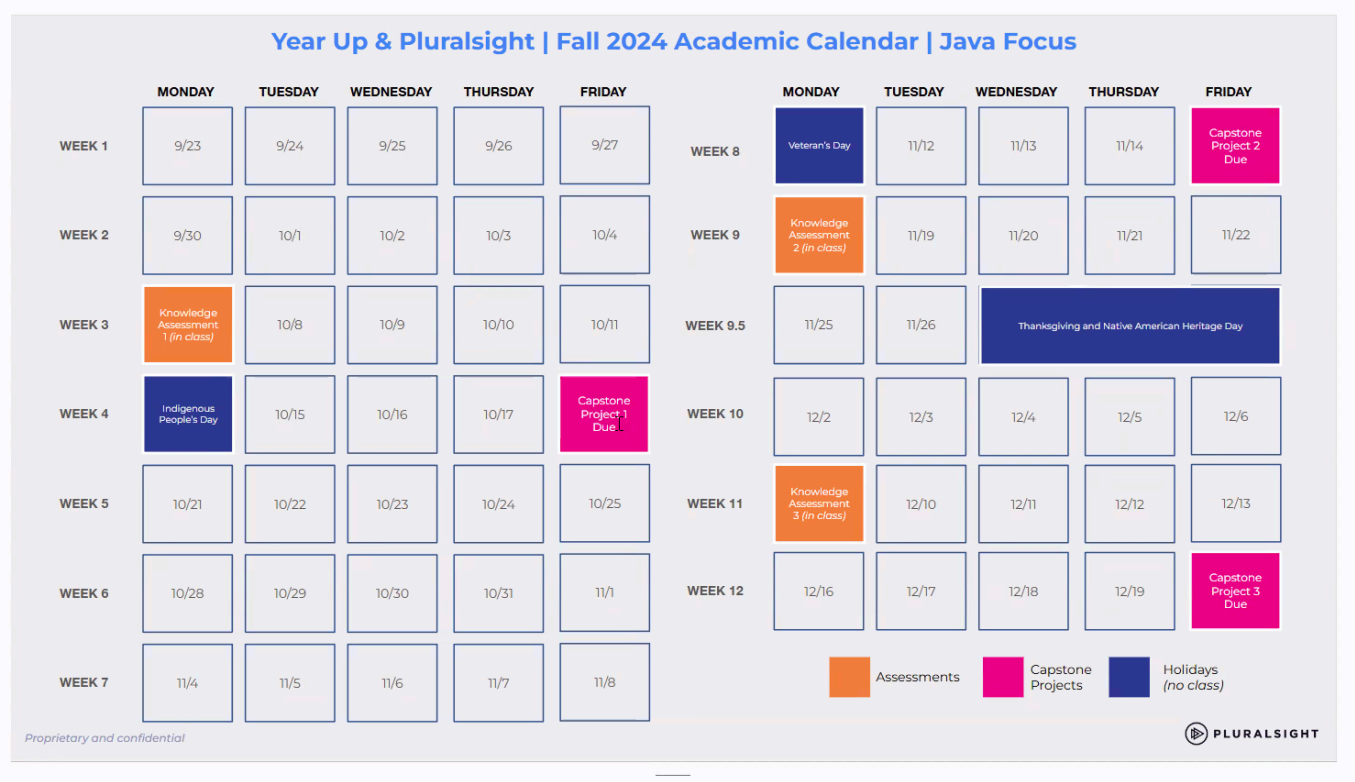
Day-One

Notes

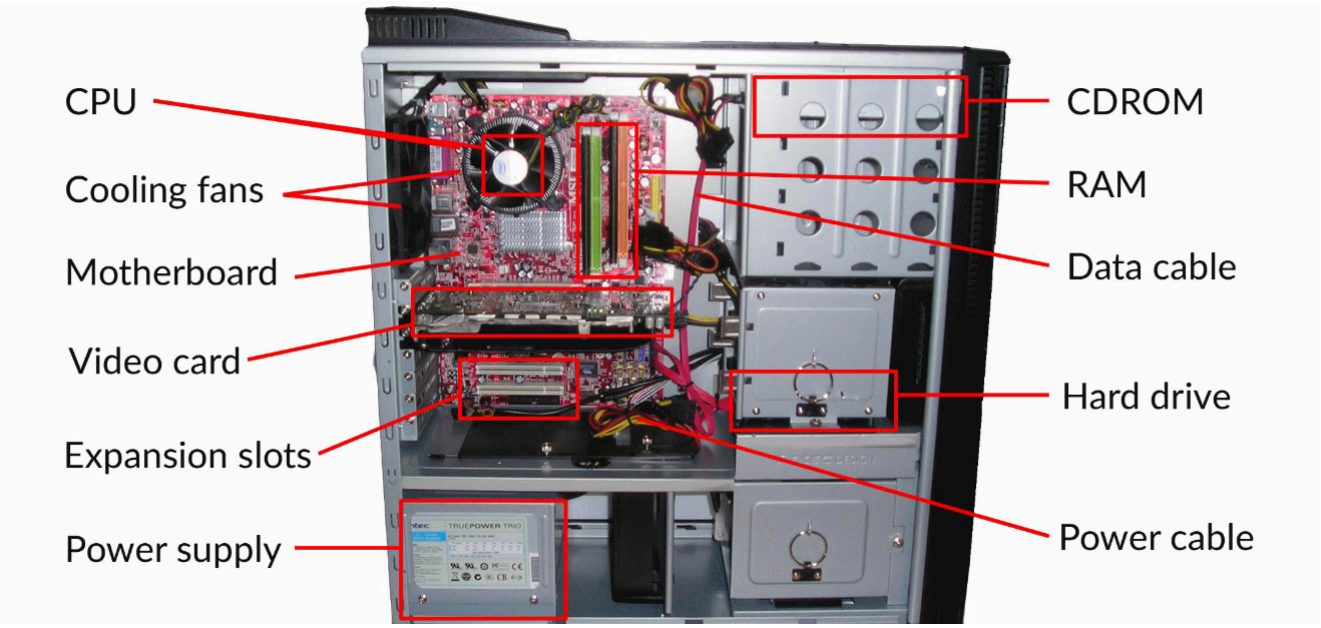
Interactive class (Feel free to stop him and ask questions)

check our basic info (name, emails, version of os, how many monitors, introduce why join the Year Up and etc..)

How the 12 Weeks Work



Parts on PC



1. CPU (Central Processing Unit):

- The brain of the computer
- Executes instructions from programs by performing basic arithmetic, logic, and control operations.

2. Cooling Fans

- Prevents components like the CPU and GPU from overheating.
- Ensures proper airflow inside the case to maintain optimal temperature.

3. Motherboard:

- The main circuit board that connects all components of the PC.
- Provides communication between the CPU, memory, storage, and peripherals.

4. Video Card (Graphics Processing Unit - GPU):

- Responsible for rendering images, video, and animations to be displayed on the monitor.
- Some computers have integrated graphics in the CPU, while others use dedicated graphics cards.

5. RAM (Random Access Memory):

- Temporary storage for active processes and data.
- Allows quick access to programs and data in use, improving overall speed.

6. Expansion Slots:

- Slots on the motherboard used for adding extra cards like video cards, sound cards, or network adapters.

7. Hard Drive:

- Long-term storage device for the operating system, software, and files.
- Can be either HDD (mechanical) or SSD (solid-state, faster).

8. Power Supply:

- Converts electrical power from the outlet into a usable form for the computer.
- Powers all internal components.

9. CDROM Drive:

- An optical drive for reading (or writing) CDs/DVDs.
- Less commonly used today as many software and media are now distributed digitally.

10. Data Cables:

- Connects storage devices (like hard drives and CD/DVD drives) to the motherboard.
- Includes SATA cables for data transfer.

11. Power Cables:

- Provide electrical power from the power supply to all components, including the motherboard, hard drives, and other peripherals.

Each component plays a crucial role in making the PC function, and they work together to execute programs, manage data, display graphics, and communicate with external devices.

