CSCI-UA-4-005

Intro to Web Design + Computer Principles

Operating Systems + Unix

Professor Emily Zhao

M/W 12:30PM – 1:45PM

Classroom Agreements

What does a teacher in this classroom look like?

What does a student in this classroom look like?

What are our agreed upon expectations?

Classroom Agreements

- Both students and teachers are expected to arrive on time and be prepared for each class.
- Everyone should treat each other with respect and kindness, valuing diverse opinions and backgrounds, and be open to giving and receiving feedback constructively.
- Students should engage actively in discussions, listen attentively, and contribute positively to the classroom dynamic, while the professor should deliver clear, interesting, and well-prepared lectures.

Classroom Agreements

- The classroom should be a supportive space where students help each other. Both students and teachers should be empathetic and helpful to those who may struggle with the material.
- Everyone should keep the shared classroom space clean and be considerate of others by avoiding disruptions like strong scents or interrupting speakers.
- The professor should treat all students equitably and be adaptable in teaching methods to meet the needs of the class.

Today’s Attendance
(via PollEverywhere)

pollev.com/emilyzhao

→ Do you agree to the classroom expectations?

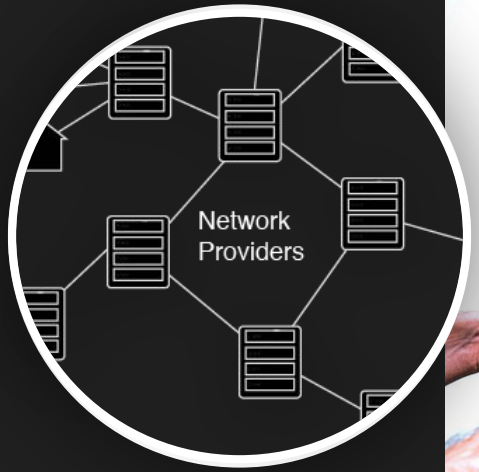
* Remember to hit submit!

Class Website

https://cs.nyu.edu/courses/spring24/CSCI-UA.0004-005/

Key terms

- Servers
- Clients
- Internet Service Providers (ISPs)
- Routers
- IP Addresses
- URLs



Servers

A computer connected directly to the internet

- Special computers that “serve up” documents upon request
- Web servers are called HTTP servers

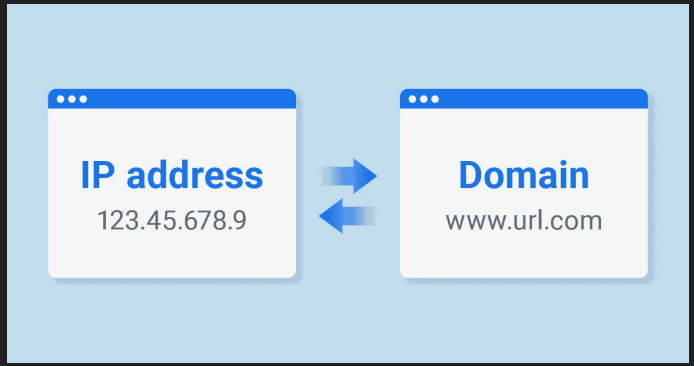
The New York Times

Internet Service Provider (ISP)

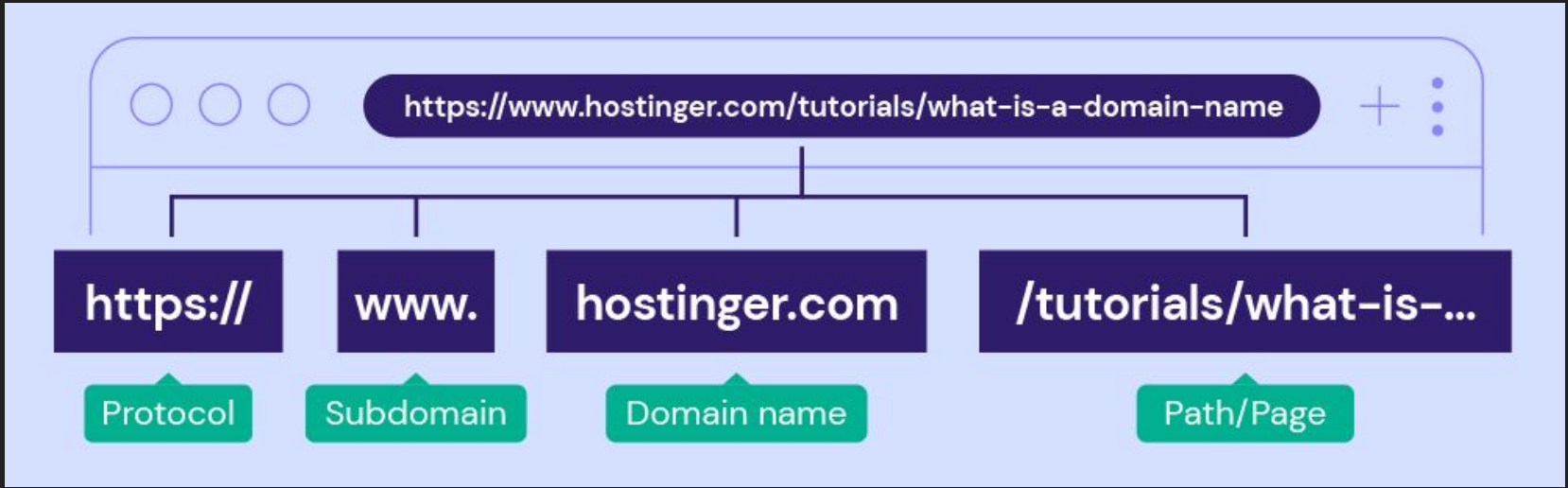
- a company that provides Internet access to users, or clients
- provides the physical infrastructure that allows users to connect to the Internet

