CSCI-UA-4-005

Intro to Web Design + Computer Principles

Operating Systems + Unix

Professor Emily Zhao

Class Website

bit.ly/web-with-emily-f24

Agenda

- Classroom Agreements
- **What is a computer?**
- **Operating Systems**
- **Unix**
- Visual Studio Code
- Setting up i6 accounts

Classroom Agreements

- **Respect and Inclusivity**: Treat everyone with respect, listen attentively, and value diverse perspectives.
- **Active Engagement**: Participate in class discussions, ask questions, and contribute to a collaborative learning environment.
- **Clear Communication**: Communicate clearly and respectfully, and be open to giving and receiving feedback.
- **Supportive Environment**: Help each other and encourage a supportive and inclusive atmosphere.
- **Effort and Responsibility**: Stay committed to your responsibilities, complete assignments on time, and engage fully in the learning process.

Today’s Attendance
(via PollEverywhere)

pollev.com/emilyzhao

What is a computer?

What is a computer?

A machine that processes information based on a program

Computers:

- Laptops
- Smartphones
- Smart watches
- Cars
- Gaming devices
- Toasters
- Calculators

What is a computer?

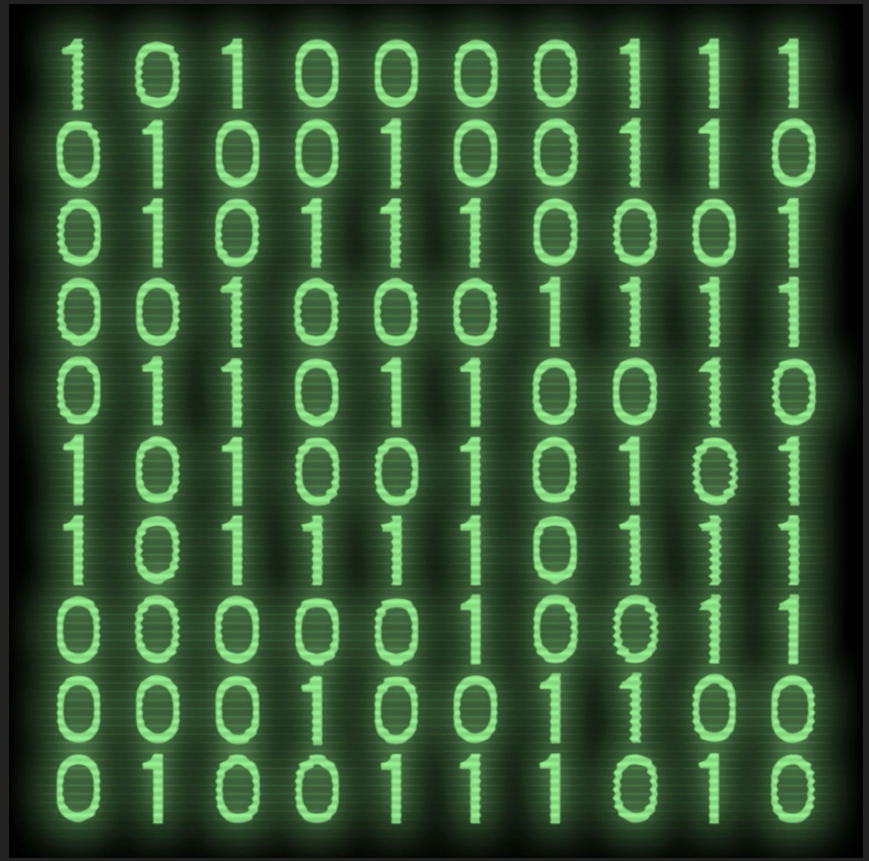
A machine that processes information based on a program

What is a program?

Instructions written to accomplish certain tasks

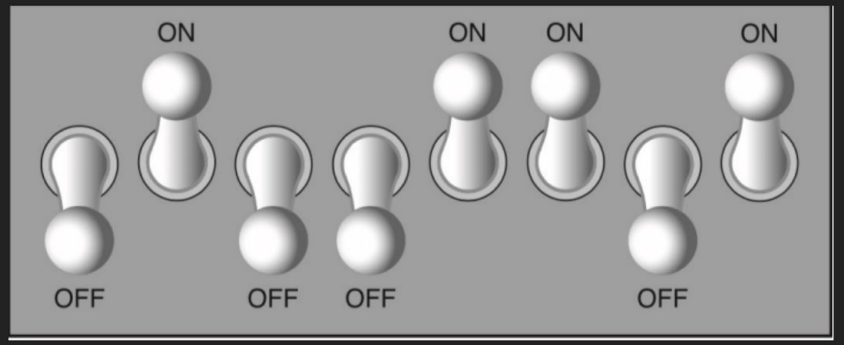
It’s all ones and zeros

- Everything that communicates with a computer “speaks” the same language (binary)
- Binary language: "0" and "1" (which really correspond to electrical impulses +5v / -5v)