Java Garbage Collector

Garbage Collector	Generations	Threads	Pauses	Heap Size	Suitable for
Serial GC	Yes	Single	High (stop-the-world)	Small (< 1 GB)	Single-threaded apps
Parallel GC	Yes	Multiple	Moderate (stop-the-world)	Medium to large	Throughput-focused apps
G1 GC	Yes	Multiple	Low to moderate	Large (> 6 GB)	Balanced performance
CMS	Yes	Multiple	Low	Medium to large	Low-latency apps
ZGC	Yes	Multiple	Extremely low (<10ms)	Very large (multi-TB)	Very large heaps
Shenandoah GC	Yes	Multiple	Extremely low	Large	Low-latency apps
Epsilon GC	No	N/A	None (no GC)	Any size	Testing only

Summary of Algorithms Used by Java GCs

- **Copying**: Used to evacuate objects in the young generation (in collectors like G1 and Parallel GC).
- **Mark-Sweep**: Used to identify and reclaim unreachable objects in the old generation.
- **Mark-Sweep-Compact**: Combines mark-sweep with compaction to reduce memory fragmentation.
- **Region-based**: Used by G1, ZGC, and Shenandoah to divide the heap into regions and collect garbage in parts to avoid long pauses.

Number System Convertor

Decimal, Binary, Octal, and Hex Numbers

Decimal	Binary	Octal	Hexadecimal
0	0000	0	0
1	0001	1	1
2	0010	2	2
3	0011	3	3
4	0100	4	4
5	0101	5	5
6	0110	6	6
7	0111	7	7
8	1000	10	8
9	1001	11	9
10	1010	12	A
11	1011	13	B
12	1100	14	C
13	1101	15	D
14	1110	16	E
15	1111	17	F

-

1. Decimal (Base 10)

- Symbol: 0-9
- Base: 10 (Each digit is raised to the power of 10)
- Common Use: This is the standard number system humans use for everyday counting and arithmetic.
- Example:
  - 345 (in decimal) = $3 \times 10^2 + 4 \times 10^1 + 5 \times 10^0 = 300 + 40 + 5$

2. Binary (Base 2)

- Symbol: 0, 1

- Base: 2 (Each digit is raised to the power of 2)
- Common Use: Used by computers and digital systems to represent data because computers operate on electrical signals that can be either on (1) or off (0).
- Example:
  - 1011 (in binary) = $1 \times 2^3 + 0 \times 2^2 + 1 \times 2^1 + 1 \times 2^0 = 8 + 0 + 2 + 1 = 11$ (in decimal)

3. Octal (Base 8)

- Symbol: 0-7
- Base: 8 (Each digit is raised to the power of 8)
- Common Use: Historically used in early computing systems. Still useful in representing large binary numbers in shorter form.
- Example:
  - 17 (in octal) = $1 \times 8^1 + 7 \times 8^0 = 8 + 7 = 15$ (in decimal)

4. Hexadecimal (Base 16)

- Symbol: 0-9, A-F (A=10, B=11, C=12, D=13, E=14, F=15)
- Base: 16 (Each digit is raised to the power of 16)
- Common Use: Widely used in computing for memory addressing, color codes in web design, and representing binary data in a more readable form.
- Example:
  - 1F (in hexadecimal) = $1 \times 16^1 + F \times 16^0 = 16 + 15 = 31$ (in decimal)

- Conversion Table

Decimal	Binary	Octal	Hexadecimal
0	0000	0	0
1	0001	1	1
2	0010	2	2
3	0011	3	3
4	0100	4	4
5	0101	5	5
6	0110	6	6
7	0111	7	7
8	1000	10	8

Decimal	Binary	Octal	Hexadecimal
9	1001	11	9
10	1010	12	A
11	1011	13	B
12	1100	14	C
13	1101	15	D
14	1110	16	E
15	1111	17	F

Summary of Use Cases

- Decimal: For everyday human use in counting and arithmetic.
- Binary: For computer operations, as it reflects the binary nature of electronic circuits (on/off states).
- Octal: Shortened version of binary for legacy systems or simpler grouping.
- Hexadecimal: Efficient representation of large binary numbers, commonly used in programming, memory addressing, and digital design (e.g., web colors).

Example: Conversion between Systems

Convert 255 (decimal) into other systems:

- Binary: 255 (decimal) = 11111111 (binary)
- Octal: 255 (decimal) = 377 (octal)
- Hexadecimal: 255 (decimal) = FF (hex)

Key Points:

- Binary is the foundation for computing systems.
- Hexadecimal is frequently used in computing for compact and human-readable binary representation.
- Octal has been mostly replaced by hexadecimal but is still useful in some contexts.

1. Decimal (Base 10)

- Digits: 0-9
- Usage: Predominantly used in everyday life and most programming scenarios.
- Example: The decimal number 10 represents ten units.

