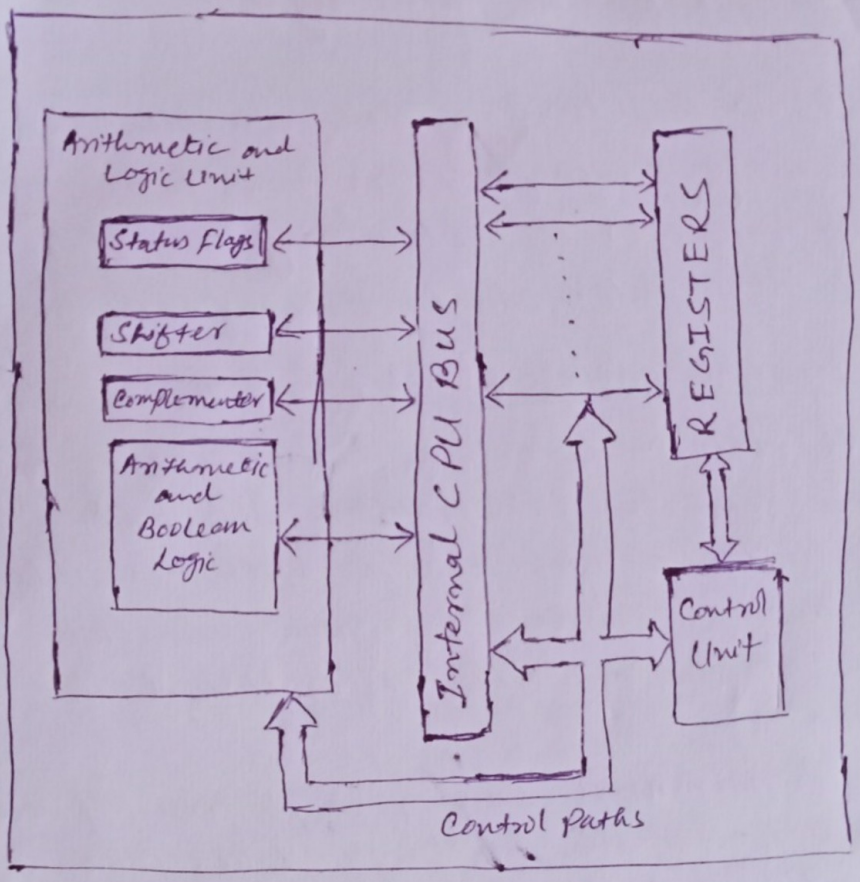
Basic CPU Structure



CPU Internal Structure

Figure above is slightly more detailed view of CPU. The data transfer and logic control paths are indicated, including an element labelled internal CPU-bus. This element is needed to transfer data between the various registers and the ALU because the the ALU infact operates only on data in the internal CPU memory.

Register Organization :-

Register organization is the arrangement of registers in the Processor. The Processor designer decides the organization of registers in a Processor. Different Processors may have different register organization.

Depending upon the roles played by the registers, they can be categorized into two types, (i) User-visible registers (ii) Control and status registers.

(i) User-visible Registers :- These enable the machine or assembly-Language Programmer to minimize main memory references by optimizing use of registers. User-visible register can be categorized in the following.

a) General purpose Register :- The general purpose registers detain both the addresses or the data, although we have separate data registers and address registers. The general purpose register also accepts the intermediate result in the course of Program execution. The general Purpose register can also be employed for the addressing function.

Programmers can restrict some of the general-purpose registers to specific functions. Like, some registers are specifically used for stack operations.

b) Data Registers :- Data registers may be used only to hold data and cannot be employed in the calculation of an operand address.

(c) Address Registers :- Address registers contain the address of an operand or it can also act as a general purpose register. An address register may be dedicated to certain addressing mode.

(d) Condition Codes Register :- Condition codes are the flag bits which are the part of the control register. The condition codes are set by the Processor as a result of an operation. The programmers are not allowed to alter the conditional codes.

(ii) Control and Status Registers :-

There are a variety of CPU registers that are employed to control the operation of CPU. Most of them, are not visible to the user. These registers are

a) Program Counter :- The Program Counter is a Processor register that holds the address of the instruction that has to executed next. It is the Processor which update the Program Counter with the address of the next instruction to be fetched for execution.

b) Instruction Register :- Instruction register has the instruction that is currently fetched. It helps in analysing the opcode and Operand Present in the instruction.

c) Memory Address Register (MAR) :- Memory address register holds the address of a memory location.

d) Memory Buffer Register (MBR) :- The memory buffer register holds the data that has to be written to a memory location or it holds the data that is recently been read.

The memory address register (MAR) and memory buffer register (MBR) are used to move the data between Processor and memory.