CHAPTER 7

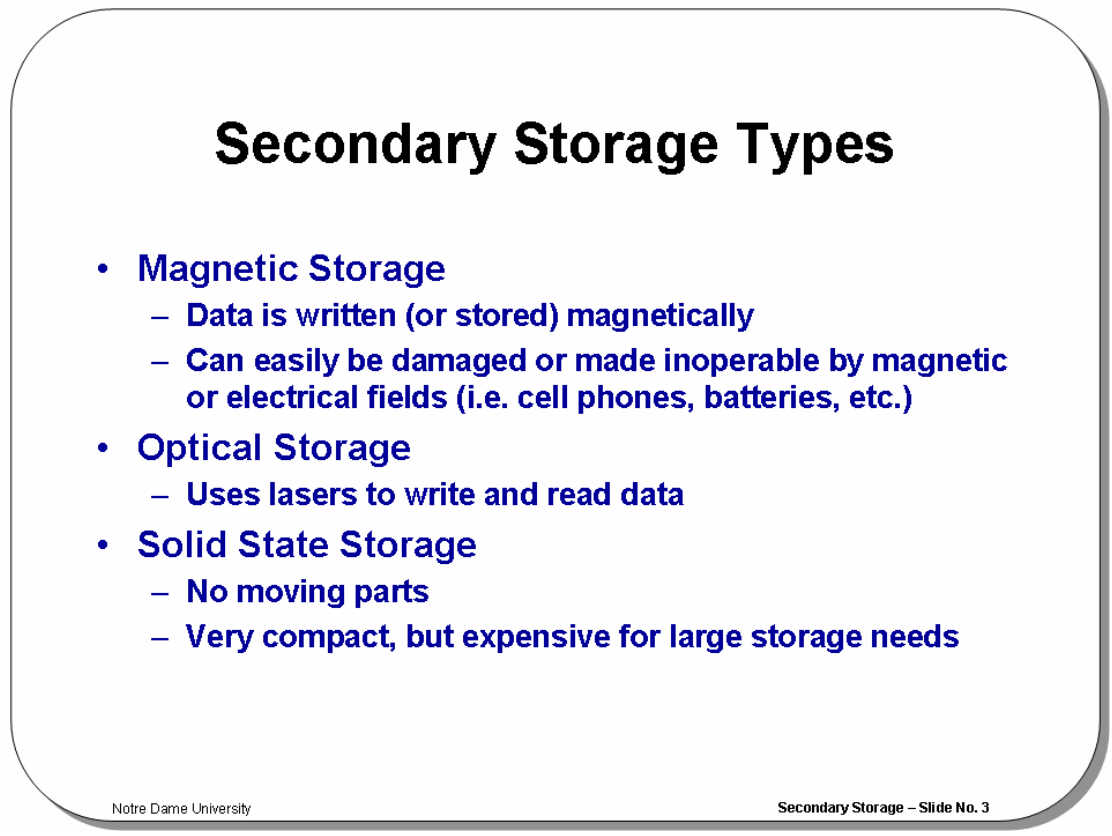
SECONDARY STORAGE

Secondary Storage Types

Learning Module Objectives

When you have completed this learning module you will have:

- Learned what differentiates secondary storage types.



Magnetic Storage Data is written to the storage media magnetically, therefore these types of storage can easily be damaged or made inoperable by magnetic or electrical fields, for example by cell phones, batteries, etc. Examples of magnetic storage include Hard Drives, Floppy Diskettes, Zip disks, etc.

Optical Storage Data is written to and read from the storage media using lasers. Examples of optical storage include CDs and DVDs.

Solid State Storage Also called Flash memory, solid state storage is a nonvolatile and very compact storage medium that employs integrated circuits (ICs) to store data. Solid state storage does not contain mechanical parts; therefore storing and retrieving data can be done significantly faster than in other storage types. For large storage needs (greater than 512 MB) however it is still quite expensive as compared to other storage types. Examples of solid state storage include USB Flash Memory, Memory Sticks, SD cards, etc.

Magnetic Disk Storage

Learning Module Objectives

When you have completed this learning module you will have:

- Seen about Diskettes.
- Seen about Internal and External Hard Disks.
- Understood Disk structure.
- Seen about Zip Disks.
- Seen about Rev Disks.
- Seen about Tape Backup.

