

23/01/19

Computer fundamentals

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* Computer: is an electronic device machine that follows a set of instructions in order that it may be able to accept and gather data and transform these into information.

* Characteristic of Computer:

1. Speed
2. Accuracy
3. Reliable
4. efficient
5. Endurance
6. Versatile
1. Reduction of cost & human efforts.

* Disadvantages

1. No IQ
2. No feeling
3. Dependency

* Generation of Computer:

- First Generation:

from 1946-1959. / machine Language

- Vacuum Tube were used
- Punch card were used for input
- Expensive and Large size
- Low space speed
- Low Accuracy
- Low Efficiency

2nd Gen. :

- From 1959 - 1965
- Used transistors
- Smaller & cheaper than 1st g.
- Assembly Language.

Language: machine (Binary)

Assembler ← Assembly (Symbol)

Compiler ← High-language (Alpha., Num., Symbols)

Interpreter

x 3rd Gen. :

- From 1965 - 1971
- Integrated Circuits (ICs)
- Smaller, cheaper and faster than 2nd g.
- Use keyboard.
- High level language.

x 4th Gen. :

- From 1971 - 1980
- VLSI Microprocessor
very large scale IC
- Mouse.

* 5th Gen. :

- From 1980 - till date.
- VLSI Microprocessor (ultra large scale ICs)
- High level Language.

Classification of Computers:

(A) On the Basis of Size.

1. Super Computer
2. Main frame Computer
3. Mini Computer
4. Micro Computer.

1. Super Computers:

- Very expensive.
- Very large in size.
- Very fast and powerful, speed of 100 ^{MIPS} (million instructions per second)
- Generally Not used for General Comp.

2. Mainframe Computers:

- Very large but smaller than Super Comp.
- Very expensive
- may have speed of 10 MIPS.
- Used in Centralised Computing Centre with many workstations.

(3) Minicomputers:

- Smaller and less expensive.
- Speed of several MIPS (2-3 MIPS)
- Very small
- Can support upto 20 users.

4) Micro computers:

- Very smaller and portable
- Cost is very Low
- Can be used for personal work.

* On the basis of function:

(1) Analog Computer:

uses physical phenomena such as electrical, mechanical or hydraulic quantities to model the problem being solved.

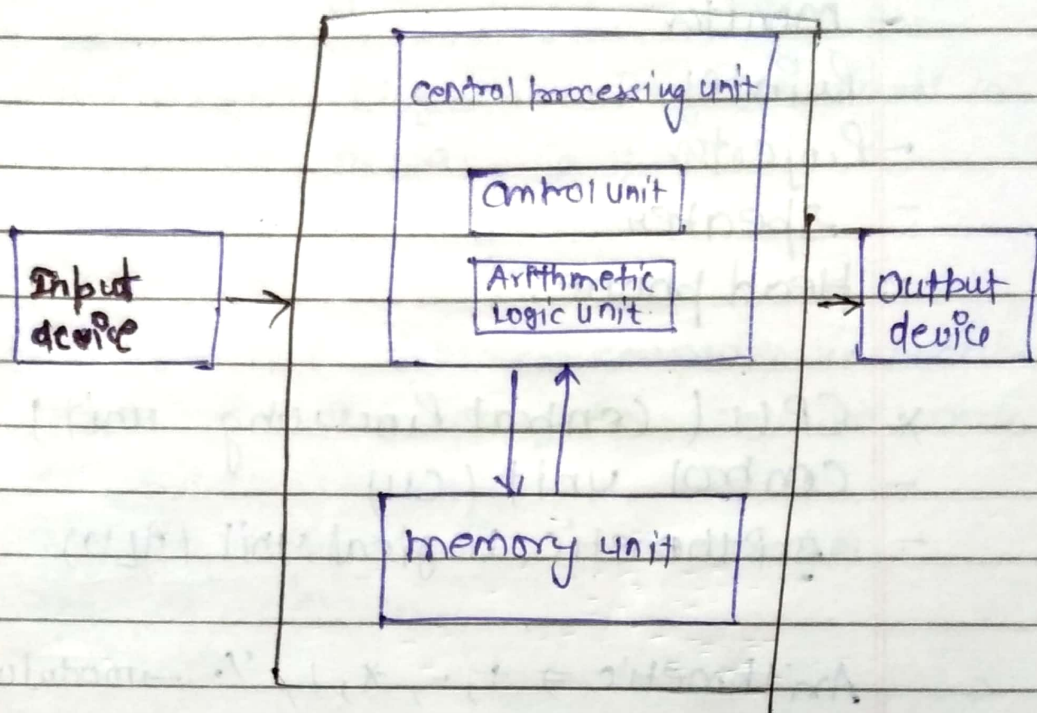
2) Digital Computer:

perform calculations and logical operations with digits usually binary.

