

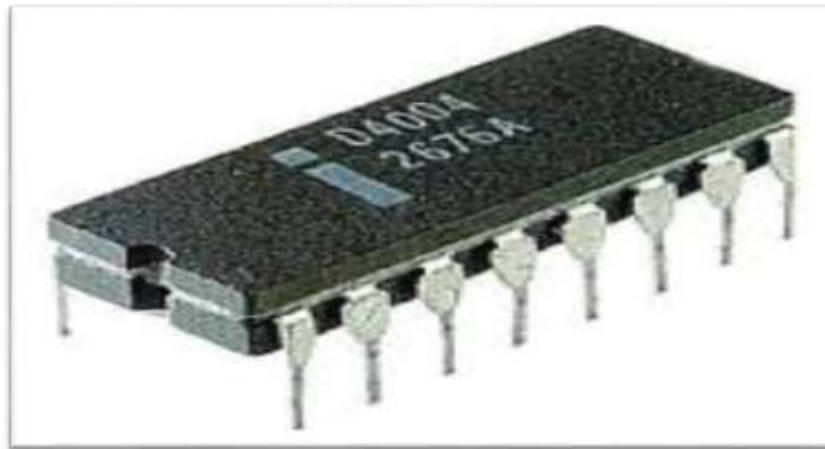


وزارة التعليم العالي والبحث العلمي  
جامعة المستقبل  
كلية الهندسة والتقنيات الهندسية

## Processor and microcomputer Lab

م.م علي كريم عبيد  
م. كوثر علي دخيل  
م.امال كريم رزاق

## Luc1:Introduction to Microprocessor



# What is microprocessor?

A microprocessor : is a programmable digital electronic component; That is, it is a chip with many pins that receives commands and executes them sequentially according to a program previously stored in an external memory chip.

- The recent microprocessor contains millions of transistors.
- These transistors are embedded on a small chip.
- This chip has all the functions of the CPU of a computer.



# Microprocessor Components

## 1. Arithmetic and logic unit :

Arithmetic and logical operations procedures (add, sub,AND,OR,...)

## 2.Control unit:

- Controls input and output operations .
- perform calculations.
- Transferring data to and from memory and to and from the processor

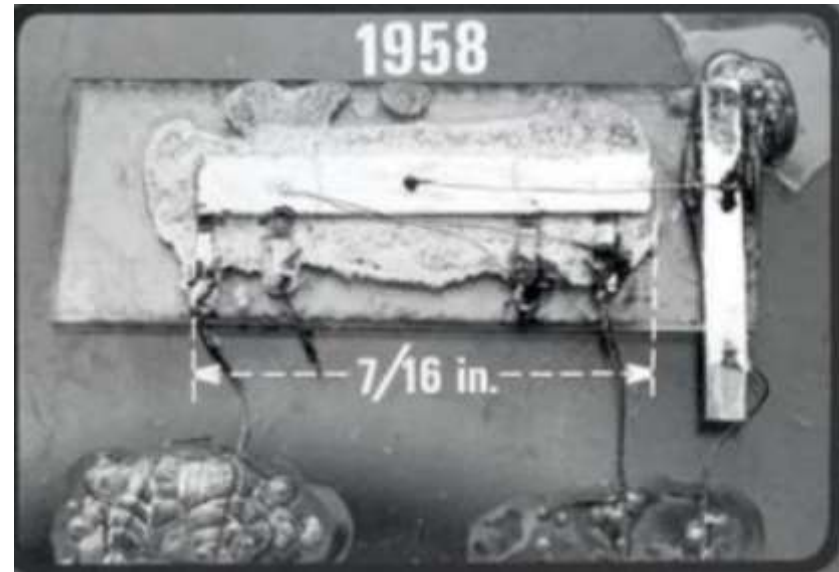
## 3.Register Unit:

It is a unit located inside the central processing unit, and it stores data or instructions in memory.

# Microprocessor Evolution

The Fairchild Semiconductors founded in 1957 which invented the first IC in 1958.