IP Addresses

- every computer and device connected to the internet is assigned a unique IP (Internet Protocol) numeric address (i.e. 123.45.678.90)
- Domain Name System (DNS) was created so developers can refer to servers by domain names (i.e. emilydidthis.com)



URLs

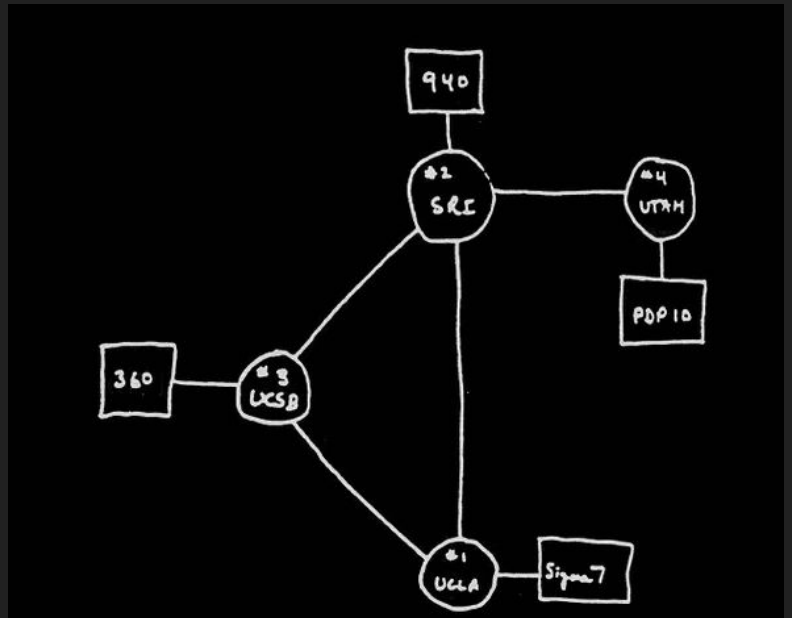

https://www.hostinger.com/tutorials/what-is-a-domain-name
https://
www.
hostinger.com
/tutorials/what-is-...
Protocol
Subdomain
Domain name
Path/Page

Router

- A router is a networking device that relays data packets between computer networks
- The direct the flow of Internet traffic so that packets arrive at their appropriate destination
- The address to which data is sent is normally in the form of a numeric IP address

Wireless Technology (radio waves)

