MULTILEVEL VIEWPOINT OF A MACHINE

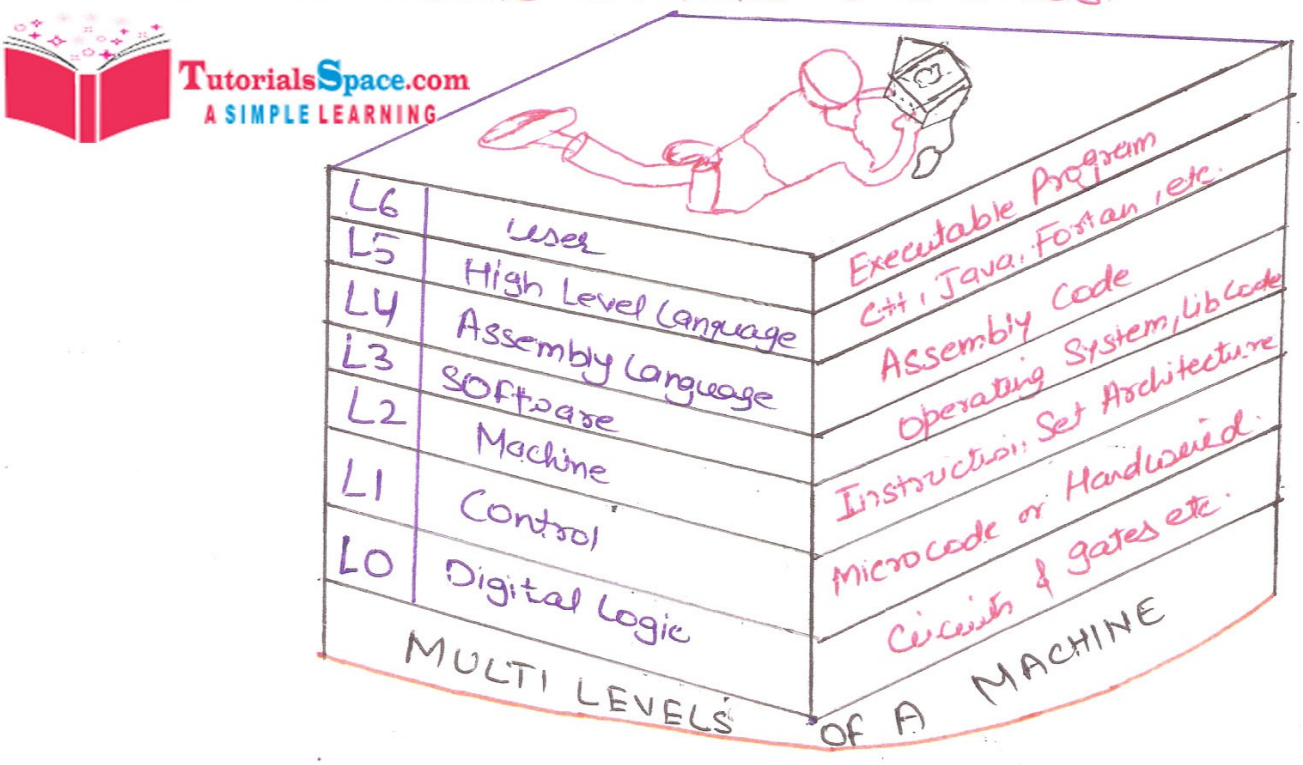
Our Computer is build on Various Layers:-

→ Software layer (Macro Architecture)

→ Instruction Set Architecture

→ Hardware Layer (Micro Architecture)

** But a Machine Can have 5-6 Levels:-



LEVEL 0 Digital Logic :-

The Lowest Level is called Digital Logic, which is the Computer's real hardware. This is the building blocks for higher levels.

→ We have objects called gates, composed of transistors

→ In these Only two logical values are present

* Each gate has one or more digital inputs (signals representing 0 or 1) and computes as outputs some function such as AND or OR. They can be used as Registers or combined for Memory.

→ A signal between 0 and 1 volt represents one value (binary 0) and one between 2 and 5 volts represents the other value (binary 1). Voltage outside these ranges are not permitted.

LEVEL 1

Micro-Architecture | Control Level.

→ This is a collection of 8 to 32 Registers for Memory and ALU to perform arithematic and logic operations

→ This level contains a microprograms which fetches, decodes and executes instructions.

→ The Registers are connected to the ALU to form a data path, over which data flow.

→ The operation of the datapath may be controlled by a microprogram, directly by Hardware ((Hardware) i.e Hardwired)

Computer Architecture is the Combination of Micro Architecture and instruction set Design.

Hardwired Control

→ Hardwired Control units Consist of Hardware that directly executes machine instructions.

→ The Control Logic is implemented Decoders, Gates, Flip-Flops, and other digital Circuits.

→ It can be optimized to produce a fast mode of operation.

→ Making any change is difficult.

Micro programmed Control:-

→ Micro programmed Control unit is built around a storage unit called Control memory where all control signals are stored in program like format.

→ Control memory stores a set of microprograms which are designed to implement instruction set.

→ Each instruction Causes a set of microprogram to be fetched.

→ And its Control information is extracted in a manner that resembles the fetching and execution of Program from main memory.

→ Design can be changed easily by just updating the Contents of the Control Memory.

→ Basically a microprogram is a program written in a low-level language that is implemented by the hardware.