Operating Systems and File Structure

CMSC 104 Section 2
September 4, 2025

Administrative Notes

Classwork 1 will begin in the second half of today’s class period. It will be due next Wednesday night before midnight. Submit it on Blackboard.

Operating System Structure

“Back in the old days” - information in computers and networks was organized in terms of “files” and “directories”

- “Files” are resources stored on a computer that contain data, programs, configuration settings, etc.
    - Just a collection of things that you want to keep together and refer to by a single name
- “Directories” (sometimes called “folders”) are part of the system catalog structure
    - they contain references to files and other directories

Taken together, directories and files are ways of storing and referring to pretty much everything in the computer. They collectively make up the “file system”

Modern systems…

Google popularized the idea of “search” instead of filesystems

- People don’t have to understand directories, files, where things are stored and how to get to them
- As long as you know the name, you can just search for it and find it
- And that mostly works

But:

- Underneath it all, there is still a filesystem with directories and files - And since this is “Computer Science” you need to learn how it works

Different Operating Systems do things differently

Each operating system does things slightly differently

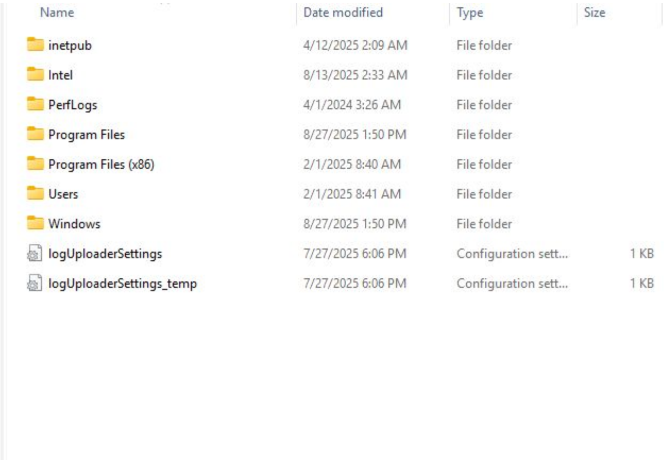
Windows:

- The filesystem is “rooted” at a system device, most commonly a disk, “C” (or some other letter)

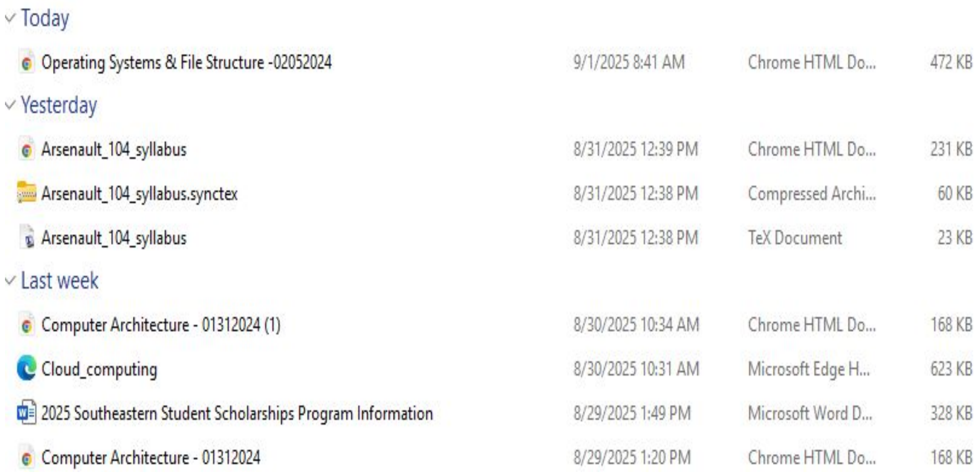
- Every file has a path that starts at that drive

- If you’re starting from the MS Cloud - e.g., using OneDrive - the filesystem starts at “OneDrive” instead of “C”

Windows Examples



Name	Date modified	Type	Size
inetpub	4/12/2025 2:09 AM	File folder	
Intel	8/13/2025 2:33 AM	File folder	
PerfLogs	4/1/2024 3:26 AM	File folder	
Program Files	8/27/2025 1:50 PM	File folder	
Program Files (x86)	2/1/2025 8:40 AM	File folder	
Users	2/1/2025 8:41 AM	File folder	
Windows	8/27/2025 1:50 PM	File folder	
logUploaderSettings	7/27/2025 6:06 PM	Configuration sett...	1 KB
logUploaderSettings_temp	7/27/2025 6:06 PM	Configuration sett...	1 KB