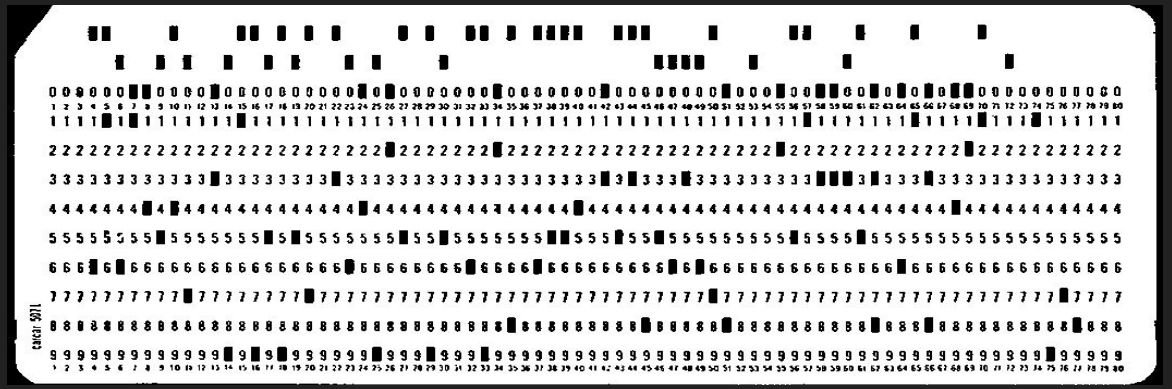


It’s all ones and zeros

- Bit: 1 | Byte: 01001011
- 1 byte has the possibility of 256 unique "states"



Early programming



Punch Card in Punch Card Machine

Bits + Bytes

1 Bit	=	Binary Digit
1 Byte	=	8 Bits
1 Kilobyte (KB)	=	1024 Bytes
1 Megabyte (MB)	=	1024 KB
1 Gigabyte (GB)	=	1024 MB
1 Terabyte (TB)	=	1024 BG

