



Computer Fundamentals



Agenda



- ▶ Introduction
- ▶ What is Computer
- ▶ How computers work
- ▶ Operating Systems

Introduction



1

Were you able to finish pre-class material?



PEAR DECK

Students choose an option

Pear Deck Interactive Slide

Do not remove this bar

Introduction



How long did it take to finish it?



Students choose an option

Pear Deck Interactive Slide
Do not remove this bar

What is Computer



What is Computer





What is Computer



Question:

Think outside of the box and tell me a computer not in traditional sense.





What is Computer





What is Computer



What is Computer

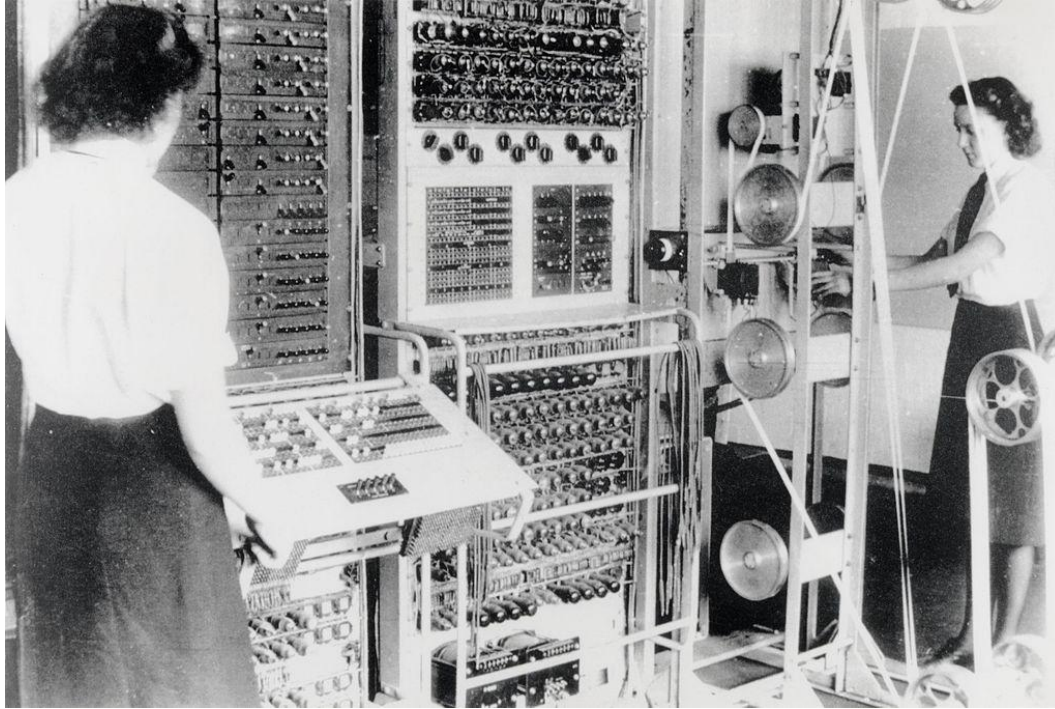


- A computer is...

a device that accepts data or **input** and **store** it to somewhere. Then **processes** this data in someway to automatically produce a **result or output**.



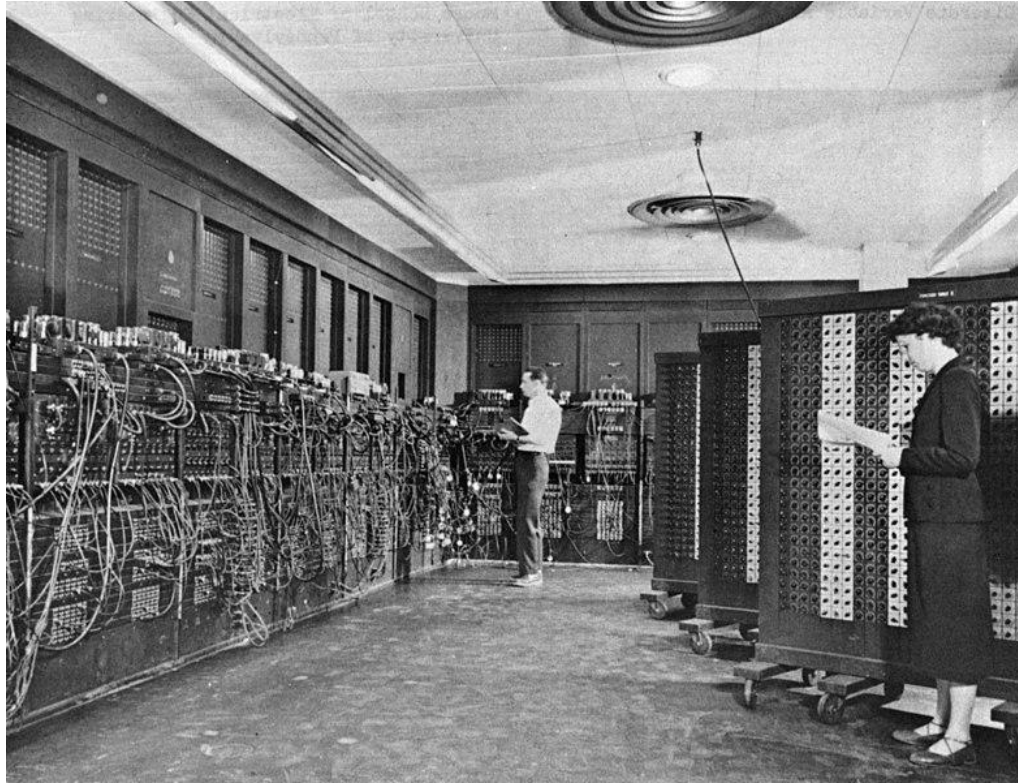
What is Computer



Colossus computer

1943 - 1945

What is Computer



ENIAC (Electronic Numerical Integrator And Computer)

1955

What is Computer



Galaxy Z Fold3





What is Computer





2

How Computers Work

How Computers Work



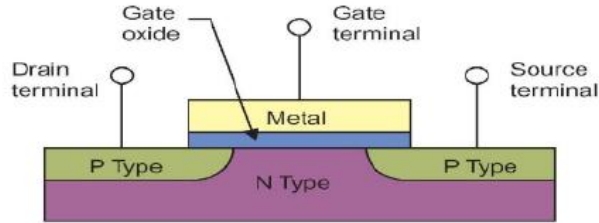
- So how does computers work?
- Let's shop on Apple.com



