Tishk International University
Science Faculty
IT Department

Computer Hardware

Lecture 08: Storage Devices

2nd Grade – Fall Semester

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Lecture 08: Storage Devices

Agenda

- Introduction to Storage Devices
- Magnetic Storage Devices
  - Diskettes- floppy disks (FDD)
  - Hard Disk Drive (HDD)
  - HDD Hardware Interfaces – (SATA and SCSI)
  - Zip Disk
- Optical Storage Devices
  - Types of Optical Storage Devices
- Solid State Devices (SSD)
  - Fixed SSD Types
  - Removable SSD Types

Introduction to Storage Devices

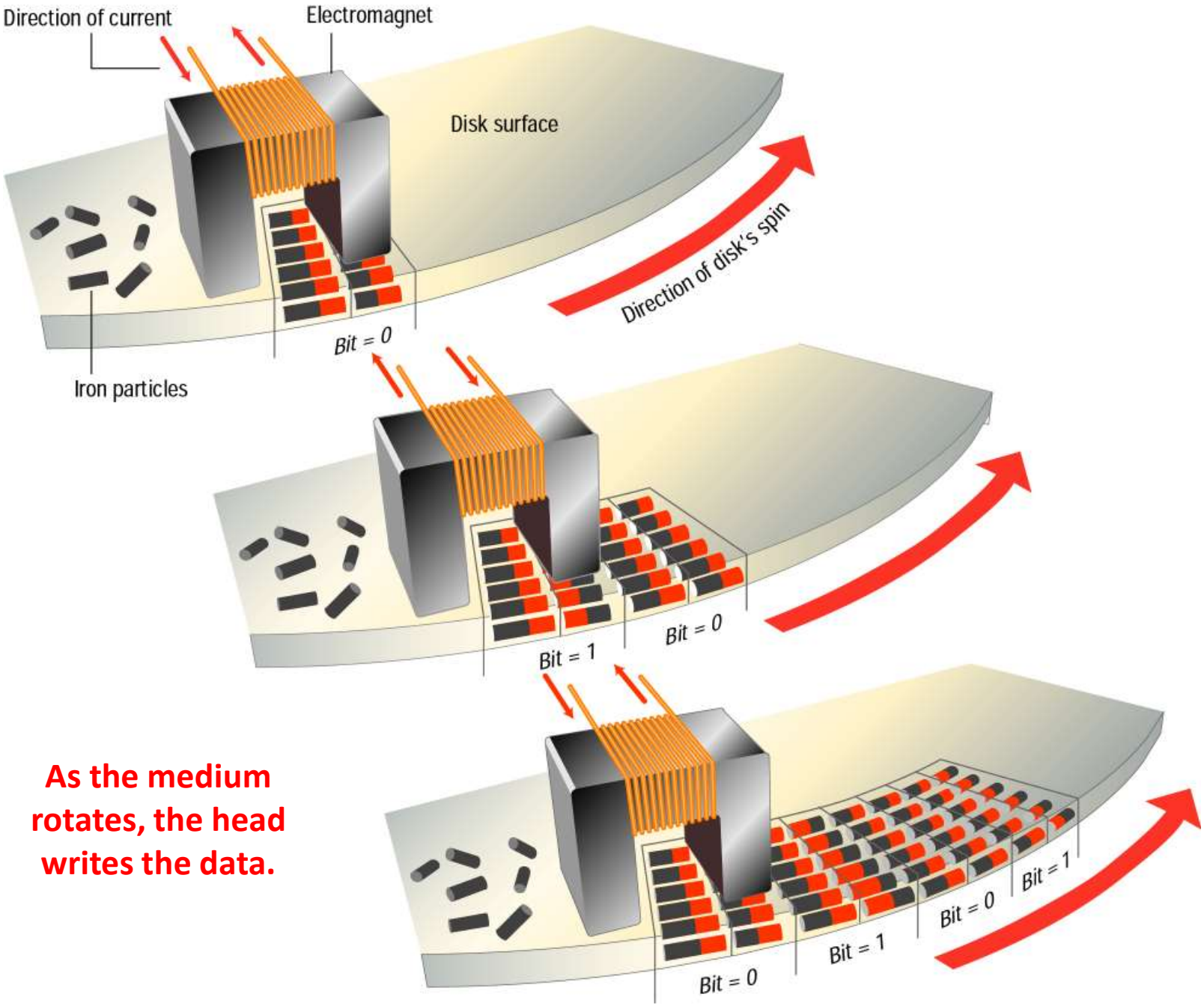
- Storage Medium: is the physical material that actually holds data, for example, the surface of a floppy disk.
- Storage Device: is the hardware that writes data or reads data from a storage medium for, example floppy disk drive.
- Storage devices hold data, even when the computer is turned off.
- There are three Main Types of Storage Devices depending on Technology used:

