Module-02

A computer Odyssey: From Past to Present

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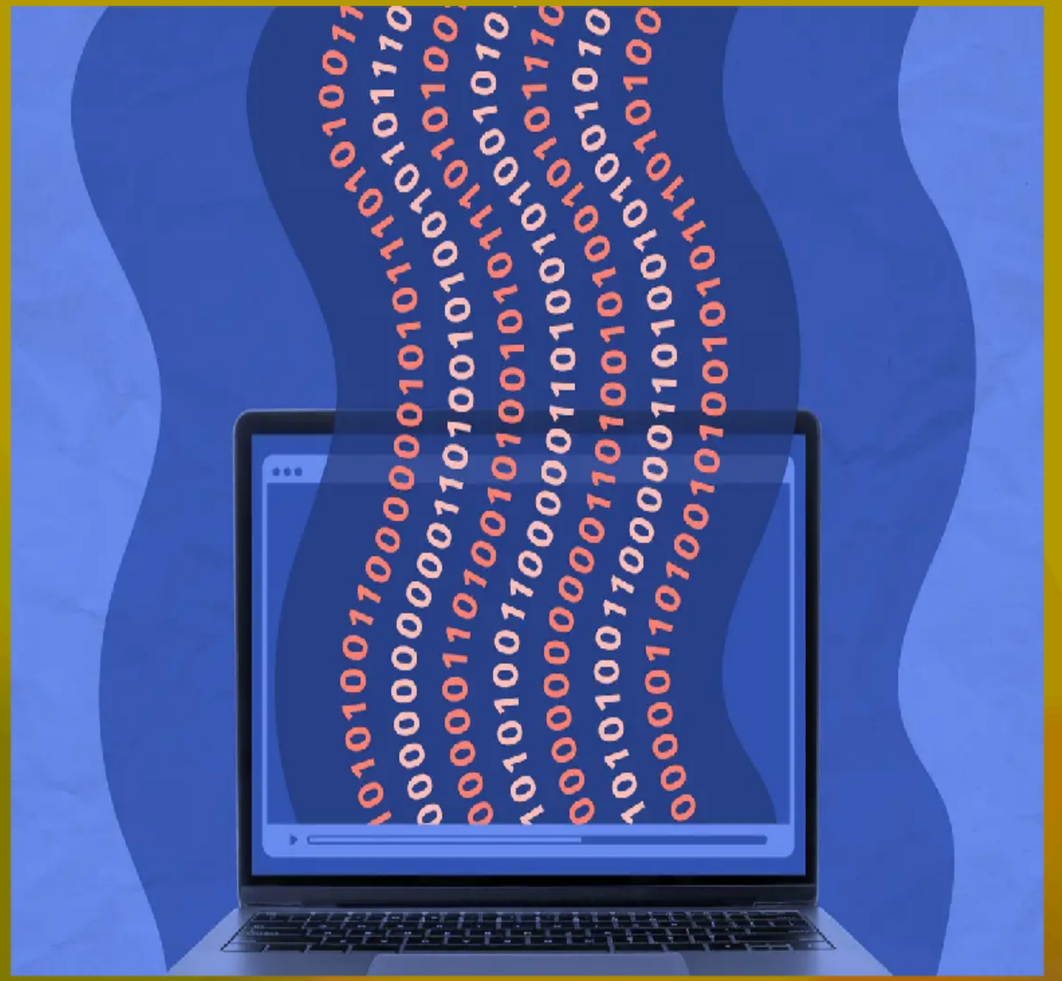
What is Computer Science?

- Study of the **data** and computation on that data.
- It is the study of computer to solve r**eal world problem.**
- It is about solving problems and **how to solve problem.**
- In detail, computer science is the study of how computers and software work, how to design and develop computer programs and applications, and how to use computer systems to solve problems in various fields such as science, engineering, business, and entertainment.



Continue…

- Those who study **computer science** are most commonly called **computer scientists**, **coders** or **programmers**. However, computer scientists don't just code, they **solve problems.**
- A computer scientist understands the **theoretical** aspects of working with computers.
- They do not necessarily work with hardware and applications in the same way that **computer engineers** do. Instead, a computer scientist considers how technology handles information then applies it to programs.
- Computer Scientists are the **designers** and **analysts** of **algorithms** used to solve complex problems. Those problems can be tangible or abstract. Tangible problems include creating user friendly apps for mobile devices, like our phone. Abstract problems involve the use of computational algorithms for general problem solving.