How Computers Work

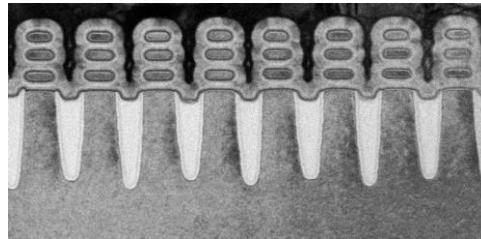


- **TRANSISTORS**



1956 Nobel Prize in Physics

- Semi-conductor
- Cheap
- Small
- Very low energy consumption

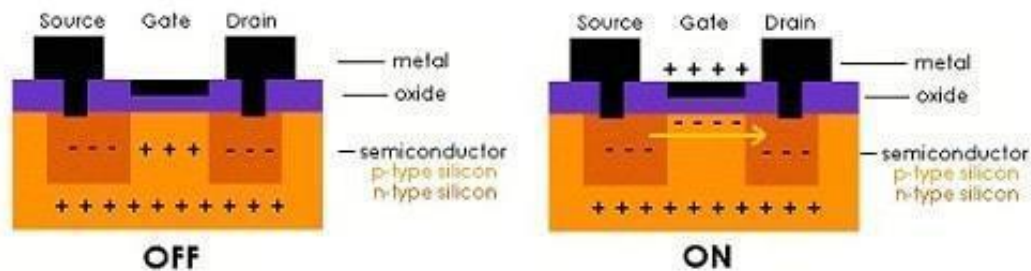
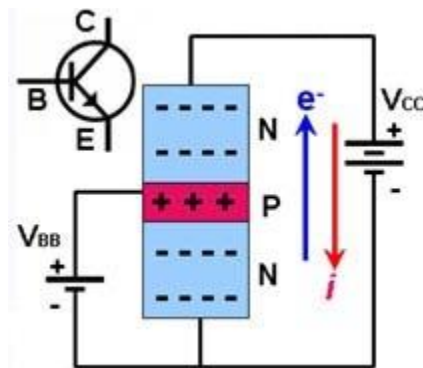


IBM's 5nm transistors

How Computers Work



- **TRANSISTORS**





How Computers Work



Vaccum Tube



Transistor

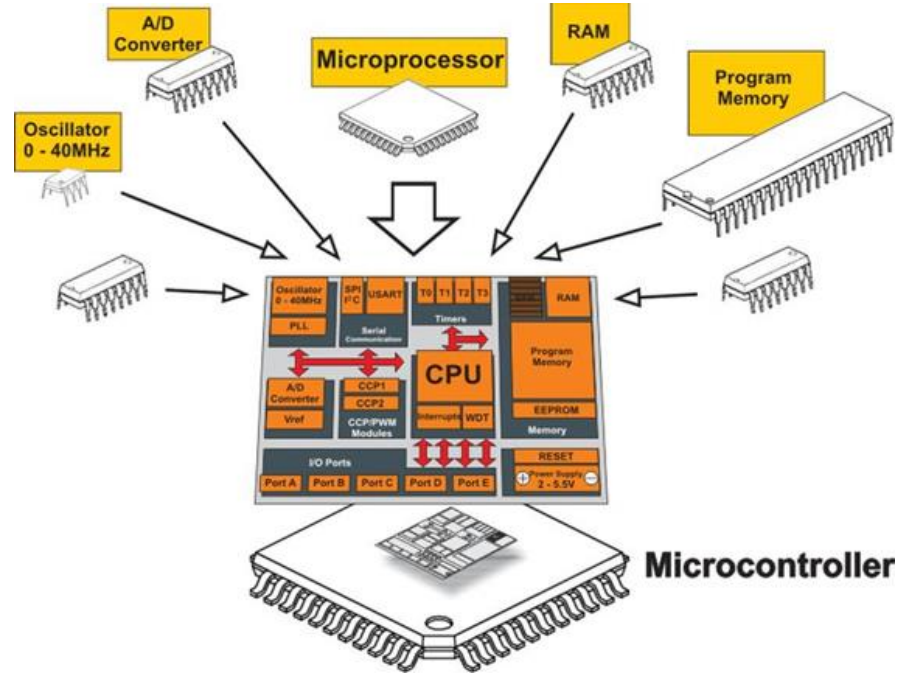
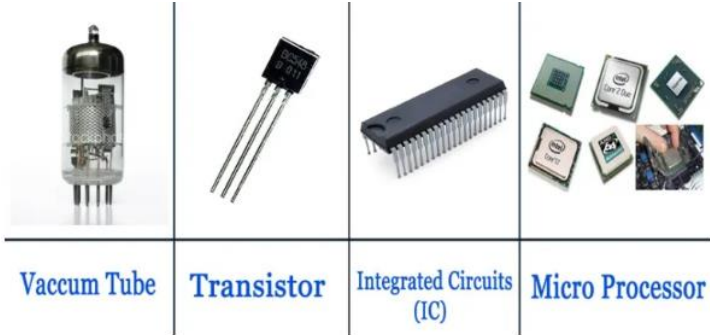


Integrated Circuits
(IC)



Micro Processor

How Computers Work



How Computers Work

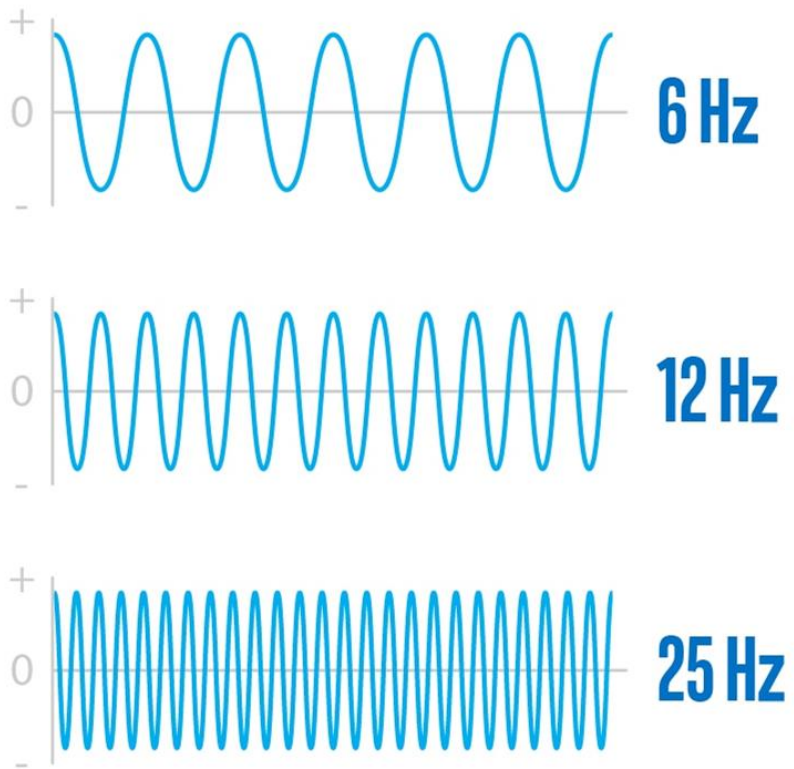


**Central Processing Unit
(Brain of the Computer)**

**4.6 GHz = 4.6 Billion cycles
per second**



How Computers Work





How Computers Work



DATE	CPU	# of transistors
1972	Intel 8008	3,500
1982	Intel 80286	134,000
1993	Pentium	3,100,000
2000	Pentium 4	42,000,000
2012	Quad-Core + GPU Core i7	1,400,000,000
2020	Apple M1 Chip	16,000,000,000
2022	Apple M2 Chip	20,000,000,000
2022	Apple M1 Ultra	114,000,000,000

