Computer memory is exactly like a human brain. In other words, we can say memory is an electronic holding section for the instructions and data which a computer demands to reach quickly. Memory is also seen as one of the primary functions of a computer because, without it, a computer would not be able to function accurately. Therefore it is a basic necessity to have good knowledge about computer memory and the types of computer memory.

Computer memory is subdivided into three types; Cache Memory, Primary memory(including RAM and ROM), and Secondary memory (including hard drive, CD, etc). In this article, we will focus on primary memory. Here RAM is for Random Access Memory and ROM is for Read-Only Memory. This article brings you the comparison between RAM and ROM, in all aspects.

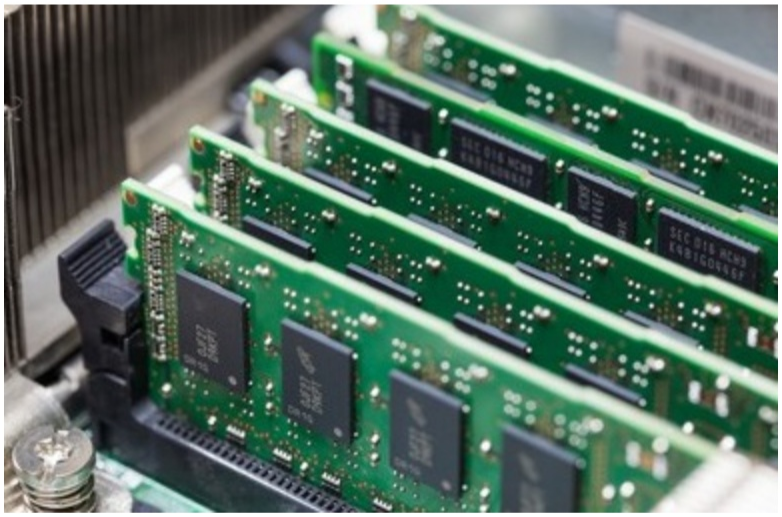
Definition: RAM and ROM

The memory is categorized into a high number of small sections called cells. Every memory location or cell consists of a unique address that varies from 0 to memory size -1. For instance, if the computer is comprised of 64k words, then this memory entity has 64 * 1024 = 65536 memory locations. The memory address of these locations differs from 0 to 65535.

Learn about the Types of Computers here.

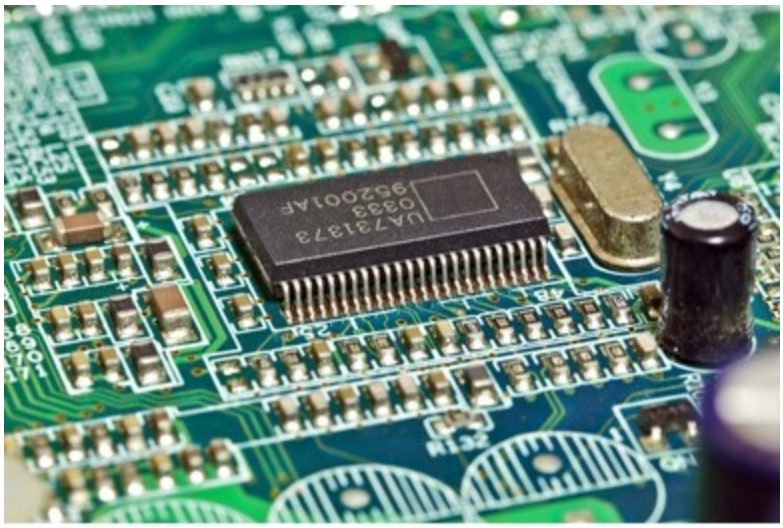
RAM

RAM (Random Access Memory) is the kind of internal memory of the CPU for holding data, program, and program results after processing. This memory is read/write memory which holds data until the machine is supplied with power. As soon as the machine is powered off, data is dumped therefore RAMsecondslatile.



ROM

ROM stands for Read-Only Memory. The memory from which the data can be read-only but rewriting it is not possible. This kind of memory is non-volatile. The data is stored permanently in such memories at the time of manufacturing. A ROM holds such instructions that are needed to turn on a computer. This process is called a bootstrap.



Difference Between RAM and ROM

RAM	ROM
RAM is defined as -Random Access Memory	ROM is defined as -Read-Only Memory
Random Access Memory (RAM) is costly if compared to ROM.	ROM is more inexpensive when compared to RAM.

Data stored in RAM can be modified, erased, retrieved and altered, and read.	Data stored in ROM can only be read, it cannot be revised or cancelled.
The data saved in RAM is utilized by the Central Processing Unit (CPU) to prepare current instructions.	The data collected in ROM is applied to bootstrap the computer/PC.
The capacity of Random Access Memory (RAM) is higher when compared to ROM.	ROM has a lesser capacity when compared to RAM.
Data saved on RAM can be reached by the Central Processing Unit. This states that the data stored is easily accessible.	For the CPU to access the data on ROM, first the data needs to be transferred to RAM, and then the Central Processing Unit can access the data. This implies the data stored is not as easily accessible as that in RAM.
Data of RAM is volatile, that is it will survive as long as there is no break in power. It can be said that RAM is a temporary memory of the computer.	Data available in Read-Only Memory (ROM) is not volatile, that is it is permanent and will remain constant even when there is a disturbance in the power supply. It can be said that ROM is the permanent memory of the computer.
It is employed as CPU Cache, Primary Memory in a computer.	It is utilized as Firmware by micro-controllers.
Types of RAM: DRAM (Dynamic Random Access Memory) SRAM (Static Random Access Memory)	Types of ROM: PROM (programmable read-only memory) EPROM (erasable programmable read-only memory) EEPROM(electrically erasable programmable ROM) Mask ROM

Know more about the Generations of Computers here.