Images

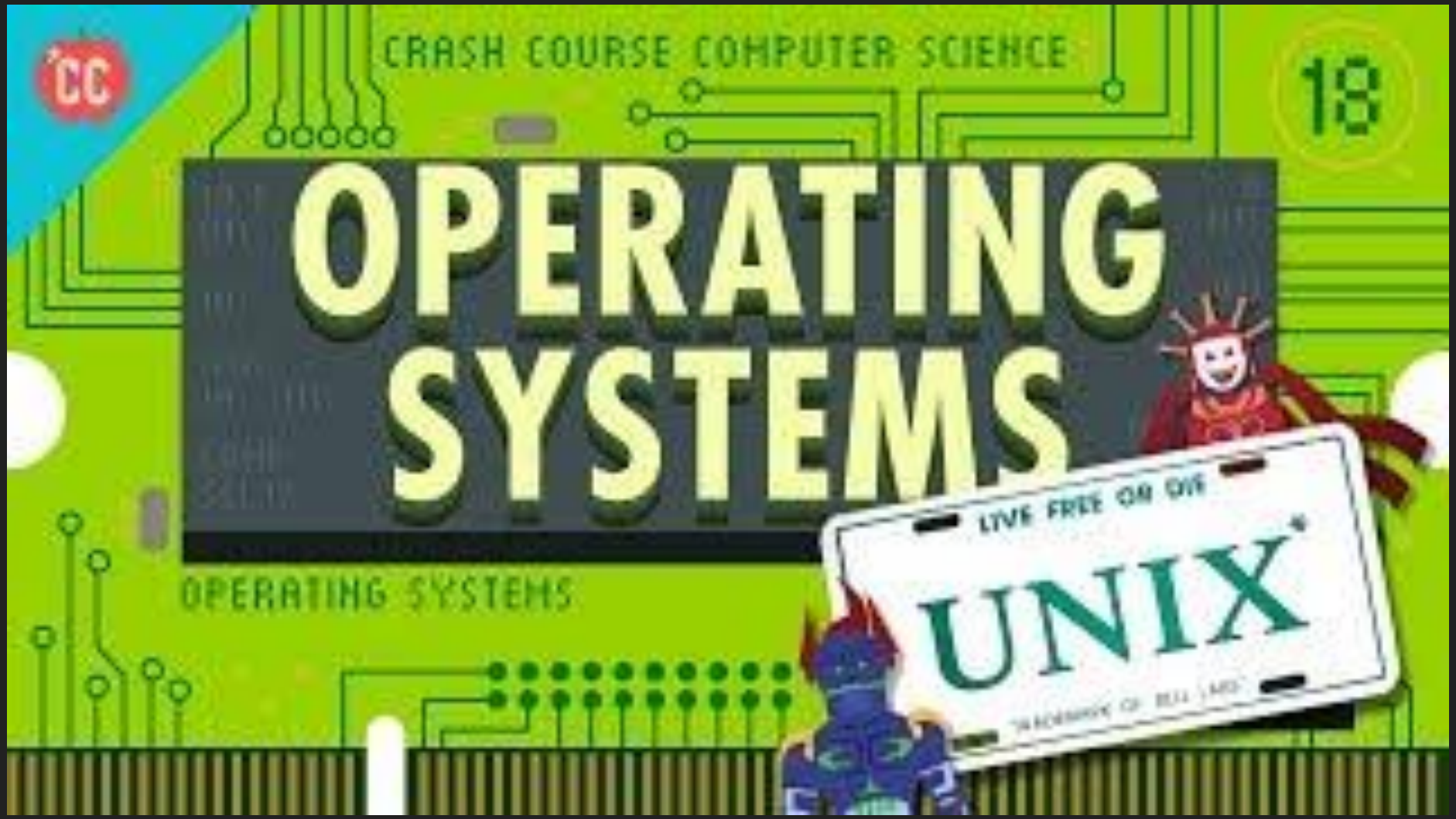
PNG	2 – 4 kB
GIF	6 – 8 kB
JPG	9 – 12 kB

Documents

DOCX	4 – 8 kB
PDF	18 – 20 kB

Media Files

eBook	1 – 5 MB
MP3 song	3 – 4 MB
DVD Movie	4 GB
HD Movie	5 – 8 GB
Blu-Ray	20 – 25 GB


CRASH COURSE COMPUTER SCIENCE
18
OPERATING SYSTEMS
OPERATING SYSTEMS
LIVE FREE OR DIE
UNIX

Early computers

- Ran on punch cards
- One program at a time
- Not user friendly
- Limited resources
- No standardization
- Minimal security + protection

