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An Evolutions of Microprocessor with salient Features

Vikram Kakade [1], Vaibhav Ambuskar[2], Aaditya Aagarkar[3]

PG Student [EXTC], Dept. of EXTC, PRMITR-Badnera, Amravati, Maharashtra, India[1]

UG Student [EXTC], Dept. of EXTC, PRMCEAM-Badnera, Amravati, Maharashtra, India[2]

PG Student [EEE], Dept. of EEE, PRMCEAM-Badnera, Amravati, Maharashtra, India[3]

ABSTRACT: In this paper we proposed different methodologies of Evolutions of Microprocessor. Analysed how digital computer has converted it's used more beneficiary with Evolution of different Processor generations. A digital computer is different from a general purpose calculator in that it is capable of operating according to the instructions that are stored within the computer whereas a calculator must be given instructions on a step by step basis. while The microcomputer is making an impact on every activity of mankind. It is being used in almost all control applications. For example analytical and scientific instruments, data communication, character recognition, musical instruments, household items, defence equipments, medical equipments etc.In this paper we have reviewed the evolutions and need of Microprocessor.

KEYWORDS: SSI, VLSI, PMOS, TTL.

I.INTRODUCTION

Digital computers have been categorized according to the size using the words large, medium, minicomputer and microcomputer. In the early years of development, the emphasis was on large and more powerful computers. Large and medium sized computers were designed to store complex scientific and engineering problems. These computers were accessible and affordable only to large corporations, big universities and government agencies. In the 1960s' computers were accessible & affordable only to large corporations, big universities & government agencies, In late 1960s, minicomputers were available for use in a office, small collage, medium size business organization, small factory etc. As the technology has advanced from SSI to VLSI & SLSI (very large scale integration & super large scale integration) the face of the computer has changed. It has now become possible to build the control processing unit (CPU) with its related timing functions on a single chip known as microprocessor. A microprocessor combined with memory and input/output devices forms a microcomputer. As for as the computing power is concerned the 32- bit microcomputers are as powerful as traditional mainframe computers. In a very general a microcomputer is best regard as a system incorporating a CPU and assisted hardware whose purpose is to manipulate data in same fashion. This is exactly what any digital circuit designed using SSI's and MSI's will also do therefore, microcomputer should be regard as a general purpose logic device. In contrast to standard SSI's and MSI's where the manufacturer decides what the device will do, with microcomputer it is the user who decides what the device should do by asking it to execute a proper set of instructions. A microcomputer, from this point of view is merely an assembly of devices whose sole task is to ensure that the instruction desire are indeed carried out properly and to allow the microprocessor to communicate with the real world, i.e. the user environment. The power of the microcomputer lies in the fact that if the application change, the same system can still used by appropriately modifying the instruction to be executed and if necessary some changes in the hardware. In contrast, a digit circuit designed using SSI's and MSI's for same application will need to be completely redesigned if the application changes significantly.

II.EVOLUTION OF THE MICROPROCESSOR

The history of the µP development is very interesting. The firstµP was introduced in 1971 by Intel Corporation. This was the Intel 4004, a processor on a single chip. It had the capability of performing simple arithmetic and logical operations. E.g. Addition, subtraction, comparison, logical AND and OR. It also had a control unit which could perform various control functions like fetching an instruction from the memory, decoding it and generating control

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pulses to execute it. It was a 4 bit µP operating on 4 bits of data at a time. The processor was the central component in the chip set, which wascalled the MCS-4. The other components in the set were a 4001ROM, 4002 ROM and a 4003 shift register. Shortly after the 4004 appeared in the commercial market place, there is other general purpose µP were introduced. These devices were the Rockwell International 4 bit PPS-4, the Intel 8 bit 8008 and the National Semiconductor 16 bit IMP-16. Other companies had also contributed in the development of µP. The first 8 bit µP, which would perform arithmetic and logic operations on 8 bit words, was introduced in 1973, by Intel. This was 8008 that was followed by an improved version- the 8080 from the same company. The µPs introduced between 1971and 1972 were the first generator systems. They were designed using the PMOS technology. This technology provided low cost, slow speed and low output currents and was compatible with TTL.

After 1973, the second generation µPs such as Motorola 6800 and 6809, Intel 8085 and Zilog Z80 evolved. These µPs were fabricated using NMOS technology. The NMOS process offered faster speed and higher density than PMOS and was TTL compatible. The distinction between the 1st & 2nd generation devices was primarily the use of new a semiconductor technology to fabricate the chips. This new technology resulted in a significant increase in instruction execution speed & higher chip densities. After 1978, the 3rd generation microprocessors were introduced. Typical µPs are Intel 8086/80186/80286 and Motorola 68000/68010. These µPs were designed using HMOS technology. HMOS provides the following advantages over NMOS.

1) Speed power produced (SSP) of HMOS is 4 times better than that of NMOS. That is for NMOS, SSP is 4 picojoules (PJ) and for HMOS, SSP is 1 picojoules (PJ).

