Chapter -1 [Introduction]

DATE

Defination of computer:-

Based on von Neuman's concept, a device that inputs processes data, stores data and produces output is known as a computer.

History of computing and computers:-

i) Abacus (14th century):-

(Abundant Beads Addition and Calculation Utili... System)

- It is the first mechanical device used for calculation.
- It was invented by Mesopotamians.
- It consists of beads on movable rods divided in two parts.
- It is used today by young children to learn basic calculation.

ii) Napier Bones (1617):-

- It was invented by John Napier Scotish mathematic...
- It has a set of rods or bones with multiplication tables on them.
- It performs addition, subtraction, multiplication and division.

PAGE

DATE

iii) Pascaline (1642):-

- It was invented by Blaise Pascal, a french mathematician.
- It was first mechanical calculator made up of gears or wheels.
- Addition and Subtraction operation was faster than abacus.

iv) Leibniz wheel (17th century):-

- It was invented by Gottfried Wilhelm Leibniz, - A.g. a german mathematician.
- It extended pascal calculator to have automatic multiplication and division.
- It had a cylindrical stepped drum with set of teeth of incremental lengths which was coupled to a counting wheel.

v) Jacquard loom (1804):-

- It was invented by Joseph Marie Jacquard,
- It made the cotton weaving process automatic.
- The loom was controlled by a number of punch card lessed together into a continous sequence

PAGE

DATE

vi) Differential Engine (1822):-

- It was invented by Charles Babbage, a british mathematician.
- It could solve differential equation and was powered by steam.
- It stored program to perform calculation and print result automatically.

vii) Analytical Engine (1833):-

- It was invented by Charles Babbage.
- It was the basis of modern computer.
- This machine had five units, i.e; Input, Output, Store, Mill, Control.

(viii) Consensus Machine (1899):-

- It was invented by Herman an americian mathematician.
- It was invented to count the population of USA.
- It opperation were controlled by punchedcards.

(ix) Mark I (1944):-

- It was invented by Howard Aiken.
- He collabritad with IBM and developed the largest electromachinical computer.

PAGE

DATE

- It was the first operating machine that could execute computation automatically.
- It is considered to be the ~~begenin~~ begining of the era of modern computer.

(X) John Von Neumann Architecture (1945):-

- ~~It~~ Dr John von Neumann proposed the concept of stored program computer.
- Program and data could be stored in the same memory unit.
- It had five components (units):-
  1) Processing unit
  2) Control unit
  3) Memory unit
  4) Storage unit
  5) Input/output unit

1.2. History of Programming Languages:-

Programming language:-

Instruction / commands ~~gtvin~~ given to the computer requireds some set of instructions which is known as program. Programs needs to be written in some language which is turned or

PAGE

DATE

known as programming language.

C - Programming language :- (1972)