Hardware

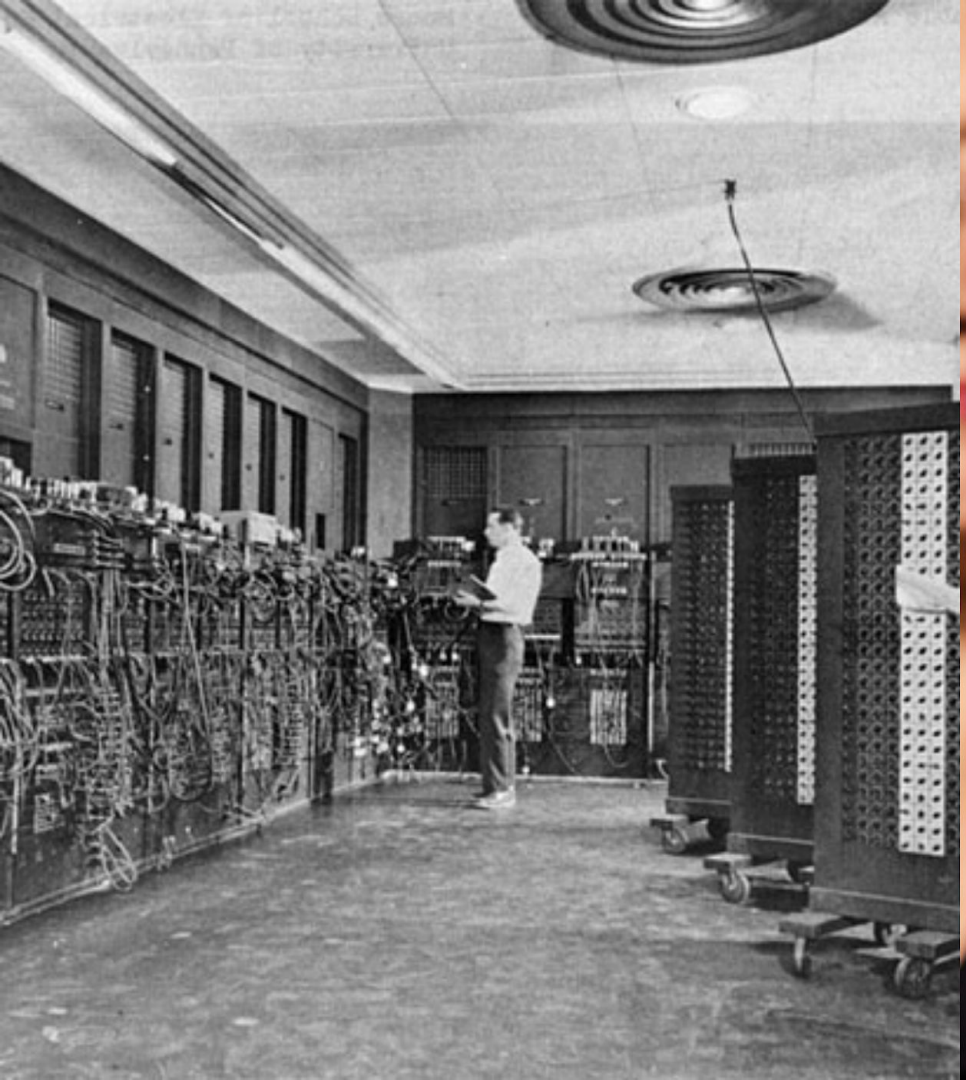
the tangible, physical parts of a computer responsible for executing and performing the actual physical operations

