



# Computer Fundamentals





# Agenda

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

# Introduction



1

Were you able to finish  
pre-class material?



USWAY<sup>©</sup>  
CHOOSE YOURSELF

Students choose an option

Pear Deck Interactive Slide  
Do not remove this bar

# Introduction



How long did it take to finish it?



USWAY<sup>©</sup>  
Students choose an option

MENT YOURSELF

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.



Students, write your response!

REINVENT YOURSELF

Pear Deck Interactive Slide  
Do not remove this bar

# 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

---



# What is Computer

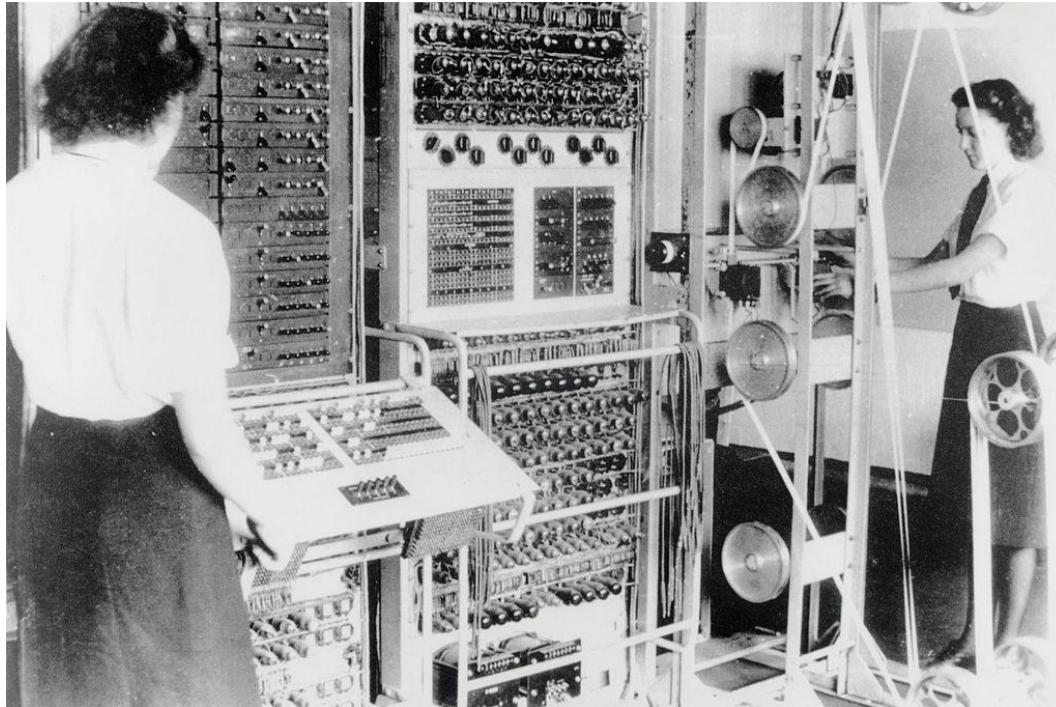


USWAY<sup>©</sup>  
STUDENT YOURSELF

Students choose an option



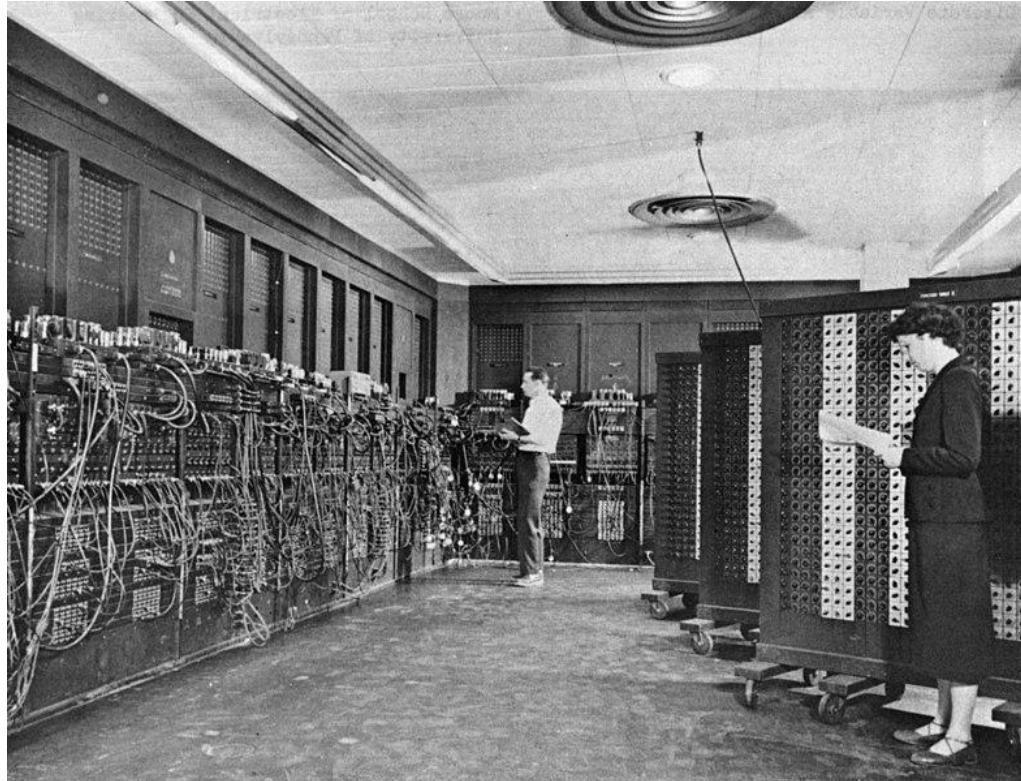
# What is Computer



Colossus computer

1943 - 1945

# What is Computer



[ENIAC](#) (Electronic Numerical Integrator And Computer)

1955



# What is Computer



# What is Computer





2

# How Computers Work

# How Computers Work

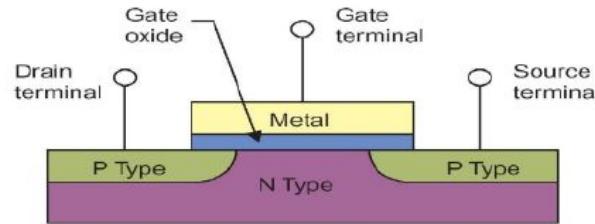
- So how does computers work?
- Let's shop on Apple.com



# How Computers Work

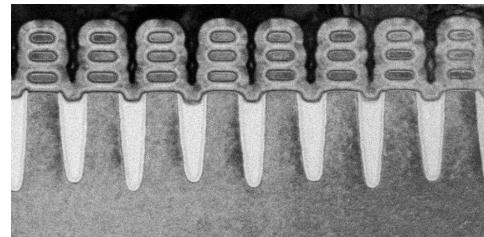


- **TRANSISTORS**



## 1956 Nobel Prize in Physics

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

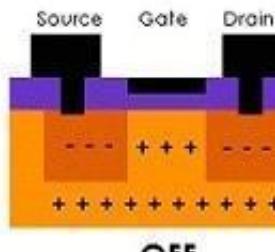
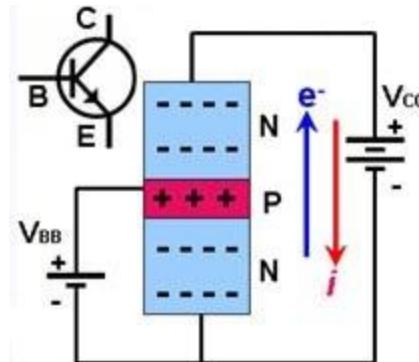