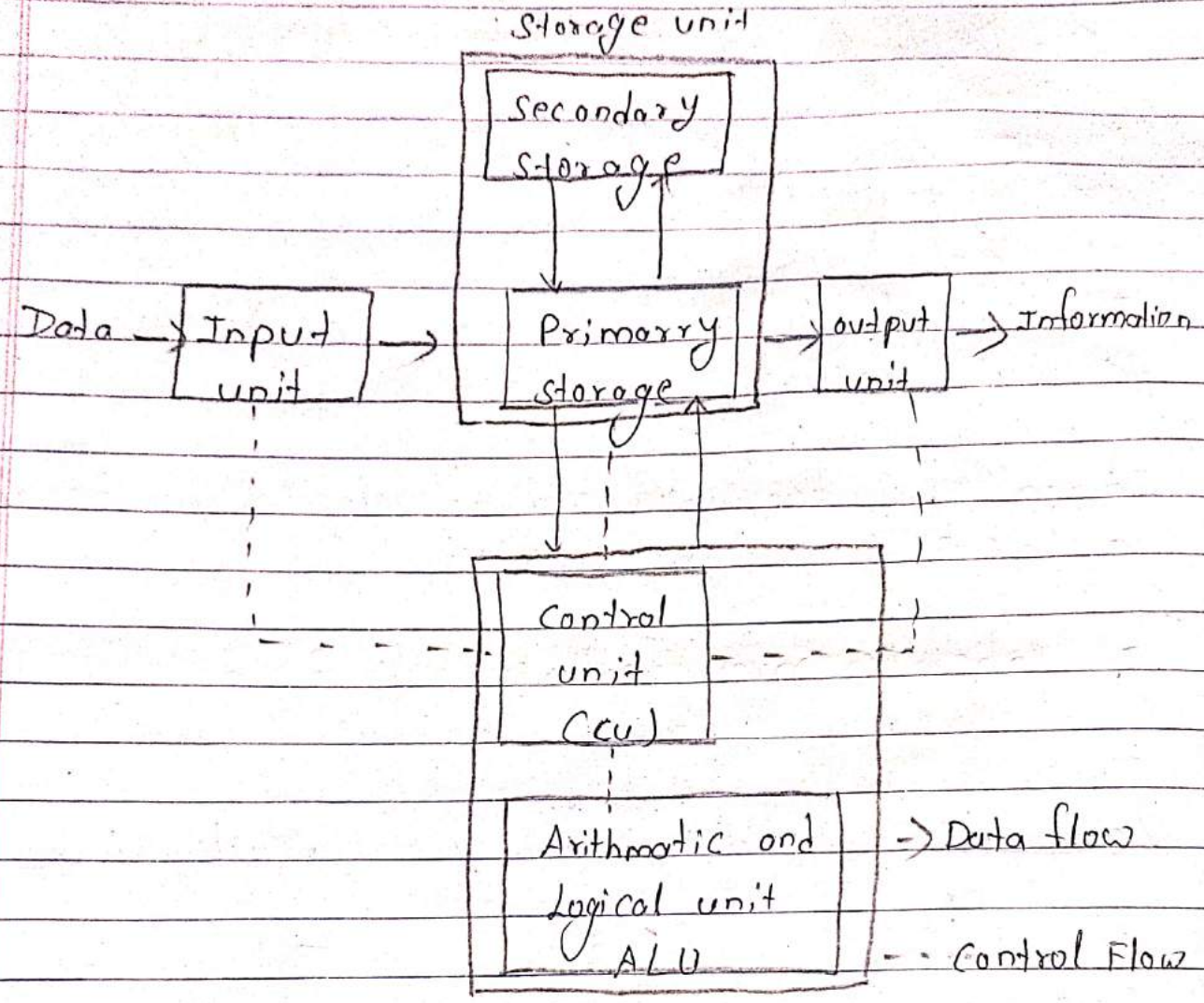
- It was developed by Dennis M Ritchie of AT and T Bell labs, USA.
- It was developed to overcome problems of peri perivious languages such as B, BCPL.
- Initially C language was developed to be used in unique UNIX operating systems.
- It inherits many features of B, BCPL.

Language	Year	Developed By.
Algol	1960	International Group
BCPL	1967	Martin Richard
B	1970	Ken Thompson
Traditional C	1972	Dennis M Ritchie
ANSI C	1989	ANSI Committee
ANSI / ISOC	1990	ISO committee
C99	1999	Standardisation lunges
C11	2011	" "

PAGE

DATE

* Block Diagram of Computer :-



- Basic Components and parts of computer system is given below

1) Input unit
2) output unit
3) CPU central processing unit
   (i) CU, (ii) ALU

PAGE

DATE

iv) Storage unit:-
(i) Primary Storage unit
(ii) Secondary Storage unit.

(i) Input unit :-

It accepts the data / instructions from outside world through input devices like keyboard, mouse.

It converts data / instructions into binary form for further processing.

They act like connection between outside world and computer system.

(ii) Output unit :-

It display the result of processing. It converts binary codes into human readable for for better understanding, like prints, monitors, projector, etc.