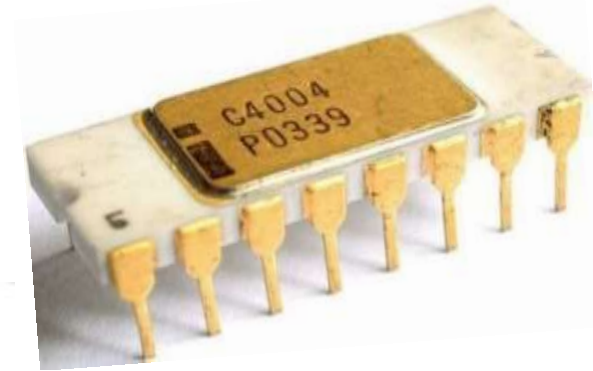
- In 1968, Robert Noyce, Gordon Moore, Andrew Grove resigned from Fairchild Semiconductors.
- They founded their own company Intel (Integrated Electronics).
- Intel grown from 3 man start-up in 1968 to industrial giant by 1981.
- Intel now had 20,000 employees and \$188 million revenue.



# Microprocessor Evolution

- The microprocessors have been developed rapidly since 1971 which created the first microprocessor 4004 with only 4-bit data bus.
- Besides, 8008 microprocessor has 8-bit data bus which found in 1972.
- Also, 8086 microprocessor represents the first 16-bit processor which has 16-bit bus for data and 20-bit for address bus. Thus, this processor could access

$$2^{20} = 1 \text{ M of n}$$



# Microprocessor Evolution

- **80386** represents the first microprocessor has **32-bit** data bus which found in **1985**.
- This processor was **used in** different **PCs** and mobile devices such as **BlackBerry 950 (1998)**, and **Nokia**.
- **Core 2 Duo** and **Core i** series such as **Core i7** and **Core i9** have **64-bit** data, and these processor starts in **2006** until now.



# 4-bit Microprocessor Family

- There are two microprocessors with 4-bit microprocessor family which are 4004, and 4040.
- There are three types for each microprocessor.
  - For instance, 4004 microprocessor has three types which are:
    - C4004 (ceramic cover without gray)
    - D4004(ceramic),and
    - P4004(plastic cover)
- There microprocessor have 4-bit data

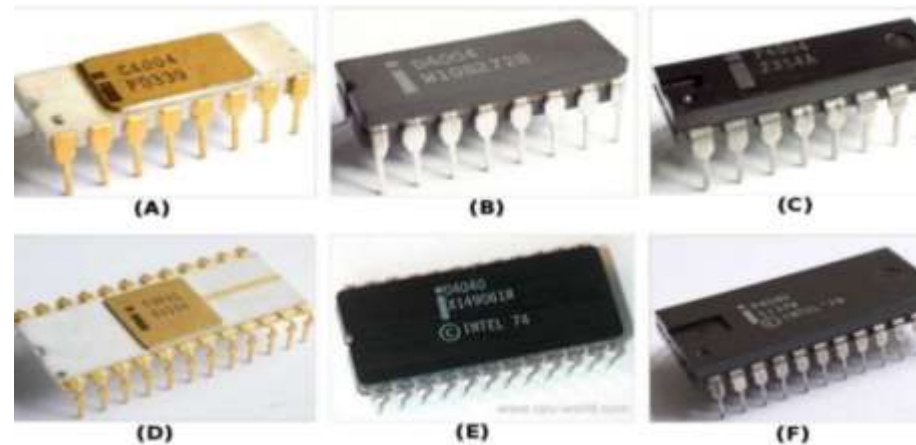


Figure 1.3: 4-bit Microprocessors: (A) C4004, (B) D4004, (C) P4040, (D) C4040, (E) D4040, and (F) P4040.

#	Name	Year	Data Bit	Add. Bit	Speed	Trans.	Inst./sec	Used in
1	4004	1971-1981	4	12	740 KHz	2300	60000	First microprocessor-controlled pinball game
2	4040	1974- 1981	4	12	500 - 740 KHz	3000	62000	Intellec 4/40 microcomputer



# 8-bit Microprocessor Family

- Three microprocessors namely, **8008**, **8080** and **8085**.
- These microprocessors have **8-bit data**.