IBM's 5nm transistors

# How Computers Work

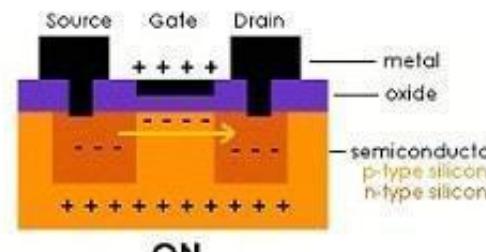


- **TRANSISTORS**



OFF

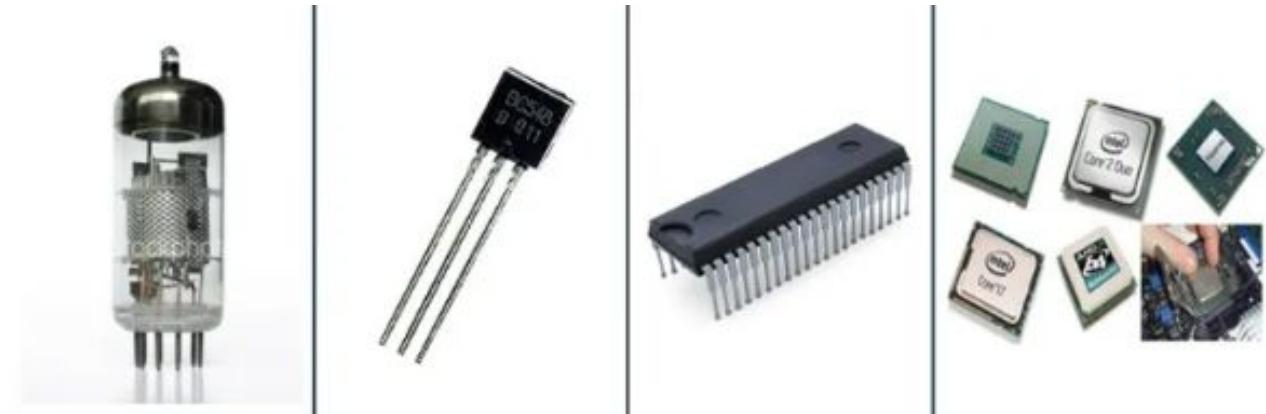
— metal  
— oxide  
— semiconductor  
p-type silicon  
n-type silicon



ON

— metal  
— oxide  
— semiconductor  
p-type silicon  
n-type silicon

# How Computers Work



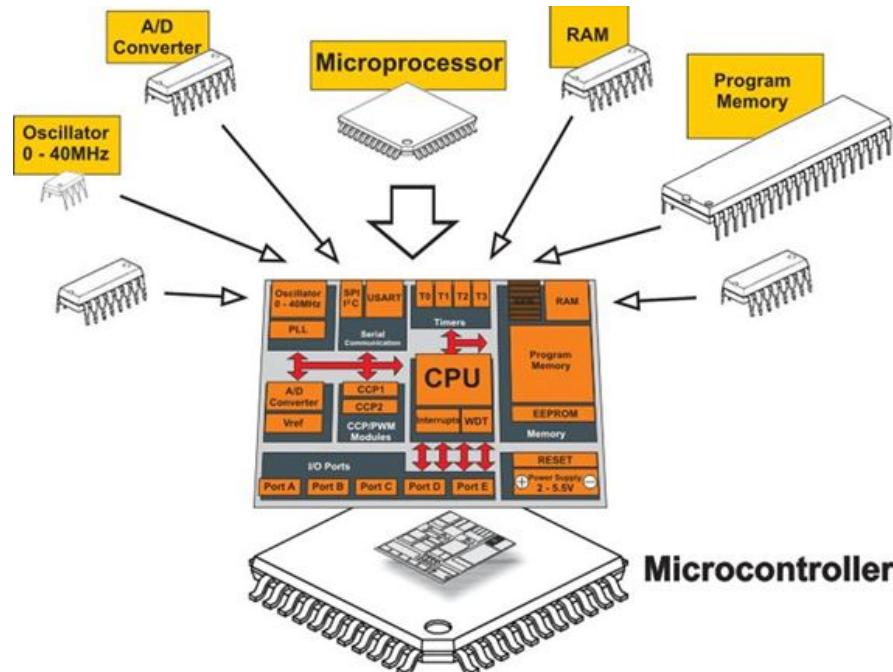
Vacuum Tube

Transistor

Integrated Circuits  
(IC)

Micro Processor

# How Computers Work



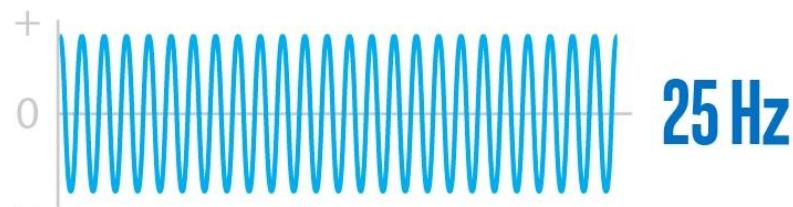
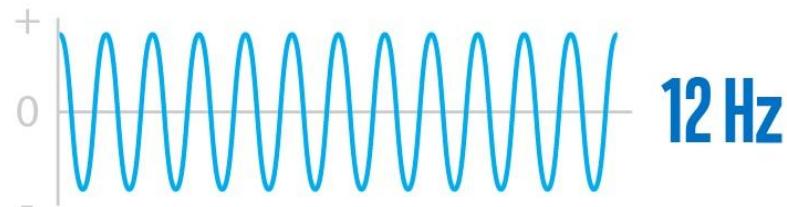
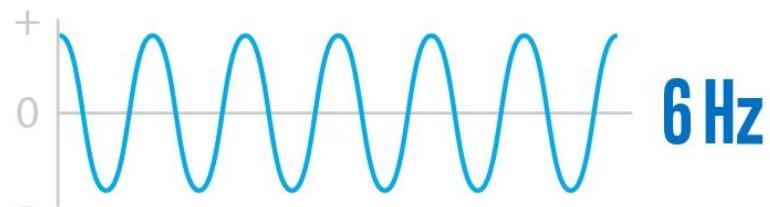
# How Computers Work



**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

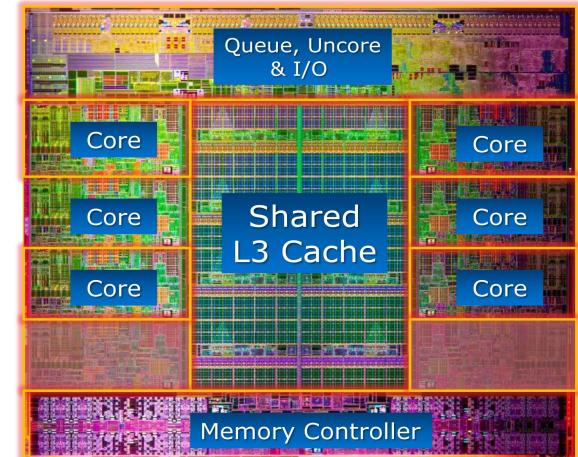
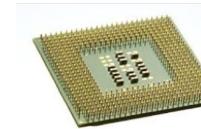
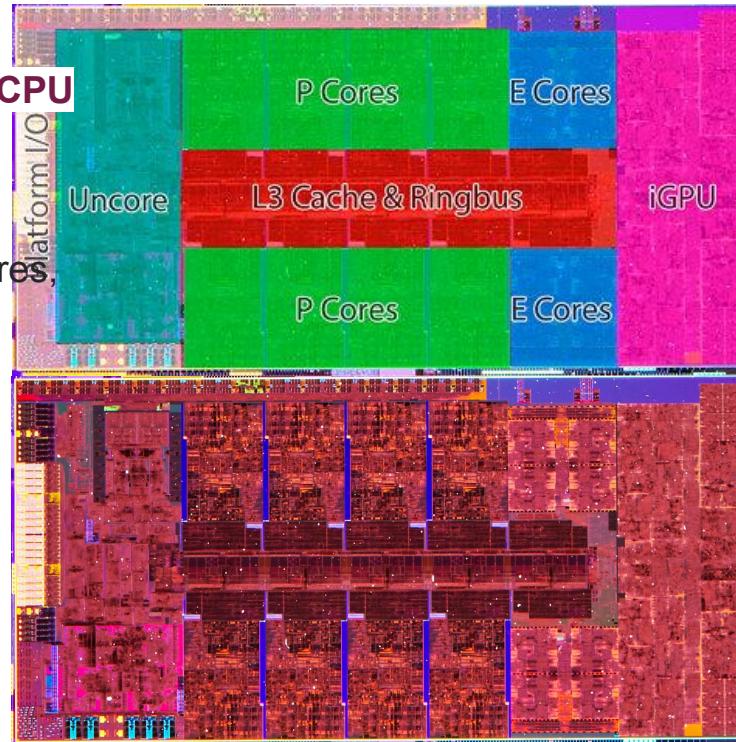


