JOHNS HOPKINS
WHITING SCHOOL
of ENGINEERING

EN.540.635
Software Carpentry

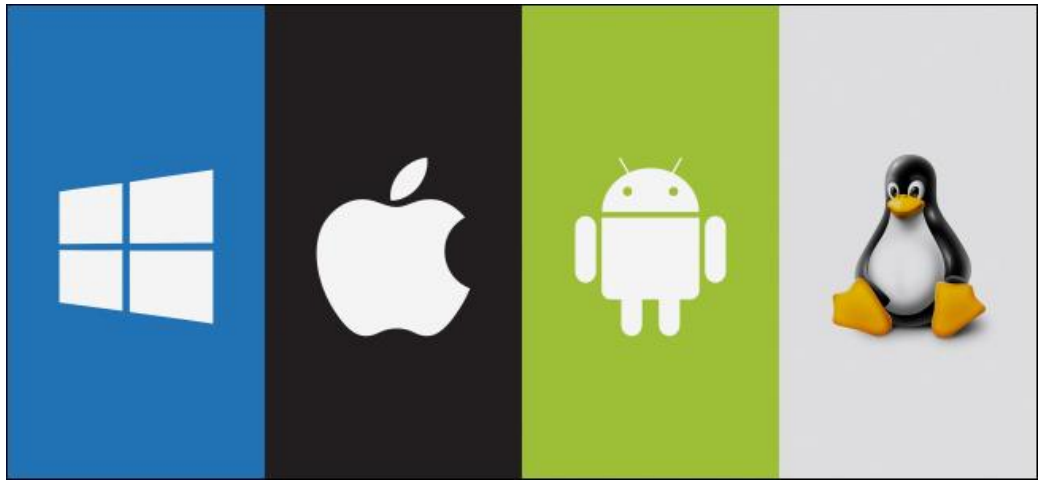
Lecture 2
Linux | SSH & SCP

Operating System

- Software that allows the user and the application on a computer to interact with the computer hardware

- Common components include:
  - ➢Kernel
  - ➢Networking
  - ➢Security
  - ➢User Interface

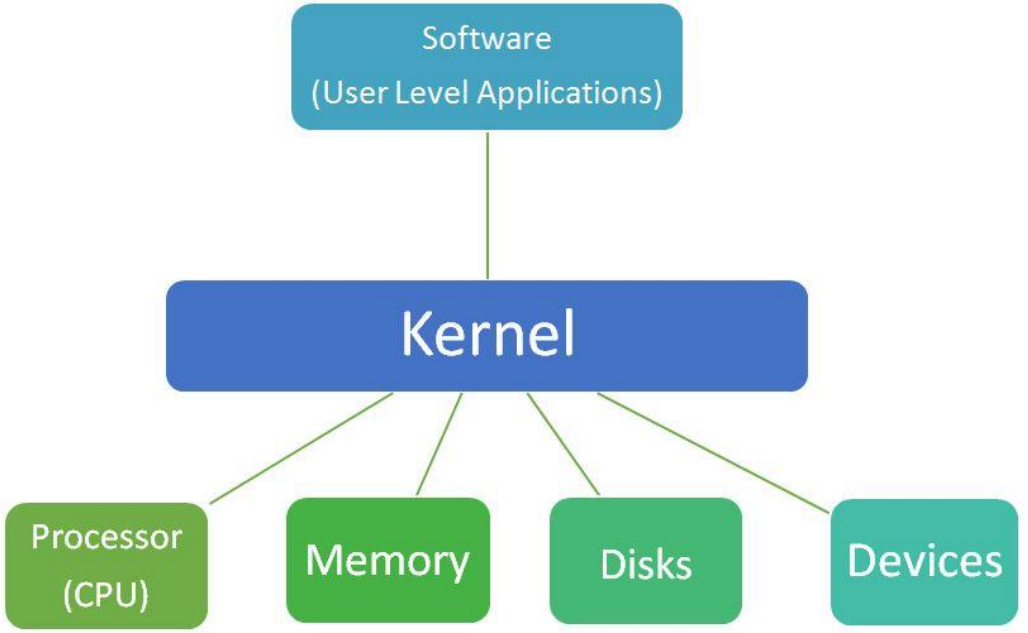
… and many others.