1. Magnetic Storage Devices
2. Optical Storage Devices
3. Solid State Devices

Magnetic Storage Devices

- A magnetic disk's medium contains iron particles, which can be polarized—given a magnetic charge—in one of two directions (north or south).
- Each particle's direction represents a 1 (on) or 0 (off), representing each bit of data that the CPU can recognize.
- The magnetic storage devices can be classified as:

1. **Diskettes- floppy disks (FDD)**
2. **Hard disks Drives (HDD)**
3. **ZIP Disk**



As the medium rotates, the head writes the data.

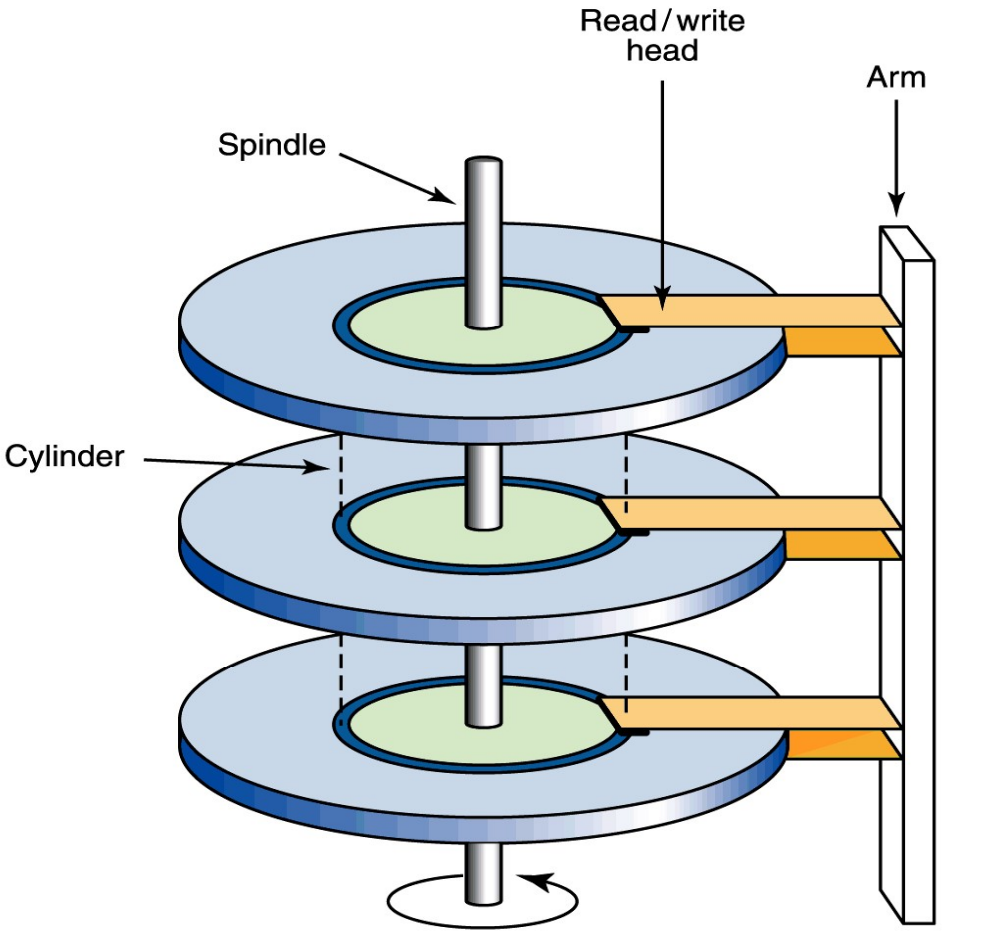
Diskettes- floppy disks (FDD)