Fields of Computer Science

CG & VR & Animation

Cyber Security

Data Science

Cloud Computing

Software Development

Networking

Artificial Intelligence

Bioinformation

Biomedical Computing

Big Data

IOT

Robotics

Computer Vision

Natural Language Processing

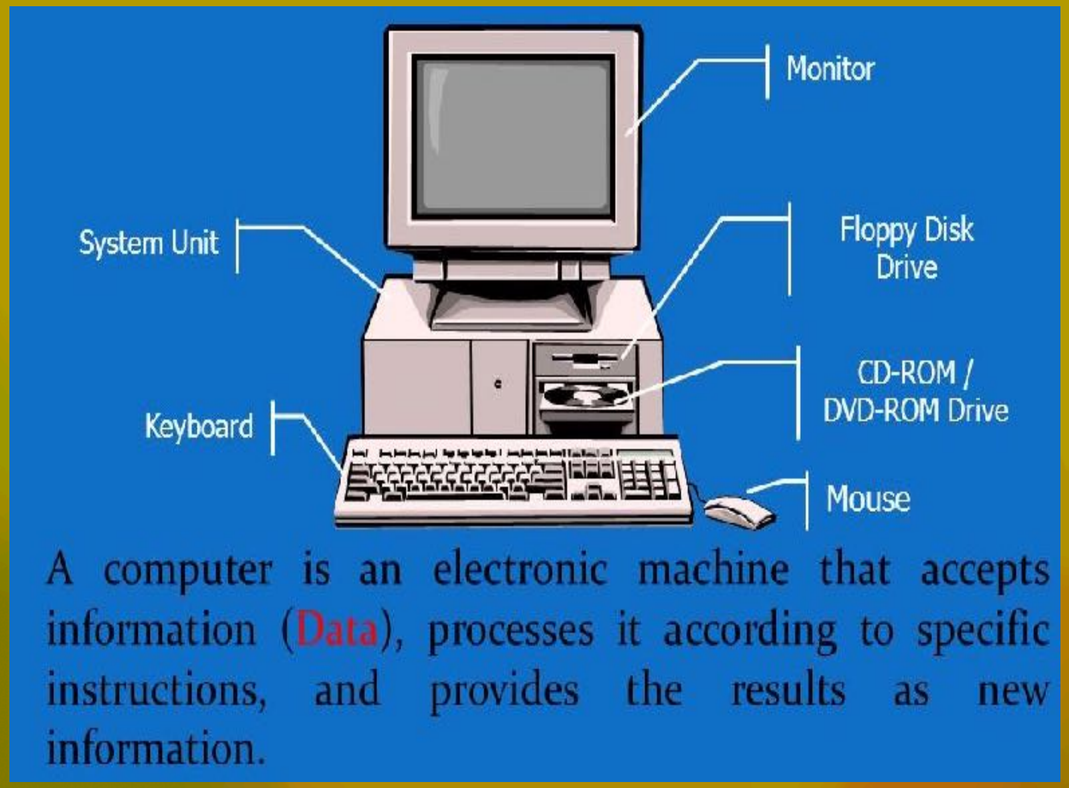
Machine Learning

Deep Learning

And Many More…

An Overview of Computer

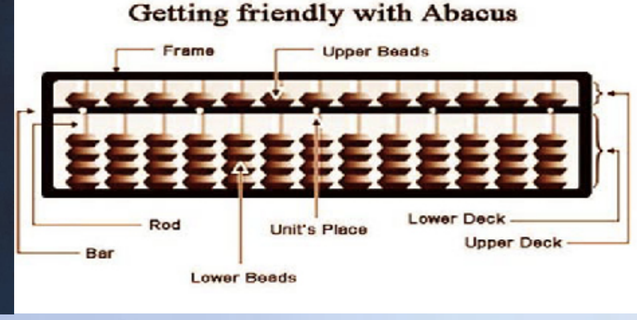
- An electronic device for storing and processing information.
- Computers are machines that process data into useful information. They are used for a variety of tasks, from organizing data to playing games. Computers are also used to create artwork and music, as well as to control other machines. Computers are made up of both hardware and software.
- Hardware includes the physical components of the computer, such as the motherboard, processor, memory, and storage devices. Software is the instructions that the computer uses to carry out tasks. It includes the operating system, applications, and drivers.

