**Introduction to Storage Systems**

Storage systems are inevtable for modern day computing. All known computing platforms ranging from handheld devices to large super computers use storage systems for storing data temporarily or permanently. Beginning from punch card which stores a few bytes of data, storage systems have reached to multi Terabytes of capacities in comparatively less space and power consumption. This tutorial is intended to give an introduction to storage systems and components to the reader.

**Storage Definition**

 Here are a few deifintions of storage when refers to computers.

* A device capable of storing data. The term usually refers to mass storage devices, such as disk and tape drives.
* In a computer, storage is the place where data is held in an electromagnetic or optical form for access by a computer processor.
* Computer data storage; often called storage or memory refer to computer components, devices and recording media that retain digital data used for computing for some interval of time.

As we see in modern day computers, storage devices can be found in many forms. Storage devices can be classified based on many criterions. Of them, the very basic is as we learned in schools i.e.; Primary storage and Secondary storage. Storage devices can be further classified based on the memory technology that they use, based on its data volatility etc... .



## RAM Module, example for Primary Storage device

 In simple words, primary storage is the storage device that is directly connected to the CPU and store data temporarily during execution. I.e. CPU can directly access primary storage and stores instruction and data for execution/processing. The most popular example of this kind of memory is the RAM (Random Access Memory) that we use in modern day computers. CPU registers, Caches and other memories connected to the CPU local bus falls in this category. Primary storage devices are comparatively faster than all other kinds of memory types. Usually primary storage devices are considered to be directly connected to the processor. But in reality, modern computers employ components like Virtual Memory Manager, DRAM controllers etc... In between processor and the memory but the notion of 'Direct connection' is still valid since these components are transparent to the processor. Volatile memories are usually used as primary storage. The picture below shows a RAM module.

**Secondary Storage Device**

On the contrary, Secondary storage may not be directly accessible by the processor. And is usually used for more permanent storage of data. This requires secondary storage devices to be non-volatile. Secondary storage devices are connected to storage controllers and the CPU is required to talk to the controllers in order to access information from secondary devices. The most popular example of secondary device is the Hard disk. CD ROM, DVD ROM, USB mass storage devices, Floppy etc... Are also falls in this category? Secondary storage devices are also called Mass Storage Devices since the capacity of these devices are comparatively large.

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| Primary Storage | Secondary Storage |
| Volatile | Non Volatile |
| More access speed | Less access speed |
| Example: RAM | Example: Hard Disk |

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