A REVIEW ON

Vishal Phaugat , Rohit Thakran , Vikas Yadav
Electronics And Communication Department, Dronacharya College Of Engineering, Gurgaon, Haryana, India

***Abstract-* The evolution of the microprocessor depends on the changes happen in technology. A microprocessor is a clock driven programmable register based device. It evolved from the inventions of the transistors and integrated circuits. The importance of the microprocessor today is very well known, but in 1971 when it got invented the everyday life use of it is vision beyond even those who have created it. While technology produces increasingly complex processor implementation, there are physical and programmable behaviour limits to the usefulness of this complexity. Physical limit include device limit and program limits include execution limits. Implementation that produces these limits is necessary to continue the evolution of the microprocessor. This paper presents the architecture techniques used in the family of processors.**

I. INTRODUCTION

Computer: It is electronics programmable logic system. Which consists of CPU memory and I/O interfaces in which with the help of memory and I/O interfaces CPU executes the program to perform basic various arithmetic and logical operation and digital data world to meet specific task.

Microprocessor: An integrated circuit that contain all the function of CPU of computer. The microprocessors have always been designed for their performance and cost keeping in mind. Gordon Moore who was the founder of Intel Corporation predicted that the number of transistors on a chip will almost be double once in every two year to meet this ever growing demand which is popularly known as Moore's Law in the semiconductor industry. In present days the integrated circuit processing technology increasing integration density which has

made it possible to integrate one billion transistors on a single chip for the improved performance. The microprocessors which evolved from the invention of transistors and integrated circuits are today an icon of the today change. From fastest computers to the simplest toys, the microprocessor continues to find new application. Everyone who works in the computer industry is well familiar with Moore's Law and the doubling of the number of transistors (an approximate measure of computer processing power) every 18 to 24 months. Until recently, overall microprocessor performance was often described in terms of processor clockspeeds, expressed in megahertz (MHz) or gigahertz (GHz).Today there's far more than clock speed to consider when you're evaluating how a given processor will perform for a given application and where it fits on the performance scale.

Microprocessor designers today are more focused on methods that leverage the latest silicon production processes and designs that minimize microprocessor footprint size, power consumption and heat generation. In advanced fabrication chip techniques there is big problem of bottleneck, power dissipation issues. From studied on it we can say that the transistor leakage current increases as the chip size reduced further and it will increases the static power dissipation to large values as shown in figure1 below. There is one change means to improve the performance and is to increase the frequency of operation which makes it fast execution of programs. As we increases the frequency beyond this limit it will increases power dissipation again.

The microprocessor has always pushed the technology of the today. The desire of ever increasing performance has led to the rapid improvement of the technology that have enabled more complex microprocessors. Advances in IC fabrication processes, computer architecture, and design methodology, have all been required to create the microprocessor of today. Some microprocessor designs of the past have been overly complex and have relied on out-of-order logic to reshuffle and optimize software instructions. Going forward, microprocessor designers will continue to deliver better and better software tools, higher software optimization and better compilers. Because it is so efficient and so small and doesn't depend on out-of-order logic. The most successful microprocessor implementations depend not simply on the use of the current state of the art in hardware algorithms, but more importantly in bringing together the knowledge of these algorithms together with projected advances in the technology and user state of the art.

II. THE HISTORY OF MICROPROCESSOR

The history of the microprocessor begins with the birth of the Intel 4004 the first commercially available microprocessor. It evolved from the inventions of the transistors and integrated circuits.
In 1968, Intel Corporation was founded to exploit the semiconductor memory market, which uniquely fulfilled these criteria. Early semiconductor RAMs, ROMs, and shift registers were welcomed wherever small memories were needed, especially in calculators and CRT terminals, In 1969, Intel engineers began to study ways of integrating and partitioning the control logic functions of these systems into LSI chips.
Intel embarked on the design of two customer-sponsored microprocessors, the 4004 for a calculator and the 8008 for a CRT terminal. The 4004, in particular, replaced what would otherwise have been six customized chips, usable by only one customer, Because the first microcomputer applications were known, tangible, and easy to understand, instruction sets and architectures were defined in a matter of weeks. Since they were programmable computers, their uses could be extended indefinitely. Both of these first microprocessors were complete CPUs-on-a-chip and had similar characteristics. But because the 4004 was designed for serial BCD arithmetic while the 8008 was made for 8-bit character handling, their instruction sets were quite different. The succeeding years saw the evolutionary process that eventually led to the 8086. Table 1 summarizes the progression of features that took place during these years.

