March 2, 2025 3:50 PM

Algorithms - Set of instructions designed to solve specific tasks, step-by-step. = foundation of any soft ware

Flowcharts = Graphical representations of algorithms

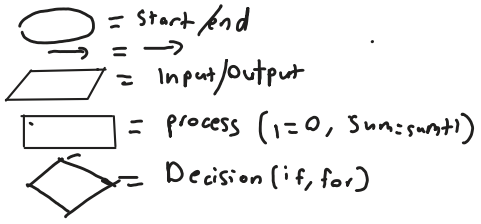
Pseudo code = Outline algorithm in human readable format before converting it into a programming language.

Programs - Actual implementation of algorithms in a specific coding language.

Pseudo code: Technique to describe algorithms in simple language.

| | |
|---|---|
| for i in range(5) | Start: Start |
| = | Sum = 0 = Set sum to 0, input = Read |
| for i from 1 to 5 | Print = write"" + |
| | if ____ : = If ____ Then |
| End For | End if |

Flow chart:




Software: A collection of programs and data that allows a computer to perform specific tasks.

Software: Intangible, code

Hardware: physical components of a computer

Software acts as an intermediary between the user and hardware.

A: System software: Manages computer hardware and system. (OpSystem, Firmware)

B: Application Software: Designed for end-users to complete tasks.
(Apps)

Programs: A sequence of instructions that are designed to be executed by the CPU.

Low Level language: Deal with hardware, Directly control the operations of the CPU.
↳ Machine code: Composed of 1, and 0, Understood by CPU. Specific for the CPU it is developed for.
↳ Assembly language: Instructions correspond to actions performed by CPU. Uses mnemonic codes. (ADD, MOV)

High-Level language: Abstract, Readable, Portable, Productive, Safe

Compiling = Translating on entire high level program into machine code before executing it. (C, C++, Rust)

Interpreted = converts line by line as it is executed.

Python = High Level, simple and readable, 1991, Data science, Machine learning, web development.

Operating systems: A software component that manages computer hardware and bridges hardware and software for users use.

Functions: Manages resources (CPU, Rom, Ram, SSD)

Processor: CPU, Brain of P.C. Executes instructions, Arithmetic and Logic unit, control unit, cache.

Registers / Cache:

Registers - Small high speed storage in processor - store temp data, fastest memory, hold important info.

Cache - small high speed memory located between the CPU and RAM, - Only purpose is to store frequently accessed data

RAM: Random Access

computer hardware and bridges hardware and software for users use.

Functions: Manages resources (cpu, Rom, Ram, SSD)
Process management (programs)
Memory management (manages system mem)
File system management (Organizes/stores Data on SSD/Hardrives)
File execution (executes program files and manages execution)
User interface (Allows user to interact with computer system)

File execution: -1 OS task
Loading files into memory, Initiating execution monitoring progress, providing system resources, handling errors, enforcing security.

IDE: Integrated Development Environment:
- A software that helps coders.
  - Code editor, debugger, compiler, Version control, project management.

Data flow: Input → primary memory ↔ Processor
↕
secondary memory → Output

Input stage (input)

Memory stage (Manufactoring process)
(Memory = workspace)

Processor stage (workers, finalize instructions)

Output Stage (output)

Data bus: Communication pathway to transfer data among computer parts.

- only purpose is to store frequently accessed data

RAM: Random Access
- volatile, temp storage, fast, can be modified

Rom: Read Only memory:
- Non volatile, can't be modified, holds Bios, firm ware.

1 byte = 8 bits (b)
1 Kilobyte (KB) = 1024 bytes
1 MB = 1024 KB
1 GB = 1024 MB
1 TB = 1024 GB

13 = 1101 (4 digits)

13 / 2 = 6 ... 1
6 / 2 = 3 ... 0
3 / 2 = 1 ... 1
1

## ENIAC Machine (February 15 1946)

The ENIAC (Electronic Numerical Integrator and Computer) was one of the earliest electronic general-purpose computers. It was developed during World War II primarily to calculate artillery firing tables for the United States Army's Ballistic Research Laboratory.

Here are some key points about the ENIAC:

1. **Development**: The ENIAC was developed at the University of Pennsylvania's Moore School of Electrical Engineering under the direction of physicists John Mauchly and J. Presper Eckert. Construction began in 1943 and was completed in 1945.
2. **Architecture**: ENIAC was a massive machine, weighing around 30 tons and consisting of over 17,000 vacuum tubes, 70,000 resistors, 10,000 capacitors, and 6,000 switches. It occupied a large room and required extensive cooling.
3. **Operation**: ENIAC was programmed using plugboards and switches, rather than the stored-program concept used in modern computers. This meant that to change the program, the wiring and switches had to be physically rearranged.
4. **Speed and Capabilities**: ENIAC could perform around 5,000 additions or 300 multiplications per second, which was a remarkable achievement for its time. It was capable of solving a wide range of numerical problems, from calculating trajectories to solving differential equations.
5. **Significance:** ENIAC is considered one of the pioneering achievements in the history of computing. It demonstrated the potential of electronic computers and paved the way for further advancements in the field. However, it was not a fully electronic digital computer, as it still relied on mechanical switches and plugboards for its operation.
6. Legacy: After its completion, ENIAC was used for various calculations, including computations for the hydrogen bomb, weather prediction, and early atomic energy research. It was in operation until 1955 when it was replaced by more advanced computers.

Despite its limitations and the advancements made since its creation, the ENIAC remains a symbol of the dawn of the electronic computing era and the beginning of the digital age.