# How Computers Work



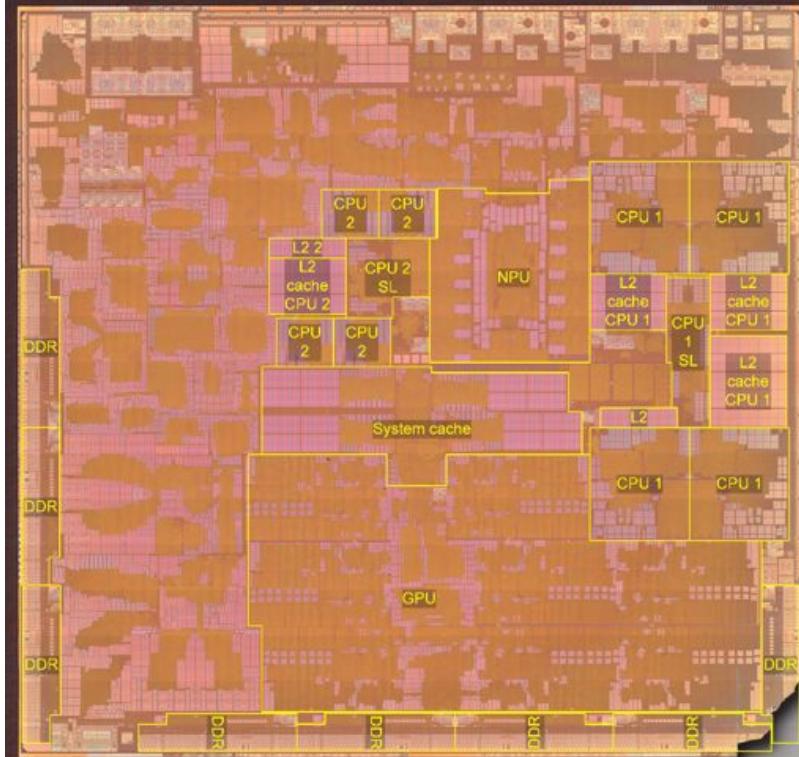
**Intel i9-12900K CPU die photo**

- 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



# How Computers Work

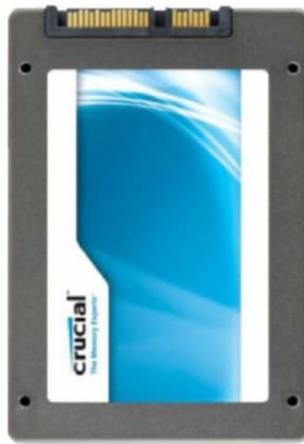


## Hard Disk Drive (HDD) vs SSD vs NVMe

**Magnetic- SATA3**



**SSD - SATA3**



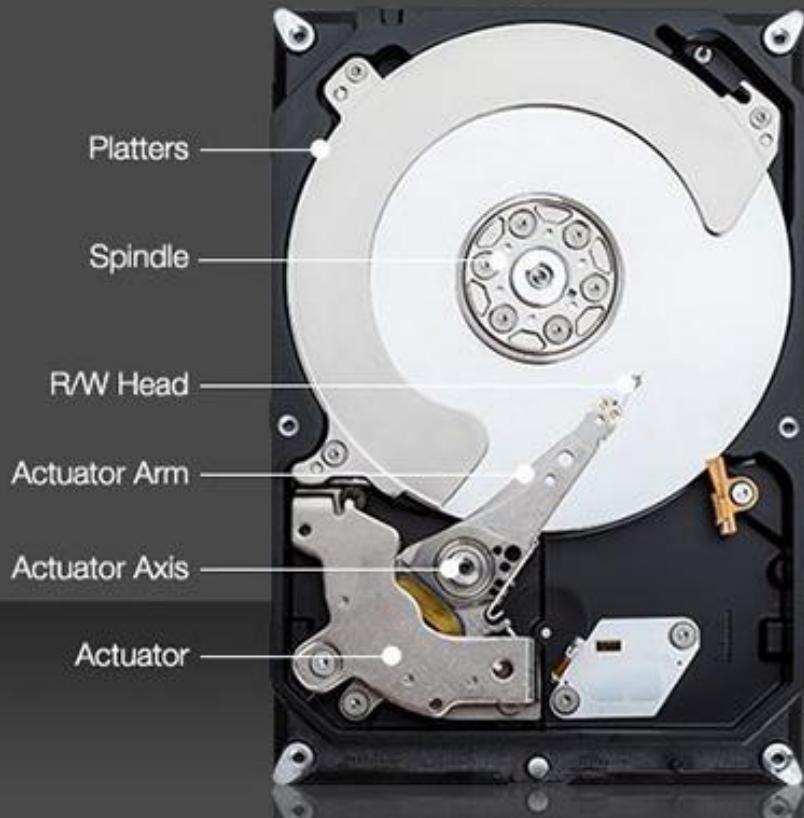
**SSD - NVMe**





## HDD

3.5"

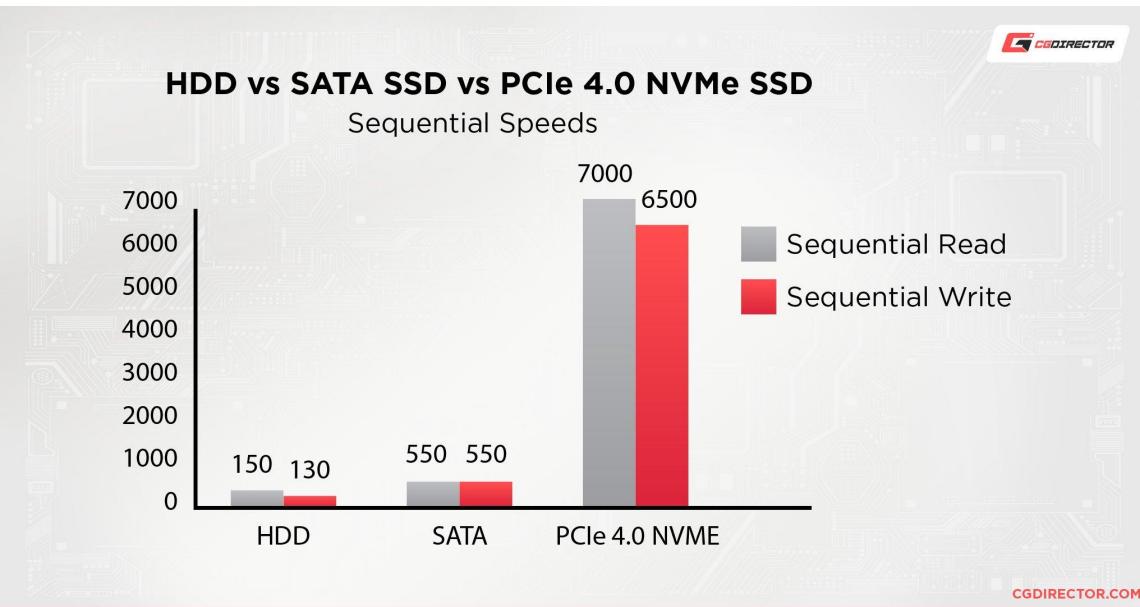


## SSD

2.5"