✓ Today			
Operating Systems & File Structure -02052024	9/1/2025 8:41 AM	Chrome HTML Do...	472 KB
✓ Yesterday			
Arsenault_104_syllabus	8/31/2025 12:39 PM	Chrome HTML Do...	231 KB
Arsenault_104_syllabus.synctex	8/31/2025 12:38 PM	Compressed Archi...	60 KB
Arsenault_104_syllabus	8/31/2025 12:38 PM	TeX Document	23 KB
✓ Last week			
Computer Architecture - 01312024 (1)	8/30/2025 10:34 AM	Chrome HTML Do...	168 KB
Cloud_computing	8/30/2025 10:31 AM	Microsoft Edge H...	623 KB
2025 Southeastern Student Scholarships Program Information	8/29/2025 1:49 PM	Microsoft Word D...	328 KB
Computer Architecture - 01312024	8/29/2025 1:20 PM	Chrome HTML Do...	168 KB

MacOS

The idea is the same (more or less) as Windows

MacOS uses the term “folder” instead of directory because they thought it was more understandable to the typical user

Mac Examples

iOS

Some examples from the iPhone

GUIs vs Command Lines

The Windows and Mac examples shared use “Graphical User Interfaces” or GUIs to present the files and directories

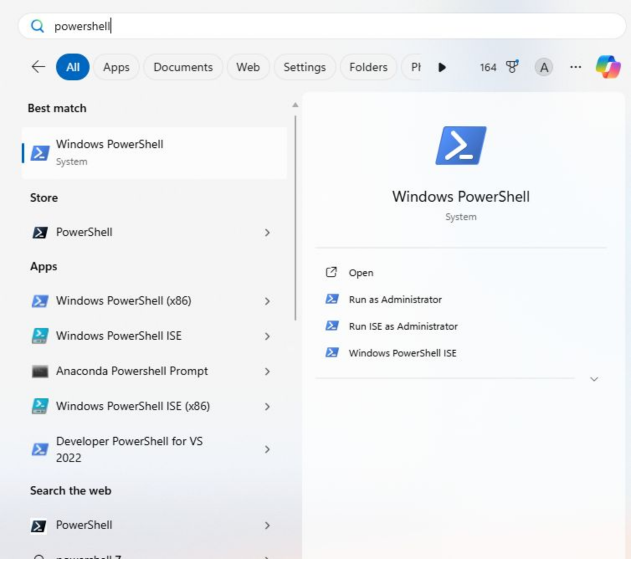
- You don’t have to type anything to move around the system; just click on various icons

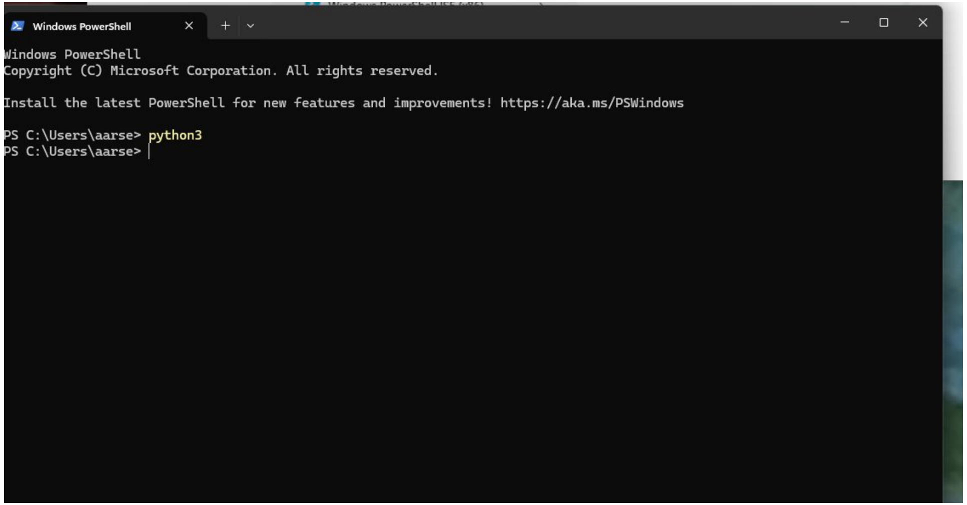
- “Make it simple for the user”