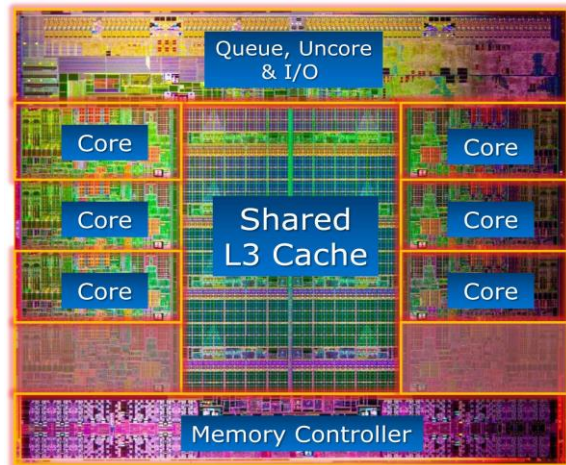
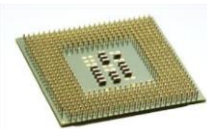
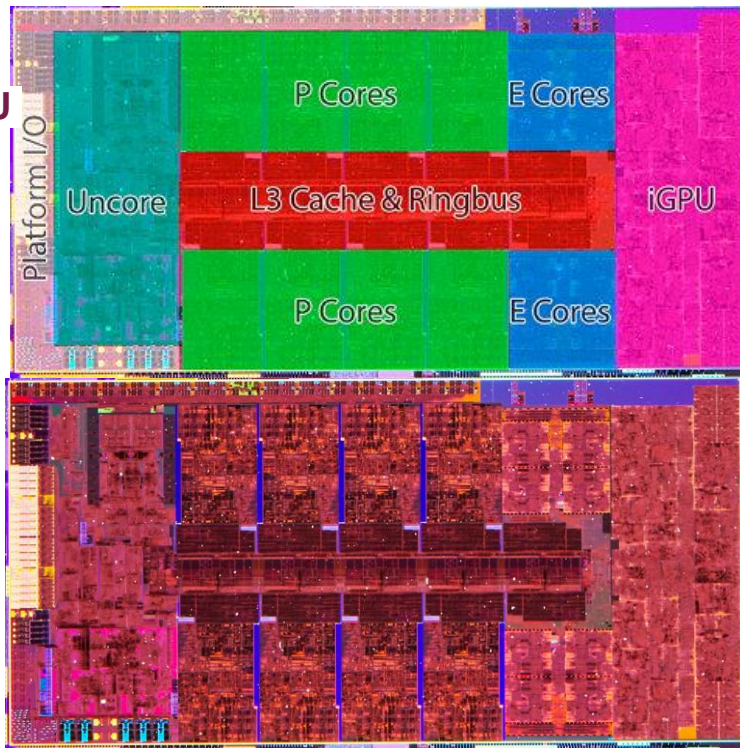


How Computers Work



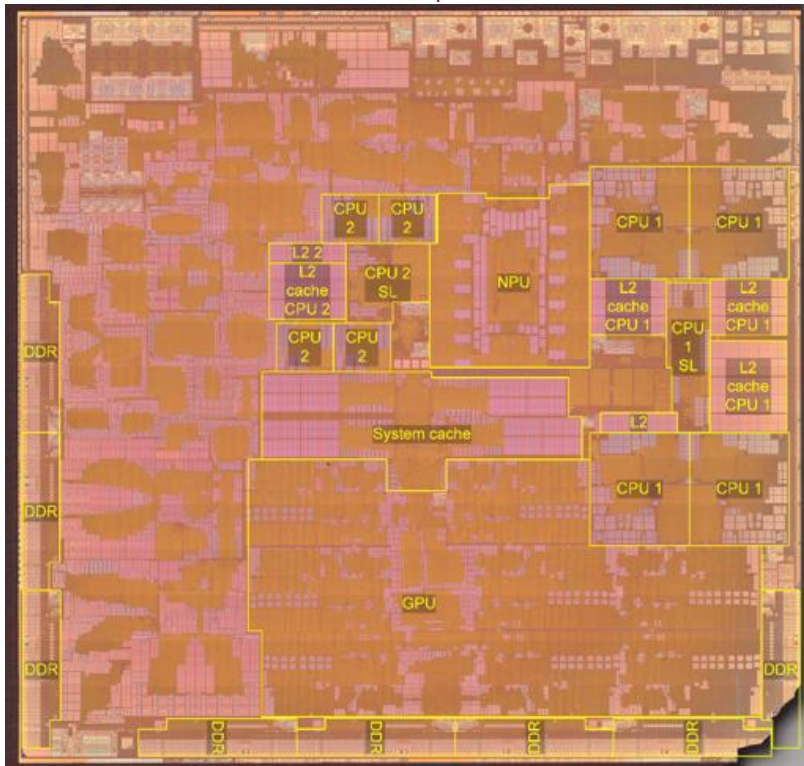
Intel i9-12900K CPU die photo

Total Cores :16
8 Performance-cores,
8 Efficient-cores
Cache : 30 MB



Intel i7-3960x CPU die

How Computers Work



Apple M1 die photo

- System on a chip (SoC)
- 5-nanometer process
- 16 billion transistors
- 8-core CPU
- 8-core GPU
- 16-core neural engine



How Computers Work



RAM (Random Access Memory)

- Temporary
- Fast
- Expensive





How Computers Work



Hard Drive

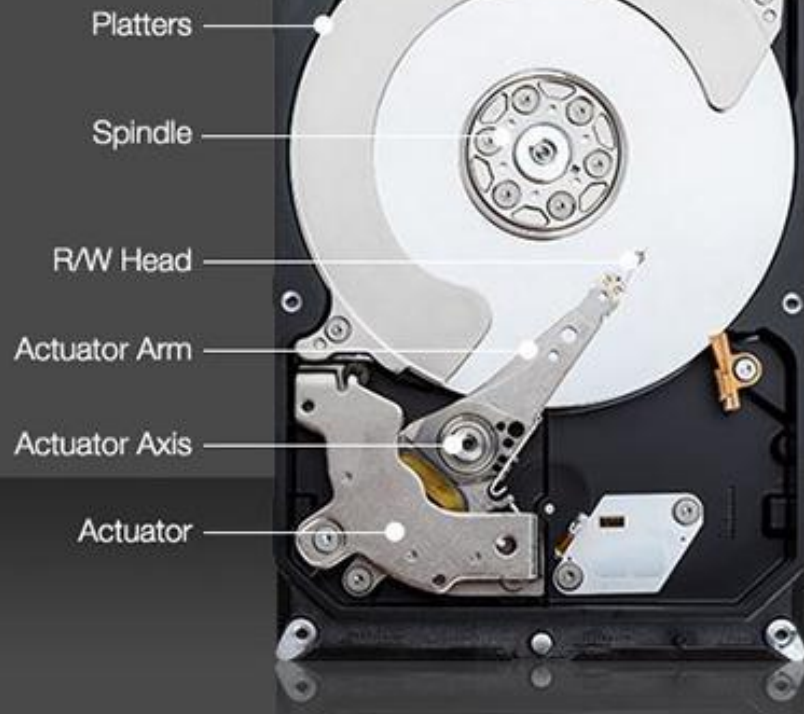
- Moving Parts
- Slow
- Cheap
- Vulnerable





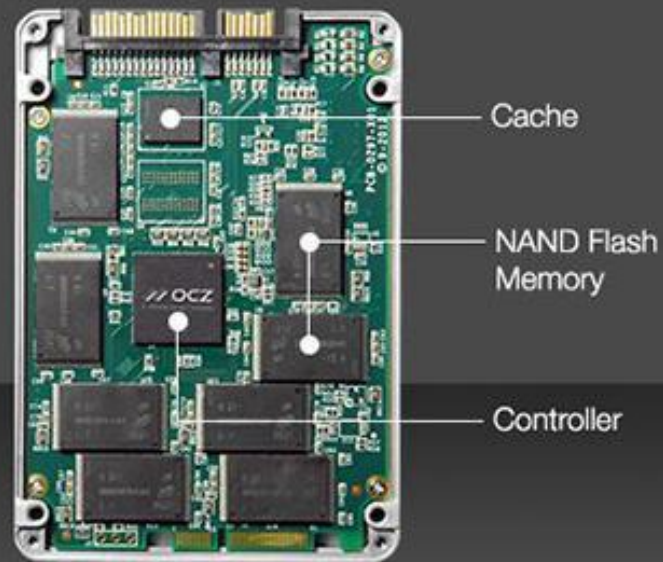
HDD

3.5"



