

Micro-processor → IT's general purpose processor, it have NOT contains RAM, ROM I/O PORTS and IT can't operate without adding them to it externally.

Micro-controller → IT's a single specific purpose chip, it contains CPU, and fixed amount of RAM, ROM, I/O PORTS used to control embedded systems.

embedded system → IT's a computing system with limited resources like processor, memory, I/O used to perform specific task and it have constraints on time and power and space.

Mechatronic system → system in which mechanical hardware with electronics parts and micro-controllers

n-bit processor → IT's referred to number of bits of data which can be processed by CPU simultaneously or at a time, data larger than n-bits has to be broken into n-bits pieces to be processed.

* compare

Micro-processor

- memory and I/O connected external
- cost is high
- use external bus
- Based on Von Neumann
- can run at high speed
- General purpose

micro controller

- memory and I/O internal on IT so IT small in size.
- cost is low
- use internal controlling bus.
- Based on Harvard architecture
- can run up to 200MHz or more
- specific purpose and include micro-processor inside IT.

Van-Niemann

- ONLY ONE MEMORY contains INSTRUCTIONS and DATA and only one bus
- CPU UNABLE TO ACCESS PROGRAM MEMORY AND DATA MEMORY SIMULTANEOUSLY.
- LOW PERFORMANCE
- SIMPLE DESIGN
- DOESN'T SUPPORT PIPELINE
- USED IN PCs, LAB TOPS

Harvard

- IT HAVE MORE THAN ONE MEMORY AND MORE THAN ONE BUS
- CPU CAN ACCESS PROGRAM MEMORY AND DATA MEMORY SIMULTANEOUSLY.
- HIGH PERFORMANCE
- COMPLEX DESIGN
- SUPPORT PIPELINE
- USED IN MICROCONTROLLER

Masked ROM

- CAN BE PROGRAMMED ONLY ONCE BY MANUFACTURE [OTP]
- NOT FOR USER PROGRAMMABLE ROM
- CAN USE FOR BOOT ROM CODE THAT INITIALIZE MICROCONTROLLER
- CHEAPER THAN OTHER KIND OF ROM

PROM

- PROGRAMMABLE READ ONLY MEMORY
- MANUFACTURES ALLOW USER TO PROGRAM IT ONLY ONCE [OTP]
- FOR EVERY BIT, THERE IS A FUSE
- PROM IS PROGRAMMED BY BLOWING THE FUSES

EPROM

- ERASABLE PROGRAMMABLE READ ONLY MEMORY
- CAN BE PROGRAMMED AND ERASED THOUSANDS OF TIME
- CALLED UV-EPRoM BECAUSE WE USE ULTRA VIOLET

radiation to erase it

- cannot erase particular byte so we need delete all data by UV first.

- cannot erased while it's in system board.

SRAM

- static random access memory

- Read and write memory and it's volatile memory

- high speed than DRAM

- use SRV cache memory

- expensive it have 6 transistor per cell

- doesn't need refreshing circuit

- small in size due to cost and complexity

DRAM

- dynamic random access memory

- Read and write memory

- can't accessed during refreshing

- simple design and cheaper than SRAM

- large size and slower

- used for main memory

- high power consumption

- volatile memory

why ROM is read only memory although i can write on it?

- it referred to ROM since in the normal operations, the CPU doesn't have the capability to write on it.

- it may be written by an external device at loading time using burner.

	Type	Volatile	writable	Erase size	max erase cycle	cost per byte	Speed
SRAM	yes	yes	Byte	unlimited	Expensive	Fast	
DRAM	yes	yes	Byte	unlimited	Moderate	Moderate	
Masked ROM	No	No	N/A	N/A	Cheaper	Fast	
EPROM	No	once	N/A	N/A	Moderate	Fast	
EPRoM	No	yes	Entire chip	Limited	Moderate	Fast	
EEPROM	No	yes	Byte	Limited	Expensive	Fast to Read Slow to erase and write	
FLASH	No	yes	Sector	Limited	Moderate	Fast to Read Slow to erase and write	
NVRAM	No	yes	Byte	unlimited	Expensive	Fast	