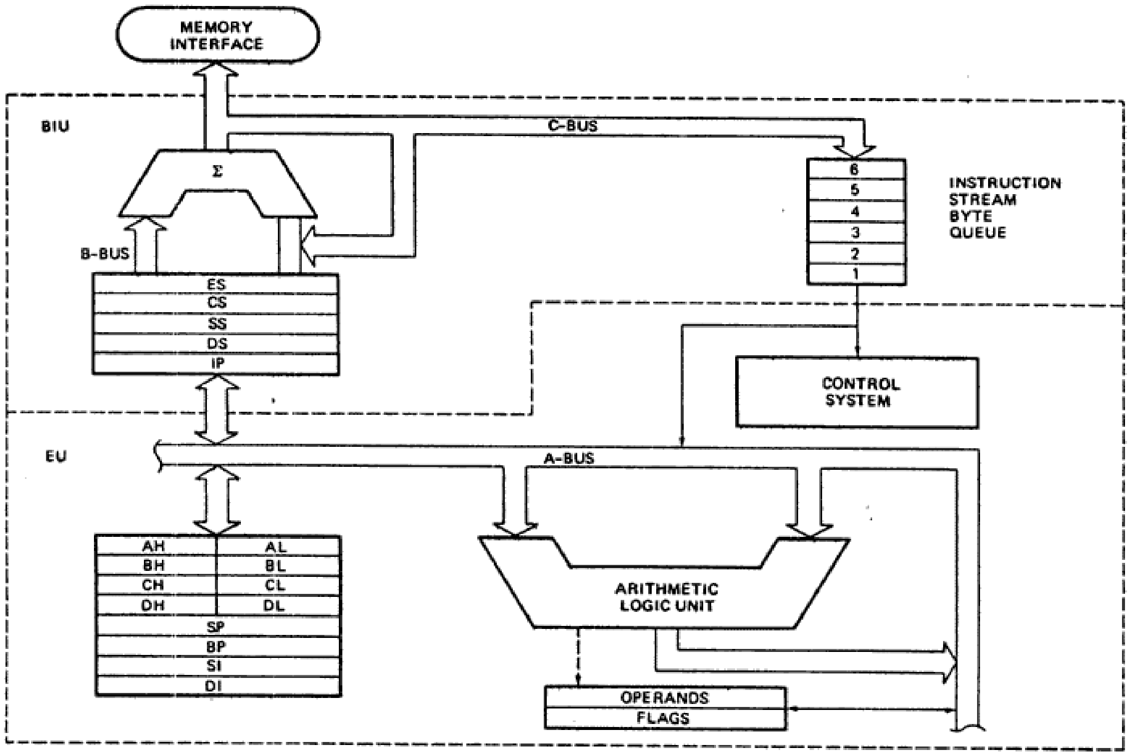
Table 1 Feature Comparison

	8008	8080	8085	8086
Number of instructions	66	111	113	133
Number of flags	4	5	5	9
Maximum memory size	16K bytes	64K bytes	64K bytes	1 M bytes
I/O ports	8 input 24 output	256 input 256 output	256 input 256 output	64K input 64K output
Number of pins	18	40	40	40
Address bus width	8†	16	16	16†
Data bus width	8†	8	8	16†
Data types	8-bit unsigned	8-bit unsigned 16-bit unsigned (limited) Packed BCD (limited)	8-bit unsigned 16-bit unsigned (limited) Packed BCD (limited)	8-bit unsigned 8-bit signed 16-bit unsigned 16-bit signed Packed BCD Unpacked BCD
Addressing modes	Register ‡ Immediate	Memory direct (limited) Memory indirect (limited) Register ‡ Immediate	Memory direct (limited) Memory indirect (limited) Register ‡ Immediate	Memory direct Memory indirect Register Immediate Indexing
Introduction date	1972	1974	1976	1978

Address and data bus multiplexed.Memory can be addressed as a special case by using register M.