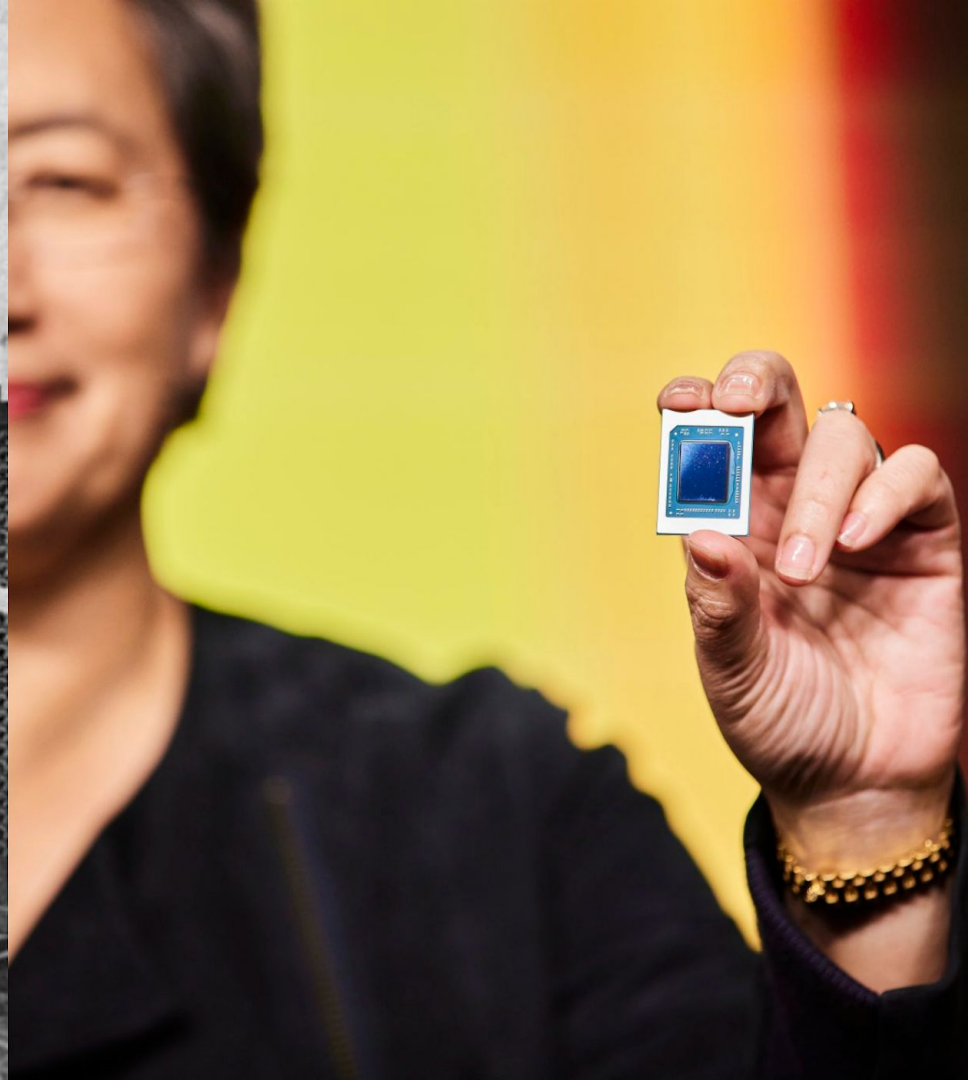
→ central processing unit (CPU)
→ memory (RAM)
→ hard drive
→ monitor, keyboard, mouse
→ peripheral devices (printers + scanners)

