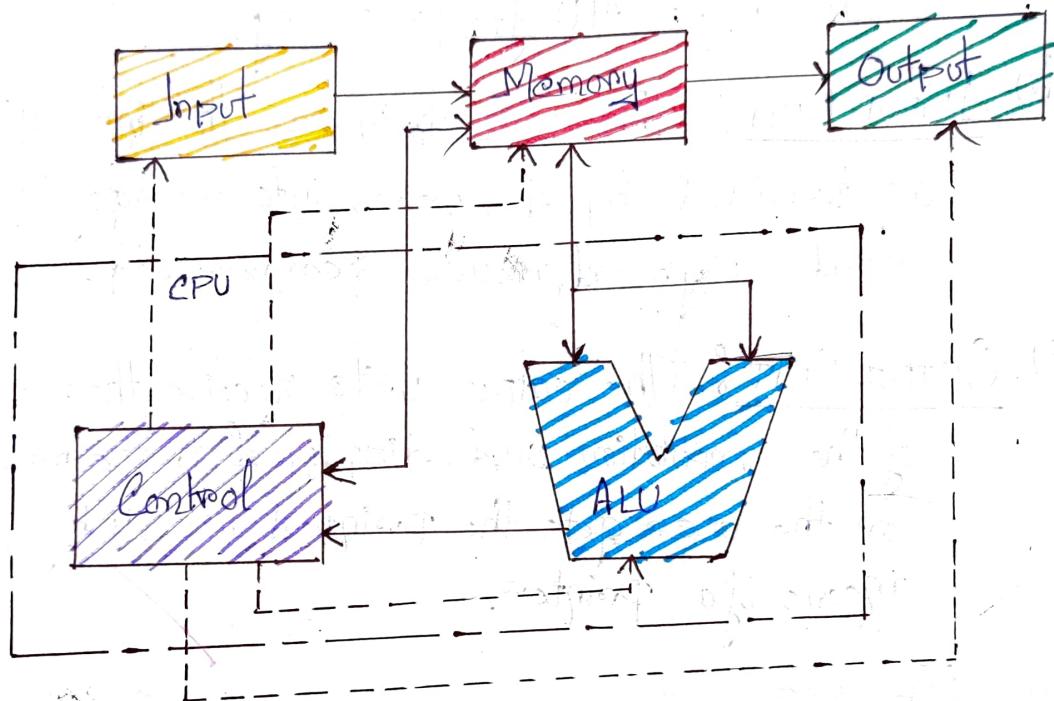


ASSIGNMENT 1 (A)

(1) Draw the Block diagram of Computer System? Explain the functionality of each component of the Computer System.

Answer:

→ Data/address lines
↔ Control lines.



BLOCK DIAGRAM OF A COMPUTER

- The Components of computer System are:-
- (i) Hardware
 - (ii) MEMORY: The memory unit stores programs as well as data.
 - (iii) ARITHMETIC AND LOGIC UNIT (ALU): It is the main processing unit which performs arithmetic and other data processing tasks as specified by the control unit. The ALU and control unit are the main constituent parts of the Central Processing unit (CPU). Another component of the CPU is register unit - collection of different registers, used to hold the data or instruction temporarily.

(iii) CONTROL UNIT: This is the unit that supervises the flow of information between various units. The control unit retrieves the instructions using registers one by one from the program, which is stored in the memory. The instructions are interpreted (or decoded) by the control unit itself and then the decoded instructions are sent to the ALU for processing.

(iv) INPUT UNIT: This unit transfers the information as provided by the users into memory. Examples include Keyboard, mouse, Scanner, etc.

(v) OUTPUT UNIT: The output units receive the result of the computation and displayed to the monitor or the user gets the printed results by means of a printer.

(b) SOFTWARE

The information processed by the hardware devices. Software consists of the instructions and data that the computers manipulate to perform various tasks. A sequence of instructions is called a program. Generally, software can be either application software or system software. Application software is a program or collection of programs used to solve a particular application-oriented problem. Examples - include editor program, real player and railway reservation program. System software is a program used to manage the entire system and to help in executing various application programs. Operating systems, compilers and device drivers are some of the

System Software's examples. System programs are generally machine dependent or is not concerned with specific application programs.

(c) HUMAN RESOURCES:

It is a manpower and skilled personal (programmers) available to perform the operation on computer systems.

(2) What is Von Neumann Computer Concept? What is Von Neumann Bottleneck? How can it be reduced?

Answer:- Von-Neumann Concept is that all data and instructions are stored in the same memory.
Time required to execute one data from processor = t_p
Time required to send data from main memory to arithmetic logic unit (ALU) = t_{m2} .
According to this concept $\rightarrow t_{m2} \gg t_p$.

Since the CPU has much higher speed than the main memory (RAM), the CPU has to wait longer to obtain a data-word from the memory. This CPU-memory speed disparity is referred to as Von Neumann bottleneck.

This performance problem is reduced by using a special type of fast memory called Cache memory between the CPU and main memory. The speed of Cache memory is almost same as the CPU, for which there is almost no waiting time of the CPU for the required data-word to come. Another way to reduce the problem is by using special type of computers known as Reduced Instruction Set Computers (RISC). The intention of the RISC computer is to reduce the total number of the memory references made by the CPU; instead it uses large numbers of registers for same purpose.

(3) What are the differences between low-level language and high-level language?