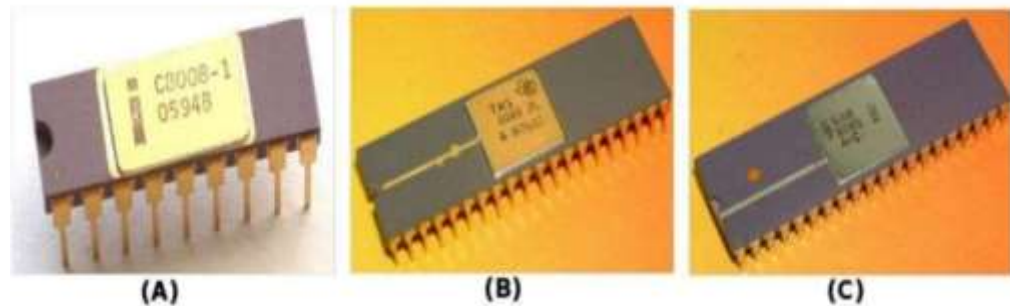


Figure 1.4: 8-bit Microprocessors: (A) 8008, (B) 8080, and (C) 8085.

#	Name	Year	Data Bit	Add. Bit	Speed	Trans.	Inst./sec	Used in
1	8008	1972-1993	8	14	200 - 800 KHz	3500	50000	IBM Selectric typewriter
2	8080	1974-1990	8	16	2 - 3.125 MHz	6000	5,00,000	Altair 8800 Computer
3	8085	1976-2000	8	16	3, 5, 6 MHz	6500	7,69,230	Computer TRS-80 Model 100 line 1983

# 16-bit Microprocessor Family

- Five microprocessors namely, 8086, 8088, 80188, 80186, 80286.
- This microprocessor have 16-bit data.

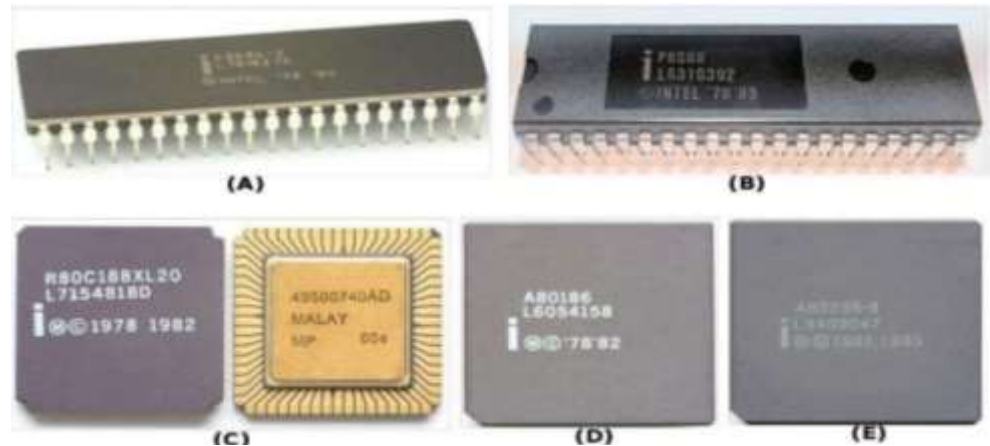


Figure 1.5: 16-bit Microprocessors: (A) 8086, (B) 8088, (C) 80188, (D) 80186, and (E) 80286.

#	Name	Year	Data Bit	Add. Bit	Speed	Trans.	Inst./sec	Used in
1	8086	1978-1998	16	20	4.77 - 10 MHz	20000	0.33 - 1 m	GriDPad tablet (1989), Toshiba T1200 laptop (1987), portable PC HP 110 (1984).
2	8088	1979-1998	8	20	4.77 - 10 MHz	29000	0.33 - 1 m	First IBM PC
3	80188 80186	1982-2007	8	20	6 - 25 MHz	55000	1 m	IBM PC
4	80286	1982-1991	16	<b>20</b>	8 MHz	134000	1 - 2.66 MIPS	IBM PC

# 32-bit Microprocessor Family

- Eleven microprocessors namely, 80386, 80486, Pentium (80586), Pentium Pro, Celeron, Pentium II, Pentium II Xeon, Pentium III, Pentium IV, Pentium D, and Pentium Dual-Core. These microprocessors have 32-bit data.