Kernel

- It is the central component of an Operating System

- The kernel performs the following tasks
  - ➢Process Management
  - ➢Memory Management
  - ➢I/O requests/ System Calls
  - ➢Device Management

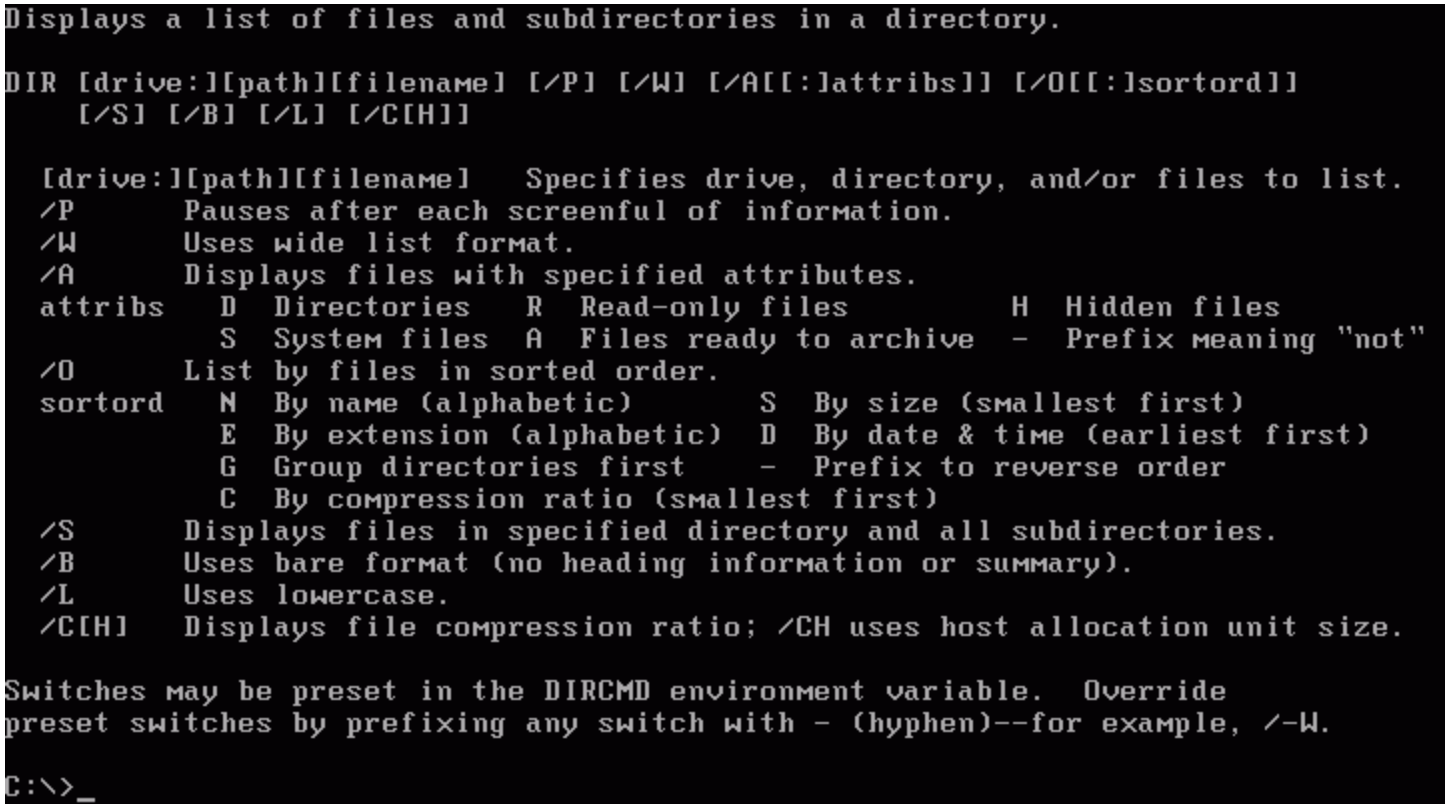


You switch on your computer …

- The CPU executes firmware code stored in non volatile memory.
  - Examples of firmware code are BIOS and UEFI.
- Fimware locates the OS specific bootloader.
- Bootloader locates the kernel file on storage device and unzips it
- Kernel loaded into the RAM file.
- Last action by Bootloader : call kernel's main() function.
- Kernel takes over control and you see the login page.

