**Al-Mustaqbal University**
**College of Engineering and Technology**
**Department of Medical Instrumentation Techniques Engineering**
**Class: Third Class**
**Subject: Processor and Microcomputer Lab**
**Lecturer: M.Sc Ali Kareem**
**Lecture Address: MOTHERBORD**
**2024 – 2025**

# Weeks 8

Processor and Microcomputer Lab
BY M.SC. ALI KAREEM AL-JUHAISHI

.

# Luc8:Introduction to Microprocessor
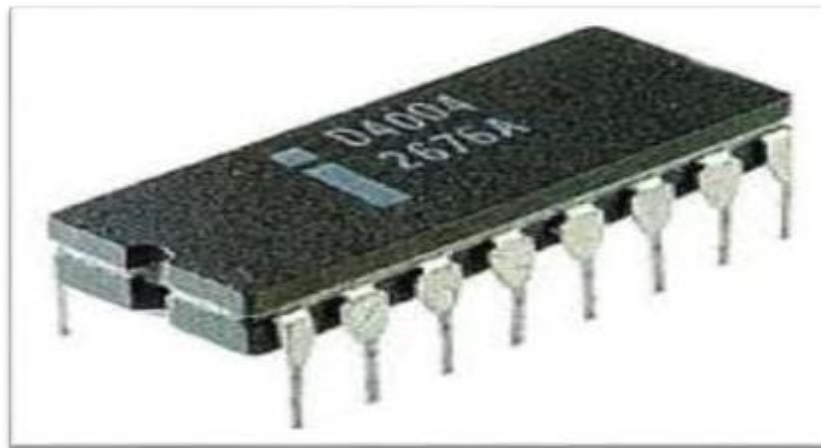
# What is microprocessor?

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 embebbed 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
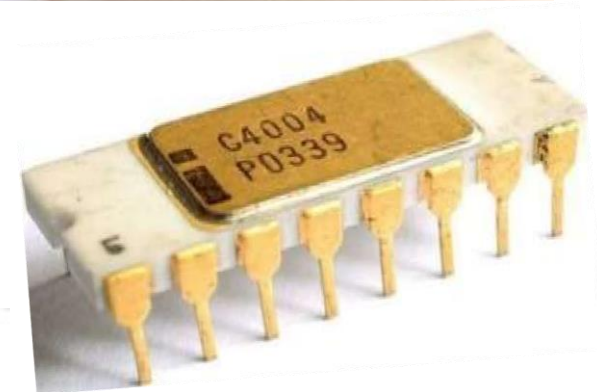
## Microprocessor Evolution

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

• In 1968, Robert Noyce, Gordan 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.
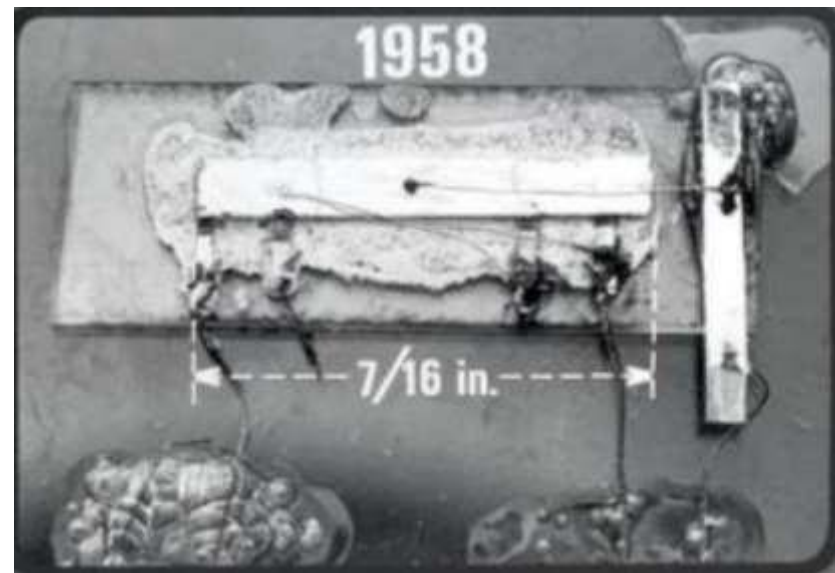
# Microprocessor Evolution

• 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 M of memory.