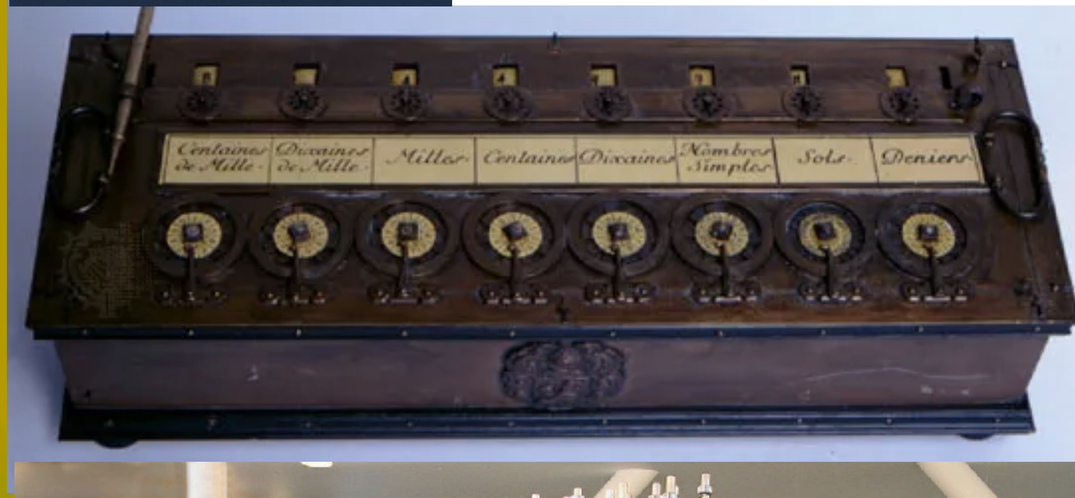


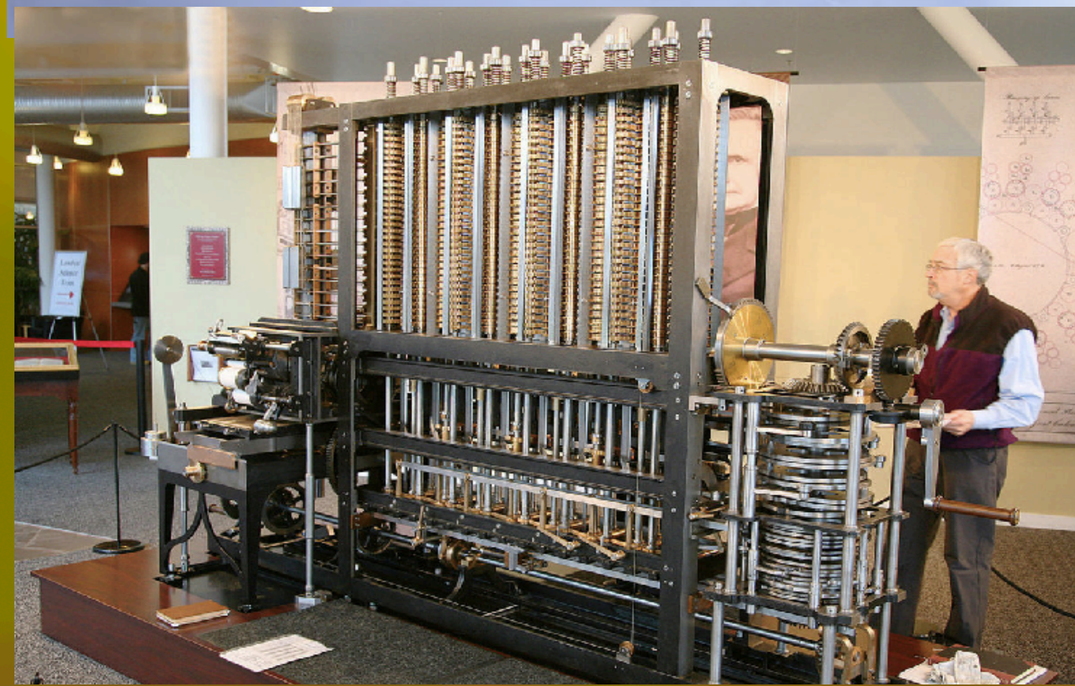
Input → Process → Output

History of Computer

- The first device known to carry out calculation was **Abacus** also known as **counting frame.** Used for addition and subtraction.
- **Napier's Bones** used for addition, subtraction , division and multiplication.
- Then **Pascaline** was invented that could sum up to eight figures long with the help of eight movable dials on wheel. Used for addition, subtraction, multiplication and division.
- **Leibniz calculator** used for addition, subtraction, multiplication, division and finding square root.
- In mid 1800s **Charles Babbage**, an English mathematician and physical scientist build a prototype of **difference engine** able to do complex math such squaring but never build the actual device.
- The analytical machine had 5 unit: input, output, mill, store and control.
- The actual complete deference machine was invented after **153 years** in London in 2002.







Hardware Overview

Binary

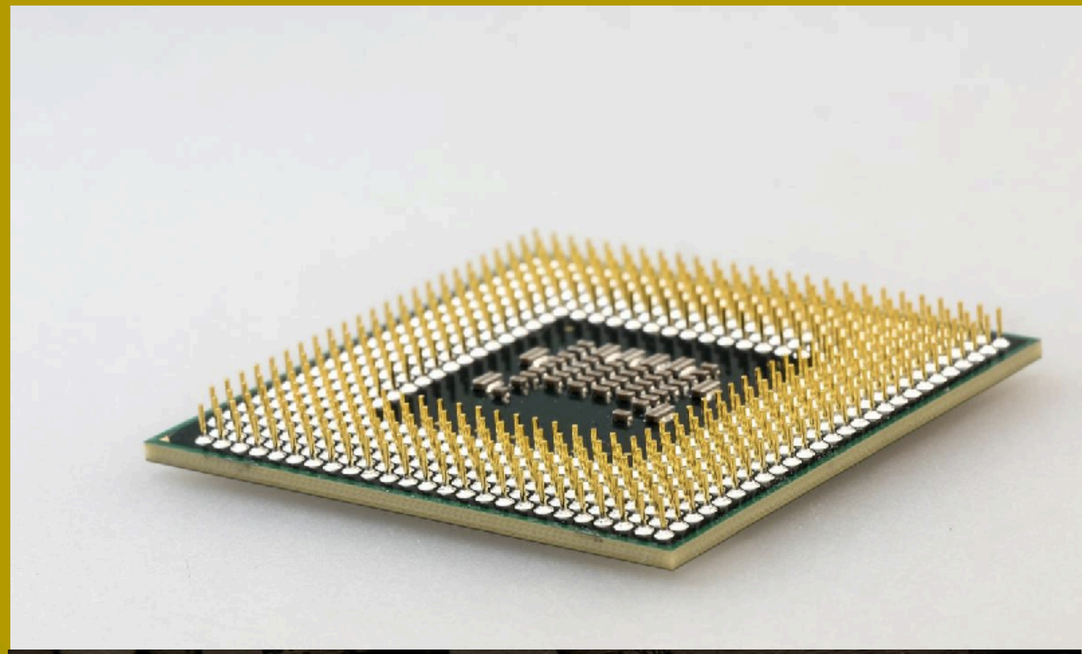
- Binary is the language of computers, consisting of 0s and 1s. It is used to represent instructions, data, and other information.
- Binary is necessary to understand and use computers, as all instructions and data must be translated into binary before the computer can understand them.

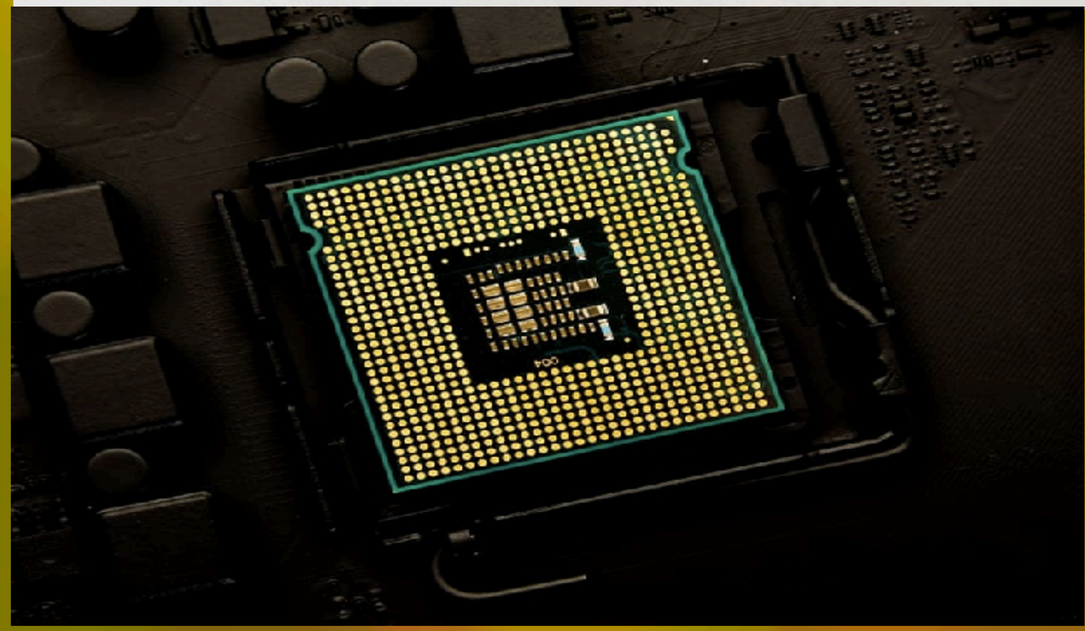
ASCII American Standard Code for information interchange

