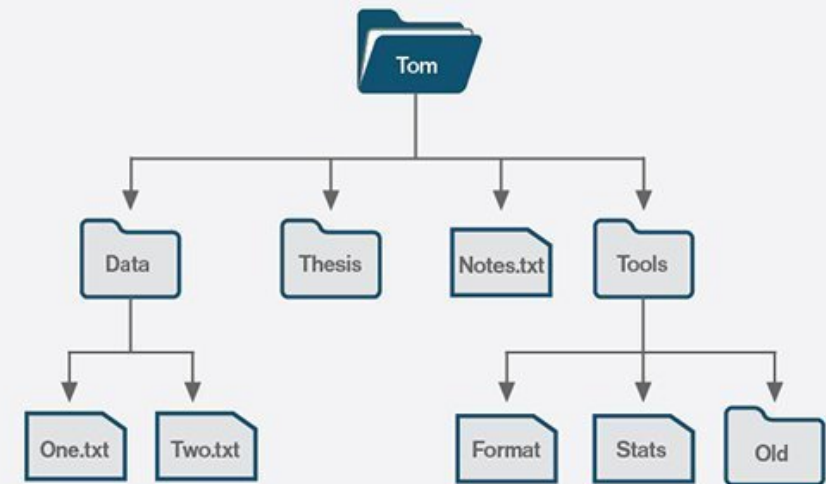
The screenshot shows a macOS Finder window titled 'f23-seven'. The left sidebar contains 'Favorites' (AirDrop, Recents, Applications, Documents, Downloads, Desktop, Creative Cloud Files, lectures), 'iCloud' (iCloud Drive, Shared), and 'Tags' (Purple). The main pane displays a list of files and folders with columns for Name, Date Modified, and Size. The 'README.md' file is highlighted in blue.

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 absolute directory, e.g. `/home1/s/sharry/directory_demo/Hi.java`

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

Java: File

Java has a File object we can use for navigating Directories

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

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