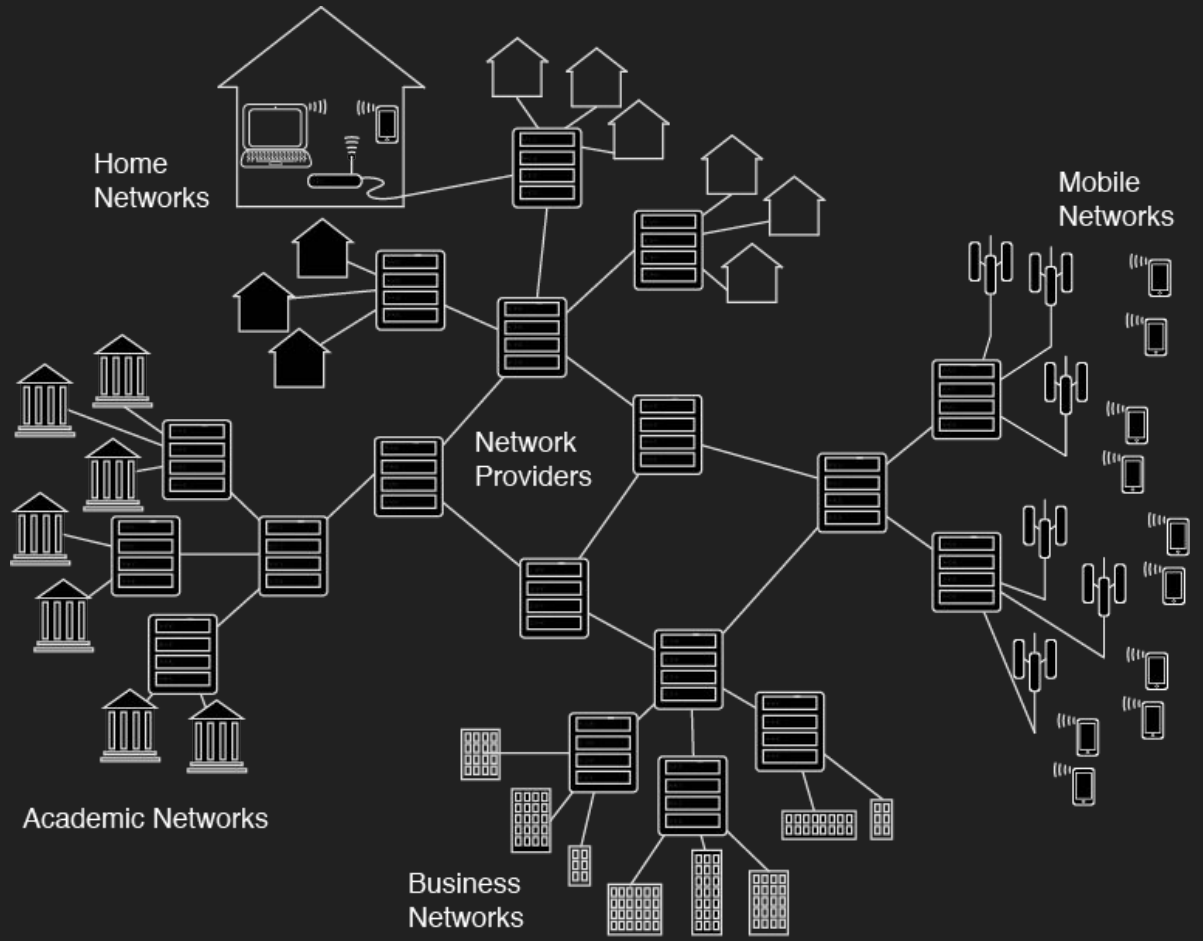
- WiFi
- Radio and television broadcasting
- Cellular communication (3G, 4G, 5G)
- Global Position Systems (GPS)
- Bluetooth



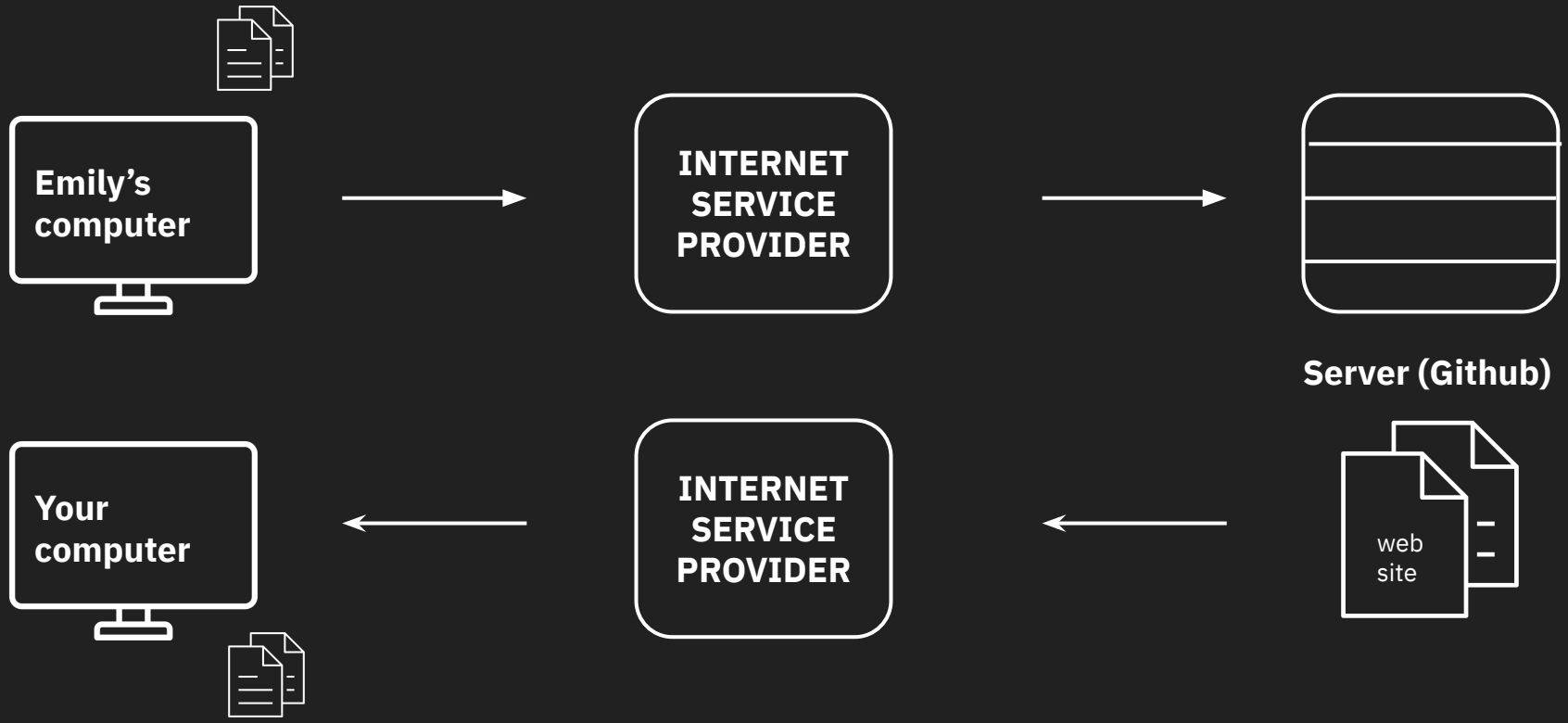
THE ARPA NETWORK

DEC 1969

4 NODES


Home
Networks
Mobile
Networks
Network
Providers
Academic Networks
Business
Networks

