

## **RANDOM ACCESS MEMORY (RAM)**

A memory unit is called a Random Access Memory if any location can be accessed for a READ or WRITE operation in some fixed amount of time that is independent of the location's address. Main memory units are of this type. This distinguishes them from serial or partly serial access storage devices such as magnetic tapes and disks which are used as the secondary storage device.

### **Cache Memory:-**

The CPU of a computer can usually process instructions and data faster than they can be fetched from comparably priced main memory unit. Thus the memory cycle time become the bottleneck in the system. One way to reduce the memory access time is to use cache memory. This is a small and fast memory that is inserted between the larger, slower main memory and the CPU. This holds the currently active segments of a program and its data. Because of the locality of address references, the CPU can, most of the time, find the relevant information in the cache memory itself (cache hit) and infrequently needs access to the main memory (cache miss) with suitable size of the cache memory, cache hit rates of over 90% are possible leading to a cost-effective increase in the performance of the system.

**Memory Interleaving: -**

This technique divides the memory system into a number of memory modules and arranges addressing so that successive words in the address space are placed in different modules. When requests for memory access involve consecutive addresses, the access will be to different modules. Since parallel access to these modules is possible, the average rate of fetching words from the Main Memory can be increased.

**Virtual Memory: -**

In a virtual memory System, the address generated by the CPU is referred to as a virtual or logical address. The corresponding physical address can be different and the required mapping is implemented by a special memory control unit, often called the memory management unit. The mapping function itself may be changed during program execution according to system requirements.

Because of the distinction made between the logical (virtual) address space and the physical address space; while the former can be as large as the addressing capability of the CPU, the actual physical memory can be much smaller. Only the active portion of the virtual address space is mapped onto the physical memory and the rest of the virtual address space is mapped onto the bulk storage device used. If the addressed information is in the Main Memory (MM), it is accessed and execution proceeds. Otherwise, an exception is generated, in response to which the memory management unit transfers a contiguous block of words containing the desired word from the bulk storage unit to the MM, displacing some block that is currently inactive. If the memory is managed in such a way that, such transfers are required relatively infrequently (ie the CPU will generally find the required information in the MM), the virtual memory system can provide a reasonably good performance and succeed in creating an illusion of a large memory with a small, in expensive MM.