- It was the first removable storage medium.
- It is obsolete now
- Spin at 300 RPM
- Takes 0.2 second to find data
- There are two main types of floppy disks
  - 3 ½ inch floppy disk, and
  - 5 ¼ inch floppy disk

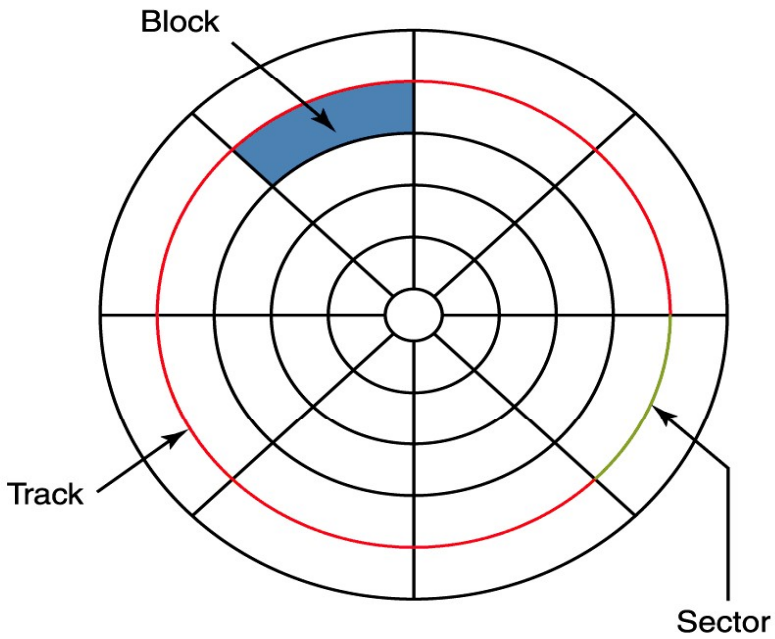
Hard Disk Drive (HDD)

- Hard Disk stores and provides relatively quick access to large amounts of data on an electromagnetically charged surface or set of surfaces.
- HDDs store most of the information in large data centers around the world
- Today's computers typically come with a hard disk that contains several Tera bytes of storage.
- A hard disk is really a set of stacked "disks," each of which, has data recorded electromagnetically in concentric circles or "tracks" on the disk.
- A "head" records or reads the information on the tracks.
- Two heads, one on each side of a disk, read or write the data as the disk spins.

HDD Structure



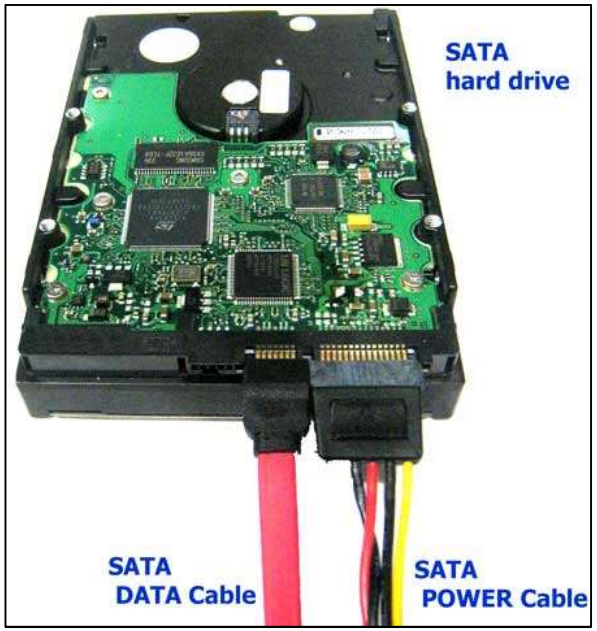
(a) A hard disc drive



(b) A single disk

HDD Hardware Interfaces - SATA

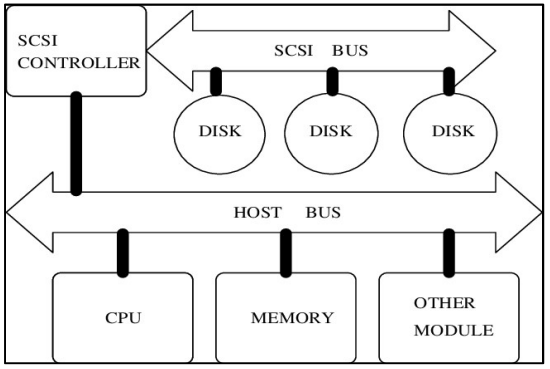
- **<u>Serial Advanced Technology Attachment (SATA).</u>**
- This interface is widely used in home and work desktops.