Decimal	Hex	Char	Decimal	Hex	Char	Decimal	Hex	Char	Decimal	Hex	Char
0	0	[NULL]	32	20	[SPACE]	64	40	@	96	60	`
1	1	[START OF HEADING]	33	21	!	65	41	A	97	61	a
2	2	[START OF TEXT]	34	22	"	66	42	B	98	62	b
3	3	[END OF TEXT]	35	23	#	67	43	C	99	63	c
4	4	[END OF TRANSMISSION]	36	24	$	68	44	D	100	64	d
5	5	[ENQUIRY]	37	25	%	69	45	E	101	65	e
6	6	[ACKNOWLEDGE]	38	26	&	70	46	F	102	66	f
7	7	[BELL]	39	27	'	71	47	G	103	67	g
8	8	[BACKSPACE]	40	28	(	72	48	H	104	68	h
9	9	[HORIZONTAL TAB]	41	29	)	73	49	I	105	69	i
10	A	[LINE FEED]	42	2A	*	74	4A	J	106	6A	j
11	B	[VERTICAL TAB]	43	2B	+	75	4B	K	107	6B	k
12	C	[FORM FEED]	44	2C	,	76	4C	L	108	6C	l
13	D	[CARRIAGE RETURN]	45	2D	-	77	4D	M	109	6D	m
14	E	[SHIFT OUT]	46	2E	.	78	4E	N	110	6E	n
15	F	[SHIFT IN]	47	2F	/	79	4F	O	111	6F	o
16	10	[DATA LINK ESCAPE]	48	30	0	80	50	P	112	70	p
17	11	[DEVICE CONTROL 1]	49	31	1	81	51	Q	113	71	q
18	12	[DEVICE CONTROL 2]	50	32	2	82	52	R	114	72	r
19	13	[DEVICE CONTROL 3]	51	33	3	83	53	S	115	73	s
20	14	[DEVICE CONTROL 4]	52	34	4	84	54	T	116	74	t
21	15	[NEGATIVE ACKNOWLEDGE]	53	35	5	85	55	U	117	75	u
22	16	[SYNCHRONOUS IDLE]	54	36	6	86	56	V	118	76	v
23	17	[END OF TRANS. BLOCK]	55	37	7	87	57	W	119	77	w
24	18	[CANCEL]	56	38	8	88	58	X	120	78	x
25	19	[END OF MEDIUM]	57	39	9	89	59	Y	121	79	y
26	1A	[SUBSTITUTE]	58	3A	:	90	5A	Z	122	7A	z
27	1B	[ESCAPE]	59	3B	;	91	5B	[	123	7B	{
28	1C	[FILE SEPARATOR]	60	3C	<	92	5C	\	124	7C	|
29	1D	[GROUP SEPARATOR]	61	3D	=	93	5D	]	125	7D	}
30	1E	[RECORD SEPARATOR]	62	3E	>	94	5E	^	126	7E	~
31	1F	[UNIT SEPARATOR]	63	3F	?	95	5F	_	127	7F	[DEL]

CPU Central Processing Unit

- The CPU, or Central Processing Unit, is the brain of the computer. It is responsible for executing instructions, carrying out commands, and performing calculations.
- The CPU is the most important component of a computer, as it is responsible for all the calculations and processing that take place in the computer.