2. Binary (Base 2)

- Digits: 0-1
- Usage: Fundamental in computing and digital electronics, as it represents the two states of a transistor (on/off).
- Example: The binary number 1010 represents the decimal number 10.

3. Octal (Base 8)

- Digits: 0-7
- Usage: Less common, but used in some programming contexts and digital systems.
- Example: The octal number 12 represents the decimal number 10.

4. Hexadecimal (Base 16)

- Digits: 0-9 and A-F
- Usage: Widely used in programming to represent binary data in a more readable format.
- Example: The hexadecimal number A represents the decimal number 10.

5. Conversions:

- Binary to Decimal: Multiply each bit by 2 raised to its position number and sum the results.
- Decimal to Binary: Divide the decimal number by 2 repeatedly and record the remainders.
- Hexadecimal to Decimal: Multiply each digit by 16 raised to its position number and sum the results.
- Decimal to Hexadecimal: Divide the decimal number by 16 repeatedly and record the remainders.

Understanding these numeral systems is essential in various fields, including computer science, digital electronics, and programming.

Memory Capacity Conversion

- “Pasted image 20240923141210.png” could not be found.
- Table: Bit, Byte, KB, MB, GB, TB in Memory/Storage Capacity

Unit	Symbol	Value in bits	Value in bytes	Explanation
Bit	`b`	1 bit	1/8 byte	Smallest unit of data (binary: 0 or 1).
Byte	`B`	8 bits	1 byte	One byte is 8 bits, commonly used to represent one character.
Kilobyte (KB)	`KB`	8,192 bits	1,024 bytes	1 KB = 1,024 bytes (in computer storage context).
Megabyte (MB)	`MB`	8,388,608 bits	1,048,576 bytes	1 MB = 1,024 KB.
Gigabyte (GB)	`GB`	8,589,934,592 bits	1,073,741,824 bytes	1 GB = 1,024 MB.
Terabyte (TB)	`TB`	8,796,093,022,208 bits	1,099,511,627,776 bytes	1 TB = 1,024 GB.

- Explanation:
  - Bit (b): The smallest unit of data in computing, representing a binary digit (0 or 1).
  - Byte (B): Made up of 8 bits, a byte is commonly used to store one character in memory.
  - Kilobyte (KB): In computer memory/storage, 1 KB = 1,024 bytes (due to binary system), though in networking or marketing, 1 KB might be considered as 1,000 bytes.
  - Megabyte (MB): 1 MB = 1,024 KB, commonly used to measure file sizes or smaller storage media.
  - Gigabyte (GB): 1 GB = 1,024 MB, typical for measuring larger storage devices, like hard drives or RAM.
  - Terabyte (TB): 1 TB = 1,024 GB, commonly used for large-scale data storage.

Table: Bit, Byte, KB, MB, GB, TB in Data Transfer Speed

Unit	Symbol	Explanation
Bit per second	`bps`	The number of bits transmitted per second.
Kilobits per second	`Kbps`	1 Kbps = 1,000 bits per second (typically used in network speeds).
Megabits per second	`Mbps`	1 Mbps = 1,000,000 bits per second (network bandwidth speeds).

Unit	Symbol	Explanation
Gigabits per second	`Gbps`	1 Gbps = 1,000,000,000 bits per second.
Terabits per second	`Tbps`	1 Tbps = 1,000,000,000,000 bits per second.
Kilobytes per second	`KBps`	1 KBps = 1,024 bytes per second (used in file download speeds).
Megabytes per second	`MBps`	1 MBps = 1,024 KB per second.
Gigabytes per second	`GBps`	1 GBps = 1,024 MB per second.
Terabytes per second	`TBps`	1 TBps = 1,024 GB per second.

Explanation:

- Bit per second (bps): Commonly used in networking to indicate how many bits are transferred every second (1 bit per second).
- Kilobits per second (Kbps): Often used in older modems and slow internet connections (1 Kbps = 1,000 bits per second).
- Megabits per second (Mbps): Common for internet speeds (e.g., 100 Mbps internet speed).
- Gigabits per second (Gbps): Typically seen in high-speed internet connections or fiber optic connections.
- Megabytes per second (MBps): Used to measure download/upload speed in terms of bytes (not bits) per second.
- Gigabytes per second (GBps): Fast data transfers like SSD to SSD or high-end networks might use these units.