Figure 1.6: 32-bit Microprocessors: (A) 80386, (B) 80486, (C) Pentium (80586), (D) Pentium Pro, (E) Celeron, (F) Pentium II Xeon, (G) Pentium II, (H) Pentium III, (I) Pentium IV, (J) Pentium D, and (K) Pentium Dual-

#	Name	Year	Data Bit	Add. Bit	Speed	Trans.	Inst./sec
1	80386	1985 -2007	32	32	12 - 40 MHz	275000	11.4 MIPS
2	80486	1989 -2007	32	32	16-100 MHz	1.2 M	40 MIPS
3	Pentium	1993 -1997	32	32	66 MHz	3 M	188 MIPS
4	Pentium PRO	1995-1998	32	32	150 - 200 MHz	5.5 M	541 MIPS
5	Celeron	1998 -Now	32 64	32 64	266 MHz - 3.6 GHz	6.2 M - 42 M	435 MIPS
6	Pentium II	1997 -1999	32	32	233-333 MHz	7.5 M	640 MIPS
7	Pentium II XEON	1998 - Now	32	32	400-450 MHz	8.2 M	1,231 MIPS
8	Pentium III	1999 - 2003	32	32	500 MHz-1.4 GHz	9.5 M	2,054 MIPS
9	Pentium IV	2000 - 2008	32	32	1.3 - 3.8 GHz	42 M	3,058 MIPS
10	Pentium D	2005 - 2008	32	32 46	2.66 GHz - 3.73 GHz	66 M	5,634 MIPS
11	Pentium Dual Core	2006 - 2009	32 64	32 64	1.3 GHz - 3.4 GHz	73 M	2,587 MIPS

# 64-bit Microprocessor Family

- Five microprocessors namely, Core2Duo, Core i7, Core i5, Core i3, Core i9
- This microprocessor have 16-bit data.

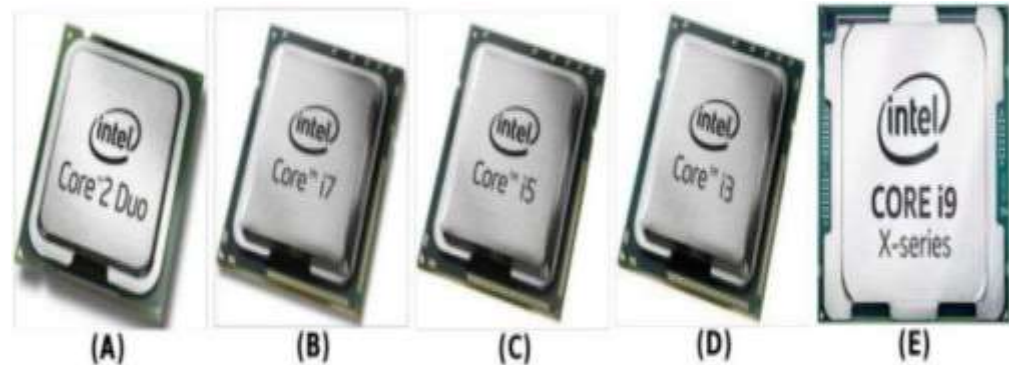


Figure 1.7: 32-bit Microprocessors: (A) Core2Duo, (B) Core i7, (C) Core i5, (D) Core i3, and (E) Core i9.

#	Name	Year	Data Bit	Add. Bit	Speed	Trans.	Inst./sec	Used in
1	Core 2 Duo	2006-2011	64	64	1.2 - 3 MHz	291 M	9.7 MIPS	PCs
2	Core I7	2008 -Now	64	64	2.66 - 3.33 GHz	781 M	147,600 MIPS	PCs
3	Core I5	2009-Now	64	64	2.40 - 3.60 GHz	672 M	83,000 MIPS	PCs
4	Core I3	2010-Now	64	64	2.93 - 3.33GHz	490 M	13,204 MIPS	PCs
5	Core i9	2017	64	64	3.3 - 5 GHz	895 M	223,400 MIPS	PCs