# How Computers Work



CrystalDiskMark 5.1.2 x64      CrystalDiskMark 5.1.2 x64

	All	Read [MB/s]	Write [MB/s]
Seq Q32T1	102.9	96.08	
4K Q32T1	1.896	2.053	
Seq	101.7	96.26	
4K	0.733	1.735	

Western Digital 2TB 7200 RPM Hard Drive

	All	Read [MB/s]	Write [MB/s]
Seq Q32T1	557.5	531.9	
4K Q32T1	395.2	355.0	
Seq	537.1	520.1	
4K	37.29	142.3	

Samsung 950 EVO 1 TB SSD Drive

	All	Read [MB/s]	Write [MB/s]
Seq Q32T1	2591	1544	
4K Q32T1	728.5	411.8	
Seq	2353	1532	
4K	56.13	195.0	

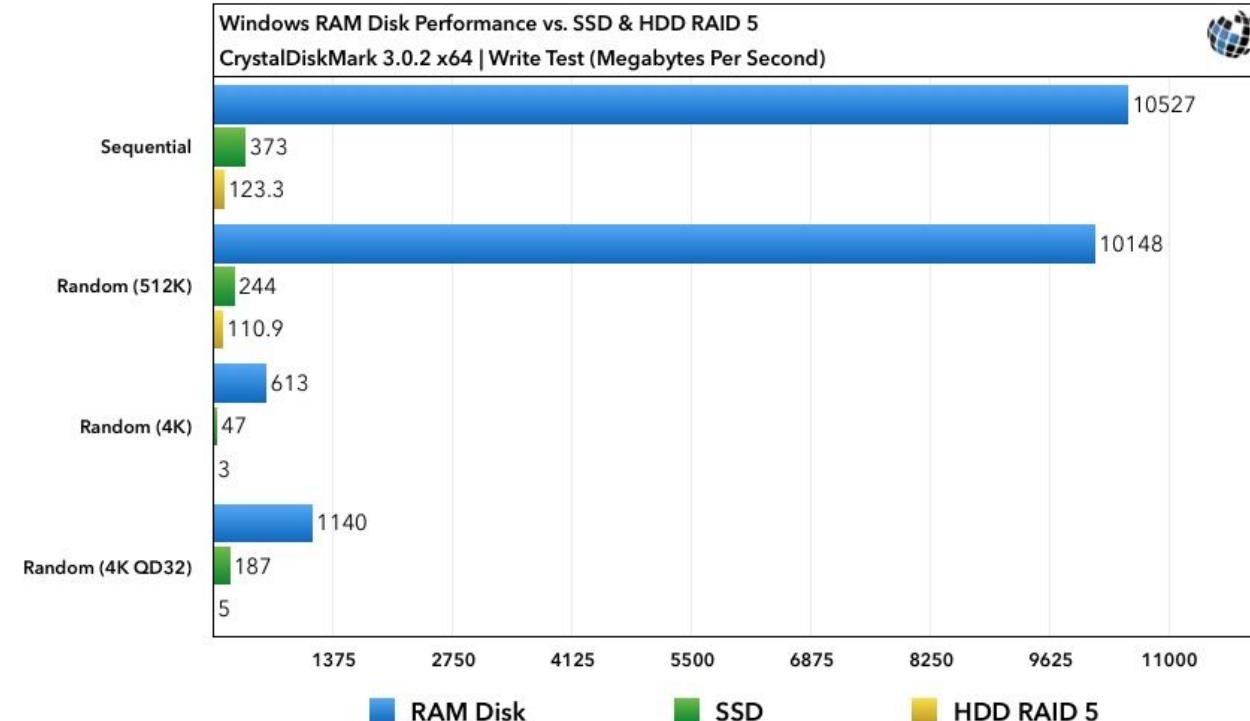
CrystalDiskMark 5.1.2 x64

Performance Summary:

Hard Drive: 103 MB/sec read, 96 MB/sec write speed  
SSD Drive: 558 MB/sec read, 532 MB/sec write speed  
M.2 Drive: 2591 MB/sec read, 1544 MB/sec write speed

In Read Performance:  
SSD is 5x Faster than HDD  
M.2 is 5x Faster than SSD  
M.2 is 25x Faster than HDD

# How Computers Work



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

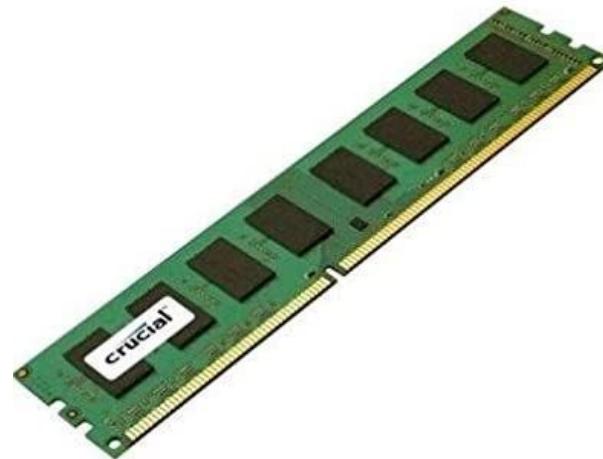
# How Computers Work



Question: How about NVMe vs RAM?



VS





# How Computers Work

## Hard Drive vs RAM

**Hard Drive**



**RAM**



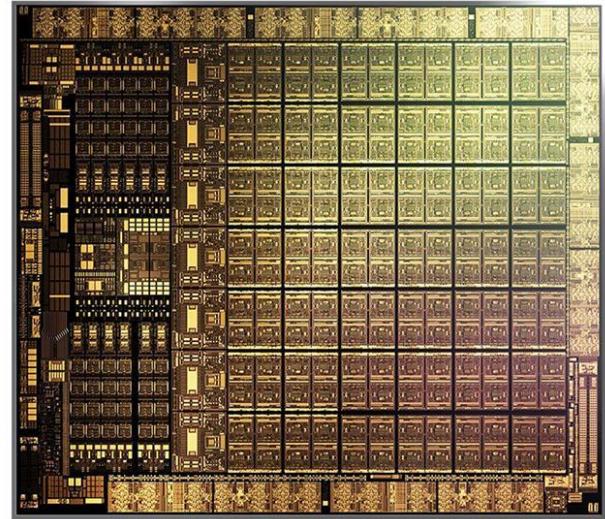
**CPU**



# How Computers Work



## GPU (Graphical Processing Unit)

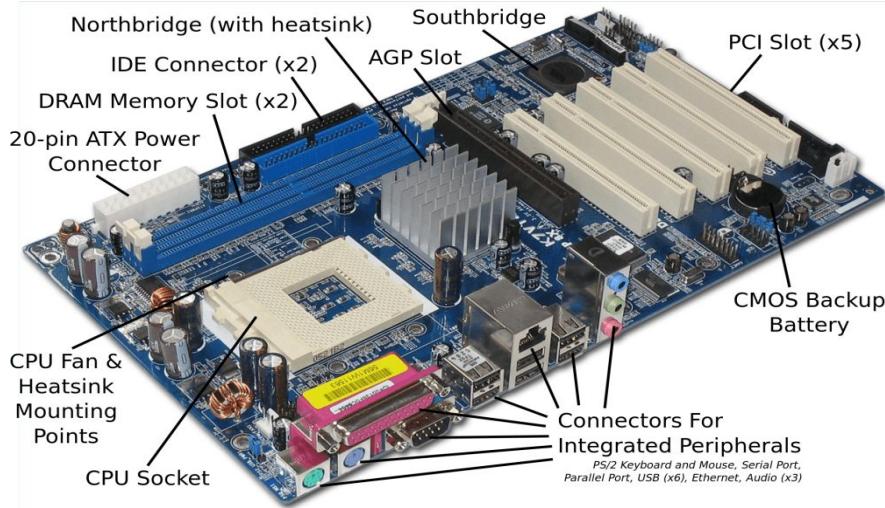


The GeForce RTX 3050's  
GA106 GPU

# How Computers Work



## Mainboard or Logic Board



New Generation motherboard (Intel i9)



# How Computers Work

## Input and Output Devices



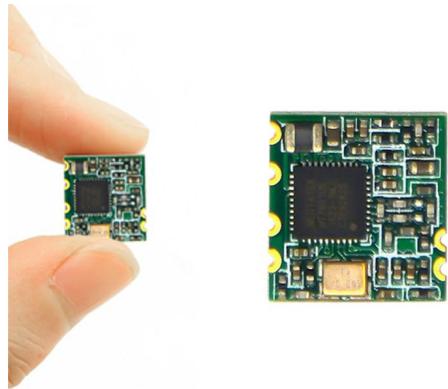
Students, write your response!