- **Advantages over earlier types**
  - Low costs
  - Large capacity
  - Faster transfer rates
  - Smaller cables for better heat dissipation
- **Disadvantages**
  - Not supported in older systems without the use of additional components

HDD Hardware Interfaces - SCSI

- **Small Computer System Interface (SCSI)**
- SCSI hard drives are upgrades over SATA drives.
- Also SCSI is a standard for connecting peripheral devices such as printers, scanners, and others.
- **Advantages**
  - Faster than SATA
  - Wide range of applications
  - Better scalability and flexibility in Disk Arrays
  - Better for storing and moving large amounts of data
  - Reliability
- **Disadvantages**
  - More Cost than SATA
  - SCSI is no longer used as consumer desktop.
  - There are different kinds of SCSI interfaces
  - SCSI drives are creating more noise and heat



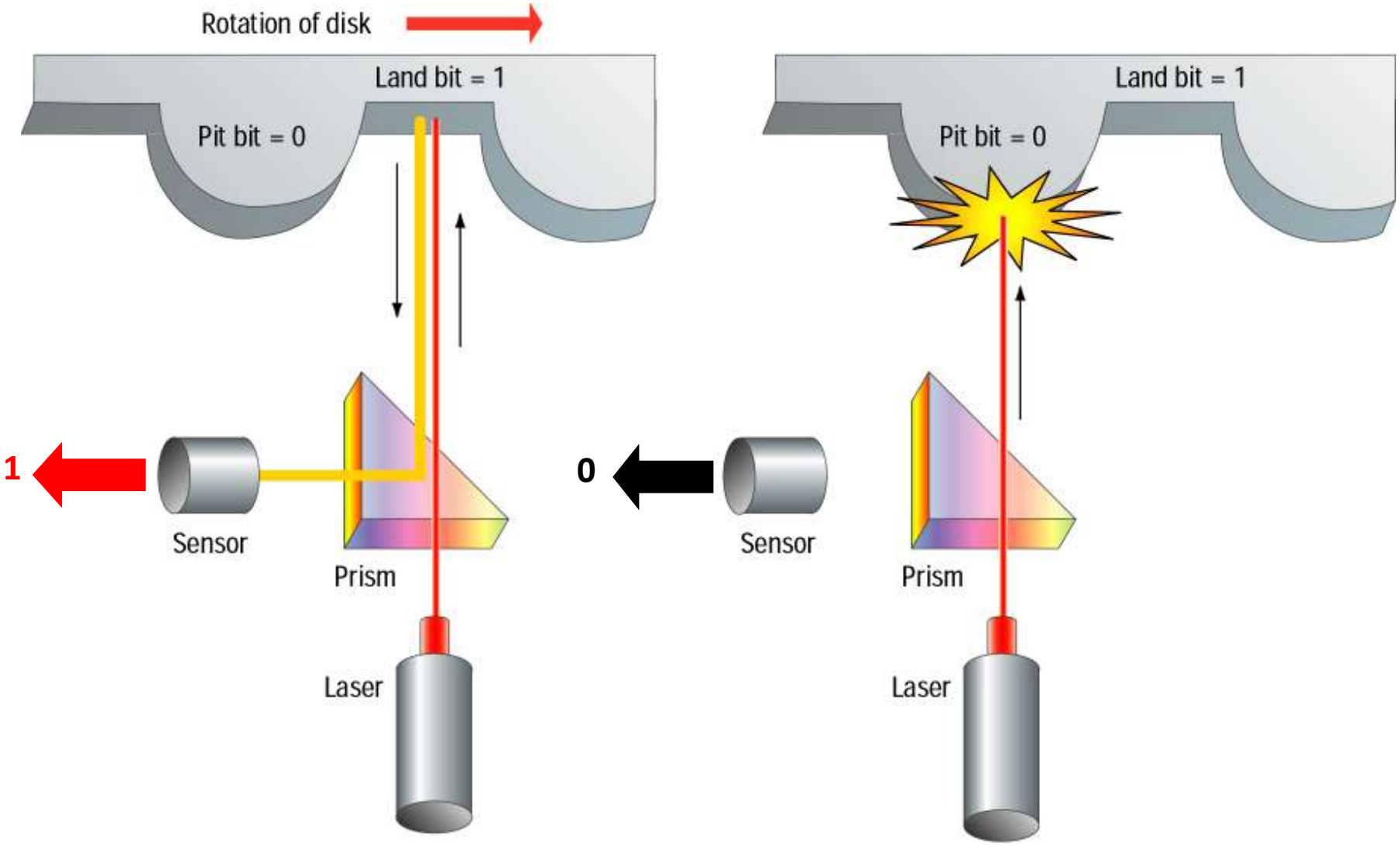
Zip Disk

- The Zip drive is a medium-to-high-capacity removable magnetic storage system
- Originally Zip disks launched with capacities of 100 MB, but later versions increased this to first 250 MB and then 750 MB.
- Normally used for backing up in data centers.

Optical Storage Devices

- In the optical storage devices, all data is saved like as patterns of dots which can be easily read with using of LIGHT.
- Laser Beam is used like as “Light Source”.
- The data is read while bouncing laser beam on the surface of storage medium. Laser beam creates the all Dots while reading process, but it is used with high power mode to mark the surface of storage device, and make a dot. This entire process is also called the “Burning” data onto Disc.

Reading From Optical Storage Device



Types of Optical Storage Devices

- **CD-ROM** stands for “Compact Disc Read Only Memory”, and CD-ROM. These types of disc can capable to store almost 800 MB of digital data.