(iii) Central processing unit (CPU) :-

It is also called the brain of the computer. It performs arithmetic logical operation. It performs arithmetic logical operation as well as controlling the operation.

Different Component of CPU are :-

(a) Control unit:-

It controls entire operation of

PAGE

DATE

computer. It also controls all devices such as memory, input/output devices connected to the CPU.

CU fetches instructions from memory decodes the instruction interprets and sends suitable control signals to other components to execute the instruction.

(b) Arithmatic logical unit:-

It performs all arithmatic operation such as addition, subtraction, multiplication and division. It also uses logic operation for comparision.

(c) Storage unit:-

Data and instruction entering through the computer system have to be stored inside computer before actual processing start.

Storage units stores program data as well as intermediate results and output results.

- primary storage unit:-

It is also called main memory or RAM. The data or instructions is stored in primary storage before processing and later the data is transfered to ALU where further processing is done. The data stored is temporary. They are very expensive.

PAGE

DATE

- Secondary storage unit:-

It is also called permanent storage unit as when the data stored can be recalled by users whenever they need. They are much cheaper than primary memory.

* Generation of Computer:-

The history of computer development changes the way computer operates resulting in smaller, cheaper, powerful and efficient computing devices. There are five generation of computer listed below:-

① First generation :- (1940-1956)

It used vaccum tubes as major peace of technology. Vaccum tubes were larger components and resulted in first generation computer to be quite large in size, taking up alot of space in a room or even a house eg:-

ENIAC, EDSAC, IBM 701, Mark I.

② Second generation :- (1956-1963)

It used transisters instead of vaccum tubes. Transisters were smaller and allowed computer to be smaller in size, faster in speed and cheaper to built. eg:-

IBM 7070, RCA 501.

PAGE

DATE

③ Third generation :- (1964 - 1971)

It used IC (Integrated Circuit) in computer in computer to reduce the size of computer even more compare to spee second generation computer. IC made the computer -faster.

eg:-
IBM-360 series, Honeywell-6000 series.

④ Fourth generation :- (1972-2010):-

It used micro-processor more commonly known as CPU. Micro processor with IC helped computer to fit easily on a desk.

eg:- Altoir 8800, IBM 5-100.

⑤ Fifth generation (2010-present):-

It is using AI (Artificial Intellegence) which is an technology with many potential application around the world. eg:-

Apple Siri, Mircrosoft Cortana.

* Types of computer:-

on the basis of principle of operation:-

① Analog computer:-

It is a computing device

PAGE

DATE

that works on continous range of values. It deals with physical variables such as voltage, pressure, temperature, speed, etc.

eg:-

Speedometer, and mercury thermometer.

(ii) Digital computer:-

It is designed using digital circuits in which there are two leblels for input or output signals known as logic zero and logic one. Digitals computers are used in the field of design and data processing.

eg:-

Laptops, desktops, Smartphones.

(iii) Hybrid Computer:-

It has features of both analog and digital computer. It is fast and has memory and accaurcy. They are used in aeroplanes, hospitals, scientific application. A processor used in pert petrolpumps that comp converts measurements of fuel flow into quantity and price.

PAGE

DATE

* Uses of C language:-

Primary C programming language was developed to write UNIX operating system but later lots of application and system softwares were written in C language.

i) libraries of operating system.
eg:- UNIX, LINUX, Windows, Mac, Android etc.

ii) language compilers:-
eg:- C, C++, Java, C#.

iii) Database software:-
eg:- Oracle, Mysql etc.

iv) Text Editors:-
eg:- Notepad, wordpad, MS office etc

v) web browsers (Major ports):-
eg:- Google chrome, Internet Explorer, Mozila firefox, etc.

vi) Device Drivers:-
Printer, Scanner, Pendrive etc.

vii) Virus and Antivirus:-
Robotics, Embedded system and IOT. (Internet of things)

PAGE

DATE

vii) Graphics package.