Software

the programs, data, and instructions that tell the hardware what to do

→ operating systems
→ applications (like word processors, web browsers, and games)
→ system utilities





Operating Systems

Intermediaries between software programs + hardware peripherals

Operating Systems

- Abstract the hardware
- Better resource management
- Multi-programming
- Security + protection
- User interfaces (CLI, GUI)

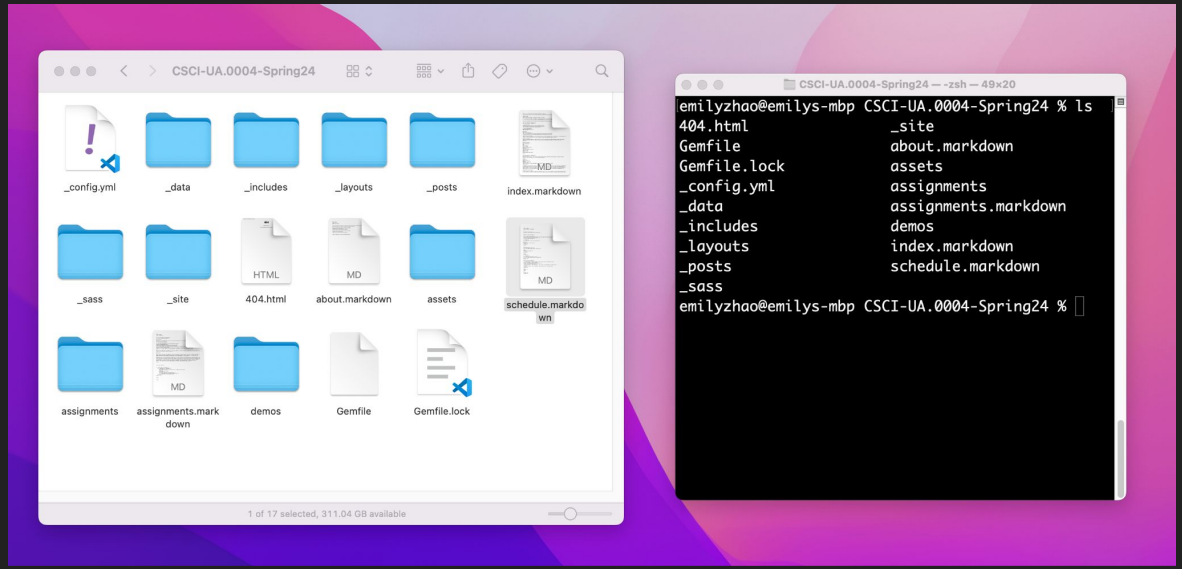
The User Interface

Portion of system software that allows you to interact with data

Two types

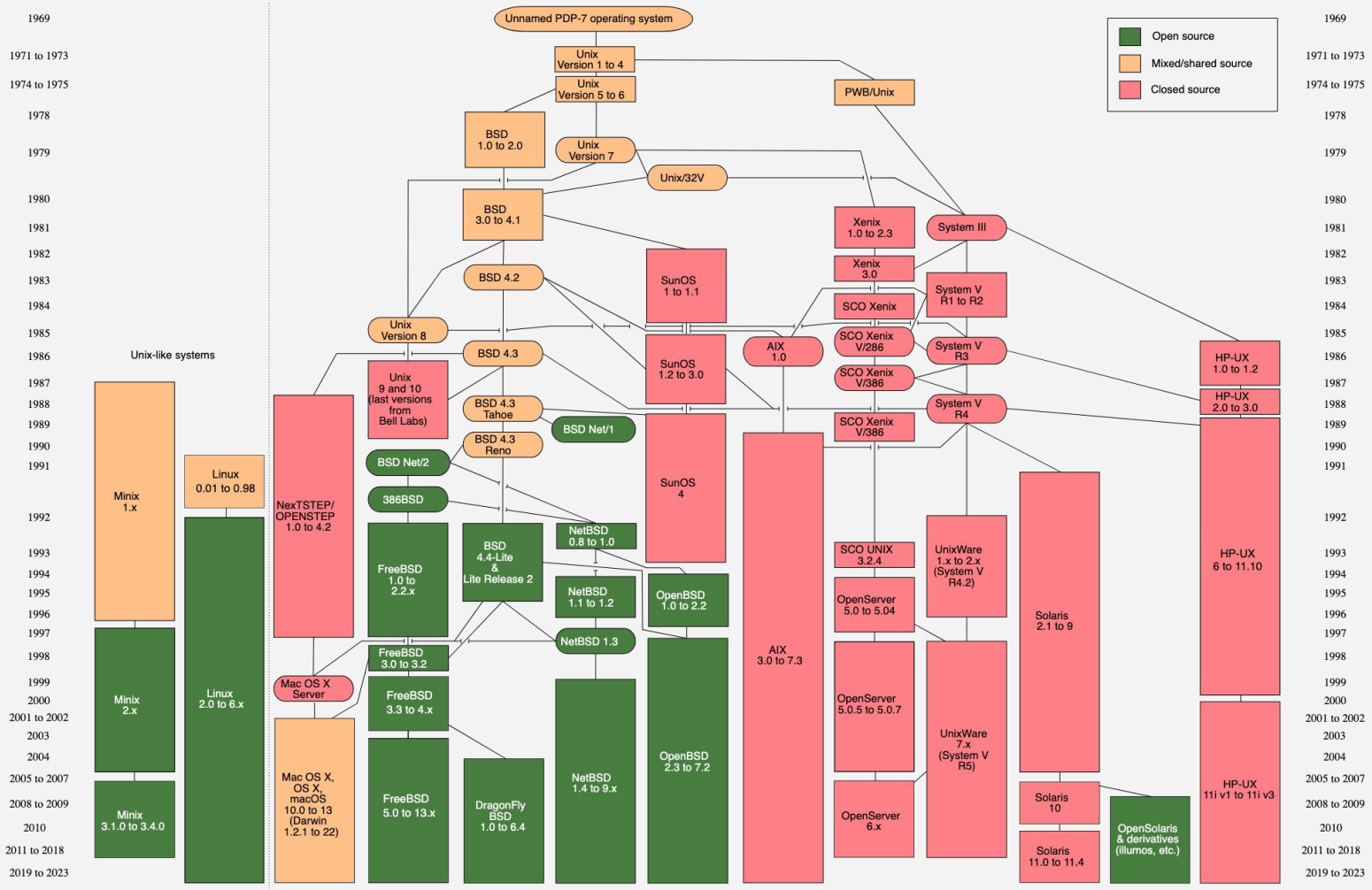
- Graphical (GUI)
- Command Line (CLI)

* GUI is more user-friendly, but command line is faster



Unix

- An open source OS produced by AT&T Bell Labs
- Originally developed in 1969
- Command line interface
- Portable, multi-tasking, multi-user
- Free distribution, open system
- Servers (including i6), workstations, mobile devices
- Basis of Linux and MacOS