How are you able to view our class website from your computer?


Emily's computer
INTERNET SERVICE PROVIDER
Server (Github)
web site
INTERNET SERVICE PROVIDER
Your computer

> That two computers can “talk” to each other and exchange information is the precisely kind of magic we are liable to take for granted in today’s world of technological marvels.

- Urban Omnibus

Agenda

- Classroom Agreements
- What is the Internet? — recap
- What is a computer?
- Operating Systems
- Unix
- Visual Studio Code
- Setting up i6 accounts

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?

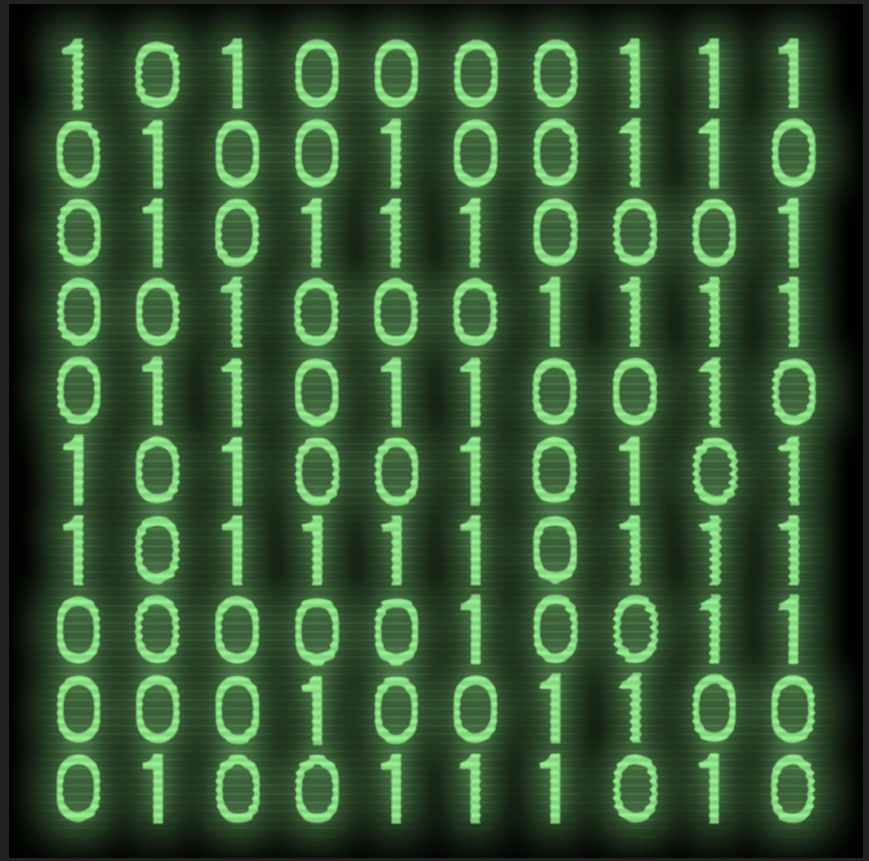
A machine that processes information based on a program

What is a program?