* On the basis of size :-

i) Mainframe computer :-

They are designed to support multiple programs at the same time. They can execute different processes simultaneously. These features make them ideal for big organizations like banking, and telecom sectors which need to process high volume of data.

ii) Mini computer :-

It is a mid-size multiprocessing computer. It is smaller than mainframe but larger than a micro computers. Mini computers are used for task billing, accounting and inventory management.

iii) Micro computer :-

It is also known as personal computer. It is designed for individual use laptops and desktops are example of micro-computers.

iv) Super computer :-

They are biggest and fastest computer. They are designed to process huge amount of data. Super computers are

PAGE

DATE

used in scientific and engeneering application such as weather forecasting, scientific simulations and research.

* Types of Software:-

Main types of Software are:-

① System Software
② Application software

On the basis of nature of use:-

③ Ready-made (of-the-shelf) s/w
④ Tailored (custom) s/w

① System software:-

It offers protective shield to all application, physical component of computer. System software lies directly on top of computers hardware components. This includes the operating system, drivers for your hardware devices, linkers and debuggers.

② Application software:-

It is used for commercial purpose. Application software lies on top of system software. It is enable to run without operating system and other utilities.

Ex:- Computer games, databases, business software and medical software.

PAGE

DATE

③ Ready-made (Of-the-Shelf) s/w :-

These types of software are made and distrubuted by large enterprize companies. They are made with the general purpase requirement in mind. This software may need to adjust in few features and usability.

Advantage:-

- Low ~~of~~ up-front cost
- Support is often, included or can be added with a maintenance contract.

Disadvantage:-

- May ~~red~~ required to change process to fit the software.
- Higher customization fees.

④ Tailored (Custom) Software:-

These Software are made for specific customer with specific purpose.

Advantage:-

- It can be tailored to exact business needs.
- Changes can be made quickly.

PAGE

DATE

Disadvantage:-
. very high initial cost.
. May occured aditional cost for higher hiring new developers.

* On the basis of privacy of resources:-

(5) Open ~~source~~ Source software:-
Open Source software provides their source code and resources abilable for publicly. They are maintained and contributed by people all over the world.
ex:-
LINUX, Firefox web browser, Apache web-server e.t.c

(6) Closed Source (proprietry) software:-
Closed Source software do not provide their source code to general public. They are generally controlled by a particular enterprises. These software generally charge money for license or subscription But their can be closed source software that that are free of cost called freewares.
ex:-
Microsoft windows, Skype, internet explorer e.t.c

PAGE

DATE

* Types of programming language:-

i) Machine level language:-

Machine level language consists to condition -> i.e; either true (1) or false (0).

Advantage:-

- It is directly interacting with computer system.
- There is no requirement of software conversion like compiler, interpreter
- It takes very less time to execute a program because there is no conversion taking place.

Disadvantage:-

- It is machine dependent language i.e; individual program is required for each machine.
- It is time consuming to develop new programs.
- Debugging is very hard.

ii) Assembly level language:-

It contains same instruction as machine level language, but instructions and variables have specific names

PAGE

called mnemonics, instead of just binary codes

Advantage:-
- It is easy to understand than machine level language.
- Debugging process is easy.

Disadvantage:-
- It is a machine dependent language.
- It still takes times, to develop a program.
- Sometimes its hard to understand, the mnemonics.

③ High level language:-
High level languages are easily understandable by humans.

ex:- C, C++, Java, etc. are examples of high level language.

Advantage:-
- Instructions and commands are easy to remember.
- It's logic and structure are easy to understand.
- Debugging is very easy.
- less time consuming to write new programs

Disadvantage:-

- It takes more space compared to other languages.
- The programming language execute slowly.

* Language translator or language Processor:-

A computer understands instruction in machine code i.e; 0's and 1's. It is a tedious task to write programme directly in ~~meeh~~ machine code. The programs are written mostly in high level languages are called source code. Hence, a special translator software is used to translate programme written in machine to high level language to machine code which is called language processor. The language processors can be any of the following three types.