Pear Deck Interactive Slide  
Do not remove this bar

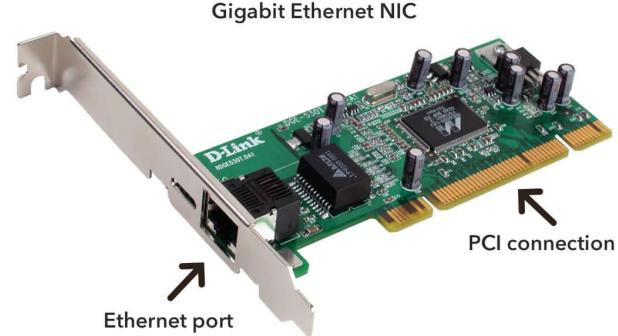
# How Computers Work



- **Communication Devices**



**Wireless Adapter**



**Network Interface Card**

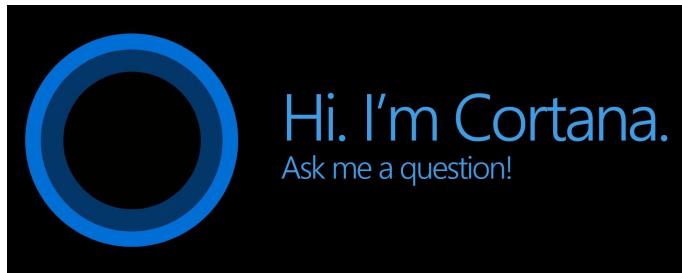


# How Computers Work

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



# How Computers Work



???



# Computer Fundamentals





# Agenda

- ▶ Operating Systems

# Operating Systems



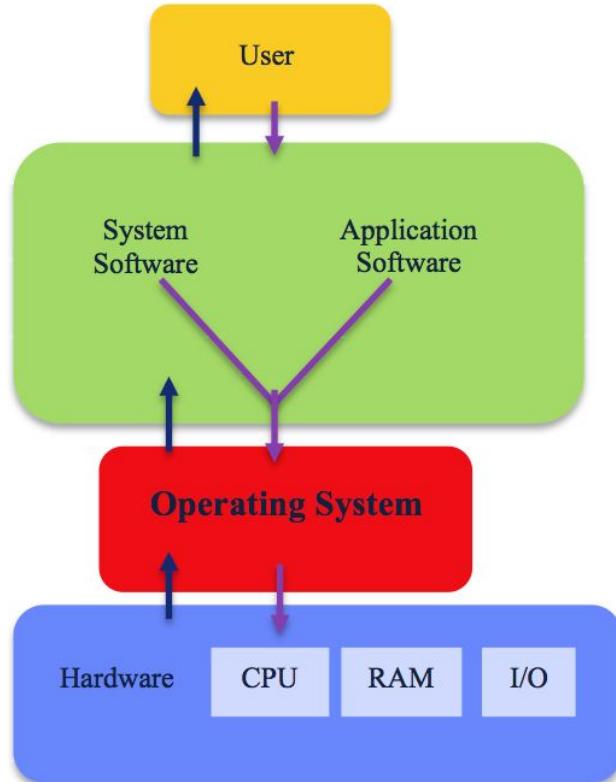
- Music
- Video
- Chat
- Shopping
- Coding
- Reading
- Gaming

# 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

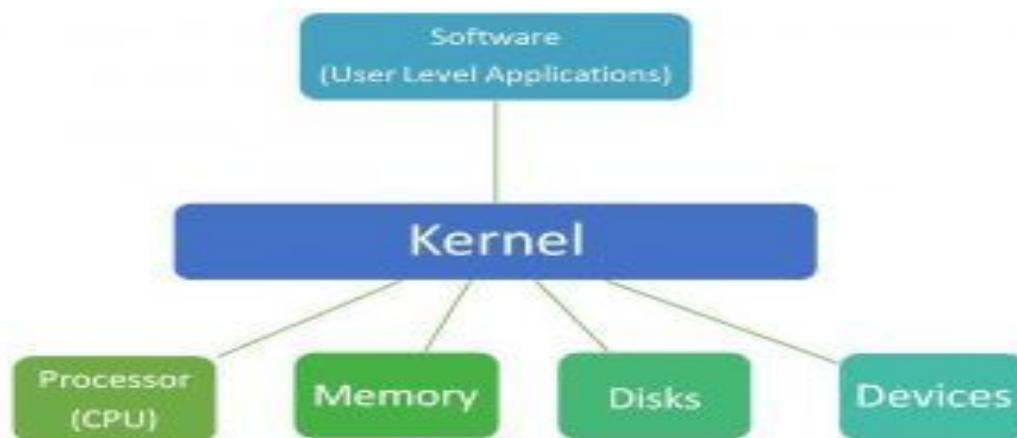


# Operating Systems



## 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.

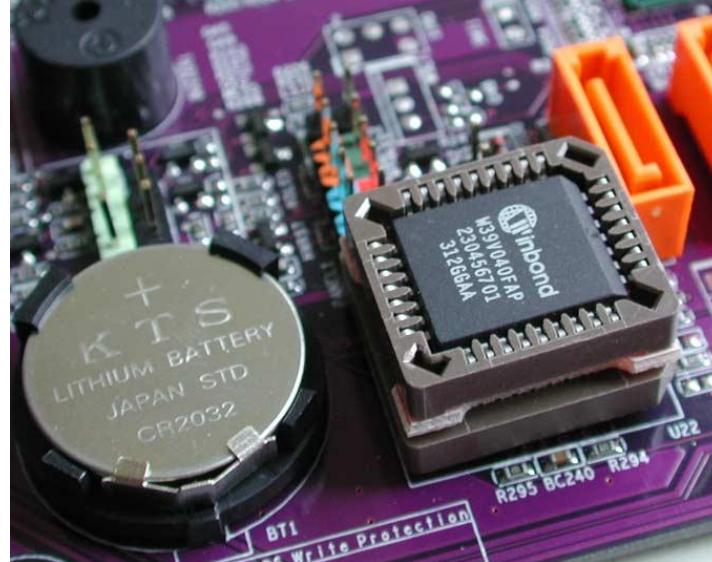
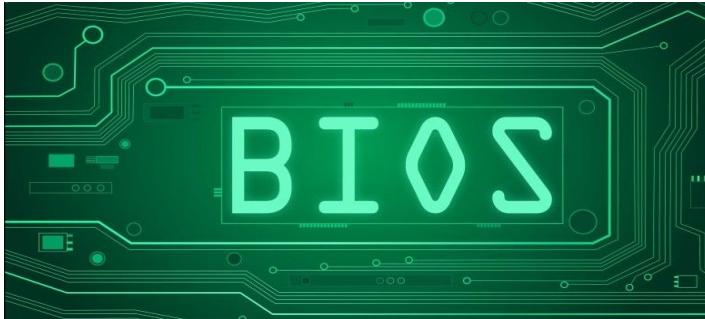


# Operating Systems



## **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.



# Operating Systems



**Question: What does OS manage?**



Students, write your response!