# 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)
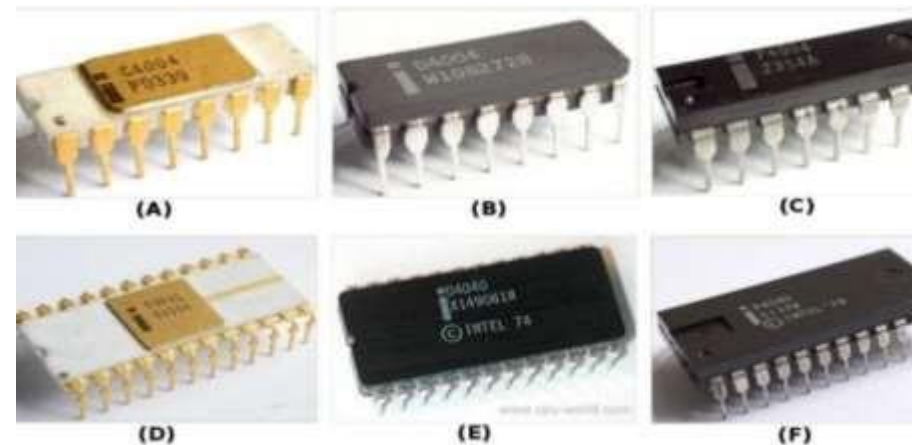
• There microprocessor have 4-bit data



Figure 1.3: 4-bit Microprocessors: (A) C4004, (B) D4004, (C) P4040, (E) 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.
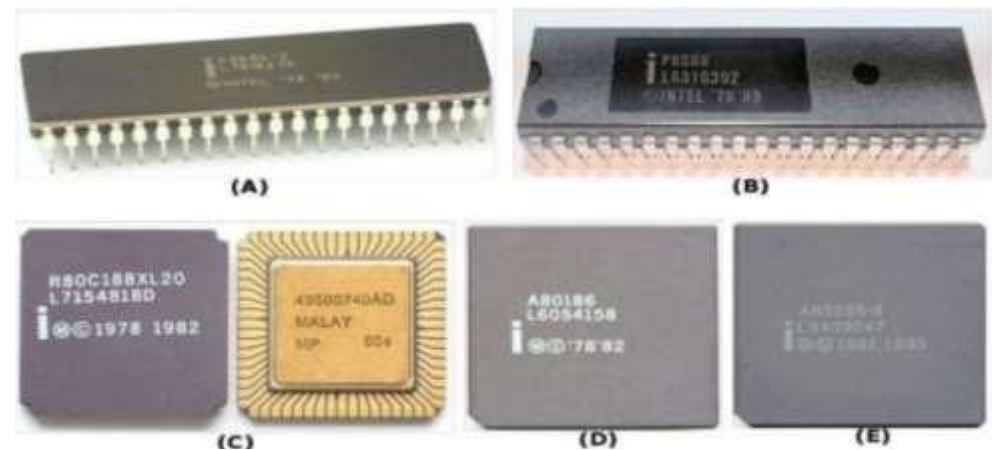
- This microprocessor have 16-bit data.



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 | 20 | 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,

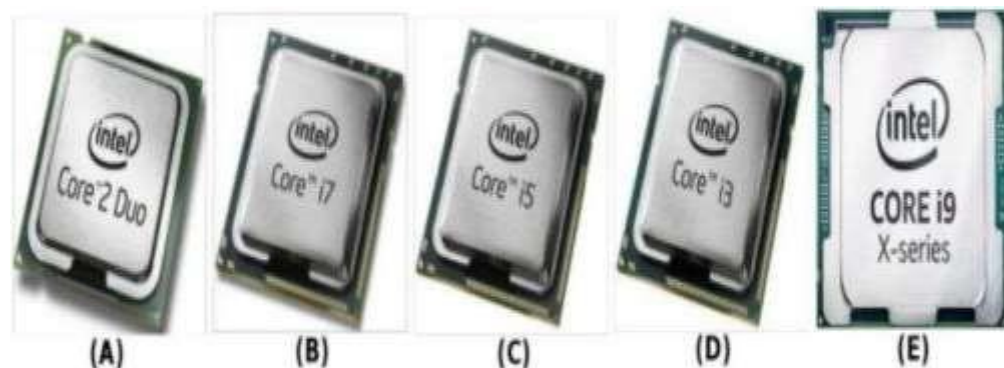Corei5,Core i3,Core i9

• 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 |