Types of RAM

- DRAM (Dynamic Random Access Memory)
- SRAM (Static Random Access Memory)

Static RAM (SRAM)

The word static implies that the memory holds its contents as long as the electricity is being supplied and the data is dumped when the power gets down because of its volatile nature. SRAM chips are equipped with a matrix of 6-transistors and no capacitors. Transistors are not dependent on power to prevent leakage, hence SRAM need not be refreshed at a regular interval.

In the matrix, there exists an extra space, that is why SRAM consists of a high number of chips as compared to the DRAM for the same capacity of storage space, making the manufacturing costs comparatively higher. That is why SRAM is utilized as cache memory and has very fast accessing capability.

Characteristic of Static RAM

- Prolonged life.
- Not necessary to refresh.
- Faster.
- Employed as cache memory.
- Large size.
- Costly.
- Huge power consumption.

Read more about Components of Computer, here.

Dynamic RAM (DRAM)

Unlike SRAM, DRAM needs to be constantly refreshed so that the data should be maintained. This is achieved by placing the memory on a refresh circuit that rewrites the content several hundred times every second.

DRAM is installed for most system memory as it is relatively cheap and small. All DRAMs consist of memory cells, which constitute a single capacitor and a single transistor.

Characteristics of Dynamic RAM

- Small data lifetime.
- Requires to be refreshed continuously.
- Slower as compared to SRAM.
- Workes as RAM.
- Smaller in size.
- Less costly.
- Less power consumption.

Few other types of RAM are:

Synchronous Dynamic RAM (SDRAM)

SDRAM is a type of DRAM and works in sync with the CPU clock, which implies it waits for the clock signal before acknowledging the data input. It simply works in contrast to DRAM(responds instantly to data input). Mostly applied in Computer memory, video game consoles, etc.

You might also be interested in reading more about Computer Storage Devices.

Single Data Rate Synchronous Dynamic RAM (SDR SDRAM)

The ‘single data rate’ symbolises how the memory processes. It can process one read and one write instruction per clock cycle. Popularly used in Computer memory, video game consoles, etc.

Double Data Rate Synchronous Dynamic RAM (DDR SDRAM)

DDR SDRAM works similar to SDR SDRAM just twice faster than it. DDR SDRAM can process two reads and two write instructions per clock cycle. Popularly used in Computer memory. The other upgraded versions of DDR SDRAM are DDR2, DDR3 and DDR4.

Graphics Double Data Rate Synchronous Dynamic RAM (GDDR SDRAM)

GDDR SDRAM is a variety of DDR SDRAM and is specifically designed for Video graphics cards. The other upgraded version of GDDR SDRAM is GDDR2 SDRAM, GDDR3 SDRAM, GDDR4 SDRAM, and GDDR5 SDRAM.

Flash Memory

Flash memory is a sort of non-volatile storage that holds all data after power off also. popularly used in digital cameras, smartphones and tablets, hand-operated gaming systems and toys.

Also, learn about Computer Fundamentals here.

Types of ROM

- PROM (programmable read-only memory)
- EPROM (erasable programmable read-only memory)
- EEPROM(electrically erasable programmable ROM)
- Mask ROM.

Masked ROM (MROM)

The early ROMs were hard-wired instruments that consisted of a pre-programmed set of data or instructions. These types of ROMs are called masked ROMs, which are comparatively inexpensive.

Programmable Read Only Memory (PROM)

PROM is a type of read-only memory that can be amended only once by a user. The user buys an empty PROM and inputs the required data using a PROM program. It consists of the small fuses inside which are burnt open during programming. It is possible to program this memory only once and is not erasable.

Learn more about Types of Computer Network Devices, here.

Erasable & Programmable Read Only Memory (EPROM)

It is possible to erase EPROM by exposing it to ultraviolet light for a period of up to 40 minutes. Normally, an EPROM eraser performs this operation. An electrical charge is stored in an insulated gate region while programming. The charge is held for more than 10 years as there is no leakage path.

To erase this charge, ultraviolet light is passed via a quartz crystal window (lid). This process of exposure to UV light dissipates the charge. The quartz lid is hidden with a sticker during normal usage.

Electrically Erasable & Programmable Read Only Memory (EEPROM)

EEPROM can be programmed and erased using electricity. It is possible to erase and reprogram it about ten thousand times. Erasing or programming, both take about 4 to 10 ms (millisecond) time. In EEPROM, any desired location can be separately erased and programmed.

It is possible to erase EEPROMs at the rate of one byte at a time, instead of erasing the entire chip all at once. That is why the technique of reprogramming is quite flexible but slow.

Advantages of ROM

- Non-volatile.
- Cannot be randomly changed.
- More affordable than RAMs.
- Simple to test.
- More reliable than RAMs.
- Static and do not demand refreshment.

Also, check out the notes on MS-Excel, here.

We hope that the above topic on the Difference Between RAM and ROM is helpful for your exam preparations. Stay tuned to the Testbook app for more updates on similar topics from Computer Awareness, and numerous such subjects. Also, access the test series available to test your knowledge regarding various exams.

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