ARCHITECTURE OF 8085 MICROPROCESSOR

ARCHITECTURE OF 8086 MICROPROCESSOR

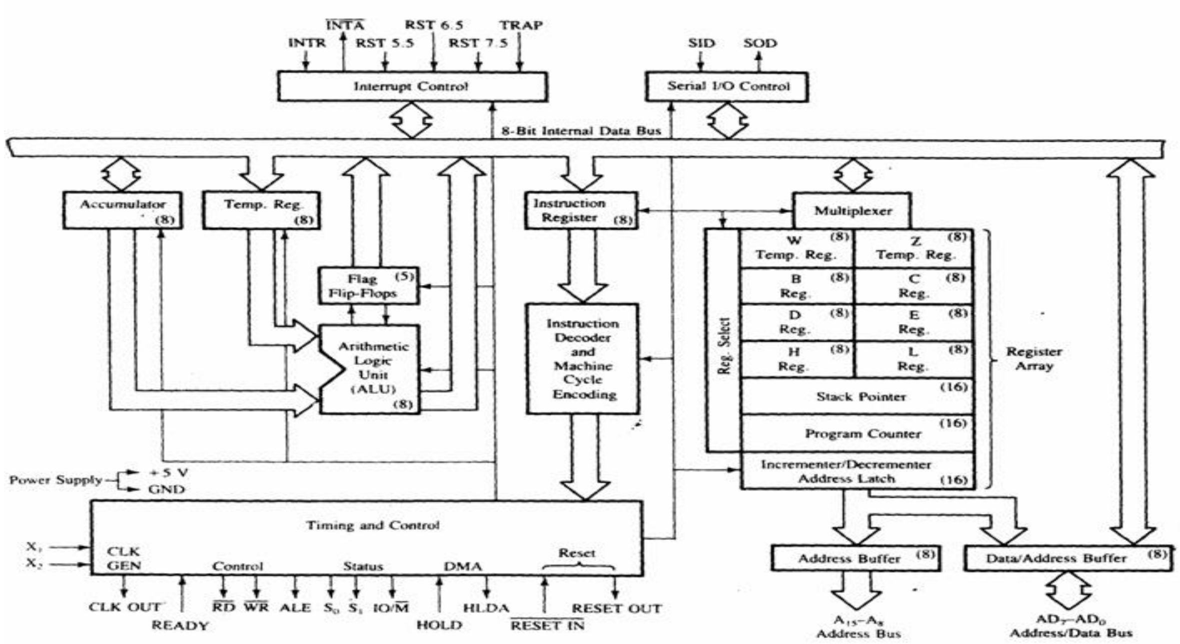


III. CONTROL UNIT

Control unit is a very important unit as it synchronizes the registers and flow of data through various registers and other units. This unit consists of an oscillator and controller sequencer which sends control signals needed for internal and external control of data and other units.

IV. ARITHMETIC AND LOGIC UNIT

There is always a need to perform arithmetic operations like +, -, *, / and to perform logical operations like AND, OR, NOT etc. So there is a necessity for creating a separate unit which can perform such types of operations. These operations are performed by the Arithmetic and Logic Unit (ALU). But these operations cannot be performed unless we have an input (or) data on which the desired operation is to be performed. So from



where do these inputs reach the ALU? For this purpose accumulator is used. ALU gets its Input from accumulator and temporary register. After processing the necessary operations, the result is stored back in accumulator.

V. ACCUMULATOR

The accumulator is also called an 8-bit register. The accumulator is connected to Internal Data bus and ALU (arithmetic and logic unit). The accumulator can be used to send or receive data from the Internal Data bus. The data to be processed by arithmetic and logic unit is stored in accumulator.