- But you can do the same with command lines

    - E.g., Windows PowerShell or Mac Terminal

Windows PowerShell Examples





```
Windows PowerShell
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Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows

PS C:\Users\aarse> python3
PS C:\Users\aarse>
```
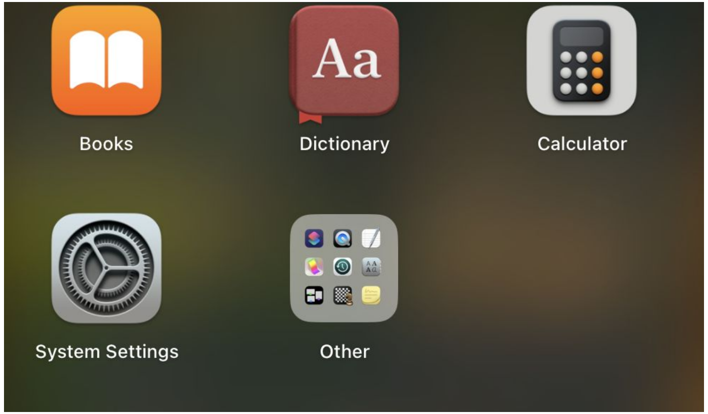
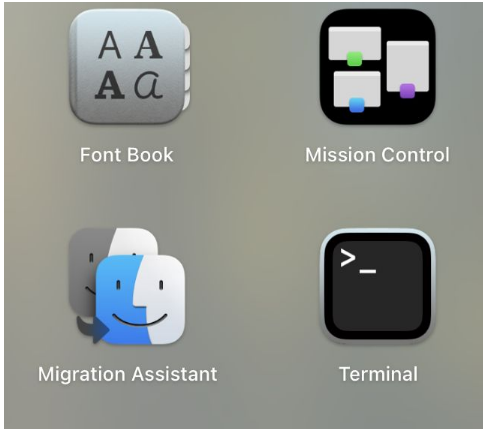
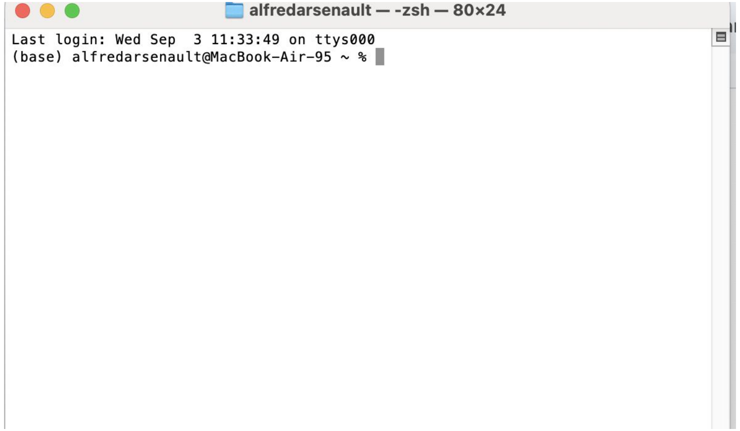

Mac Terminal Examples







```
Last login: Wed Sep  3 11:33:49 on ttys000
(base) alfredarsenault@MacBook-Air-95 ~ % 
```

Integrated Development Environments (IDEs)

To develop and run computer programs you need a number of tools:

- An “editor” where you can type in the code and edit it when you discover there’s a bug
- A way to run the code - to see if it works and see what your answer is
- A “debugger” - a tool to help you find and fix errors so that your program runs
- A directory/folder system with files
    - Simple programs are usually stored as a single file
    - Complex programs involve much more than one file
- Examples:
    - IDLE
    - PyCharm
    - VSCode
- We don’t care which one you use; any of them will work. Pick one you like

Python you need for classwork 1

When you write a Python program, the statements are executed sequentially - one statement at a time.

If you want something done more than once, you have to use a loop.

Syntax, for now:

for ***index*** in range(***begin, end, step***):

This colon is critical - leave it off and your program won't work

#your code goes here

Replace the bolded & italicized words with your actual values

Notes on semantics

Whatever goes where ***“index”*** is, is called a variable

Python grabs an empty location in the computer’s memory, and associates the variable name you used with that location

Variables:

- Have to start with an underscore or a letter, either upper or lower-case
    - Python is CASE SENsiTiVE!!
- Can contain letters, underscores, and digits, but nothing else
- Can be as long as you want

More semantics

for ***index*** in range(***begin, end, step***): *Right now we'll use integers here*

When this loop starts, "index" is set to the value in "begin"

Each time the loop executes, "index" is incremented by the value in "step"

When "index" has the value in "end" (or is greater), the loop does NOT execute!!!