Pear Deck Interactive Slide  
Do not remove this bar

# Operating Systems



Mac<sup>TM</sup>OS



Linux



# Operating Systems

**Please write your computers and mobile phones operating system.**



USWAY<sup>©</sup>  
REINVENT YOURSELF

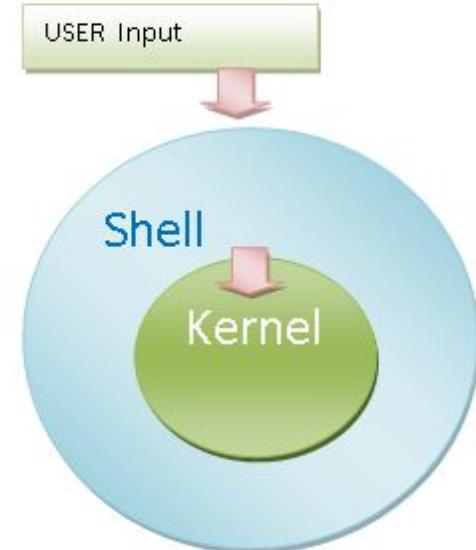
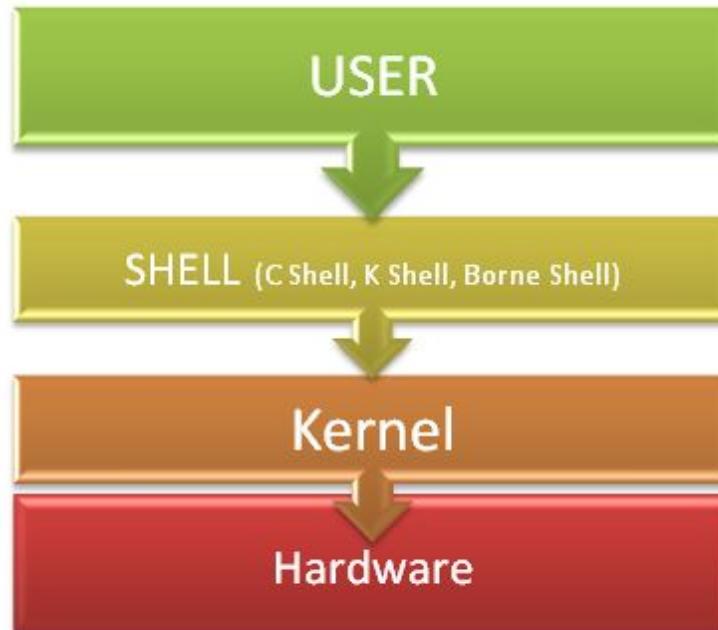
Students, write your response!

Pear Deck Interactive Slide  
Do not remove this bar



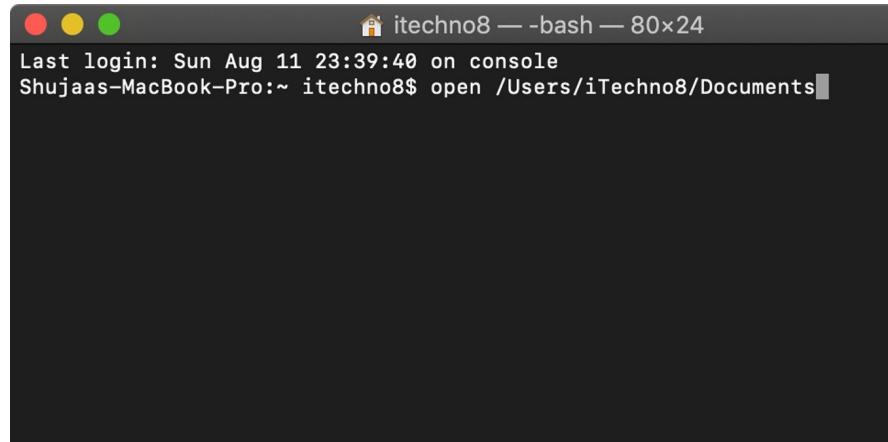
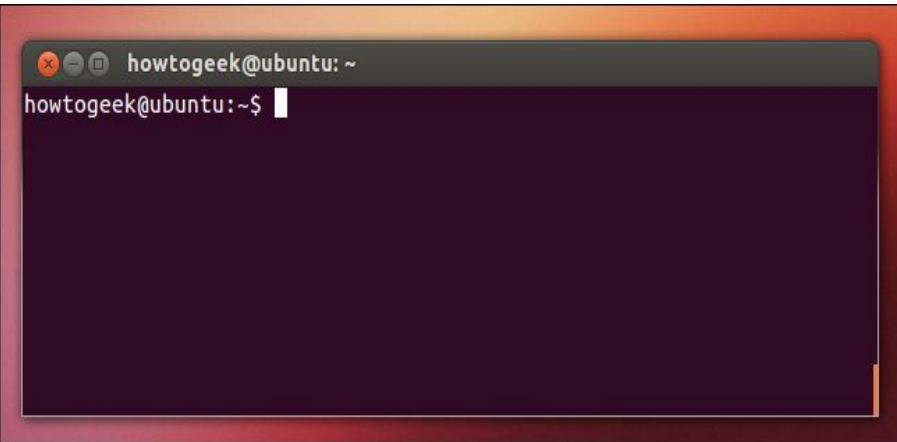
# Operating Systems

- **Shell**



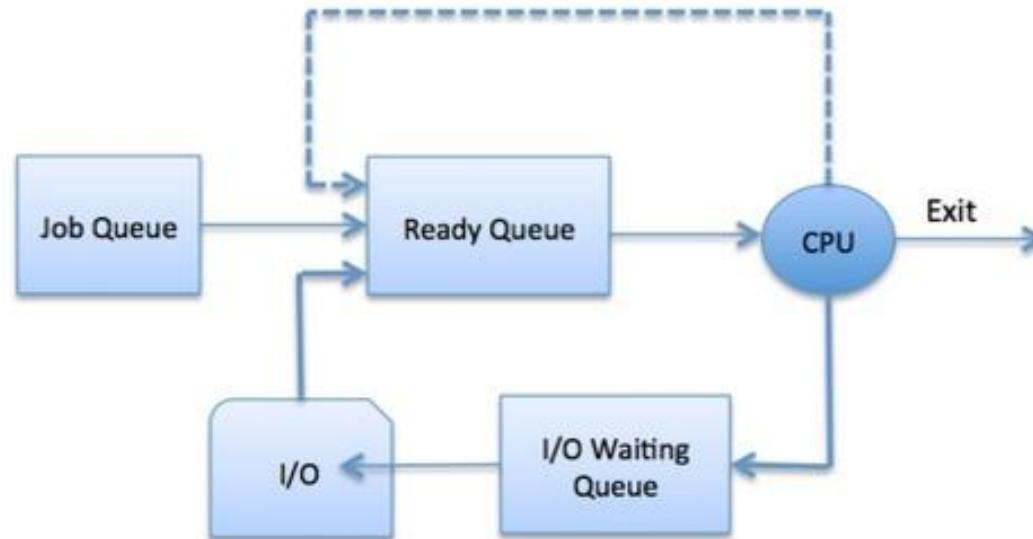
# Operating Systems

- **Terminal**



# Operating Systems

## What do you know about scheduling?



Students, write your response!

