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Architecture of 8086

The following diagram depicts the architecture of a 8086 Microprocessor –

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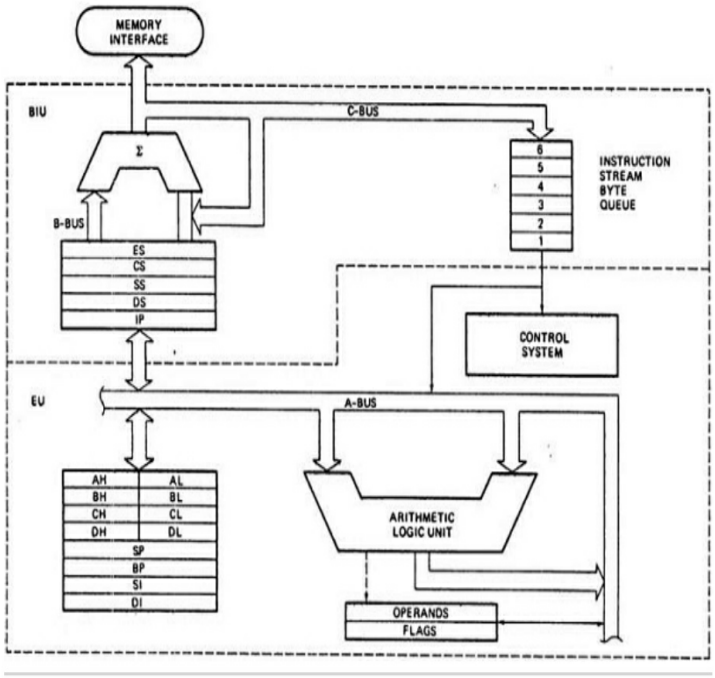

8086 Microprocessor is divided into two functional units, i.e., EU (Execution Unit) and BIU (Bus Interface Unit).

EU (Execution Unit)

Execution unit gives instructions to BIU stating from where to fetch the data and then decode and execute those instructions. Its function is to control operations on data using the instruction

decoder & ALU. EU has no direct connection with system buses as shown in the above figure, it performs operations over data through BIU.

Let us now discuss the functional parts of 8086 microprocessors.

ALU

It handles all arithmetic and logical operations, like +, −, ×, /, OR, AND, NOT operations.

Flag Register

It is a 16-bit register that behaves like a flip-flop, i.e. it changes its status according to the result stored in the accumulator. It has 9 flags and they are divided into 2 groups – Conditional Flags and Control Flags.

Conditional Flags

It represents the result of the last arithmetic or logical instruction executed. Following is the list of conditional flags –

Carry flag – This flag indicates an overflow condition for arithmetic

operations.

Auxiliary flag – When an operation is performed at ALU, it results in a carry/barrow from lower nibble (i.e. D0 – D3) to upper nibble (i.e. D4 – D7), then this flag is set, i.e. carry given by D3 bit to D4 is AF flag. The processor uses this flag to perform binary to BCD conversion.

Parity flag – This flag is used to indicate the parity of the result, i.e. when the lower order 8-bits of the result contains even number of 1’s, then the Parity Flag is set. For odd number of 1’s, the Parity

Flag is reset.

Zero flag – This flag is set to 1 when the result of arithmetic or logical operation is zero else it is set to 0.

Sign flag – This flag holds the sign of the result, i.e. when the result of the operation is negative, then the sign flag is set to 1 else set to 0.

Overflow flag – This flag represents the result when the system capacity is exceeded.

Control Flags

Control flags controls the operations of the execution unit. Following is the list of control flags −

Trap flag − It is used for single step control and allows the user to execute one instruction at a time for debugging. If it is set, then the program can be run in a single step mode.

Interrupt flag − It is an interrupt enable/disable flag, i.e. used to

allow/prohibit the interruption of a program. It is set to 1 for interrupt enabled condition and set to 0 for interrupt disabled condition.

Direction flag – It is used in string operation. As the name suggests when it is set then string bytes are accessed from the higher memory address to the lower memory address and vice-a-versa

General purpose register

There are 8 general purpose registers, i.e., AH, AL, BH, BL, CH, CL, DH, and DL. These registers can be used individually

to store 8-bit data and can be used in pairs to store 16bit data. The valid register pairs are AH and AL, BH and BL, CH and CL, and DH and DL. It is referred to the AX, BX, CX, and DX respectively.

AX register − It is also known as accumulator register. It is used to store operands for arithmetic operations.

BX register − It is used as a base register. It is used to store the starting base address of the memory area within the data segment.

CX register − It is referred to as counter.

It is used in loop instruction to store the loop counter.

DX register – This register is used to hold I/O port address for I/O instruction.

Stack pointer register

It is a 16-bit register, which holds the address from the start of the segment to the memory location, where a word was most recently stored on the stack.

Thank you