Memory vs. Speed Clarification:

- Memory/Storage units (KB, MB, GB, TB) are in bytes (B) and refer to capacity.
- Data transfer speeds (Kbps, Mbps, Gbps, Tbps) are typically in bits (b) and refer to how fast data is transferred over networks or between devices.

Example Conversions:

- 1 Byte (B) = 8 bits (b)
- 1 KB (Kilobyte) = 1,024 bytes (B) = 8,192 bits (b)

- 1 MB (Megabyte) = 1,024 KB = 1,048,576 bytes (B)
- 1 GB (Gigabyte) = 1,024 MB = 1,073,741,824 bytes (B)

When considering transfer speeds, it is important to remember that 1 byte is 8 bits. For example:

- A download speed of 10 Mbps (megabits per second) translates to a real download speed of 1.25 MBps (megabytes per second), since 10 megabits ÷ 8 = 1.25 megabytes.

Summary:

- Storage units like MB, GB, and TB refer to memory capacity.
- Transfer speed units like Mbps, Gbps are used to measure how fast data moves over a network.

Command Prompts

Introduction Windows

Welcome to the Windows Command Prompt (CMD) Commands Guide! In this comprehensive guide, you'll find a vast collection of Windows CMD commands ranging from beginner to advanced levels. CMD is a powerful tool for interacting with your Windows operating system through a command-line interface.

This guide is designed to help you learn and master the essential commands, making you more efficient in managing your Windows system. Whether you're a novice or an experienced user, you'll find valuable information here.

Commands

File and Directory Commands:

1. `dir` - List files and directories in the current directory.
2. `cd` - Change the current directory.
3. `mkdir` - Create a new directory.
4. `rmdir` - Remove a directory.
5. `copy` - Copy files or directories.
6. `move` - Move files or directories.

7. `del` - Delete files.
8. `ren` - Rename files or directories.
9. `type` - Display the contents of a text file.
10. `find` - Search for a specific string in a file.
11. `attrib` - Change file attributes.
12. `tree` - Display directory structure as a tree.
13. `xcopy` - Extended copy command with more options.
14. `chkdsk` - Check and repair disk errors.
15. `fc` - Compare two files or sets of files.
16. `comp` - Compare the contents of two files.
17. `robocopy` - Robust file and directory copying tool.
18. `sfc` - System File Checker to repair corrupted system files.
19. `findstr` - Search for specific strings in files.
20. `more` - Display the contents of a text file one page at a time.
21. `sort` - Sort the contents of a text file.
22. `xcopy /e` - Copy directories and subdirectories, including empty ones.
23. `compact` - Compress or decompress files on an NTFS partition.
24. `xcaccls` - Backup and restore NTFS permissions.
25. `subst` - Associate a drive letter with a directory.
26. `deltree` - Delete a directory and its subdirectories.
27. `cipher` - Display or alter file encryption on NTFS volumes.
28. `fsutil` - File system utility for managing various file system settings.
29. `openfiles` - Display or disconnect open shared files and folders.

Network Commands:

30. `ipconfig` - Display network configuration information.
31. `ping` - Test network connectivity.
32. `tracert` - Trace the route to a remote host.
33. `netstat` - Display network statistics.
34. `nslookup` - Look up IP addresses and domain names.
35. `hostname` - Display or set the computer's hostname.
36. `arp` - Display and modify the ARP cache.
37. `route` - Display or modify the routing table.
38. `telnet` - Connect to remote hosts using Telnet.
39. `ftp` - Transfer files to/from remote FTP servers.
40. `net` - Manage network resources.
41. `netsh` - Network Shell for configuring network-related settings.

42. `net use` - Connect or disconnect a computer from shared resources.
43. `net view` - Display a list of available network resources.
44. `net share` - Create, delete, or manage shared folders.
45. `net session` - View and manage network sessions.
46. `net time` - Synchronize the computer's time with a network server.
47. `netdom` - Domain-related management tool.
48. `route print` - Display the routing table with more details.
49. `nbtstat` - Display statistics and current connections using NetBIOS over TCP/IP.
50. `ipconfig /flushdns` - Flush and reset the DNS resolver cache.
51. `ipconfig /release` - Release the current DHCP configuration.
52. `ipconfig /renew` - Renew the DHCP configuration.
53. `netsh firewall` - Configure the Windows Firewall.
54. `netstat –a` - Display all active network connections and listening ports.