# Operating Systems



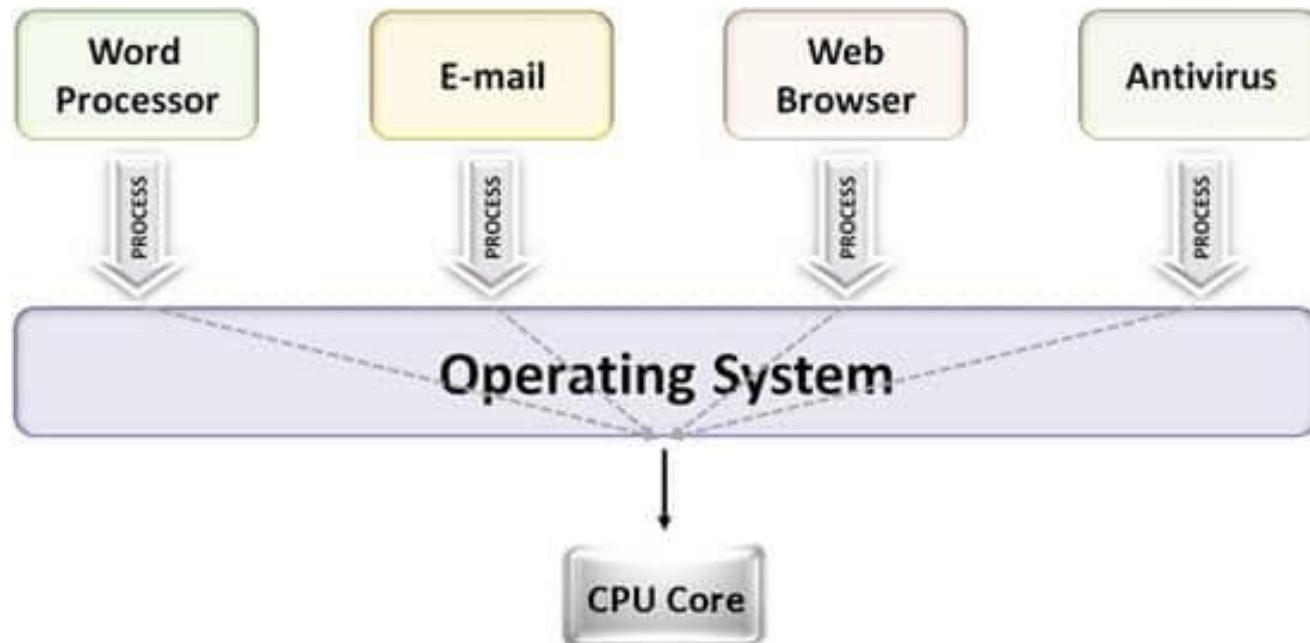
## Scheduling

- Multiprogramming
- Multiprocessing
- Multithreading



# Operating Systems

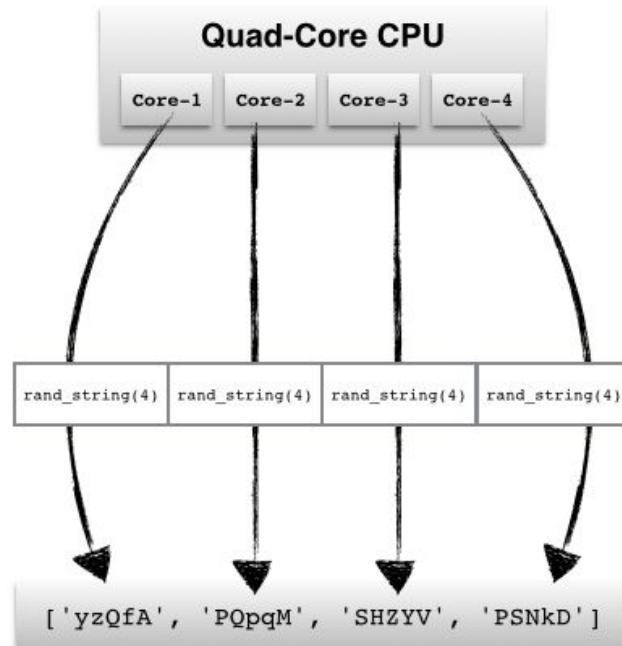
- Multiprogramming



# Operating Systems



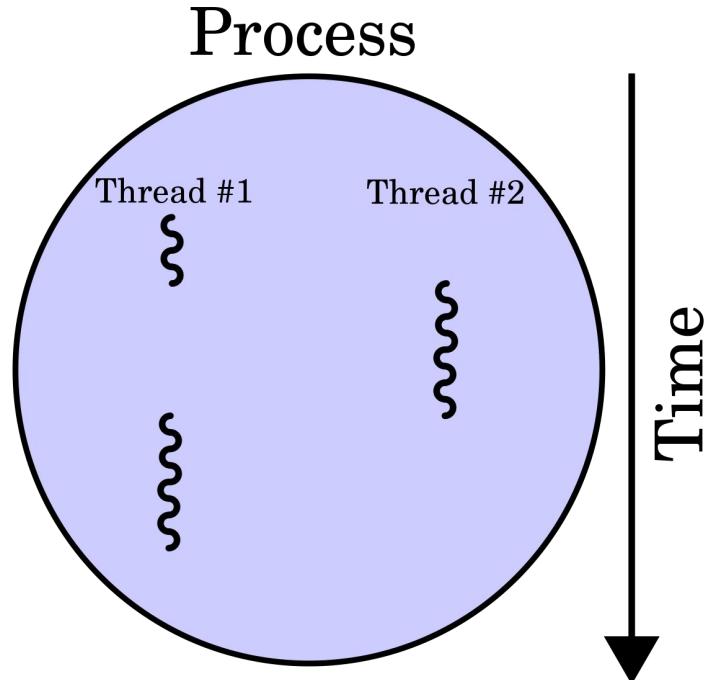
- Multiprocessing  
[parallel processing]



# Operating Systems



- Multithreading



# Operating Systems

**What is the difference between processes and threads?**



SWAY<sup>©</sup>  
REINVENT YOURSELF

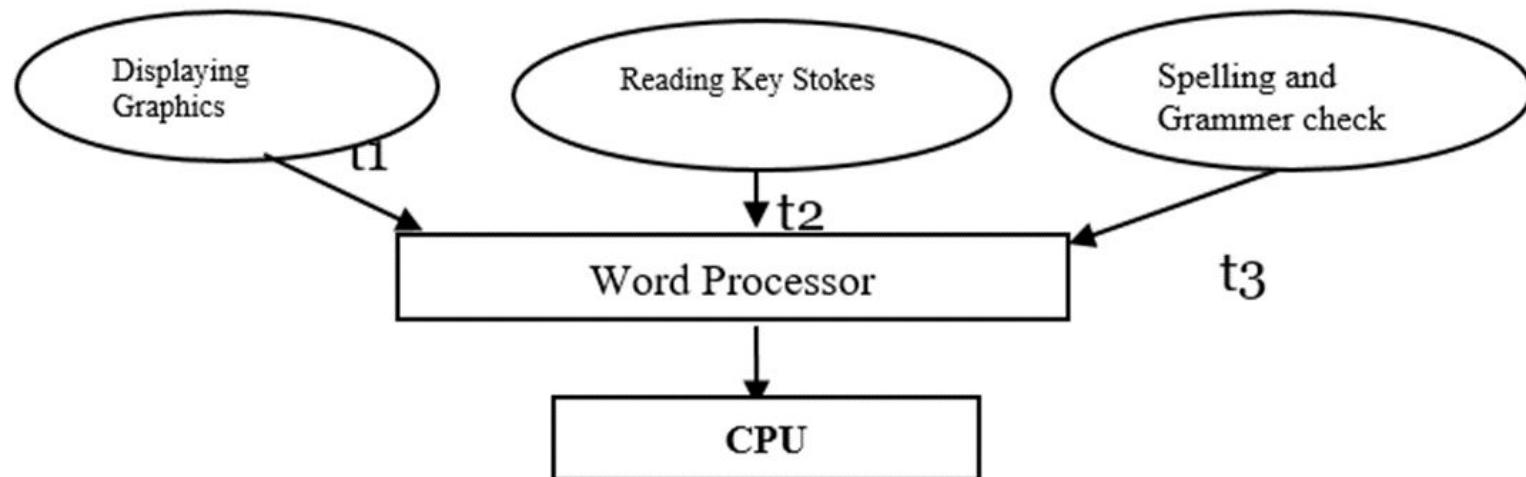
Students, write your response!