3) Hybrid Computer:

combination of analog and digital.

* Components of computer :-



* Input unit

- keyboard
- mouse
- Joystick
- Light Pen
- scanner
- Microphone
- magnetic Ink card Reader (MICR)
- optical character Reader (OCR)
- Bar Code Reader
- Optical Mark Reader (OMR)

* Output Unit

- monitor
- Printer
- Projector
- speaker
- Head phone

* CPU (Central Processing Unit)

- Control unit (CU)
- Arithmetic Logical unit (ALU)

Arithmetic $\Rightarrow +, -, *, /, \% \rightarrow$ modulus

Logical $\rightarrow$ Relational $\Rightarrow <, >, <=, >=, ==, !=$

$\rightarrow$ Logical $\Rightarrow$ AND, OR, NOT

$\&\& \ || \ !$

- Control unit (CU)

* Memory unit :

* Primary memory :

- RAM (Random Access memory)
- ROM (Read only memory) $\Rightarrow$ PROM, EPROM, EEPROM,

* Secondary memory :

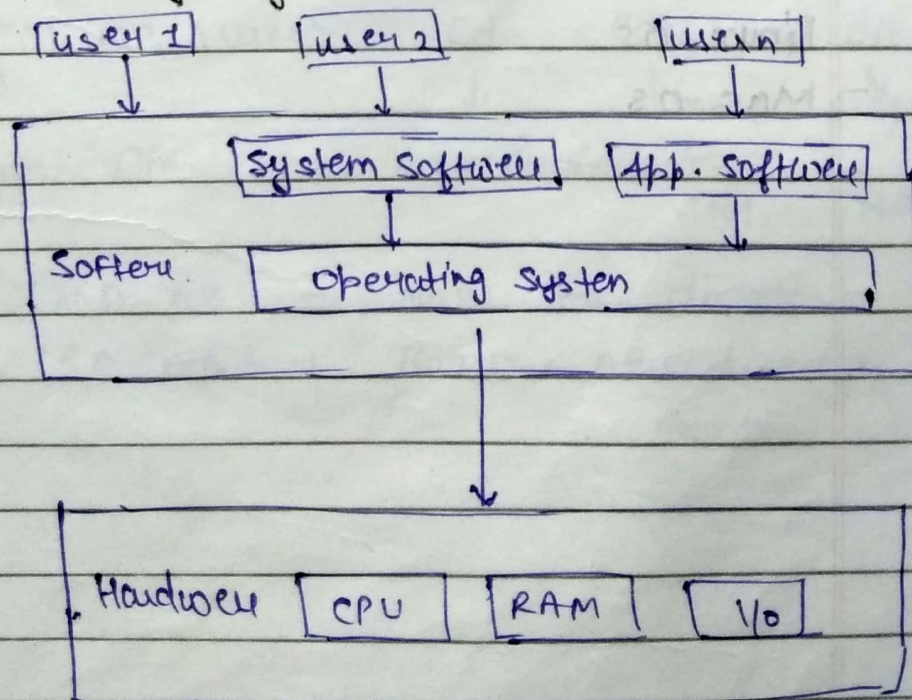
- Hard Drive
- Optical Disk

Date

* Operating System:

- * Hardware: Physical, Tangible Parts or Components of a Computer
- * Software:
 - Collections of data or computer instruction that tell the computer how to work
 - System software:
 - operates the Computer Hardware
 - Ex- Os, utilities
 - Application Software:
 - Perform specific or special function Ex- MS word

* Operating system



◦ A Program that act as an interface b/w the user and computer hardware and Controls the execution of all kinds of programs.

× Main Functions :

- Memory Management
- Processal management
- Device management
- File management
- Security
- Controls over system performance

× Types -

- Disk operating system (DOS)
- Window OS
- Unix OS
- Linux OS
- Mac OS

CLS → For command clear

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DOS commands

- CD - change directory (folder)
- MD - Make directory
- RD - Remove a directory
- DIR - Display the contents of a directory
- Copy - Place a copy of files
- Move - Move file(s) from one folder to another
- REN - Renames file(s)
- ATTRIB - Display or sets file attributes
- FORMAT - format a disk
- CHKDSK - Tests the file system on a disk, and report status
- DATE - Display & Set the current date in the PC
- TIME - Display " " " " time in the PC

C:\user\user>	cd..	cd\	cd dir.
↑	↓	↓ move	↓ go in
root dir.	move previous	to root	ndm

C:\MD ABC → make ABC directory.
/RD ABC → Remove ABC directory

* Compiler *

- A computer program that translates the source code written in a high-level language into the corresponding executable machine code.
- Scans the entire program first and translates it into machine code.
- Slow for debugging (removal of mistake from a program).
- Execution time is less.