Ref : OpenCSF.

MS DOS



[Source Code]

The Linux Kernel

- An Open-Source Kernel, released by Linus Torvalds on September 17th, 1991

- Common "Linux" operating systems:
  - Ubuntu
  - CentOS
  - Fedora
  - Debian
  - Arch Linux

ARCH: Rockfish

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Advanced **R**esearch **C**omputing at **H**opkins

arch.jhu.edu

RockFish - Resource Allocation System

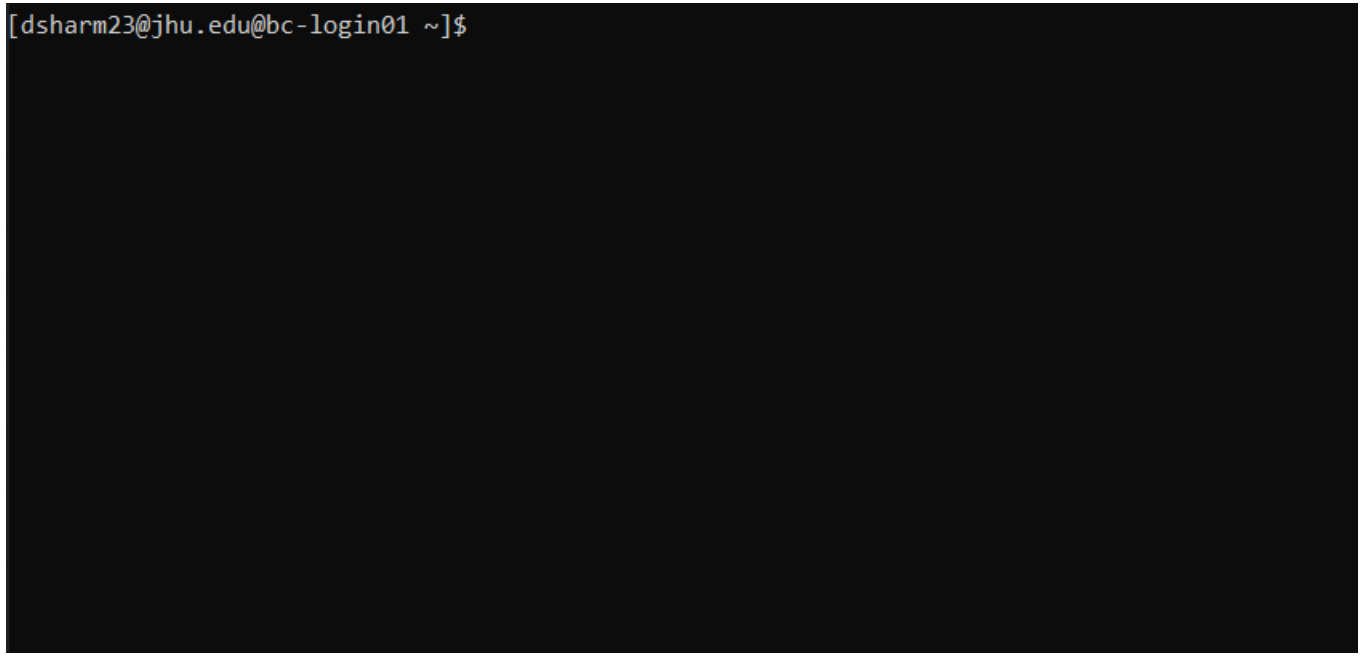
Advanced Research Computing at Hopkins

Rockfish was rated #496 in top500.org at 1.9PFLOPs (June 2023)

Linux Command Line (Terminal): Bash Shell

- The ‘shell’ is part of the OS that allows the user to directly interface with the kernel

- Linux commonly uses the bash shell (stands for ‘Bourne again shell’)