SSD

2.5"





How Computers Work

Hard Disk Drive (HDD) vs SSD vs NVMe

Magnetic- SATA3



**SSD -
SATA3**



SSD - NVMe

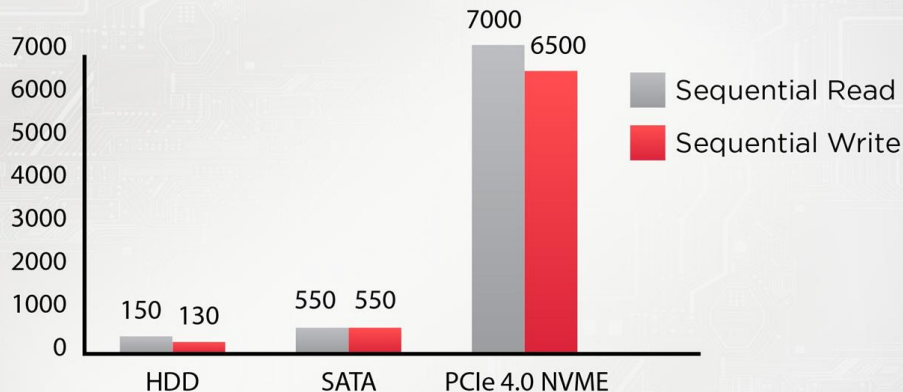


How Computers Work

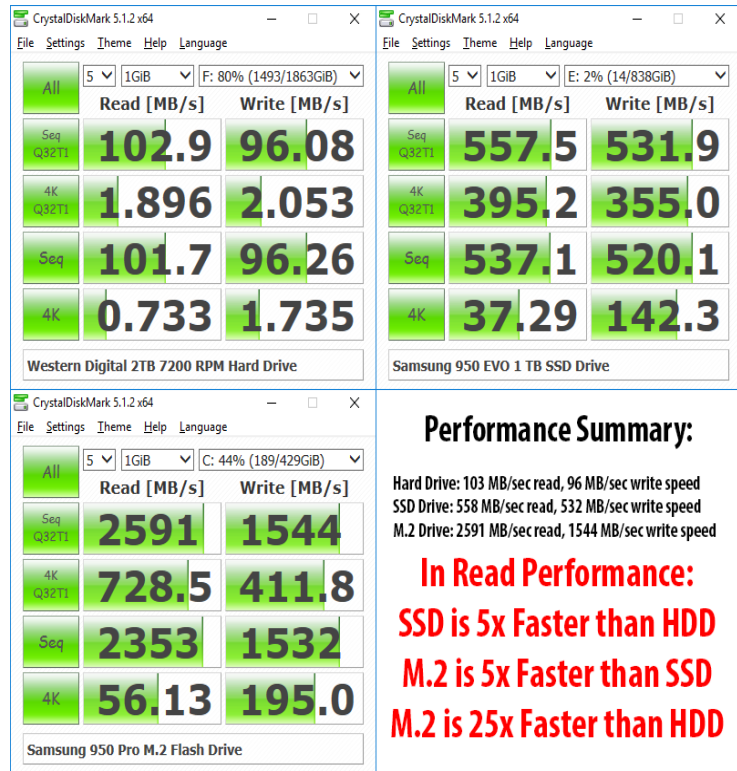


HDD vs SATA SSD vs PCIe 4.0 NVMe SSD

Sequential Speeds



CGDIRECTOR.COM





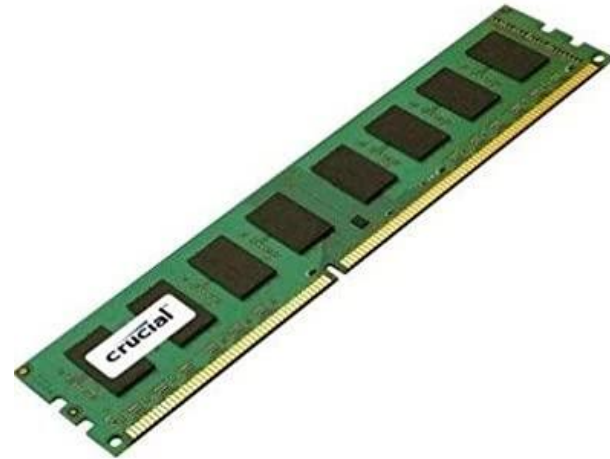
How Computers Work



Question: How about NVMe vs RAM?