1. Compiler
2. Assembler
3. Interpreter

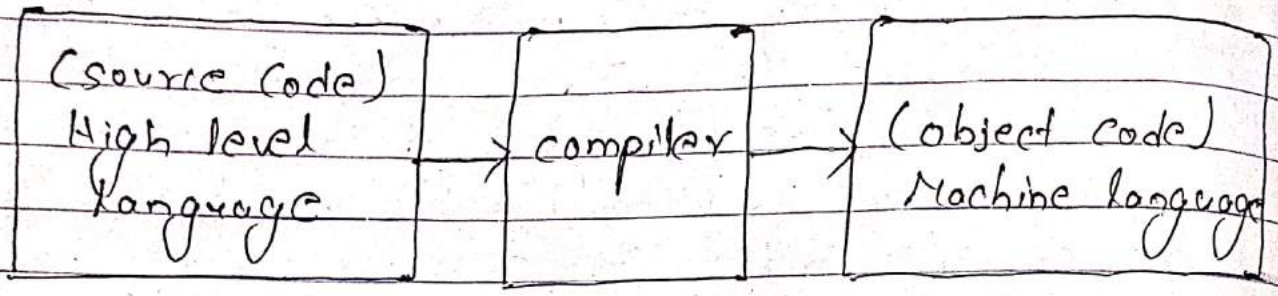
① Compiler:-

The language processor that reads the complete ~~reso~~ source program written in high level language as a whole and translates it into an equivalent program in machine language is called a compiler.

DATE

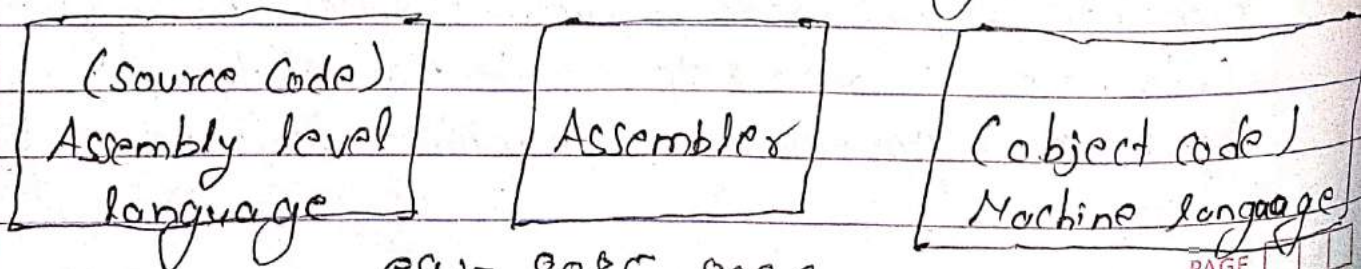
In compiler the source source code is translated to the object code successfully if it is free of errors. The compiler specify the errors at the end of compilation with line numbers when there are any error in the source code. The errors must be removed before the compiler can successfully recompile the source code again.

Ex:- C, C++, JAVA



(2) Assembler:-

The assembler is used to translate the program written in assembly language into machine code. The source source program is a input to assembler that contains assembly language instructions. The assembler converts source code to an object file then it converts to machine code with linker programs. The output generated by assembler is the machine code understandable by the computer.