- Can change your default shell by typing

chsh –s /bin/shell_name

Common Commands

Command	Description	Usage
ls	List files in current folder	ls; ls –l; ls -la
cd	Change directory	cd ..; cd <name_of_dir>
mkdir	Create Directory	mkdir <name_of_dir>
cat	Returns content of file as output	cat <fptr>
head	Returns the beginning few lines of a file	head <fptr>; head –n <no_of_lines> <fptr>
tail	Returns the last few lines of a file	tail <fptr>; tail –n <no_of_lines> <fptr>
rm	Deletes file/folder	rm <fptr>; rm –f <name_of_dir>
touch	Create or change timestamps of a file	touch <name_of_file>

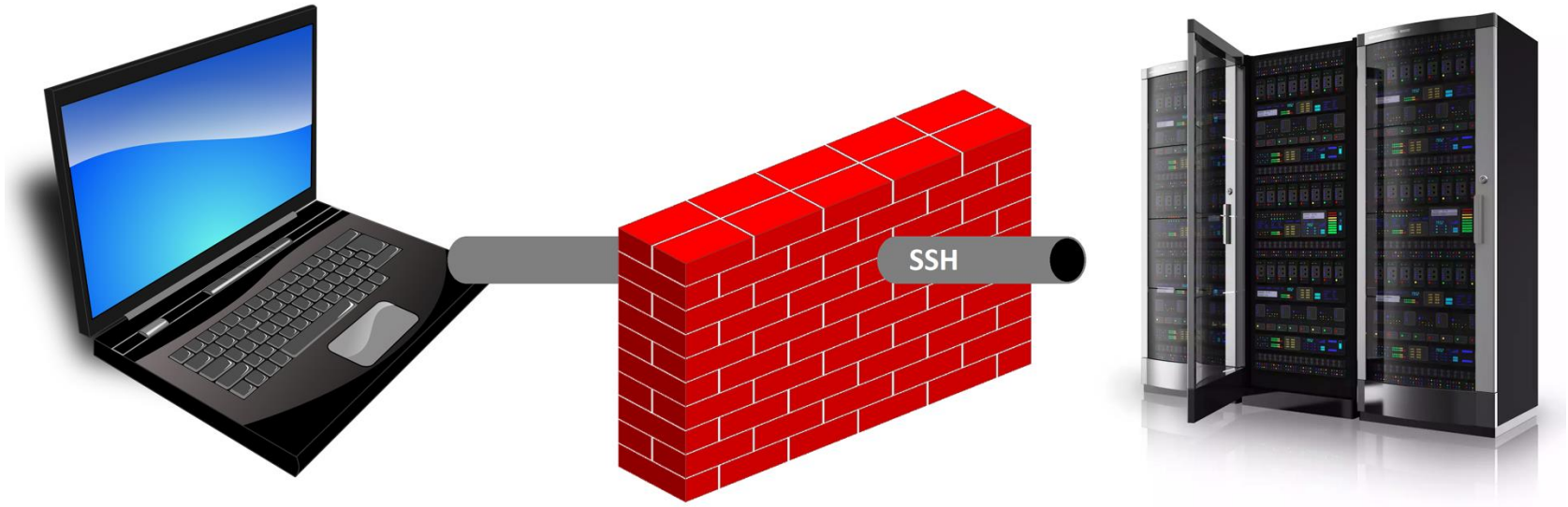
Commands are case sensitive!

https://explainshell.com

Networking: SSH and SCP

Secure Shell (**SSH**) is a cryptographic network protocol for operating network services securely over an unsecured network.

SCP (secure copy) is a command-line utility that allows you to securely copy files and directories between two locations.



Connecting using SSH and SCP

1. Open up a terminal
2. Use the SSH command as follows

```
ssh username_on_remote_machine@address_of_remote_machine
```

3. Use scp to Download or upload files as follows

```
scp [OPTION] [user@]SRC_HOST:]file1 [user@]DEST_HOST:]file2
```

Instructions

- Make sure you have SSH capability in your laptop either using terminal or an SSH client
- For the next Homework, make sure you have python 3.10 set up
- You should be able to run saved python scripts, either from the terminal or using an IDE