VS

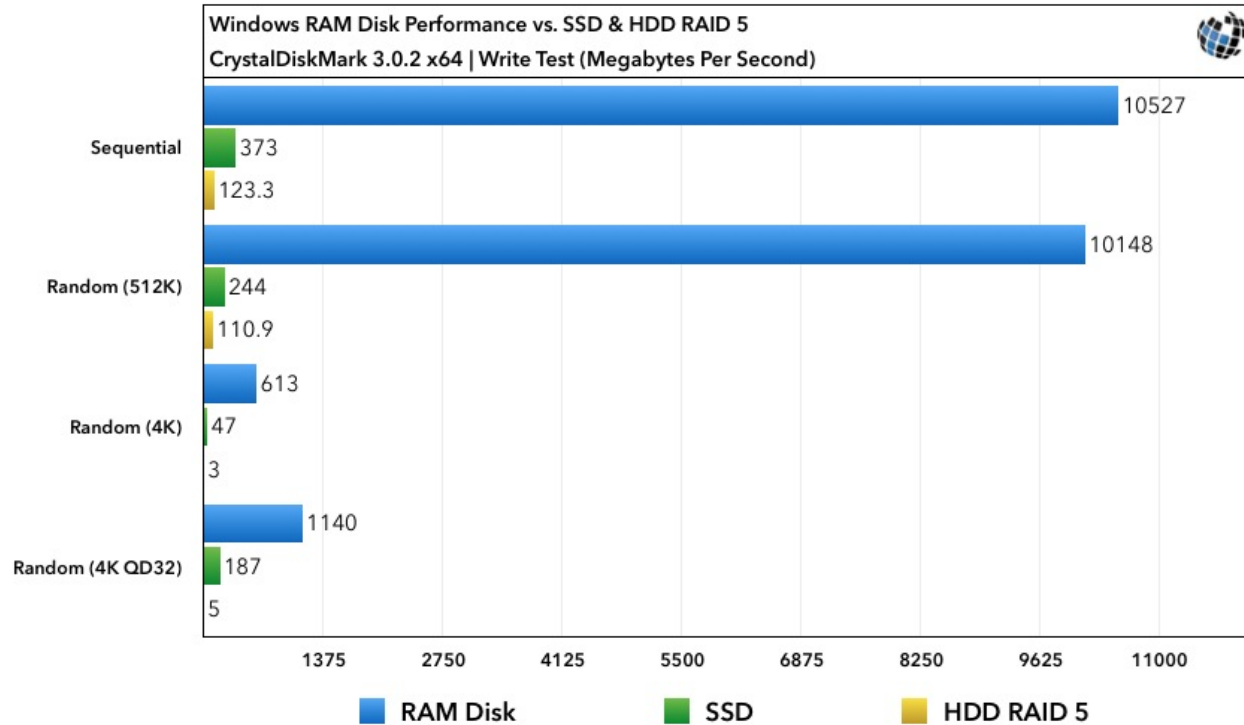


Students choose an option

Pear Deck Interactive Slide
Do not remove this bar



How Computers Work



Computer memory fundamentals

<https://www.youtube.com/watch?v=p3q5zWCw8J4>

How Computers Work



Hard Drive vs RAM

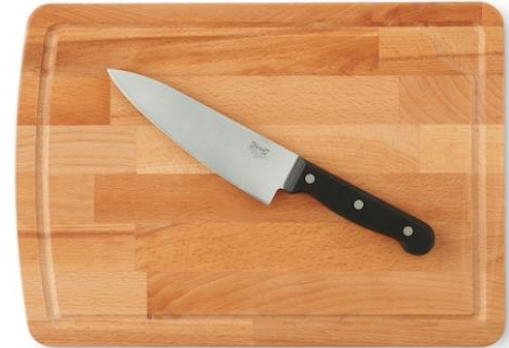
Hard Drive



RAM



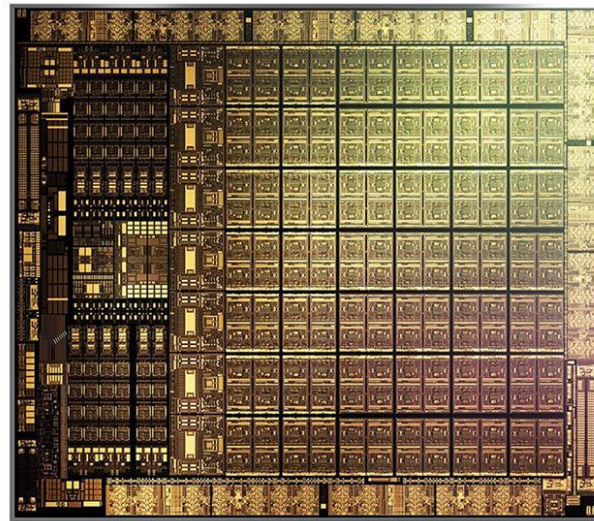
CPU



How Computers Work



GPU (Graphical Processing Unit)

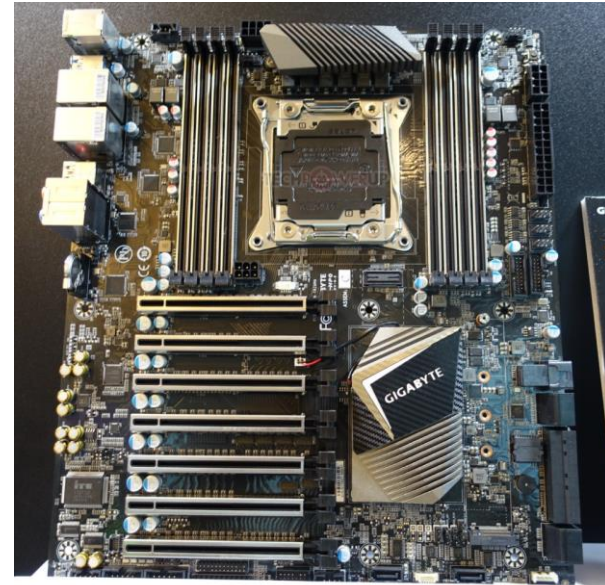
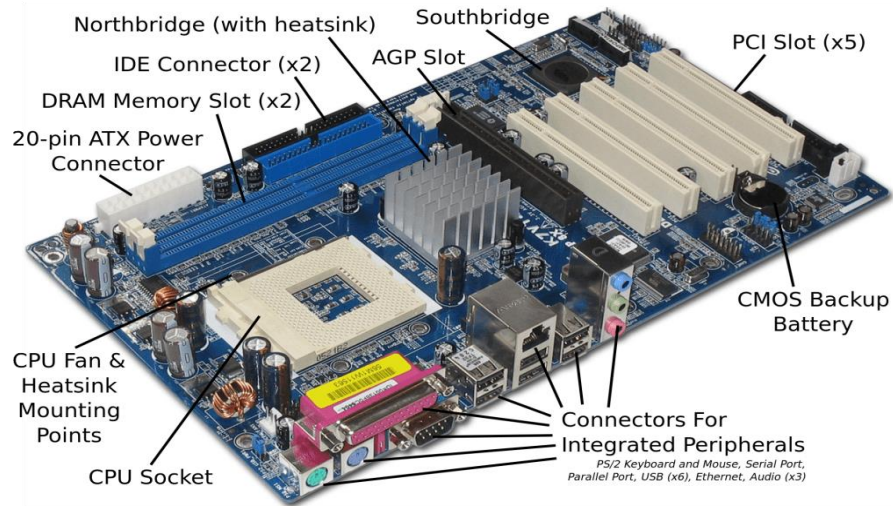


The GeForce RTX 3050's
GA106 GPU

How Computers Work



Mainboard or Logic Board



New Generation motherboard (Intel i9)



How Computers Work

Input and Output Devices



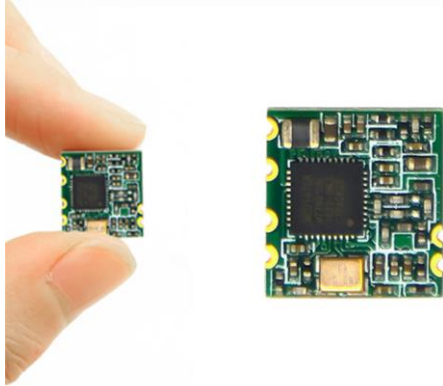
Students, write your response!

Pear Deck Interactive Slide
Do not remove this bar

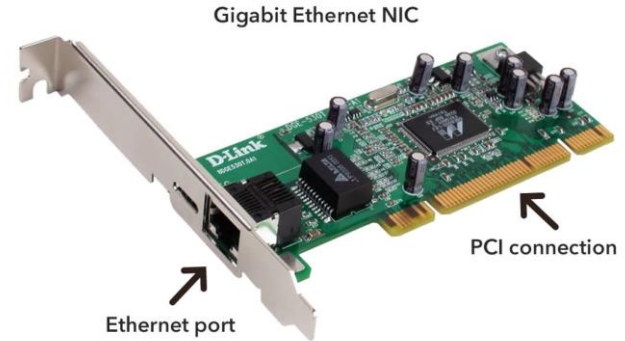
How Computers Work



- **Communication Devices**



Wireless Adapter



Network Interface Card

How Computers Work

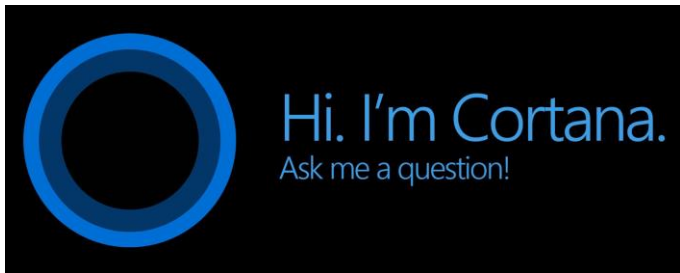


- **Virtual Reality / Augmented Reality / Mixed Reality**





How Computers Work



???



Computer Fundamentals



Agenda



► Operating Systems

Introduction



How long did it take to finish it?