VI. REGISTERS

The 8085/8080A-programming model includes six registers, one accumulator, and one flag register, as shown in Figure. In addition, it has two 16-bit registers: the stack pointer and the program counter. They are described briefly as follows. The 8085/8080A has six general-purpose registers to store 8-bit data; these are identified as B,C,D,E,H, and L as shown in the figure. They can be combined as register pairs - BC, DE, and HL - to perform some 16-bit operations. The programmer can use these registers to store or copy data into the registers by using data copy instructions.

VII. FLAGS

Flags are nothing but a group of individual flip flops. The flags are mainly associated with arithmetic and logic operations. The flags will show either a logical (0 or 1) (i.e.) a set or reset depending on the data conditions in accumulator or various other registers. A flag is actually a latch which can hold some bits of information. It alerts the processor that some event has taken place. Intel processors have a set of 5 flags.

- Carry flag
- Parity flag
- Auxiliary carry flag
- Zero flag
- Sign flag

VIII. PROGRAM COUNTER

This 16-bit register deals with sequencing the execution of instructions. This register is a memory pointer. Memory locations have 16-bit addresses, and that is why this is a16-bit register. The microprocessor uses this register to sequence the execution of the instructions. The function of the program counter is to point to the memory address from which the next byte is to be fetched. When a byte (machine code) is being fetched, the program counter is incremented by one to point to the next memory location.

IX. STACK POINTER

Stack pointer maintains the address of the last byte that is entered into stack. Each time when the data is loaded into stack, Stack pointer gets decremented. Conversely it is incremented when data is retrieved from stack.

X. INSTRUCTION REGISTER AND DECODER

Instruction register is 8-bit register just like every other register of microprocessor. Consider an instruction. The instruction may be anything like adding two data's, moving a data, copying a data etc. When such an instruction is fetched from memory, it is directed to Instruction register. So the instruction registers are specifically to store the instructions that are fetched from memory. There is an Instruction decoder which decodes the information present in the Instruction register for further processing.

XI. GENERAL PURPOSE REGISTER

µP requires extra registers for versatility. Can be used to store additional data during a program. More complex processors may have a variety of differently named registers. Microprogramming how does the up know what an instruction means, especially when it is only a binary number? The micro program in a µP/µC is written by the chip designer and tells the µP/µC the meaning of each instruction µP/µC can then carry out operation.

SPECIFICATION OF 8085 AND 8086 MICROPROCESSOR:

8085[8 bit]:

- Clock rate 3MHz
- 0.37 MIPS
- Bus Width 8 bits data, 16 bits address
- Depletion load NMOS logic
- Number of Transistors 6,500 at 3 µm
- Binary compatible downwards with the 8080.
- Used in Toledo scales. Also was used as a computer peripheral controller – modems, hard disks, printers, etc.
- CMOS 80C85 in Mars Sojourner, Radio Shack
Model 100 portable.

- High level of integration, operating for the first time on a single 5-volt power supply, from 12 volts previously. Also featured serial I/O, 3 maskable interrupts, 1 non-maskable interrupt, 1 externally expandable interrupt w/[8259], status,DMA.
- MCS-85 family contains processors and peripherals

8086[16 bit]

- Introduced June 8, 1978
- Clock rates:

5 MHz with 0.33 MIPS
8 MHz with 0.66 MIPS
10 MHz with 0.75 MIPS

- The memory is divided into odd and even banks; it accesses both banks concurrently to read 16 bits of data in one clock cycle.
- Bus Width 16 bits data, 20 bits address.
- Number of Transistors 29,000 at 3 µm
- Addressable memory 1 megabyte
- Up to 10X the performance of 8080
- Used in portable computing and in the IBMPS /2 Model 25 and Model 30. Also used in the AT&T PC6300 / Olivetti M24, a popular IBM PC compatible (predating the IBM PS/2 line).
- Used segment registers to access more than 64 KB of data at once, which many programmers complained made their work excessively difficult.

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