Instructions written to accomplish certain tasks

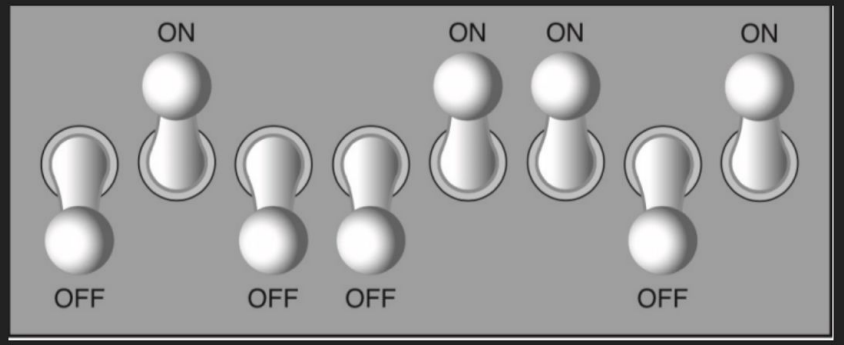
It’s all ones and zeros

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

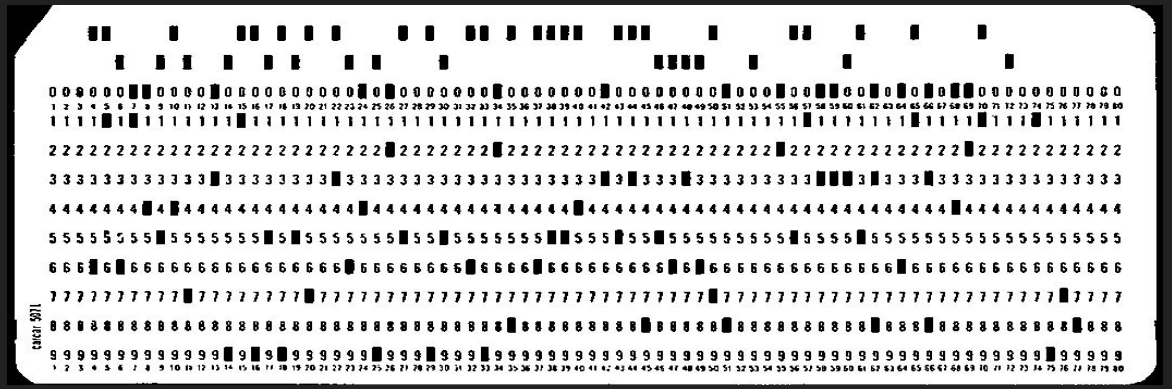


It’s all ones and zeros

- 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