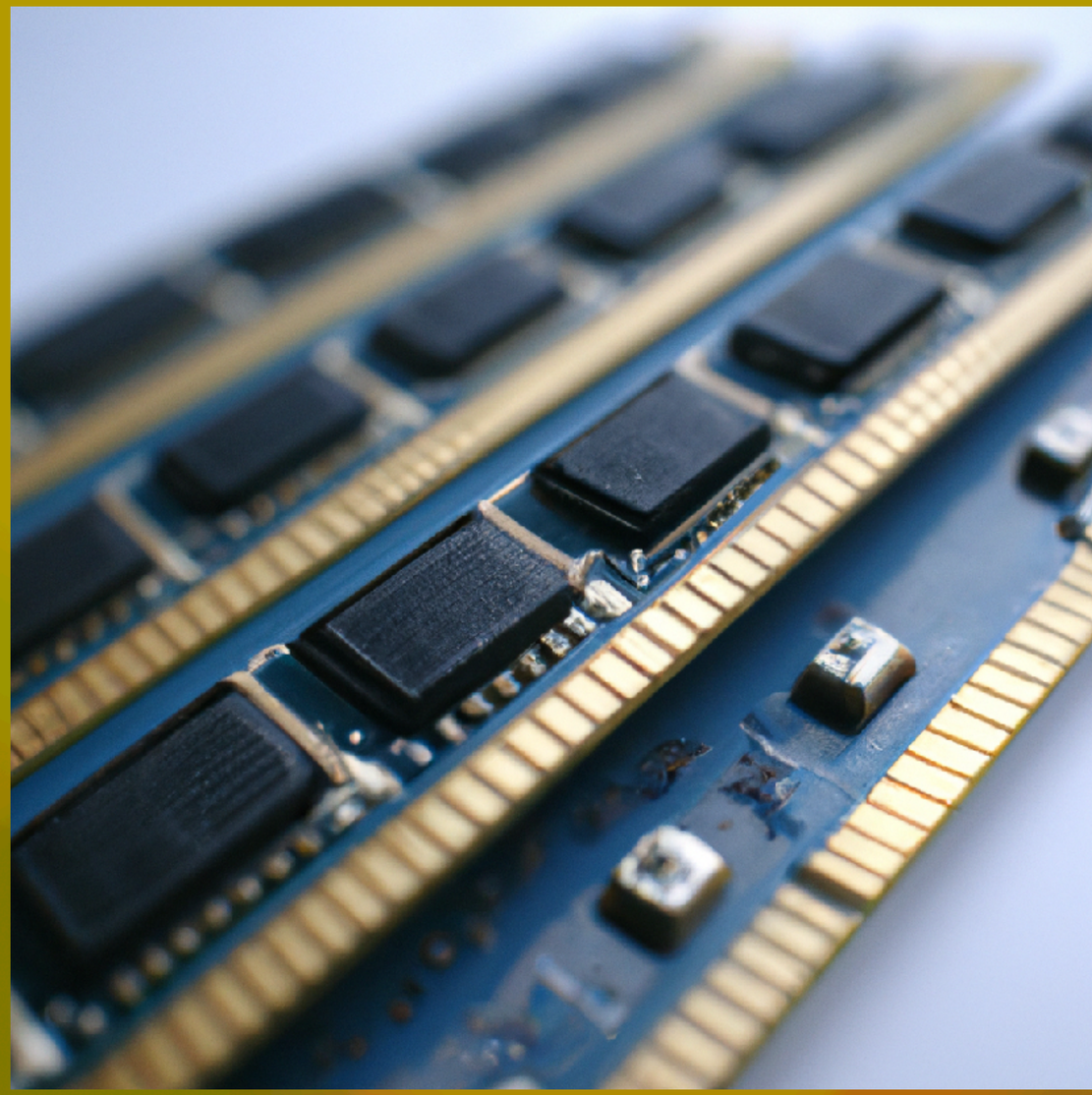




RAM Random Access Memory

- RAM, or Random Access Memory, is a type of memory used to store data and instructions for the CPU. It is used to store data temporarily, as it is erased when the computer is turned off.

- RAM is necessary for the CPU to access and execute instructions, as it stores the data and instructions that the CPU needs to process.



Hard Drive

- A hard drive is a type of storage device used to store data and instructions. It is used to store data permanently, as it is not erased when the computer is turned off.
- A hard drive is necessary to store data and instructions, as it is used to store data permanently and can be accessed by the CPU when needed.

Operating System

- An operating system is a set of software programs that control the operation of a computer and provide a platform for applications to run on.
- It is responsible for managing the computer's memory, processes, and all of its software and hardware.

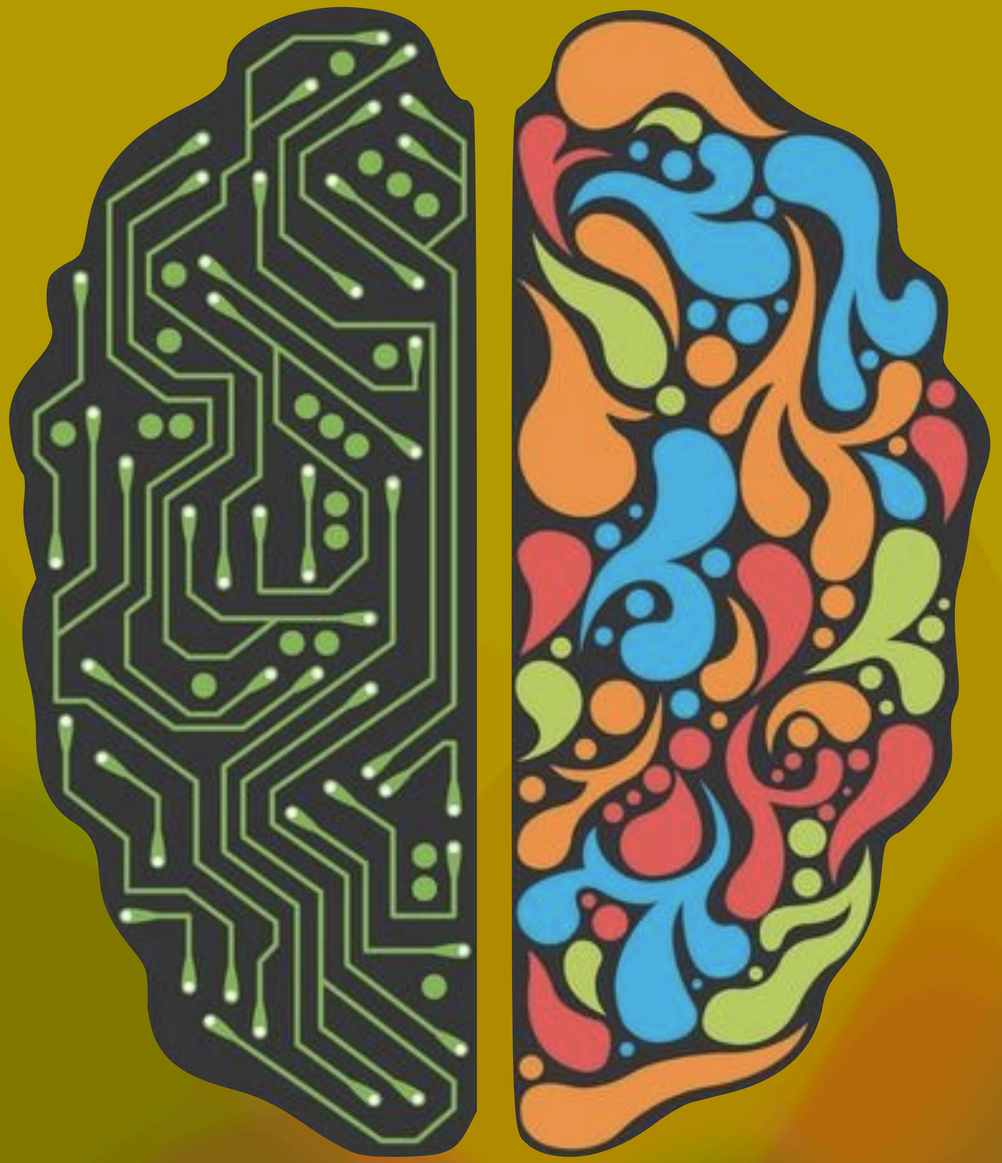
Programming

What is Programming?

- Programming is ultimately making software.
  - Software runs on hardware.
- Code Is just a technical implementation of algorithms.
  - Algorithms are step by step instruction for solving a problem.

Pseudo Code

- Pseudocode is a way of expressing an algorithm without using a specific programming language.
- It is used to create an outline of the structure of a program, which can then be translated into a programming language.



