**Add new Webpage: Read Only Memory (ROM)**

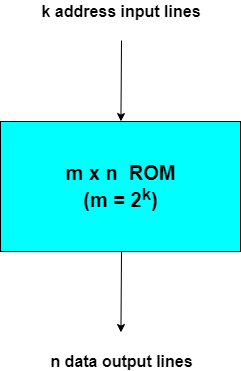
After RAM webpage

**Read Only Memory:**

As the name implies, a **read-only memory (ROM)** is a memory unit that performs the read operation only; it does not have a write capability. This implies that the binary information stored in a ROM is made permanent during the hardware production of the unit and cannot be altered by writing different words into it.

Whereas a RAM is a general-purpose device whose contents can be altered during the computational process, a ROM is restricted to reading words that are **permanently stored** within the unit. The binary information to be stored, specified by the designer, is then embedded in the unit to form the required interconnection pattern. ROMs come with special internal electronic fuses that can be “**programmed**” for a specific configuration. Once the pattern is established, it stays within the unit even when power is turned off and on again.

An **m x n** ROM is an array of binary cells organized into **m** words of **n** bits each. As shown in the block diagram below, a ROM has **k** address input lines to select one of **2k = m** words of memory, and n input lines, one for each bit of the word. An integrated circuit ROM may also have one or more enable inputs for expanding a number of packages into a ROM with larger capacity.



The ROM does not need a read-control line since at any given time, the output lines automatically provide the n bits of the word selected by the address value. Because the outputs are a function of only the present inputs (the address lines), a ROM is classified as a combinational circuit. In fact, a **ROM is constructed internally with decoders and a set of OR gates**. There is no need for providing storage capabilities as in RAM, since the values of the bits in the ROM are permanently fixed.

ROMs find a wide range of applications in the design of digital systems. As such, it can implement any combinational circuit with k inputs and n outputs. When employed in a computer system as a memory unit, the ROM is used for storing fixed programs that are not to be altered and for tables of constants that are not subject to change. ROM is also employed in the design of control units for digital computers. As such, they are used to store coded information that represents the sequence of internal control variables needed for enabling the various operations in the computer. A control unit that utilizes a ROM to store binary control information is called a microprogrammed control unit.

**Types of ROMs:**

The required paths in a ROM may be programmed in three different ways.

1. The first, **mask programming,** is done by the semiconductor company during the last fabrication process of the unit. This procedure is costly because the vendor charges the customer a special fee for custom masking the particular ROM. For this reason, mask programming is economical only if a large quantity of the same ROM configuration is to be ordered.
2. For small quantities it is more economical to use a second type of ROM called a **Programmable Read Only Memory (PROM)**. The hardware procedure for programming ROMs or PROMs is **irreversible**, and once programmed, the fixed pattern is permanent and cannot be altered. Once a bit pattern has been established, the unit must be discarded if the bit pattern is to be changed.
3. A third type of ROM available is called **Erasable PROM** or **EPROM**. The EPROM can be restructured to the initial value even though its fuses have been blown previously. Certain PROMs can be erased with electrical signals instead of ultraviolet light. These PROMs are called **Electrically Erasable PROM or EEPROM**. Flash memory is a form of EEPROM in which a block of bytes can be erased in a very short duration.

Example applications of **EEPROM** devices are:

* 1. Storing current time and date in a machine.
  2. Storing port statuses.

Example of **Flash memory device** applications are:

1. Storing messages in a mobile phone.
2. Storing photographs in a digital camera.