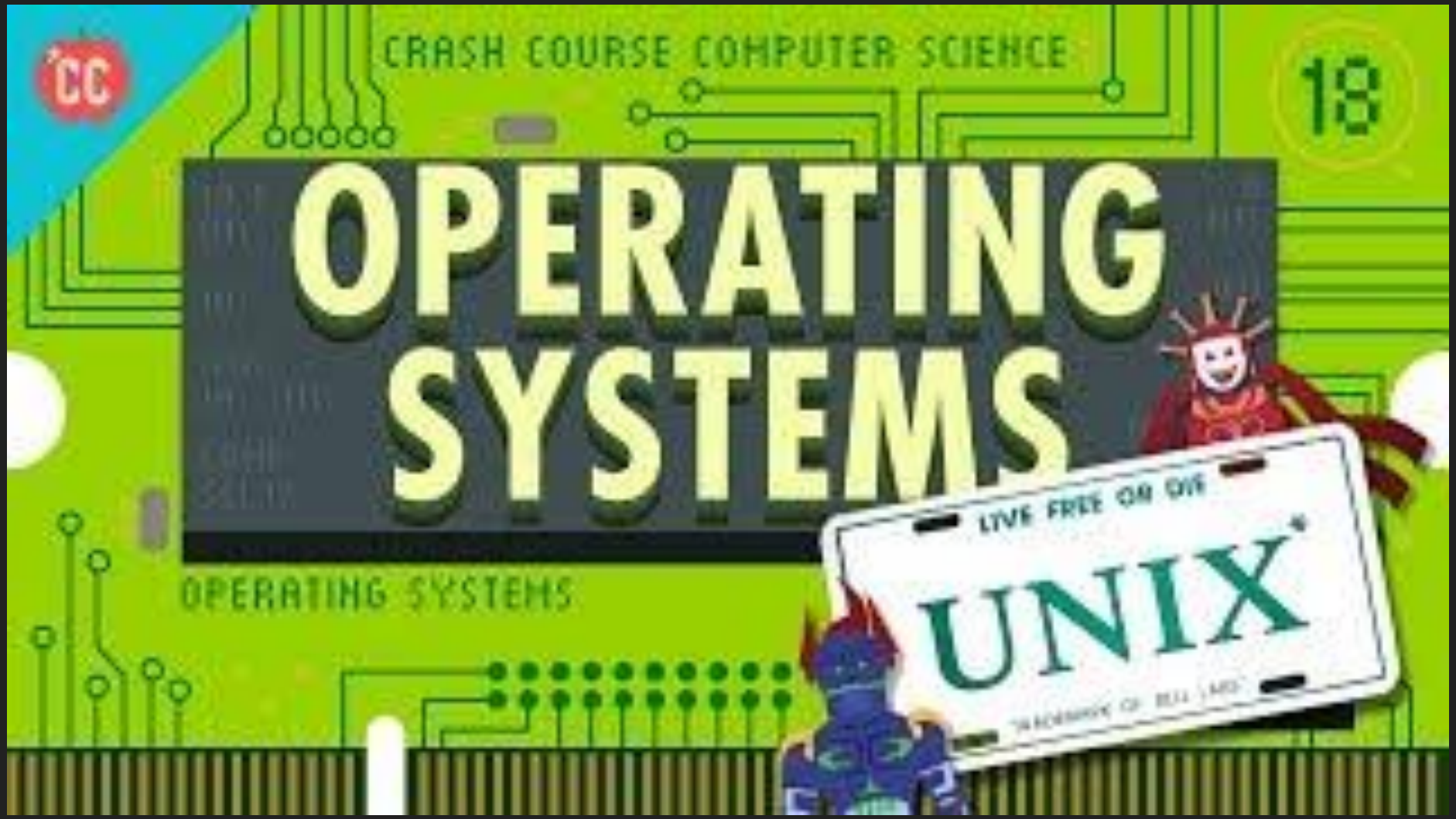
PNG	2 – 4 kB
GIF	6 – 8 kB
JPG	9 – 12 kB

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

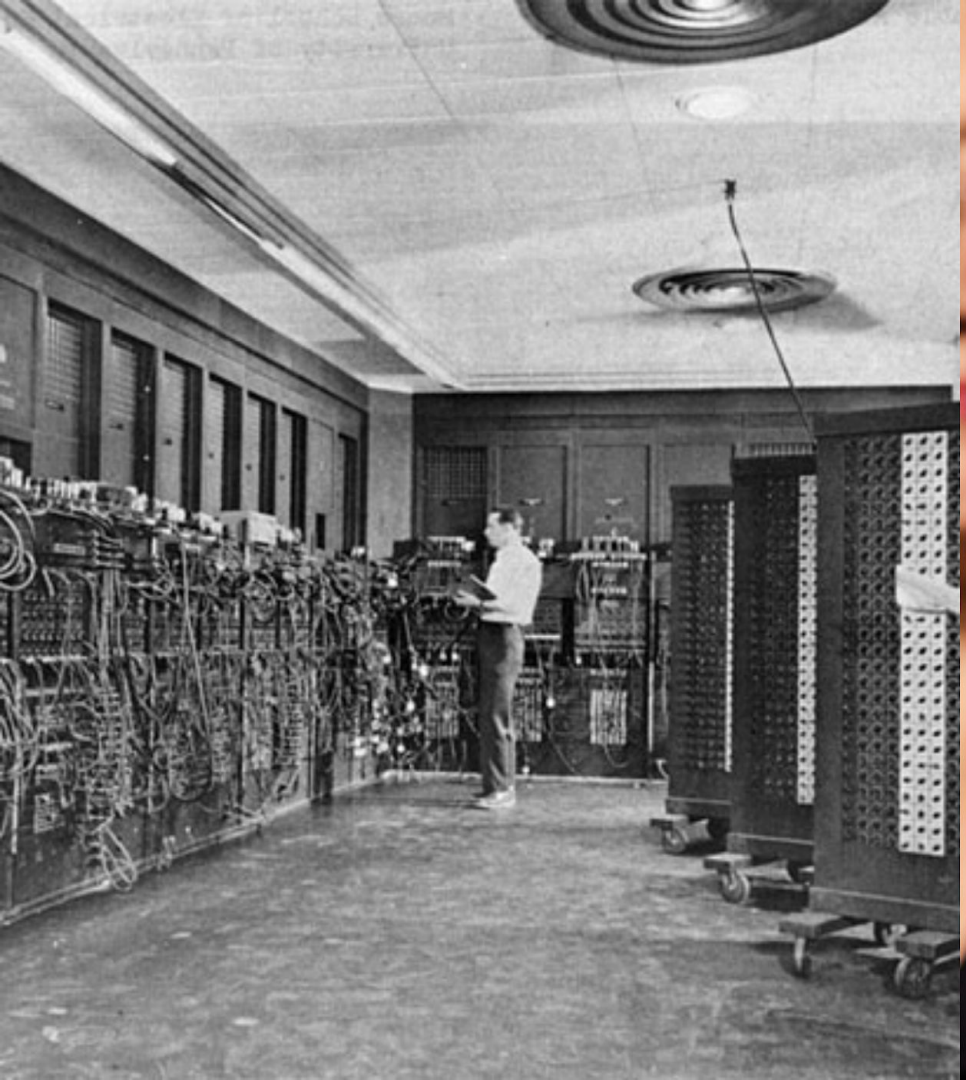
→ operating systems
→ applications (like word processors, web browsers, and games)
→ system utilities