Pear Deck Interactive Slide  
Do not remove this bar



# Operating Systems

- Multithreading



Multithreading Operating System

# Operating Systems



- **Files:**

Files are spaces on your computer where data is stored.



# Operating Systems



- **Metadata**





# Operating Systems

- **Metadata**

Bilginin;

- ▶ Ne?
- ▶ Nerede?
- ▶ Nasıl ?
- ▶ Ne zaman ? ve
- ▶ Kim ? Tarafından oluşturulduğu hakkında bilgi veren unsurlar bütünüdür.
- ▶ Genel olarak bilgi kaynağının kimliklenmesini sağlayan unsurlar bütünüdür.

# Operating Systems



- **Metadata**

## Metadata example

Structural	Descriptive
Song Title:	Better Man
Artist Name:	Pearl Jam
Album Title:	Vitalogy
Genre:	Rock
Release Year:	1994
Track Number:	11 of 14
Composer:	Eddie Vedder
Copyright:	© Pearl Jam
Administrative	
Added By:	Robert Godino
Date Added:	26/11/2016 8:19 pm
Encoded With:	iTune v7.6.1
Media Kind:	MPEG audio file

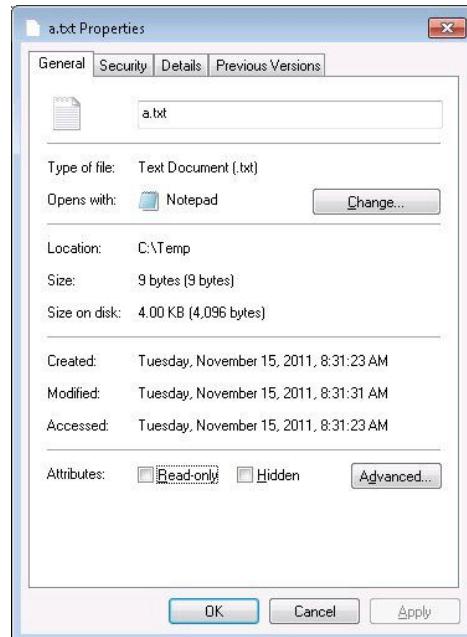
**Elements**      **Values**

# Operating Systems



- **File Attributes:**

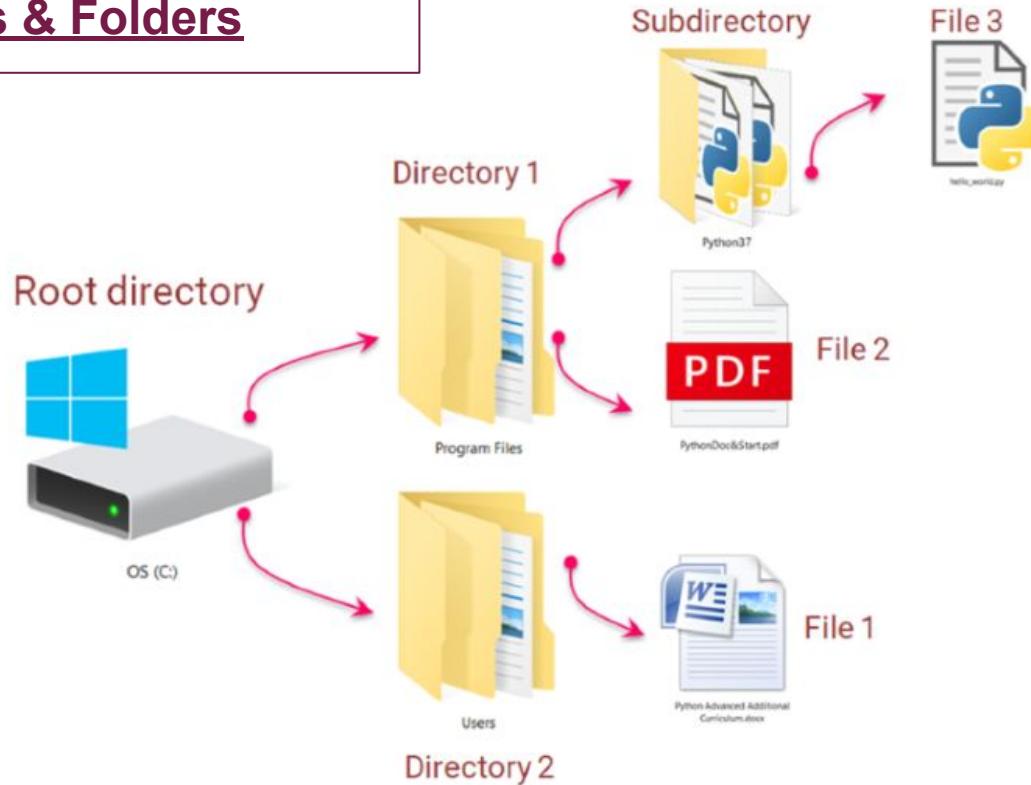
File attributes are metadata associated with computer files that define file system behavior.





# Operating Systems

- **Directories & Folders**

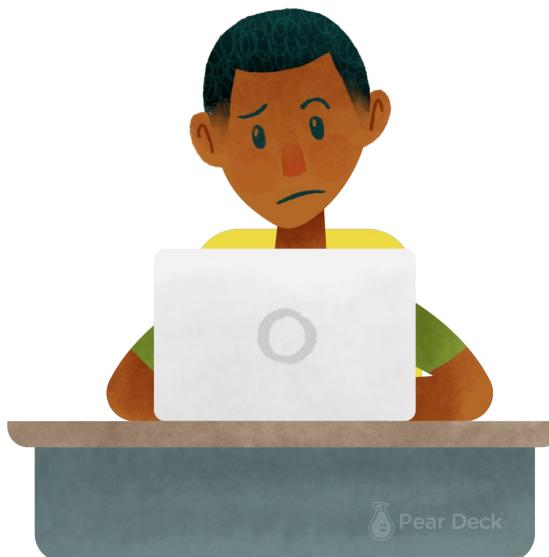




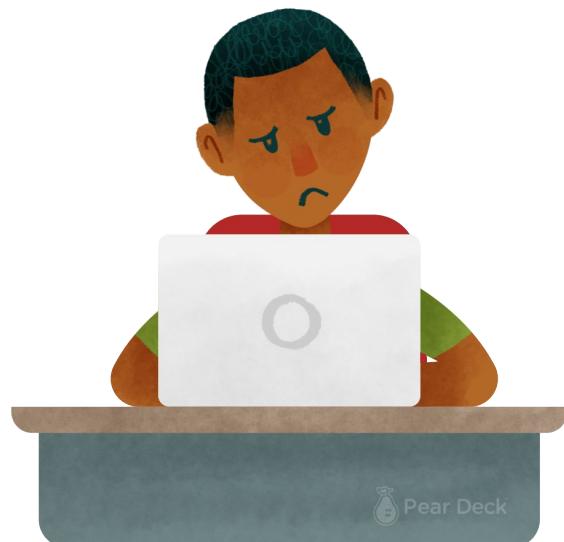
# Drag your dot to how you are feeling:



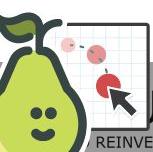
Keep going, I understand



I'm a little confused



Stop, I need help!



Students, drag the icon!

REINVENT YOURSELF



Pear Deck Interactive Slide  
Do not remove this bar



# Kahoot!

# THANKS!

## Any questions?