System Information and Management:

55. `systeminfo` - Display detailed system information.
56. `tasklist` - List running processes.
57. `taskkill` - Terminate processes or applications.
58. `msconfig` - System Configuration Utility.
59. `regedit` - Registry Editor.
60. `eventvwr` - Event Viewer.
61. `services.msc` - Services management console.
62. `shutdown` - Shut down or restart the computer.
63. `gpupdate` - Update Group Policy settings.
64. `ver` - Display the Windows version.
65. `systeminfo` - Display detailed system information.
66. `gpresult` - Display Group Policy settings for the current user.
67. `powercfg` - Configure power management settings.
68. `bcdedit` - Boot Configuration Data Editor for managing boot options.
69. `dxdiag` - DirectX Diagnostic Tool for troubleshooting DirectX issues.
70. `driverquery` - List installed device drivers.
71. `msinfo32` - System Information utility.
72. `mmc` - Microsoft Management Console for creating custom management tools.
73. `taskmgr` - Task Manager for managing running processes.
74. `perfmon` - Performance Monitor for system monitoring.
75. `wmic` - Windows Management Instrumentation Command-line tool.
76. `schtasks` - Schedule tasks to run at specific times or events.

User Account Management:

77. `net user` - Manage user accounts.
78. `net group` - Manage user groups.
79. `net localgroup` - Manage local groups.
80. `whoami` - Display the current user.
81. `runas` - Run a program as another user.
82. `control userpasswords2` - User Accounts control panel.

Disk and Storage Management:

83. `diskpart` - Disk Partitioning tool.
84. `format` - Format a disk drive.
85. `defrag` - Defragment disk drives.
86. `diskmgmt.msc` - Disk Management console.
87. `cleanmgr` - Disk Cleanup utility.

Miscellaneous Commands:

88. `cls` - Clear the screen.
89. `echo` - Display text on the screen.
90. `date` - Display or set the system date.
91. `time` - Display or set the system time.
92. `help` - Get help on commands.
93. `color` - Change the console text and background color.
94. `assoc` - Display or modify file extension associations.
95. `shutdown` - Shutdown or restart the computer.
96. `shutdown /s` - Shutdown the computer (immediate).
97. `shutdown /r` - Restart the computer (immediate).
98. `shutdown /h` - Hibernate the computer (if supported).

Source :

Mac/ Linux

1. https://linuxcommand.org/lc3_resources.php
2. https://github.com/sudheerj/Linux-cheat-sheet

Unix/Linux Command Reference

FOSSwire.com

File Commands

ls – directory listing
ls -al – formatted listing with hidden files
cd *dir* - change directory to *dir*
cd – change to home
pwd – show current directory
mkdir *dir* – create a directory *dir*
rm *file* – delete *file*
rm -r *dir* – delete directory *dir*
rm -f *file* – force remove *file*
rm -rf *dir* – force remove directory *dir* *
cp *file1 file2* – copy *file1* to *file2*
cp -r *dir1 dir2* – copy *dir1* to *dir2*; create *dir2* if it doesn't exist
mv *file1 file2* – rename or move *file1* to *file2* if *file2* is an existing directory, moves *file1* into directory *file2*
ln -s *file link* – create symbolic link *link* to *file*
touch *file* – create or update *file*
cat > *file* – places standard input into *file*
more *file* – output the contents of *file*
head *file* – output the first 10 lines of *file*
tail *file* – output the last 10 lines of *file*
tail -f *file* – output the contents of *file* as it grows, starting with the last 10 lines

Process Management

ps – display your currently active processes
top – display all running processes
kill *pid* – kill process id *pid*
killall *proc* – kill all processes named *proc* *
bg – lists stopped or background jobs; resume a stopped job in the background
fg – brings the most recent job to foreground
fg *n* – brings job *n* to the foreground

File Permissions

chmod *octal file* – change the permissions of *file* to *octal*, which can be found separately for user, group, and world by adding:

- 4 – read (r)
- 2 – write (w)
- 1 – execute (x)

Examples:
chmod 777 – read, write, execute for all
chmod 755 – rwx for owner, rx for group and world
For more options, see **man chmod**.