* Interpreter *

- A computer program that converts each high-level program statement into the corresponding machine code.
- Translates the program line by line.
- Each time the program is executed, every line is checked for syntax error and then converted to equivalent machine code.
- Good for fast debugging.

* Algorithm:

- A set of rules that precisely defines a sequence of operations to solve a particular problem.
- Algorithms are intended to be implemented as computer programs.
- characteristics:
 - unambiguously
 - Precision
 - Input
 - Output
 - finiteness
 - feasible
 - Generality

Ex: An Algorithm determining the average of 3 given no. a, b , and c .

- Step 1: start
- Step 2: Input three integers a, b, c
- Step 3: calculate Average

$$Avg = \frac{(a+b+c)}{3}$$
- Step 4: Print Avg.
- Step 5: Stop.

Q Write an Algorithm to find greatest of two Numbers.

Step 1: Start
 Step 2: Input two numbers: a, b .
 Step 3:
 Step 4: Print greatest
 Step:

Step 1: start
 Step 2: I/P two numbers
 Step 3: if $a > b$ then go to Set (4), otherwise go to step (5)
 Step 4: Print a is greater. Go to step (6)
 5) Print b is greater
 6 Stop.

* Flow chart:

Graphical representation of step by step instruction which provides the better or easier view of the problem and its solution.

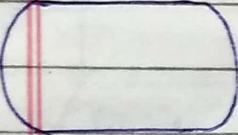
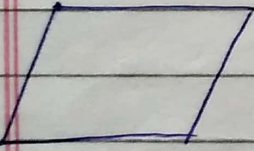
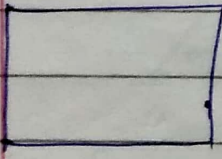
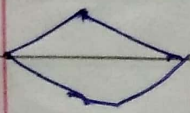
• Advantages:

- Better Communication
- Effective analysis
- Proper Debugging

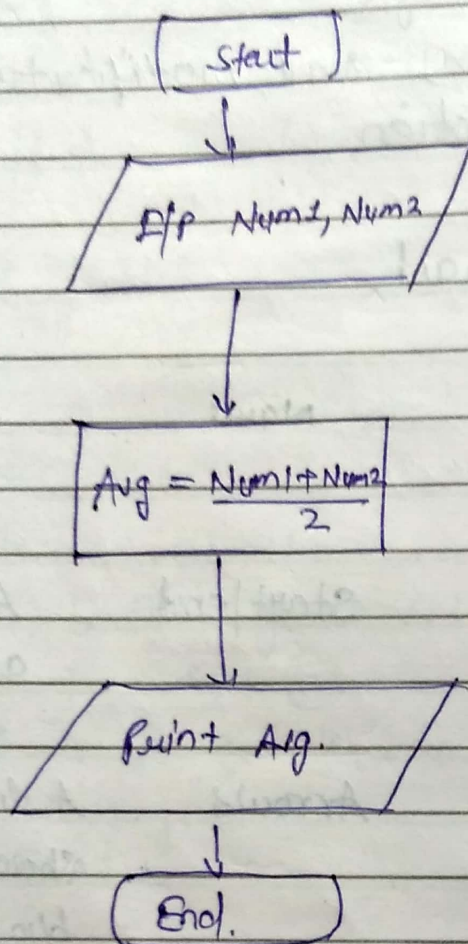
- Disadvantages:

- Complex logic
- Alteration and modifications
- Reproduction

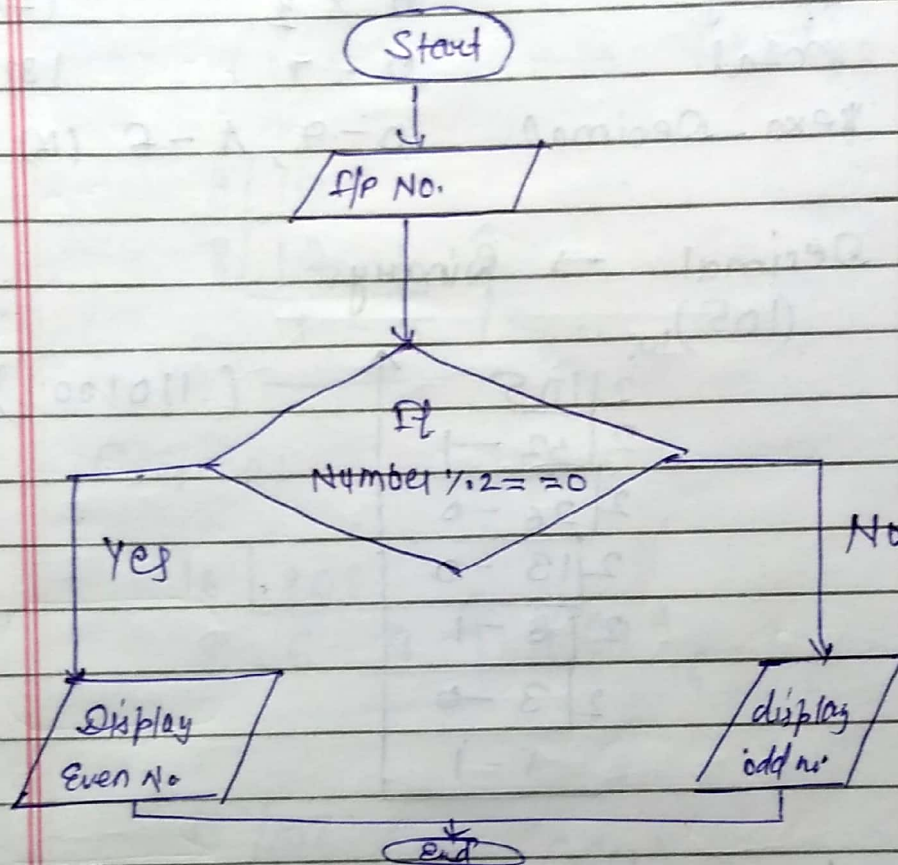
* Flowchart

Symbol	Name	Function
	Start/end	An oval represents a Start or end point
	Arrows	A line is a Connector that shows relationship b/w two representations or output
	Input/output	A parallelogram represent I/P or O/P
	Process	A rectangle represents a process
	Decision	A diamond indicates a decision

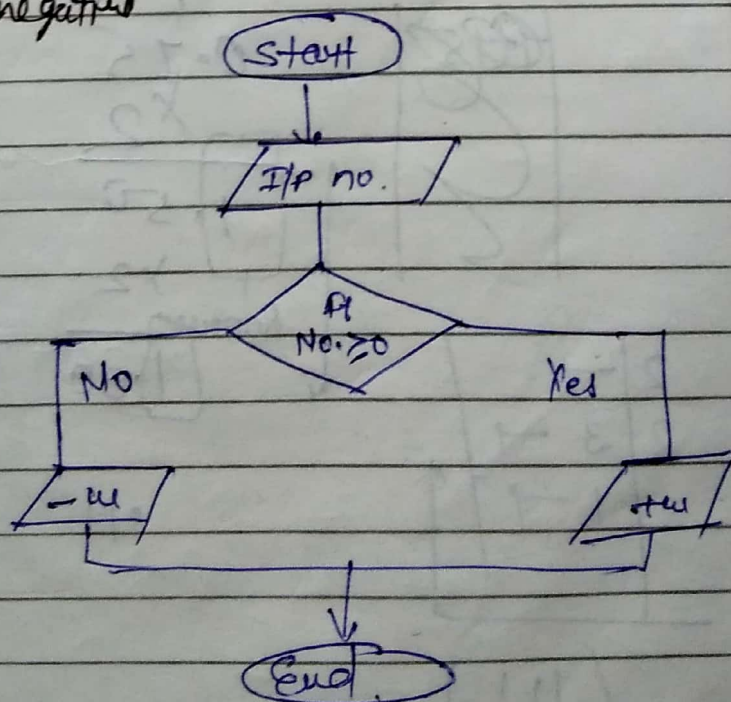
Ex Calculate avg. of two No.



Ex: check a no. is odd or even



Q Draw a flowchart check whether a no. is positive or negative



Number system Digit

Base

(1) Decimal	0-9	(10)
(2) Binary	0 & 1	(2)
(3) Octal	0-7	(8)
(4) Hexa-Decimal	0-9, A-F	(16) (15 digit)

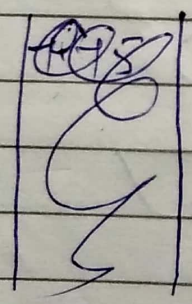
1) Decimal $\rightarrow$ Binary

$(105)_{10}$

2	105	
2	52	1
2	26	0
2	13	0
2	6	1
2	3	0
	1	1

$(1101001)_2$

$(7.75)_{10} \rightarrow$



0.75
$\times 2$
1.50
$\times 2$
1.00

Remove

2	7	
2	3	1
	1	1

0.11

(111)