Open source
Mixed/shared source
Closed source
1969
1971 to 1973
1974 to 1975
1978
1979
1980
1981
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1987
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1989
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1993
1994
1995
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2000
2001 to 2002
2003
2004
2005 to 2007
2008 to 2009
2010
2011 to 2018
2019 to 2023
Unix-like systems
Unnamed PDP-7 operating system
Unix Version 1 to 4
Unix Version 5 to 6
Unix Version 7
PWB/Unix
BSD 1.0 to 2.0
Unix/32V
BSD 3.0 to 4.1
Xenix 1.0 to 2.3
System III
Xenix 3.0
BSD 4.2
SunOS 1 to 1.1
System V R1 to R2
SCO Xenix
Unix Version 8
BSD 4.3
SunOS 1.2 to 3.0
AIX 1.0
SCO Xenix V/286
System V R3
SCO Xenix V/386
HP-UX 1.0 to 1.2
HP-UX 2.0 to 3.0
Unix 9 and 10 (last versions from Bell Labs)
BSD 4.3 Tahoe
BSD Net/1
BSD 4.3 Reno
System V R4
BSD Net/2
386BSD
SunOS 4
Minix 1.x
Linux 0.01 to 0.98
NexTSTEP/ OPENSTEP 1.0 to 4.2
FreeBSD 1.0 to 2.2.x
BSD 4.4-Lite & Lite Release 2
NetBSD 0.8 to 1.0
NetBSD 1.1 to 1.2
OpenBSD 1.0 to 2.2
SCO UNIX 3.2.4
UnixWare 1.x to 2.x (System V R4.2)
OpenServer 5.0 to 5.04
Solaris 2.1 to 9
HP-UX 6 to 11.10
Minix 2.x
Linux 2.0 to 6.x
NetBSD 1.3
FreeBSD 3.0 to 3.2
Mac OS X Server
FreeBSD 3.3 to 4.x
AIX 3.0 to 7.3
OpenServer 5.0.5 to 5.0.7
UnixWare 7.x (System V R5)
Mac OS X, OS X, macOS 10.0 to 13 (Darwin 1.2.1 to 22)
FreeBSD 5.0 to 13.x
DragonFly BSD 1.0 to 6.4
NetBSD 1.4 to 9.x
OpenBSD 2.3 to 7.2
OpenServer 6.x
Solaris 10
Solaris 11.0 to 11.4
OpenSolaris & derivatives (illumos, etc.)
HP-UX 11i v1 to 11i v3
Minix 3.1.0 to 3.4.0

Operating System Lineage

Unix-Based:
MacOS
Android
iOS
Linux

Non-Unix:
Microsoft OS

Common Unix Commands

`% ls`	list directory files
`% pwd`	show current directory
`% cd`	change directory
`% cd ~`	go to home directory
`% cd ..`	go to parent directory
`% touch`	create, change, modify timestamp of file
`% mkdir`	create directory

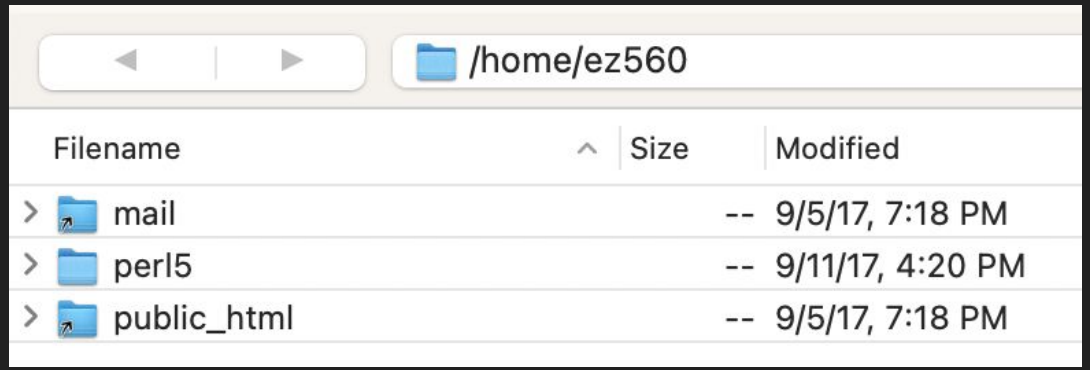
Activity: Unix Maze

Set up i6 accounts

i6 Services

`http://i6.cims.nyu.edu/~NETID`

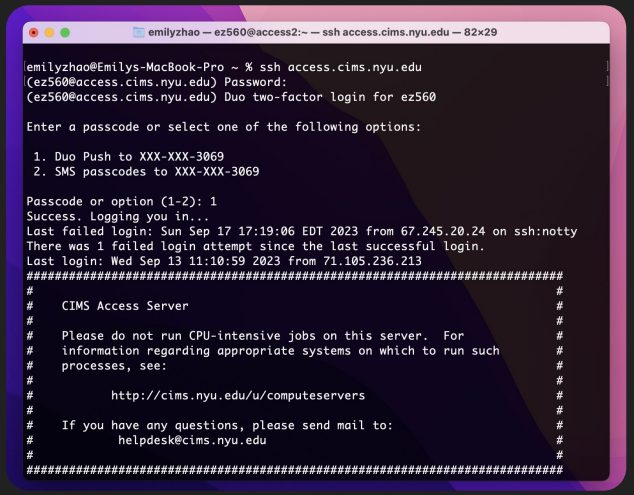
- `i6.cims.nyu.edu` is a server that provides a Linux environment for students to develop and host their websites
- Each account is granted a home directory and a web directory:



SSH (Secure Shell)

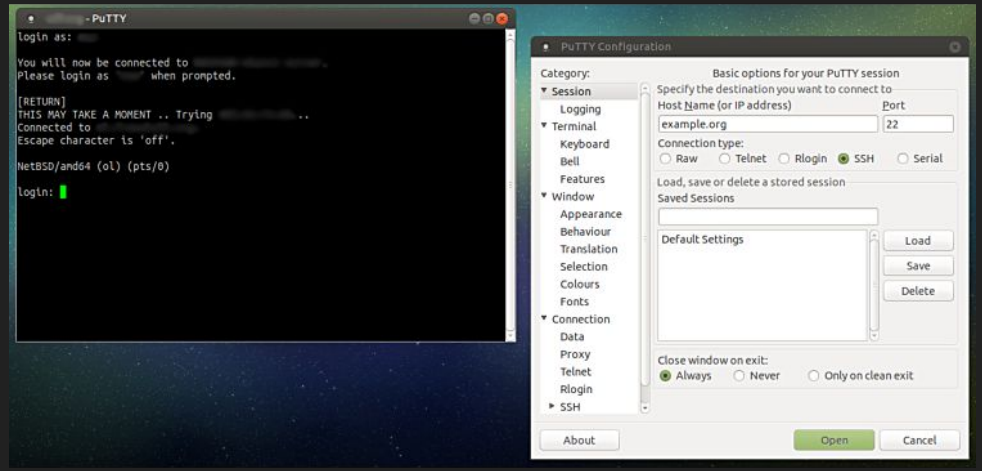
Allows users to securely log into remote systems and execute commands on those systems

- Login, change password, change file permissions



puTTY

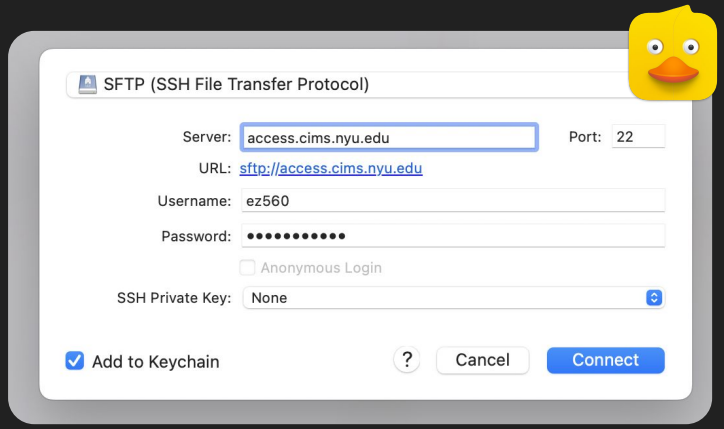
an open-source terminal emulator and SSH client for Windows



SFTP (SSH File Transfer Protocol)

A file transfer protocol that operates over an SSH connection

- Used solely for transferring files between client and server
- File management capabilities such as uploading, downloading, renaming, and deleting files



chmod

Every file and directory has nine permissions associated with it

The Unix `chmod` command sets permissions of files and directories

Files and directories have three types of permissions (or none):

- r (read)
- w (write)
- x (execute)
- - (no permission)

The above permissions occur for each of the following classes or users:

- u (user/owner)
- g (group)
- o (other/world)

Standard Web Permissions

Permissions	Unix Commands
U G W	
rwx rwx rwx	% chmod 777 filename
rwx rwx r-x	% chmod 775 filename
rwx r-x r-x	% chmod 755 filename
rw- rw- r--	% chmod 664 filename
rw- r-- r--	% chmod 644 filename

Standard **file** permission: 644

- owner can read and write file
- group can read file
- others can read file

Standard **directory** permission: 755

- owner can read, write + execute file
- group can read and execute file
- others can read and execute file

For next time

- Assignment #1
- Read Chapter 4: Creating a Simple Page