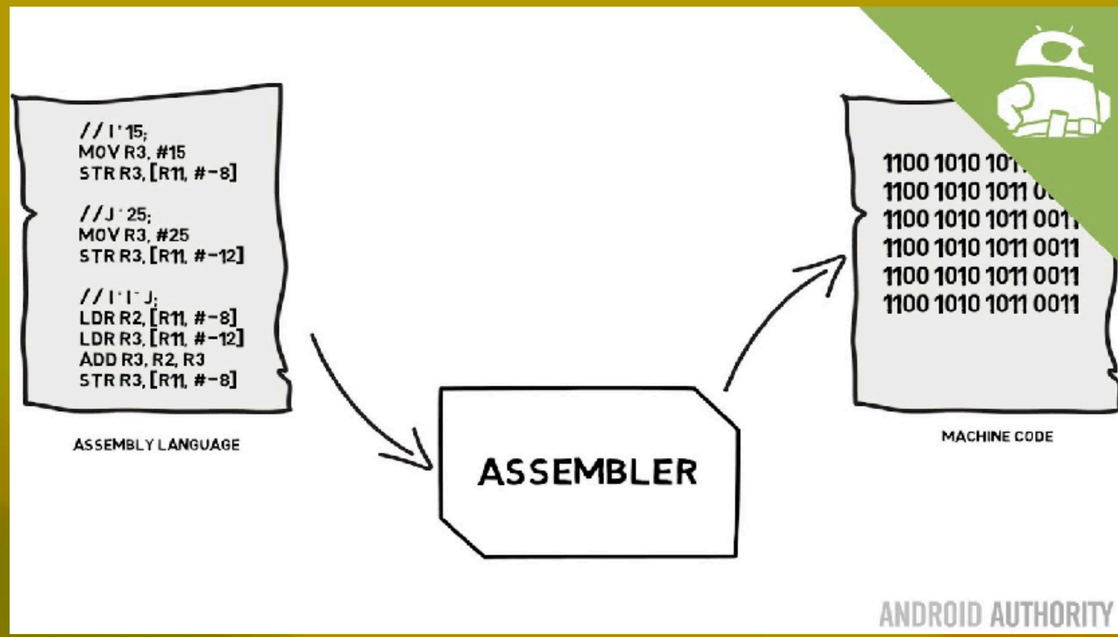
FLow Chart

- Flowcharts are diagrams that depict a process from start to finish, using symbols to represent each step along the way.

- Flowcharts provide a visual representation of an algorithm or process, helping to break down complex tasks into smaller steps.

Assembly Language

- An assembly language is a type of low-level programming language that is intended to communicate directly with a computer's hardware.
- Unlike machine language, which consists of binary and hexadecimal characters, assembly languages are designed to be readable by humans.



C Programming Language

- The C programming language is a procedural and general-purpose language that provides low-level access to system memory.
- A program written in C must be run through a C compiler to convert it into an executable that a computer can run.
- Many versions of Unix-based operating systems (OSes) are written in C and it has been standardized as part of the Portable Operating System Interface (POSIX).

```c
/*
* C Program to Print "Hello World"
*/
#include <stdio.h>

int main(){
    printf("Hello World");
    return 0;
}
```

C++ Programming Language

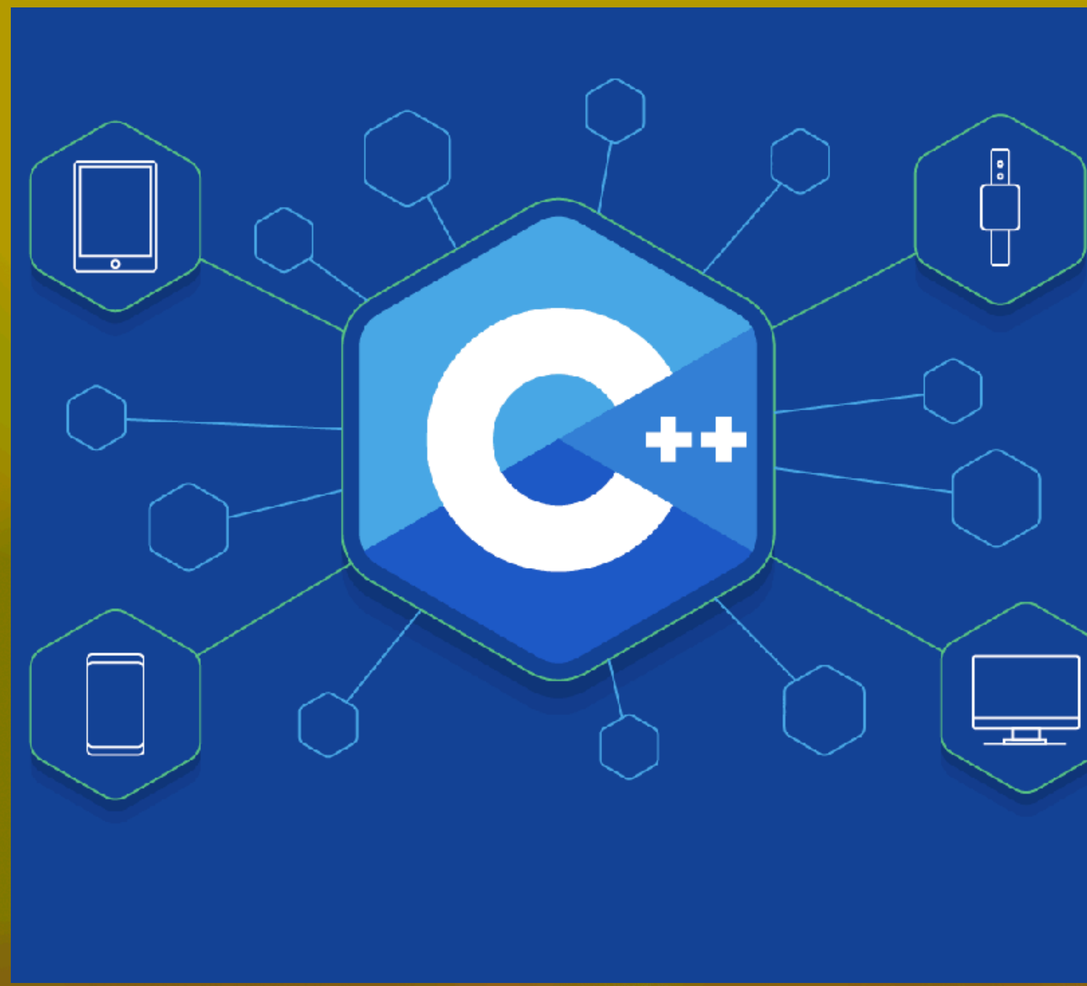
```cpp
#include <iostream>

using namespace std;

int main()
{
    cout << "Hello, World!" << endl;

    return 0;
}
```