$\Rightarrow 111.11$

(1) Decimal $\rightarrow$ Octal

$$(105)_{10} \rightarrow (151)_8$$

$$\begin{array}{r} 8 \overline{) 105} \\ 8 \overline{) 13} - 1 \\ \hline 1 - 5 \end{array} \quad \uparrow$$

Decimal $\rightarrow$ Hexa

$$\begin{array}{r} 16 \overline{) 105} \\ 6 - 9 \\ \hline \end{array} \quad \uparrow \quad (69)_{16}$$

$$\begin{array}{r} 16 \overline{) 107} \\ 6 - 11 \\ \hline \end{array} \quad \uparrow \quad (6B)_{16}$$

Binary $\rightarrow$ Decimal.

~~1011~~

$$\begin{array}{cccc}
 1 & 0 & 1 & 1 \\
 2^3 & 2^2 & 2^1 & 2^0 \\
 \hline
 8 + 0 + 2 + 1 = (11)_{10}
 \end{array}$$

$$\begin{array}{ccccc}
 1 & 0 & 1 & . & 1 & 1 \\
 2^2 & 2^1 & 2^0 & & 2^{-1} & 2^{-2} \\
 \hline
 4 + 0 + 1 + 0.5 + 0.25
 \end{array}$$

$$(5.75)_{10}$$

$$\begin{array}{r}
 64 \\
 32 \\
 \hline
 32^2
 \end{array}$$

n Octal $\rightarrow$ Decimal

$$\begin{array}{ccc}
 5 & 0 & 7 \\
 8^2 & 8^1 & 8^0 \\
 \hline
 320 + 0 + 7 = (327)_{10}
 \end{array}$$

$$\begin{array}{r}
 16 \\
 16 \\
 \hline
 96^3 \\
 16 \\
 \hline
 25^2
 \end{array}$$

n Hexa $\rightarrow$ Dec.

$$\begin{array}{ccc}
 1 & A & 9 \\
 16^2 & 16^1 & 16^0 \\
 \hline
 256 + 160 + 9
 \end{array}$$

Octal $\rightarrow$ Binary

0 0000

1 0001

2 0010

3 0011

4 0100

5 0101

6 0110

7 0111

Octal $\leftarrow$ Binary

010101

(25)₈

001011 . 101010

(13.52)₈

~~10~~ ~~11~~ (710)₈ $\rightarrow$

(111001000)₂

(5.6)₈ $\rightarrow$

(101.110)₂

* Hexa $\leftrightarrow$ Binary

8 - 1000

9 1001

A 1010

B 1011

C 1100

D 1101

E 1110

F 1111

(A9.B) Hexa $\rightarrow$ Binary

$(10101001.1011)_2$

Binary $\rightarrow$ Hexa

$\underline{0001} \ \underline{1011} \cdot \underline{0110}$

$(1B.6)_{16}$

Hexa $\leftrightarrow$ Octal

x (i) Hexa $\xleftarrow{\text{Dec}}$ Octal

✓ (ii) Hexa $\xleftarrow{\text{Binary}}$ Octal

(AF.93) $\rightarrow$ Octal

in Binary $\downarrow$

$\underline{01010111} \cdot \underline{100100110}$

$\downarrow$
 $(257.446)_8$

$(507)_8$

$\downarrow$ Binary

$\underline{000101000111}$

$\downarrow$ Hexa (Pairing 4)

$(147)_{16}$

* $0 + 0 = 0$

$0 + 1 = 1$

$1 + 0 = 1$

$1 + 1 = 10$

$1 + 1 + 1 = 11$

$$\begin{array}{r} \\ \\ \\ \\ \hline 1 \end{array}$$

4/02/19

* Pseudocode :

- An informal high-level description used to represent an algorithm for a program
- Does not have a specific syntax
- Acts as a bridge b/w the program and the algorithm or flowchart

- Ex:

if Student's grade is greater than
or equal to 60 :

 Print "passed"

else

 Print "failed"

end if

Q write a Pseudocode for printing
division of students based on their
Percentage

$\geq 75 \rightarrow$ I with Hon.

< 75 & $\geq 60 \rightarrow$ II

< 60 & $\geq 50 \rightarrow$ III

< 50 & $\geq 40 \rightarrow$ IV

$< 40 \rightarrow$ Fail

grade per.

if student [↑] is equal to or greater than 75

Print " I with Hon. "

else if student ^{per} ~~grade~~ is smaller than 75 or
greater or equal to 60

~~else~~ Print " I "

else if per is b/w 60 and 50

else if