Students choose an option

Pear Deck Interactive Slide
Do not remove this bar

Operating Systems



- **Music**
- **Video**
- **Chat**
- **Shopping**
- **Coding**
- **Reading**
- **Gaming**

Operating Systems

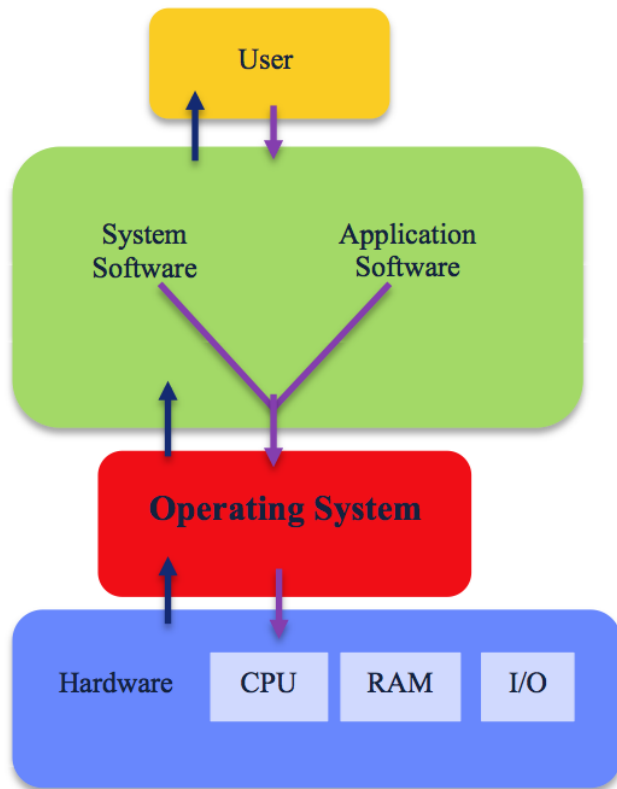


- **OPERATING SYSTEMS:**
AN OPERATING SYSTEM (OS) IS SYSTEM SOFTWARE THAT MANAGES COMPUTER HARDWARE AND SOFTWARE RESOURCES AND PROVIDES COMMON SERVICES FOR COMPUTER PROGRAMS REQUIRE AN OPERATING SYSTEM TO FUNCTION.





Operating Systems



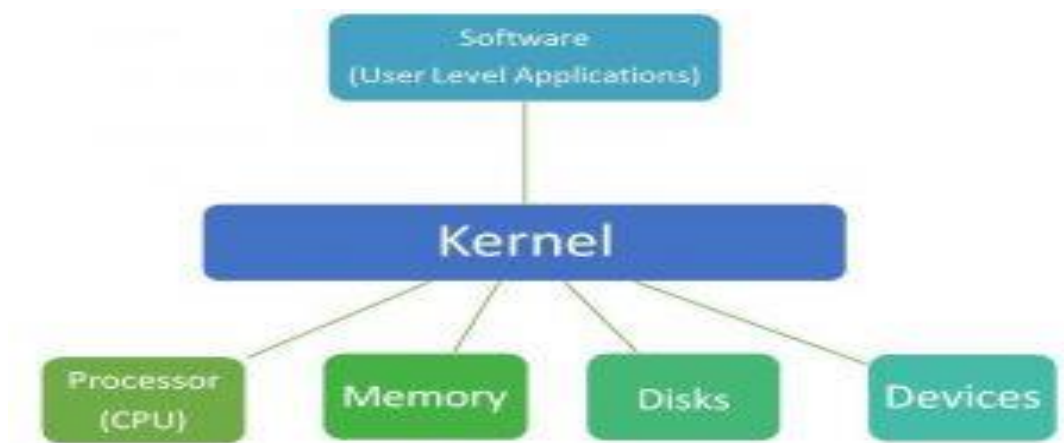


Operating Systems



Kernel:

It connects applications to the actual processing of data. It also manages all communications between software and hardware components to ensure usability and reliability.



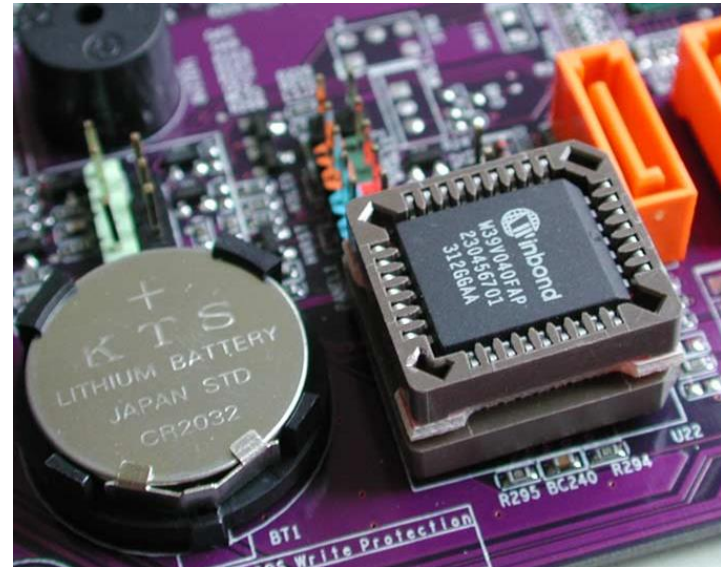
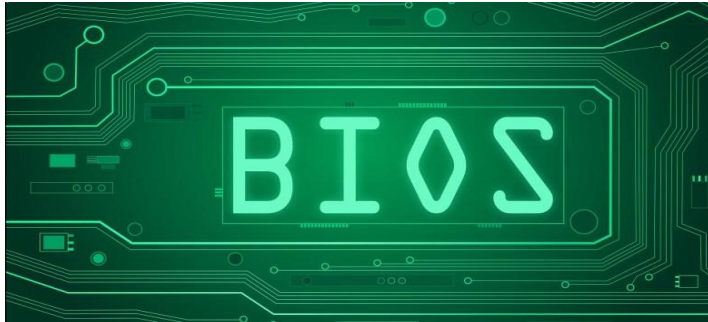


Operating Systems



BIOS (Basic Input Output System):

It is firmware used to perform hardware initialization during the booting process (power-on startup), and to provide runtime services for operating systems and programs.





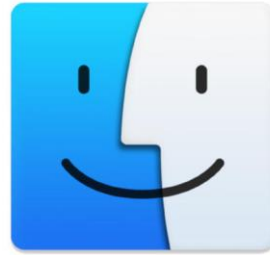
Question: What does OS manage?



Students, write your response!

Pear Deck Interactive Slide
Do not remove this bar

Operating Systems



MacOS



Linux





Operating Systems



Please write your computers and mobile phones operating system.



