

5.1.2 Storage Device Facts

The following table describes common storage devices:

Device Type	Description
Hard Disk Drive (HDD)	<p>A hard disk is a thick magnetic disk encased in a thicker protective shell. A hard disk consists of several aluminum platters, each of which requires a read/write head for each side. All of the read/write heads are attached to a single access arm to prevent them from moving independently. Each platter has circular tracks that cut through all of the platters in the drive to form cylinders. The spinning of the platters is referred to as revolutions per minute (RPM). The higher the revolutions per minute, the faster the data can be accessed. Standard hard drives are categorized as follow:</p> <ul style="list-style-type: none"> 5400 rpm (inexpensive HDD) 7200 rpm (good quality HDD) 10,000 rpm (expensive HDD) <p>Some of the advantages of hard disks are:</p> <ul style="list-style-type: none"> They have lots of storage (starting at 16 GB up to several TB). They are significantly faster than floppy disks. The cost per MB is cheap. <p>Some of the disadvantages of hard disks are:</p> <ul style="list-style-type: none"> Many hard disks are internal devices, though you can get external enclosures. They are prone to failure. They are vulnerable to physical damage (e.g., when dropped). <p>SCSI is a standard for transferring data between devices on internal and external computer buses. Though SCSI devices are most commonly used for tape storage devices and hard disks, they can also be used for devices such as CD-ROM drives, scanners, and printers.</p>
Solid State Drive (SSD)	<p>A solid state drive is a flash device with a storage capacity similar to a small hard drive. Solid state drives are used as replacements for hard disk drives for storing operating system, application, and data files.</p> <p>Some advantages of solid state drives:</p> <ul style="list-style-type: none"> They are faster than hard drives. They have no moving parts. They have lower power consumption than hard drives (good for laptops). They are less susceptible to physical damage (from dropping) and immune from magnetic fields. They are smaller and lighter than hard drives <p>The main disadvantage currently for solid state drives is cost. They are several times more expensive than comparable hard drives. However, their advantages make them a good choice, especially for portable devices. M.2 is a popular SSD for portable devices.</p>
Non-Volatile Memory Express (NVMe)	<p>A memory storage device designed to allow access to non-volatile storage media through a PCI express (PCIe) bus. NVMe Express is designed to work well with low latency and internal parallelism of solid-state storage devices. By allowing host hardware and software to utilize the level of parallelism possible in modern SSDs, NVMe Express reduces I/O overhead and improves functionality.</p> <p>NVMe Express devices come in three forms. The most common are standard-sized PCI Express expansion cards and a 2.5-inch form-factor devices that provide a four-lane PCI Express interface through the U.2 connector. There are also storage devices that use SATA Express and the M.2 specification, which support NVMe Express as the logical device interface.</p>
Flash Devices	<p>Flash memory cards store information using programmable, non-volatile flash memory. Some of the advantages of flash devices are:</p> <ul style="list-style-type: none"> The memory is re-programmable. They can retain content without power. They are optimal for use in devices like cameras. They are highly portable. They have a larger capacity than CDs and DVDs. They have relatively fast memory access. <p>Some of the disadvantages of flash devices are:</p> <ul style="list-style-type: none"> Their storage capacity is not yet comparable to the capacity of modern hard disks. Different memory card formats require different readers.

	<p>Common flash memory cards include:</p> <ul style="list-style-type: none"> ▪ CompactFlash cards ▪ SD cards ▪ SSD cards ▪ MiniSD cards ▪ MicroSD cards ▪ xD cards ▪ Hybrid cards (combines SSD and HDD technology) ▪ Memory sticks
Optical Disc	<p>Optical discs such as CDs, DVDs, and Blu-ray discs are a storage medium that uses lasers for both reading and writing information. Optical discs store information through pits in their reflective coating. As the disc spins, the optical drive sends laser optics to the disk and receives the stored information through the deflected output.</p> <p>Some of the advantages of optical discs are:</p> <ul style="list-style-type: none"> ▪ They are great for music and video (they play in audio or video devices that aren't computers). ▪ They are portable and universal. ▪ They are cheap. ▪ You can buy discs that are recordable. ▪ They have a long shelf life and are relatively sturdy. ▪ Blu-ray discs can store a large amount of data (25 GB or more, depending upon the format). <p>Some of the disadvantages of optical discs are:</p> <ul style="list-style-type: none"> ▪ They are slower than hard disks. ▪ They have a small capacity (650 MB for CDs, 4.7 GB for DVDs). ▪ There are some compatibility issues between disc formats and readers.
Integrated Drive Electronics (IDE)	<p>An electronic interface allows communication between a motherboard's data paths or bus and a computer's hard disks.</p>

Removable storage refers to the ability to easily connect and disconnect storage devices or storage media from a computer (as compared to internal or fixed storage). Optical discs, flash devices, eSATA drives, and tapes are examples of removable media. Hard disks and solid state drives are typically not removable media as they are installed internally in the computer.