eg:- 8085, 8086

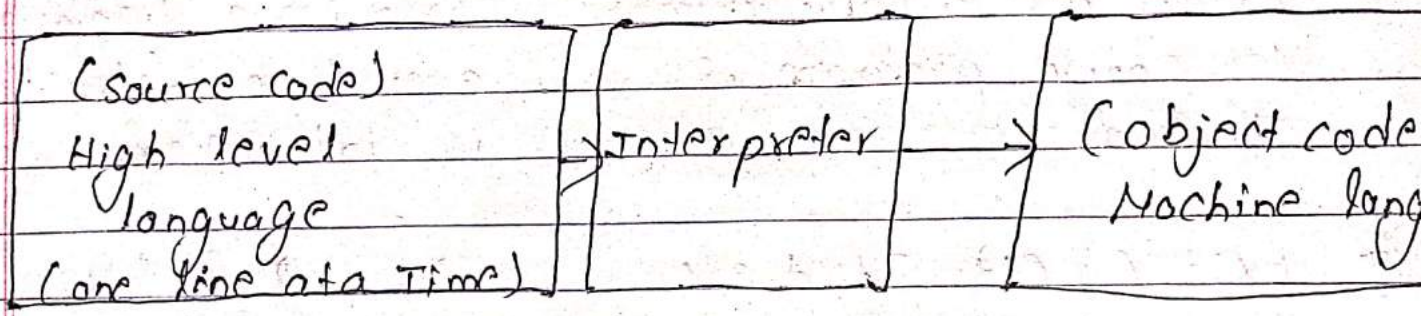
PAGE

DATE

(3) Interpreter :-

The translation of single statement of source program into machine code is done by interpreter and it executes the statements indiotly before moving on to the next line. If there is an error in the statement, the interpreter then terminates its translating process and displaces an error message. The interpreter moves on to the next line for execution only after removable of the error.

eg:-
Perl, BASIC, MATLAB



* Difference between Compiler and Interpreter :-

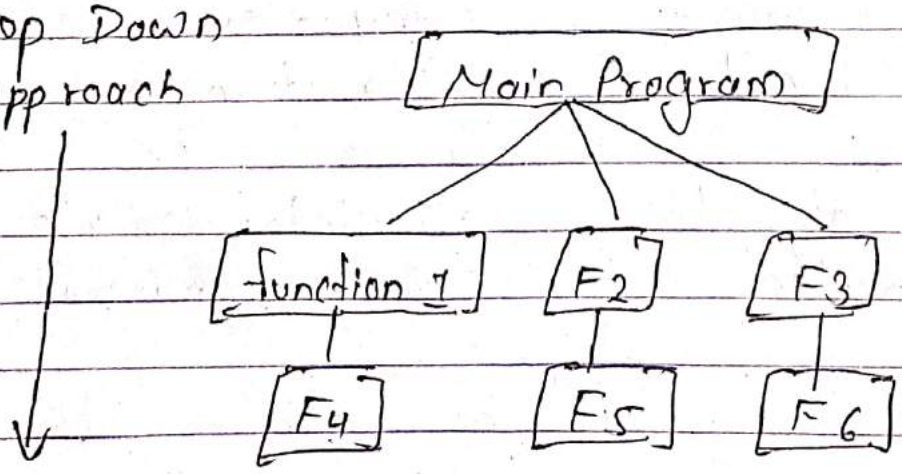
SN.	Compiler	Interpreter
①	Compiler takes entire program as input.	Interpreter takes single instruction as input.
②	Intermediate object code is generated.	No - intermediate object code is generated

PAGE

③ Conditional control statements exicutes faster.	Conditional control statement exicutes slower.
④ Memory requirement is more (since object code is generated).	Memory requirement is less.
⑤ Program doesn't need to be capilied every time.	Every time higher level program is converted to loweer level program.
⑥ Errors are displayed after entire program is checked.	Errors are displayed everytime instruction is interpreted.
⑦ EX:- C, C++, JAVA etc.	EX:- perl, BASIC, MATLAB

* Traditional (structured) programming concept / procedure oriented Program (POP)

Top Down Approach



In pop large program is divided into smaller programs. Programs are written as a sequence of procedures / function.

Features of POP :-

① Each procedure contains a series of instructions for performing a specific task.

② During program execution each procedure can be called by other procedures.

③ To call the function we have to write function name only.

④ More enphasis of these languages is on function and not on data.

⑤ POP language allowed data to move freely around the system.

⑥ Top down approach is used by POP languages.

Ex:- COBOL, FORTRAN, C, BASIC.

* Top down Approach :-

In this approach a complex algrothem is brokendown into smaller fragments known as modules. These modules are further brokendown into more smaller fragment until they can no-longer be fragment. This process is known as modularization.

During the modularization

DATE

you must always maintain the orizonility of the algorithm.