Answer:-

LOW-LEVEL LANGUAGE	HIGH-LEVEL LANGUAGE
(1) Low-level languages are closer to computers, that is low-level languages are generally written using binary codes.	(1) High-level languages are closer to the human, that is these are written using English-like instructions.
(2) Low-level language programs are machine dependent, that is one program written for a particular machine using low-level language.	(2) High-level language programs are machine independent.
(3) Debugging is difficult.	(3) Debugging is easy.
(4) It is difficult to develop application programs.	(4) It is convenient to develop application programs.

(4) What are the differences between machine language and assembly language?

Answer:-

MACHINE LANGUAGE	ASSEMBLY LANGUAGE
(1) Machine language instructions are composed of bits (0s and 1s). This is the only language the computer understands. Each computer program can be written in different languages, but ultimately it is converted into machine language because this is the only language the computer understands.	(1) Assembly language instructions are composed of text-type mnemonic codes.

- (2) Machine language instructions are difficult to understand and debug, since each instruction is only combination of 0s and 1s.
- (3) Execution is much faster.
- (4) No converter is needed.
- (2) Since assembly language instructions are closer to the human language (i.e. English), it is easy to debug.
- (3) Execution is slow.
- (4) One converter called assembler is needed to convert it into machine language.

(5) What are the differences between Compilers and Interpreters?

Answer:-

COMPILERS

(1) Compiler is a system program that converts the source program written in a high-level language into corresponding target code in low-level language. This conversion is done by compiler at a time for all instructions. Popular compilers are C, C++, FORTRAN and PASCAL.

(2) Compilers are executed more efficiently and are faster.

(3) Cannot be designed easily.

(4) Use large memory space.

INTERPRETERS

(1) The interpreter is a system program that translates each high-level program instruction into the corresponding machine code. Here, in interpreter instead of the whole program, one instruction at a time is translated and executed immediately. The commonly used interpreters are BASIC and PERL.

(2) It is executed less efficiently and are slower.

(3) Can be designed easily.

(4) Use less memory space.

(6) What is an Operating System (OS)? Briefly describe the major functions of an OS.

Answer:- An operating system is a collection of programs and utilities, which acts as the interface between user and computer. The operating system is a system program that tells computer to do tasks under a variety of conditions. The main objective of an operating system is to create the user friendly environment.

The following are the main functions of operating system:

- (1) Managing the user's programs.
- (2) Managing the memories of computer.
- (3) Managing the I/O operations.
- (4) Controlling the Security of computer.

(7) Show the addressing for program and data, assuming Von Neumann architecture for storing the following programs:

- (a) Assume that a program has a length of 2048 bytes and the program starts from an address 0.
- (b) The input data size is 512 bytes and stores from 3000.
- (c) The results of 30 bytes generated after program execution are stored at address 4000.

Answer:-

Address
0

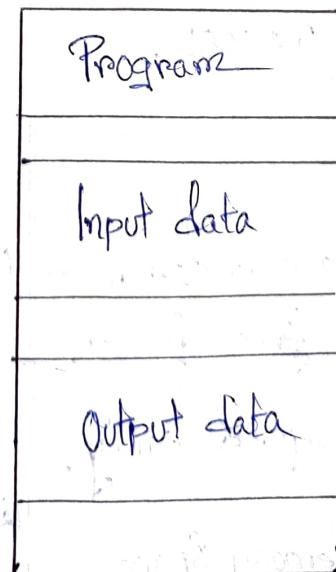
2047

3000

3511

4000

4029



(8) Is there any difference between Computer organization and computer architecture?

Answer :- Yes, there is difference between computers organisation and computer architecture.

COMPUTER ORGANIZATION

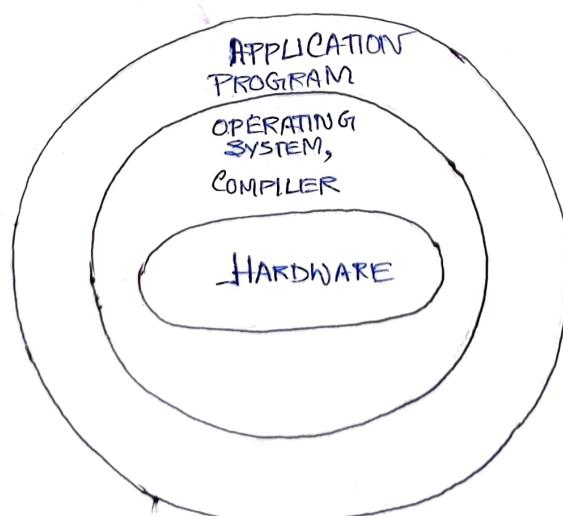
- (1) deals with the working method of computer system.
- (2) handles arrangement of device.
- (3) depends upon technology not devices.
- (4) User only know where to give input and from where to take output.
- (5) Software model

COMPUTER ARCHITECTURE

- (1) handles how working is performed by devices.
- (2) handles how devices are connected.
- (3) depends on nature of components, so different components can be in source technology.
- (4) deals with actual manipulation of inputs or outputs of data from devices.
- (5) hardware implementation of software model.

(9) Show the layer in a Computer System.

Answer :-



Most computer system are divided in 3 layers:

- (i) hardware
- (ii) Operating System.
- (iii) applications.

Hardware consist of the following:

- (1) Memory.
- (2) Processor.
- (3) Output device.
- (4) Input devices.

Operating System is also Separated in various layers

- (1) OS Core (Kernel, master program, Primary program etc.)
- (2) I/O management (ODIN interfaces and protocols.)
- (3) Component System (file System, common interpreter)
- (4) User interface. (Speech recognition, voice Synthesis, graphical display)

Application are programs written to do a specific job of no use to the computer's System operation