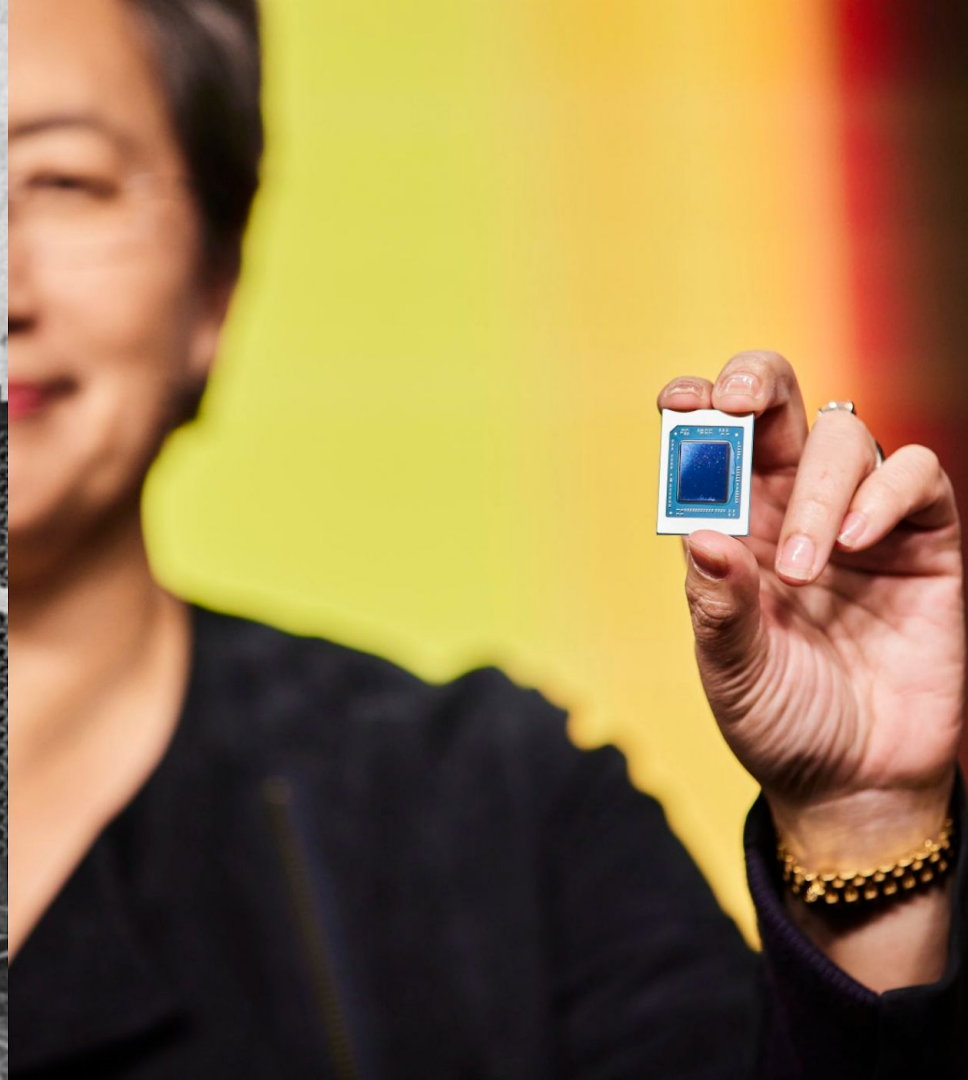
Operating Systems

Intermediaries between software programs + hardware peripherals

Operating Systems

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





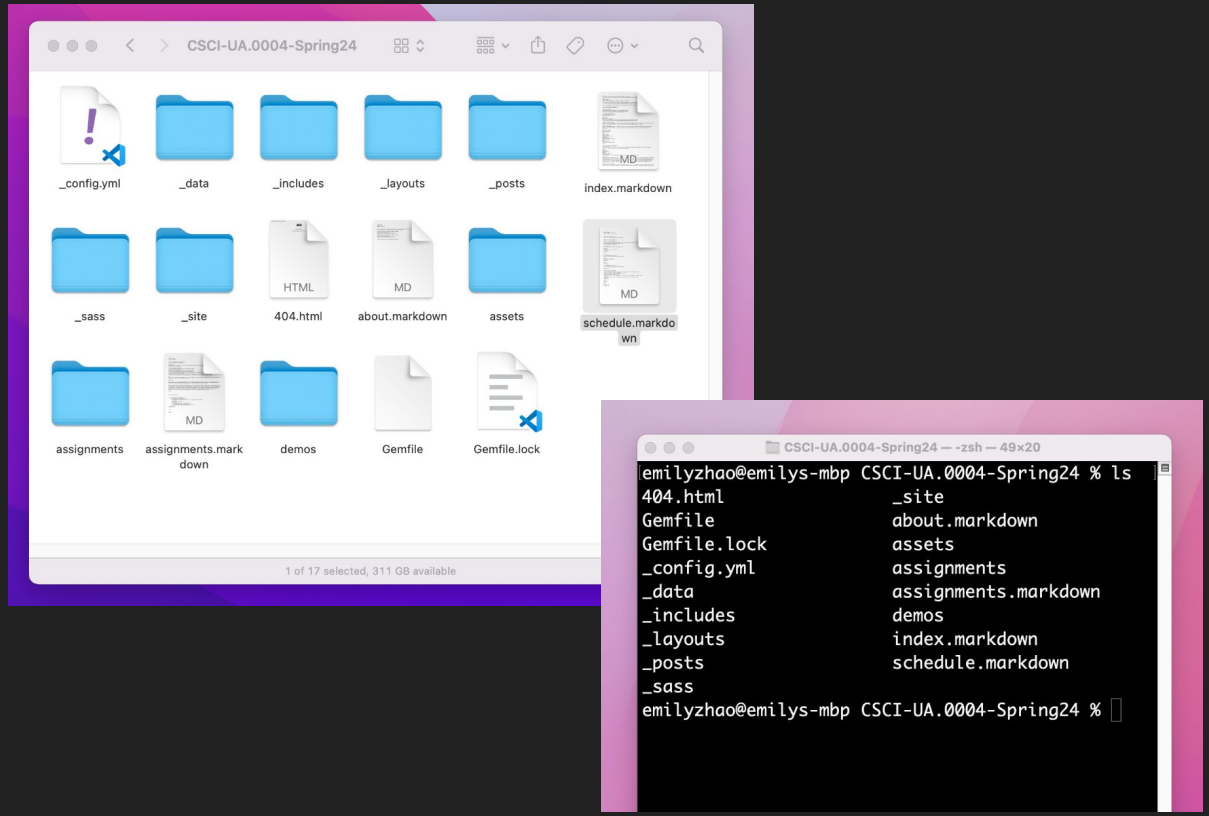
The User Interface

Portion of system software that allows you to interact with data

Two types:

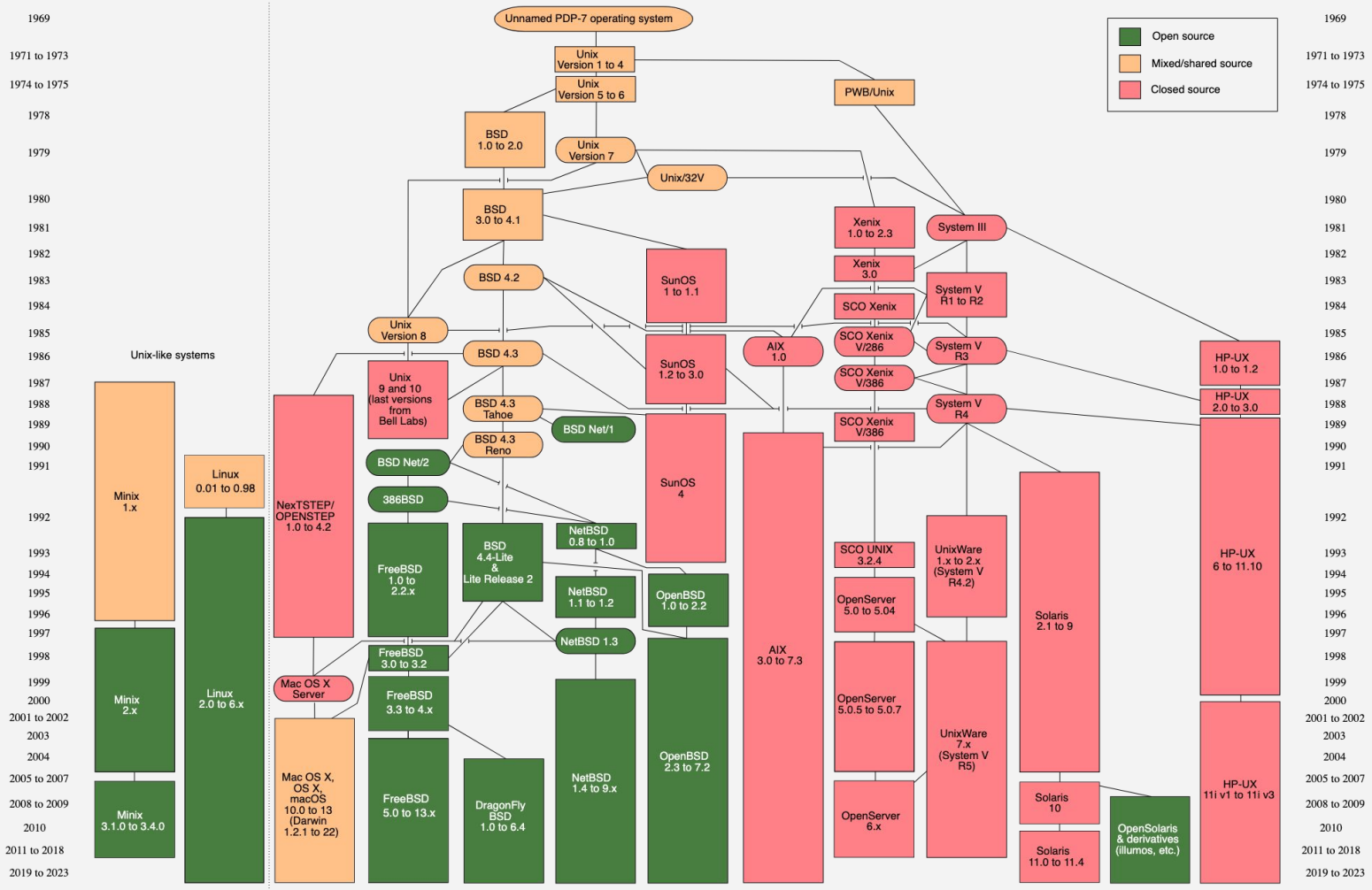
- Graphical (GUI)
- Command Line (CLI)

* 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
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
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

Let’s practice! → Unix Maze on Ed

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 and execute file;
group can read and execute file;
others can read and execute file

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

Decimal	Binary
0	000
1	001
2	010
3	011
4	100
5	101
6	110
7	111

Set up i6 accounts

For next time

- Read Chapter 4: Creating a Simple Page
- Finish Assignment #1 (due next Wed)