Operating Systems



- **Terminal**

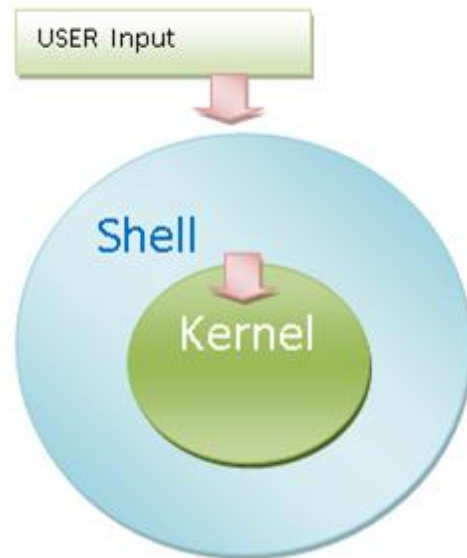
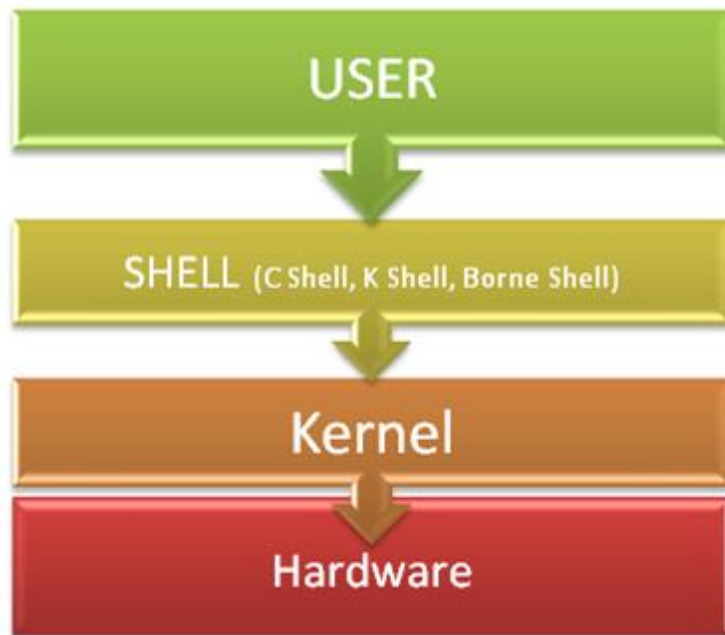
```
howtogeek@ubuntu: ~$
```

```
itechno8 — -bash — 80x24
Last login: Sun Aug 11 23:39:40 on console
Shujaas-MacBook-Pro:~ itechno8$ open /Users/iTechno8/Documents
```



Operating Systems

- **Shell**

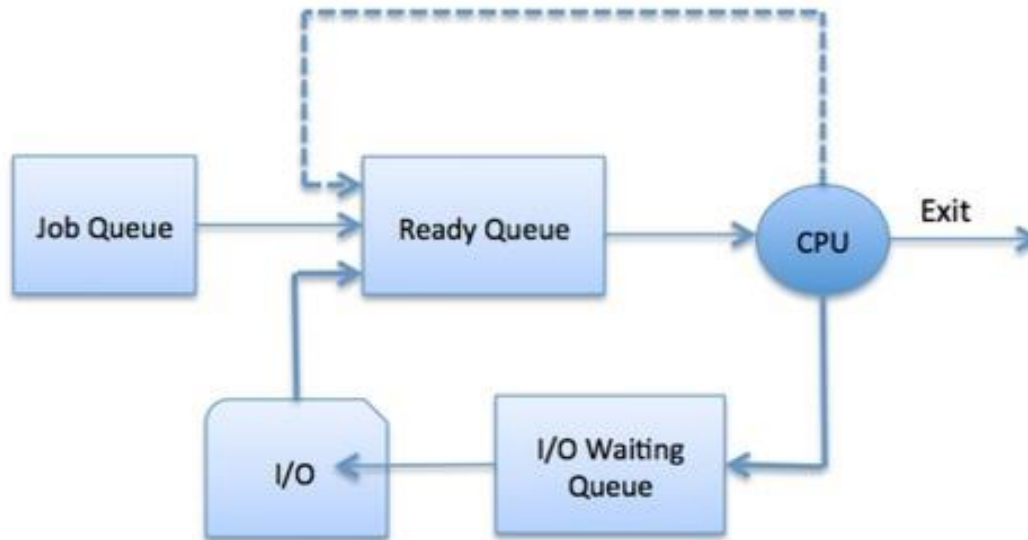




Operating Systems



What do you know about scheduling?





Operating Systems



Scheduling:

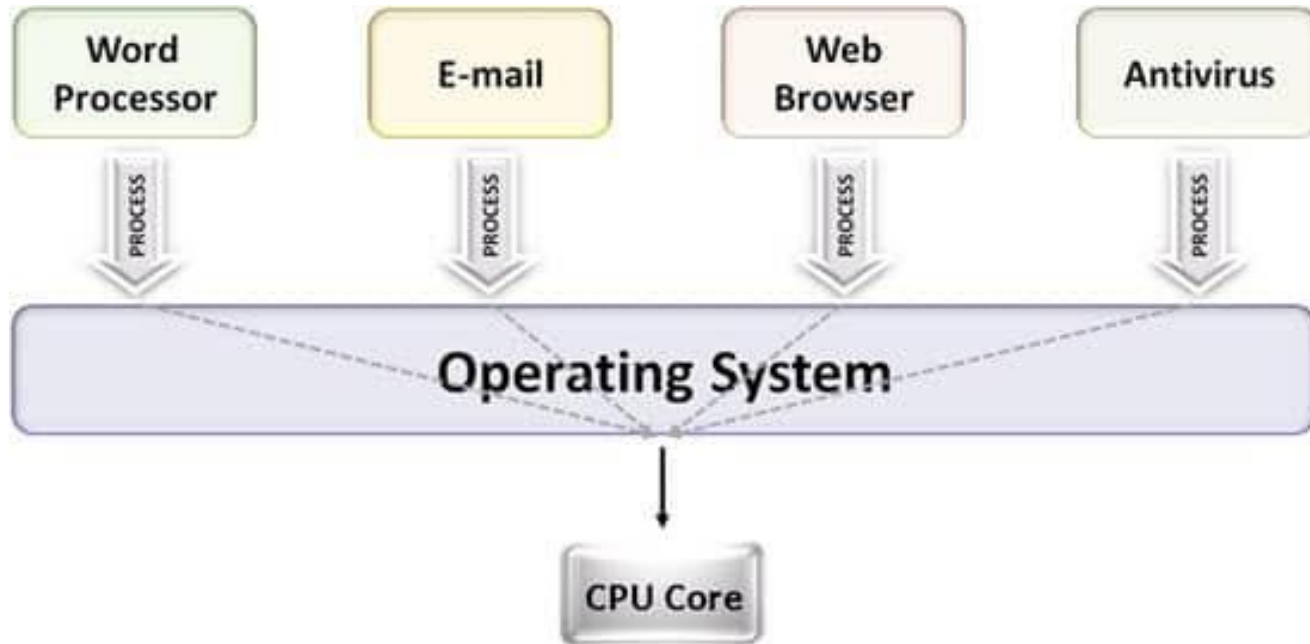
- Multiprogramming
- Multiprocessing
- Multithreading



Operating Systems



- Multiprogramming



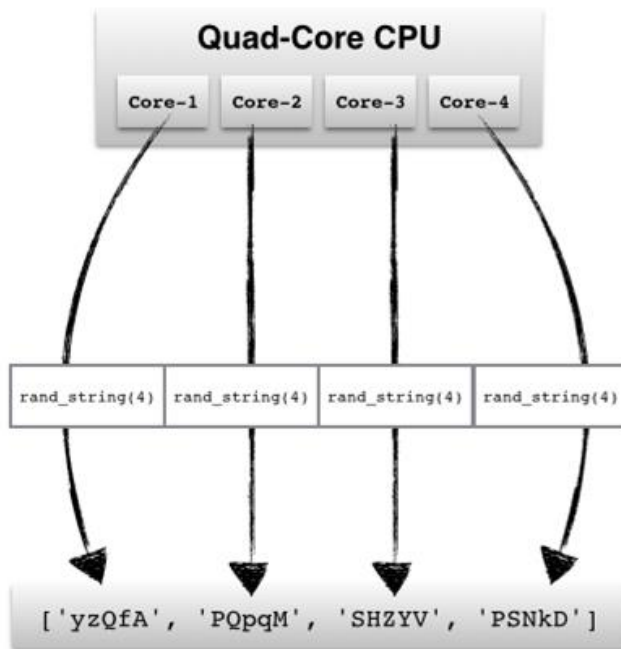


Operating Systems



- Multiprocessing

[parallel processing]