SSH

ssh *user@host* – connect to *host* as *user*
ssh -p *port user@host* – connect to *host* on port *port* as *user*
ssh-copy-id *user@host* – add your key to *host* for *user* to enable a keyed or passwordless login

Searching

grep *pattern files* – search for *pattern* in *files*
grep -r *pattern dir* – search recursively for *pattern* in *dir*
command* | grep *pattern – search for *pattern* in the output of *command*
locate *file* – find all instances of *file*

System Info

date – show the current date and time
cal – show this month's calendar
uptime – show current uptime
w – display who is online
whoami – who you are logged in as
finger *user* – display information about *user*
uname -a – show kernel information
cat /proc/cpuinfo – cpu information
cat /proc/meminfo – memory information
man *command* – show the manual for *command*
df – show disk usage
du – show directory space usage
free – show memory and swap usage
whereis *app* – show possible locations of *app*
which *app* – show which *app* will be run by default

Compression

tar cf *file.tar files* – create a tar named *file.tar* containing *files*
tar xf *file.tar* – extract the files from *file.tar*
tar czf *file.tar.gz files* – create a tar with Gzip compression
tar xzf *file.tar.gz* – extract a tar using Gzip
tar cjf *file.tar.bz2* – create a tar with Bzip2 compression
tar xjf *file.tar.bz2* – extract a tar using Bzip2
gzip *file* – compresses *file* and renames it to *file.gz*
gzip -d *file.gz* – decompresses *file.gz* back to *file*

Network

ping *host* – ping *host* and output results
whois *domain* – get whois information for *domain*
dig *domain* – get DNS information for *domain*
dig -x *host* – reverse lookup *host*
wget *file* – download *file*
wget -c *file* – continue a stopped download

Installation

Install from source:
./configure
make
make install
dpkg -i *pkg.deb* – install a package (Debian)
rpm -Uvh *pkg.rpm* – install a package (RPM)

Shortcuts

Ctrl+C – halts the current command
Ctrl+Z – stops the current command, resume with **fg** in the foreground or **bg** in the background
Ctrl+D – log out of current session, similar to **exit**
Ctrl+W – erases one word in the current line
Ctrl+U – erases the whole line
Ctrl+R – type to bring up a recent command
!! - repeats the last command
exit – log out of current session

* use with extreme caution.

3.

End with Exercise

```
yiminggao@MacBookAir Week_One % ls
Workbook 1 - Intro to Java v2.1Y.pdf
Workbook 1 - Workshop - Financial Calculators v2.0Y.pdf
Workbook 1 - a - From-10000-Feet v3.0Y.pdf
Workbook 1 - b - CLI and Git v6.0Y.pdf
Workbook 1 - c - Working with IntelliJ v2.0Y.pdf
command-line
yiminggao@MacBookAir Week_One % cd command-line/VirtualWorld
yiminggao@MacBookAir VirtualWorld % pwd
/Users/yiminggao/Documents/Year_up/Content/Week_One/command-line/VirtualWorld
yiminggao@MacBookAir VirtualWorld % ls
Animals Foods   Parks
yiminggao@MacBookAir VirtualWorld % ls Foods/
BBQ     Mexican
yiminggao@MacBookAir VirtualWorld % ls Animals/Pets
Cat.txt         Dog.txt         Goldfish.txt    Parrot.txt
yiminggao@MacBookAir VirtualWorld % ls Parks/Califiornia
Joshua Tree National Park.txt           Sequoia National Park.txt
Point Reyes National Seashore.txt       Yosemite National Park.txt
Redwood National Park.txt
yiminggao@MacBookAir VirtualWorld % ls Foods/BBQ
Brisket.txt     Ribs.txt        Sausage.txt
yiminggao@MacBookAir VirtualWorld % ls Animals/Farm/
Buffalo.txt     Cow.txt         Goat.txt        Pig.txt         Sheep.txt
yiminggao@MacBookAir VirtualWorld % ls Foods/Mexican/
Burrito.txt             Guacamole and Chips.txt
Chile Rellano.txt       Taco.txt
yiminggao@MacBookAir VirtualWorld % cd Parks/Texas
yiminggao@MacBookAir Texas % ls
Big Bend National Park.txt              Mineral Wells State Park.txt
Big Bend State Park.txt                 Padre Island National Seashore.txt
Enchanted Rock State Park.txt
yiminggao@MacBookAir Texas % cd ../..
yiminggao@MacBookAir VirtualWorld % ls
Animals Foods   Parks
yiminggao@MacBookAir VirtualWorld %
```