- C++ is a general-purpose, free-form programming language created by Bjarne Stroustrup in 1979 at Bell Labs in Murray Hill, New Jersey, as an enhancement to the C language.
- Since it is an extension of C, it is also known as C with classes.
- It was specifically designed with an orientation towards large systems and resource-constrained software.
- Operating System, Games, GUI Based Application, Web Browsers, Embedded Systems, Banking Application, Compilers and more…



Java

- Java is a programming language and a platform.
- Java is a high level, robust, object-oriented and secure programming language.
- Java was developed by Sun Microsystems (which is now the subsidiary of Oracle) in the year 1995. James Gosling is known as the father of Java. Before Java, its name was Oak. Since Oak was already a registered company, so James Gosling and his team changed the name from Oak to Java.

```java
// file.java
class HelloWorld
{
    public static void main(String args[])
    {
        System.out.println("Hello, World");
    }
}
```

Java

Programming

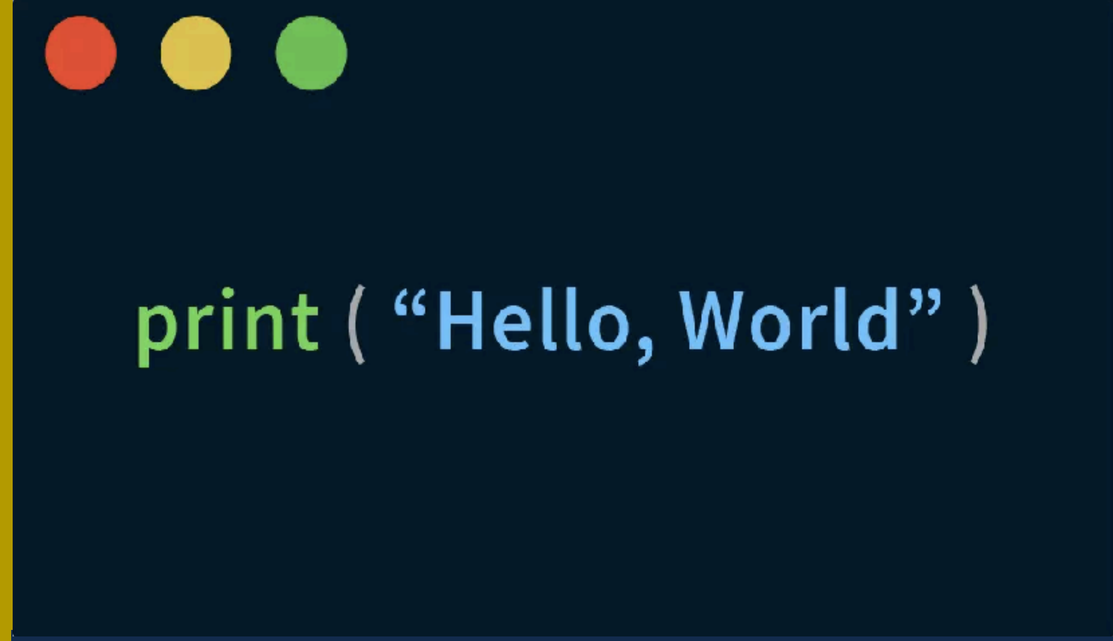
Java Script

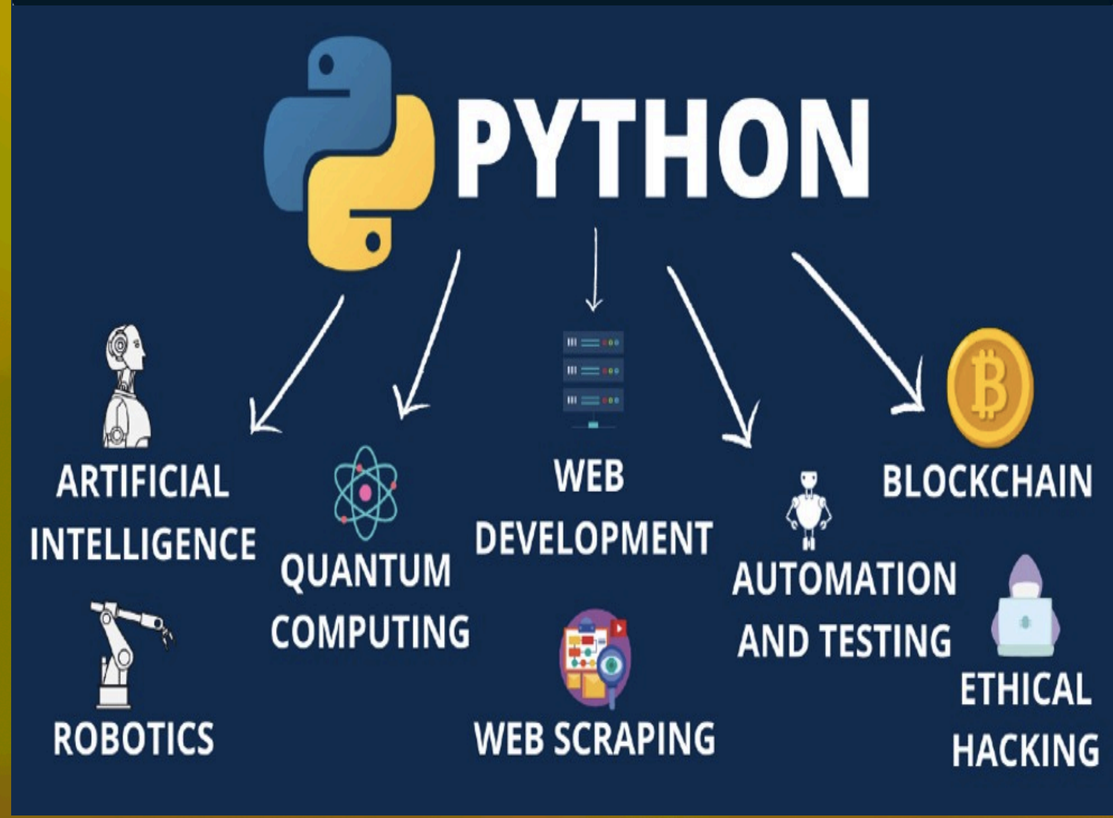
- JavaScript is a scripting or programming language that allows you to implement complex features on web pages.
- Every time a web page does more than just sit there and display static information for you to look at displaying timely content updates, interactive maps, animated 2D/3D graphics, scrolling video jukeboxes, etc, you can bet that JavaScript is probably involved.
- It is the third layer of the layer cake of standard web technologies, two of which (HTML and CSS)