- **DVD-ROM** stands for “Digital Versatile Disc – Read Only Memory”. DVD-ROM discs can store data up to 4.7 GB, but Dual Layer DVD device’s storage capacity is double. These types of disc are used to store ultra quality video. DVDs are compatible with older CD-ROM technology.
- **Blue Ray** discs are capable to hold data up to 25-50 GB, as well as double layer Blue Rays discs can store double data. Due to high storage capacity, Blue Ray discs are used to store HD (High Definition) videos.

Solid State Devices (SSD)

- SSDs do not depend on spinning disks or moving parts; instead, they use semiconductor chips to send and receive data. These chips are divided into pages which store the data.
- Since SSDs have no moving parts, they can run at speed far above those of a traditional HDDs.
- SSDs can be **Fixed** or **Removable**.

Advantages:

✓Provide faster data access and data transfer.

✓They do not generate noise.

Disadvantages:

✓Price – solid state drives are more expensive than HDD.

✓Recovery of data is more difficult than HDD

Fixed SSD Types

- 2.5-Inch SATA SSD: This is the most common SSD type and should be compatible with the widest range of PCs, even old ones.

- PCIe SSD: it has become a new way to increase the speed of solid-state drives (SSD) to servers and storage devices.

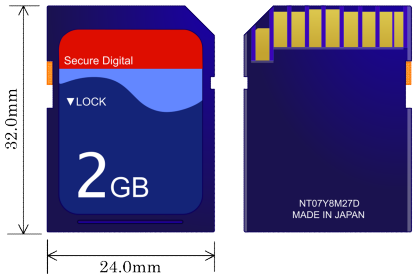
- M.2 SSD is used in internally mounted storage expansion cards normally in Laptops

Removable SSD Types

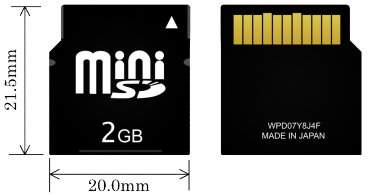
- USB Flash Drive: is also known as **USB stick** or **Pen drive**. It is light weight portable storage device, and it is used as “”Plug and Play. It can be plugged into USB port of the computer and it is capable to store most important data.

- SD card, short for **Secure Digital card**, is a type of removable memory card used to read and write large quantities of data in a wide variety of mobile electronics, cameras, smart devices, and more.
- SD card comes in different sizes:

1. Regular SD card



2. Mini-SD Card



3. Micro-SD Card: also known as TF card