Speed power product = speed * power
= nanoseconds * mill watt
= picojoules

2) Circuit densities provided by HMOS are approximately twice those of NMOS. That is for NMOS. It is 4128 µm2/gate and for HMOS it is 1052.5 µm2/gate, where 1 µm = 10-6 meter. Later, Intel initialized the HMOS technology to fabricate the 8085A. Thus, Intel offers a high speed version of the 8085A called 8085AH. The third generation introduced in 1978 is typically separated by the Intel 8086 iAPX 8086 iAPX 80186, iAPX 80286 Zilog 78000, and the Motorola 68000 which are 16- bit s with minicomputer like performances. One of the most popular 16 bit µP has been introduced by Intel, which is 8088. The 8088 has the same introduction set as the 8088. However, it has only an 8 bit data bus. The 8088 is the µP used in the IBM PC and its clones.A precursor to these microprocessors was the 16-bit Texas instruments 9900 microprocessor introduced in 1976. The latest microprocessor has the word length of 32-bit. Example of 32-bit microprocessors are Intel iAPX 80386, iAPX 432, Motorola MC68020, National semiconductor NS 32032. The characteristic for few microprocessors introduced by Intel are given in the Table. This shows that power of microprocessors has increased tremendously with advancement in integrated circuit technology & microprocessor systems architecture. Very large & cute integration, VLSI allow extremely complex system consisting of as many as a million of transistors on a single chip to be realized. In 1980, the fourth generation µPs were evolved. Intel introduced the first commercial 32 bit microprocessor, Intel 432. This µP was discontinued by Intel due to some problem. Since 1985, more 32bit µPs have been introduced. These include the Motorola MC 68020/68030/68040 and Intel 80386/80486. These processors are fabricated using the low power version of HMOS technology called HCMOS, and they include an on-chip RAM called the cache memory to speed up program execution..

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III.EVOLUATION OF MAJOR μp CHARACTERISTICS

	4004	8008	8085A	8086	80386
Data	71	71	77	78	85
Lass	4-bit	8	8	16	32
Technology	PMOS	PMOS	NMOS	HMOS	CHMOS
Record size data/ must	4/8	8/8	8/8	16/16	32/32
Address capacity	4K	16K	64K	1M	4G
Clock kHz/phase	740/2	800/2	6250/2	8000/2	16000/2
Add time	10.8μ s	20 μ s	1.3 μ s	0.375 μ s	0.125 μ s
Internal reg. al/gp	1/16	1/6	1/6	1/8	1/8
Tale size	3*12	7*14	RWM	RWM	RWM
Records/ bits	150-10,5*	-9.5v	+5V	+5V	+5V
Voltages	16pin	18pin	40pin	40pin	132pin
Package size introduction	45	48	74	133	135
Transition	2300	2000	6200	29000	275000
Chip size (mil)	117*159	125*170	164*222	225*230	390*390
Manufactures	Intel	Intel	Intel	Intel	Intel

IV.REGISTER STRUCTRE OF 8085

8085 microprocessor are typical and are described below:

(i) Accumulator (Acc) or Result Register

This is an 8-bit register used in various arithmetic and logical operations. Out of the two operands to be operated upon, one comes from accumulator (Acc), whilst the other one may be in another internal register or may be brought in by the data bus from the main memory. Upon completion of the arithmetic/logical operation, the result is placed in the accumulator (replacing the earlier operand). Because of the later function, this register is also called as result register.

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(*ii*) *General Purpose Registers or Scratch Pad Memory*
There are six general purpose 8-bit registers that can be used by the programmer for a variety of purposes. These registers, labelled as B, C, D, E, H and L, can be used individually (e.g., when operation on 8-bit data is desired) or in pairs (e.g., when a 16-bit address is to be stored). Only B-C, D-E and H-L pairs are allowed.

(*iii*) *Instruction Register* (*IR*)
This 8-bit register stores the next instruction to be executed. At the proper time this stored word (instruction) is fed to an instruction decoder which decodes it and supplied appropriate signals to the control unit. When the execution has been accomplished the new word in the instruction register is processed.

(*iv*) *Program Counter* (*PC*)
This is a 16-bit register which holds the address of the next instruction that has to be fetched from the main memory and loaded into the instruction register. The program controlling the operation is stored in the main memory and instructions are retrieved from this memory normally in order. Therefore, normally the address contained in the PC is incremented after each instruction is fetched. However, certain classes of instruction can modify the PC so that the programmer can provide for branching away from the normal program flow. Examples are
instructions in the "jump" and 'call subroutine' groups.

(*v*) *Stack Pointer* (*SP*)
This is also a 16-bit register and is used by the programmer to maintain a stack in the memory while using subroutines.

(*vi*) *Status Register or Condition Flags*
A status register consisting of a few flip-flops, called as condition flags (in 8085 the number of flags is five) is used to provide indication of certain conditions that arise during arithmetic and logical operations. These are: 'zero' Flag is set if result of instruction is 0. 'sign' Set if MSB of result is 1. 'parity' Set if result has even parity. 'carry' Set if carry or borrow resulted. 'auxiliary carry' Set if instruction caused a carry out of bit 3 and into bit 4 of the resulting value. *Overview of Microprocessors* **5**

(*vii*) *Dedicated Registers*
Several other registers are incorporated in the µP for its internal operation. They cannot be accessed by the programmer and hence do not concern much a µp user.

V.CONCLUSION

From the above review we can sense the used of Evolution of Microprocessor and how it is useful in terms of function of a Microprocessor is to conduct arithmetic and logic operations. One advantage of a Microprocessor is its speed, which is measured in hertz. For instance, a Microprocessor with 3 gigahertz, shortly GHz, is capable of performing 3 billion tasks per second. Another advantage of a Microprocessor is that it can quickly move data between the various memory locations. While some drawbacks which can be a Future scope for this paper is that it might get over-heated, and the limitation it imposes on the size of data.

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