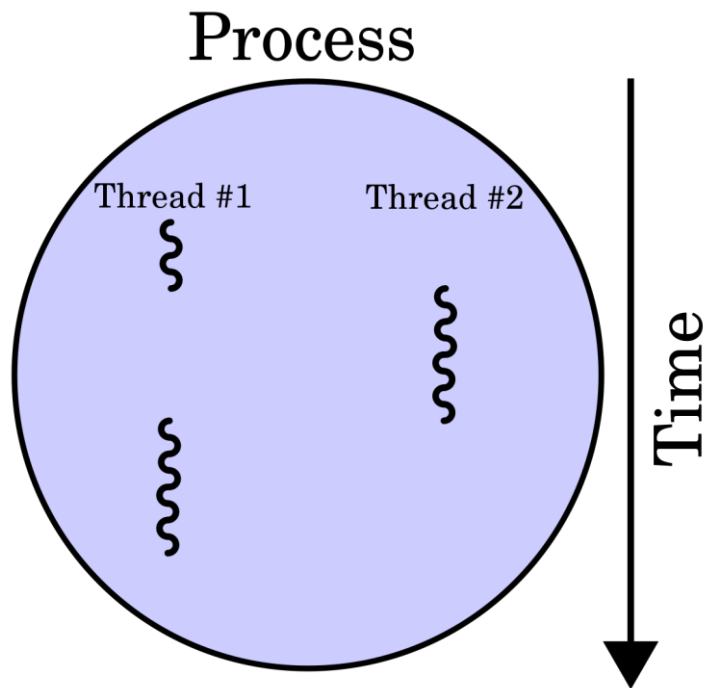




Operating Systems



- Multithreading





What is the difference between processes and threads?

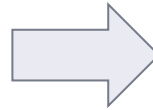


Operating Systems



- **Files:**

Files are spaces on your computer where data is stored.





Operating Systems



- **Metadata**



Operating Systems



- **Metadata**

Metadata example

Structural

Song Title:
Artist Name:
Album Title:
Genre:
Release Year:
Track Number:
Composer:
Copyright:

Descriptive

Better Man
Pearl Jam
Vitalogy
Rock
1994
11 of 14
Eddie Vedder
© Pearl Jam

Administrative

Added By:
Date Added:
Encoded With:
Media Kind:

Robert Godino
26/11/2016 8:19 pm
iTune v7.6.1
MPEG audio file

↑
Elements

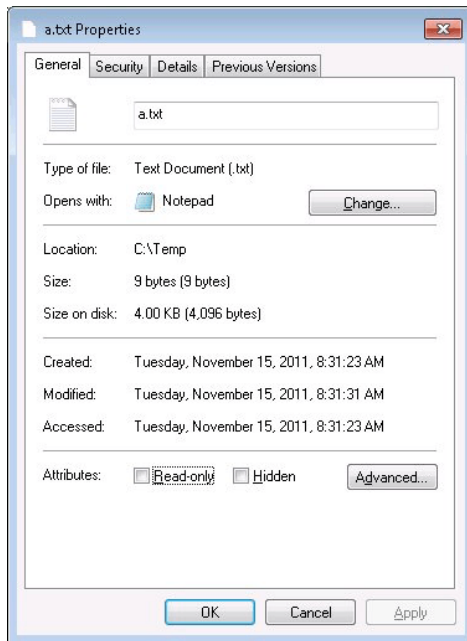
↑
Values

Operating Systems



- **File Attributes:**

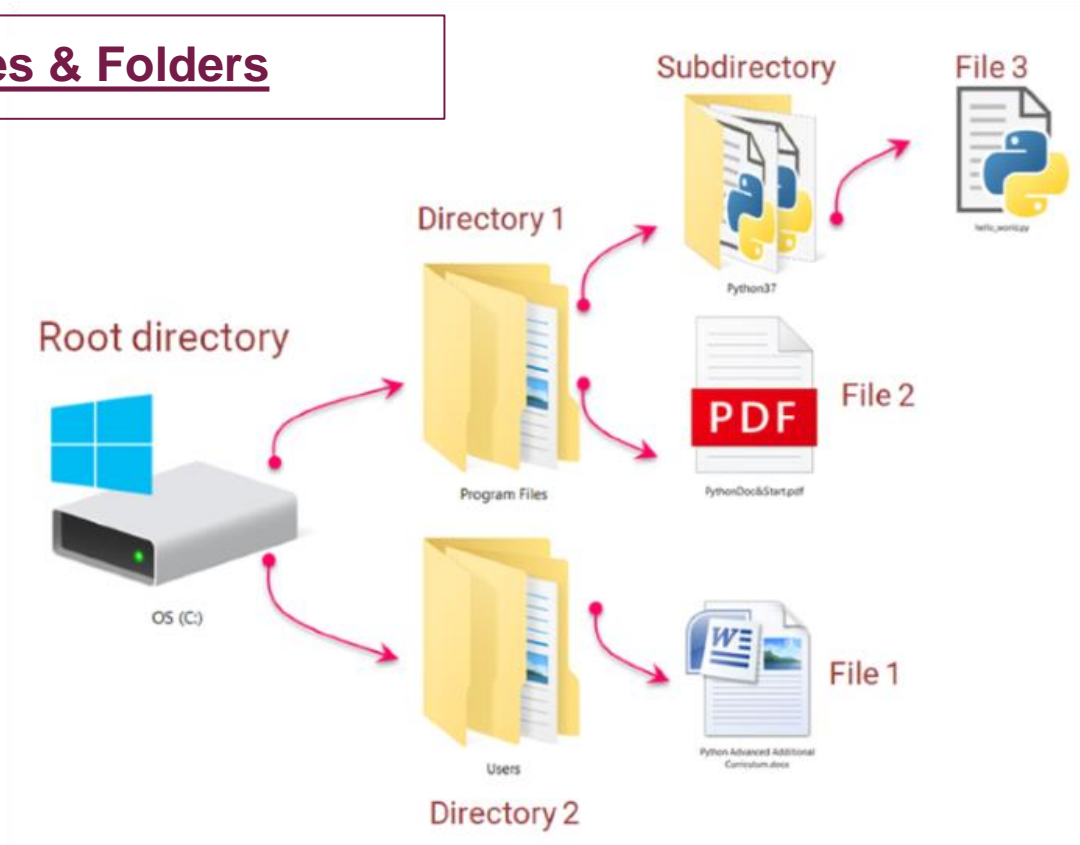
File attributes are metadata associated with computer files that define file system behavior.



Operating Systems



- **Directories & Folders**





How Computers Work





Drag your dot to how you are feeling:



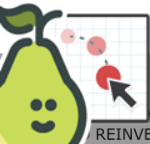
Keep going, I understand



I'm a little confused



Stop, I need help!



THANKS!

Any questions?