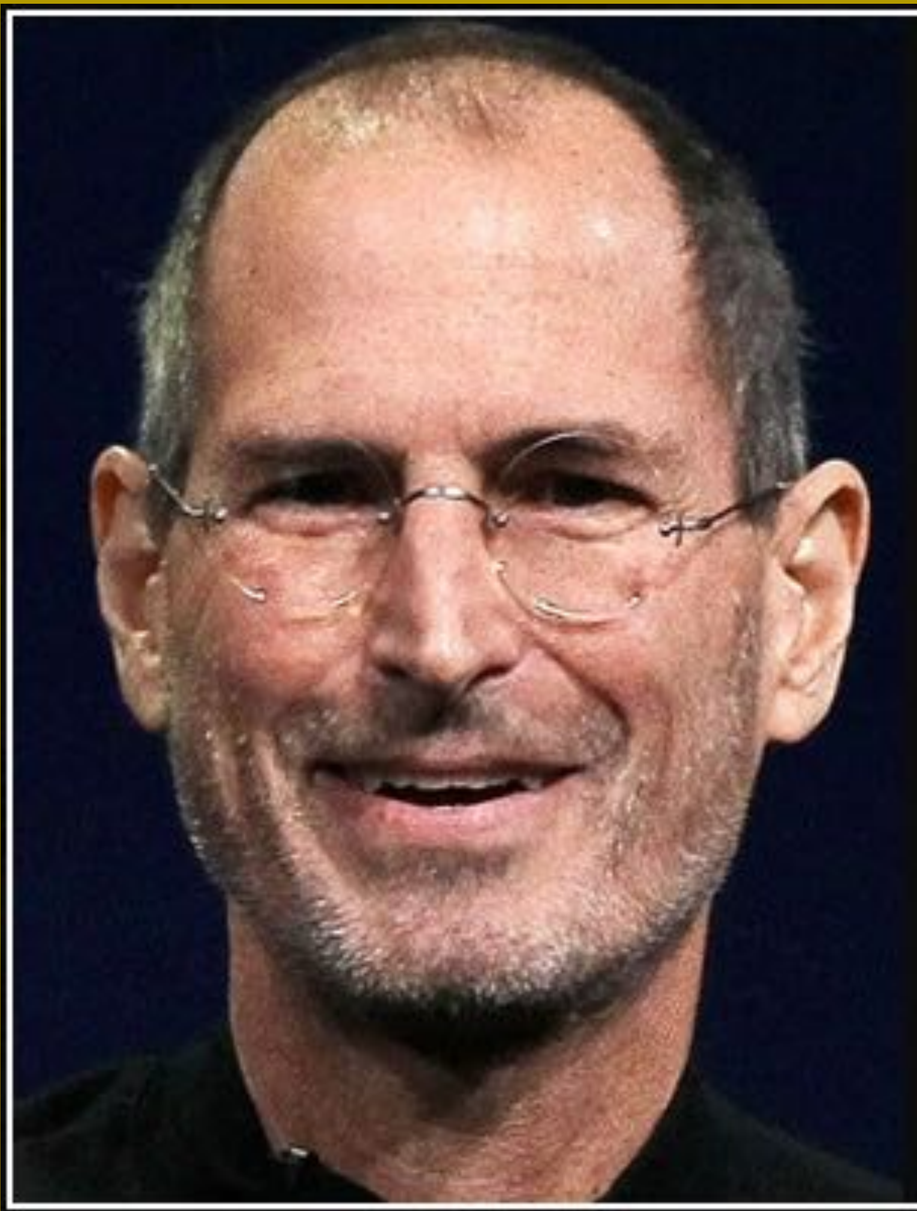
```
console.log('Hello world!')
```

Python

- Python is a high-level, interpreted programming language that was first released in 1991.
- It is designed to be easy to read and write, with a clean syntax and a focus on code readability. Python supports multiple programming paradigms, including object-oriented, imperative, and functional programming styles.
- One of the key features of Python is its simplicity and ease of use. The language's syntax is designed to be clear and concise, with a focus on readability and reducing the amount of boilerplate code required. This makes it an ideal language for beginners to learn, as well as for experienced developers who want to prototype ideas quickly.







Everybody in this country should learn how to program a computer, because it teaches you how to think.

— Steve Jobs —

AZ QUOTES

References

- https://www.latinasinstem.com/blog/what-is-computer-science.
- https://www.gcu.edu/blog/engineering-technology/what-does-computer-scientist-do#:~:text=On%20the%20job%2C%20computer%20scientists,computers%20or%20software%20and%20devices.
- https://www.computerhistory.org/babbage/#:~:text=The%20first%20complete%20Babbage%20Engine,and%20measures%2011%20feet%20long.
- https://www.youtube.com/watch?v=cNN_tTXABUA
- YouTube.
- ChatGPT.

❀ Thank You ❀

Keep Smiling 😊