Diskettes (Floppy Disks)

- Speed:
  - Very slow!
- Capacity:
  - Normally 1.44 Mbytes.
- Cost:
  - Very cheap.

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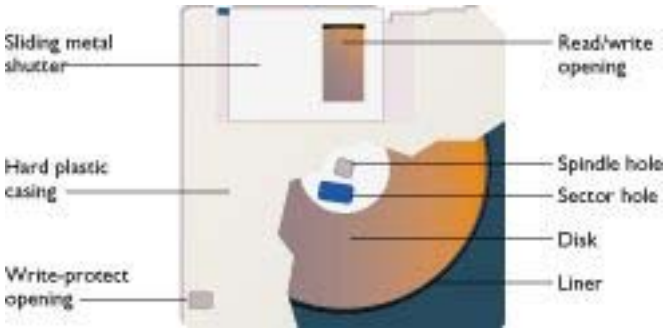
Diskettes (floppy disks)

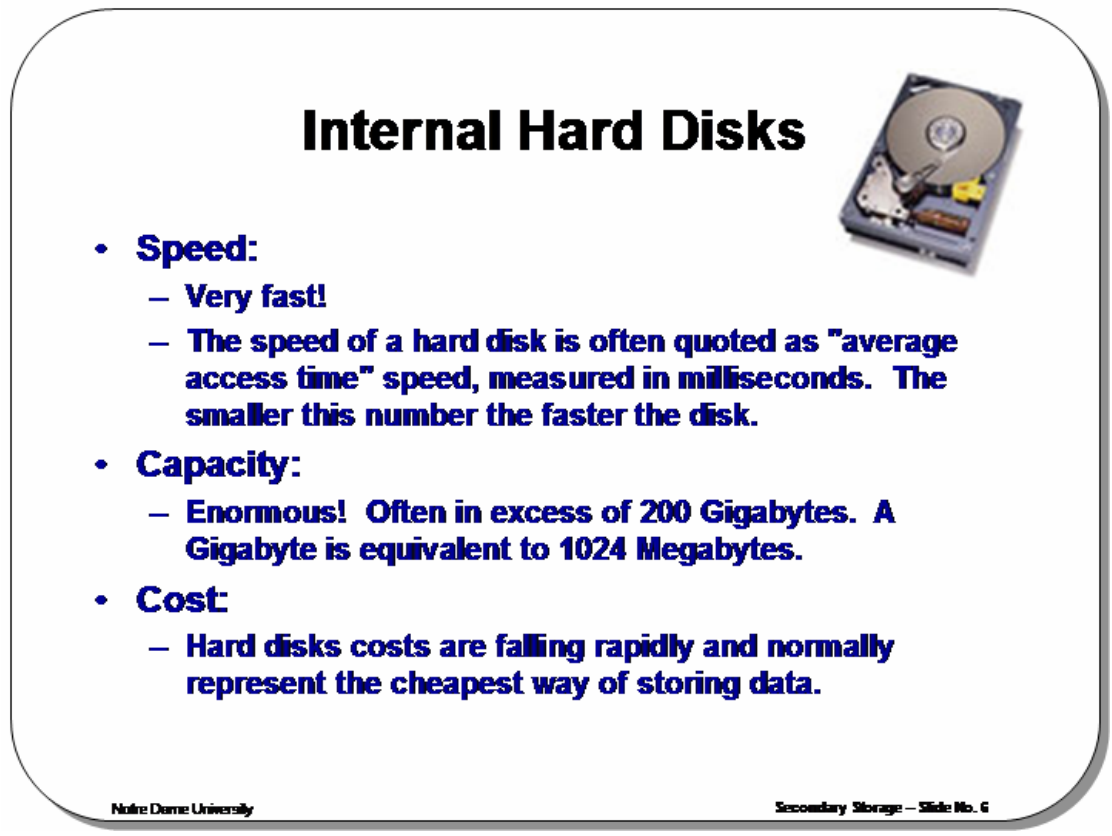
Known also as a 3.5-inch disk.

Speed: Very slow!

Capacity: Normally 1.44 Mbytes.

Cost: Very cheap.



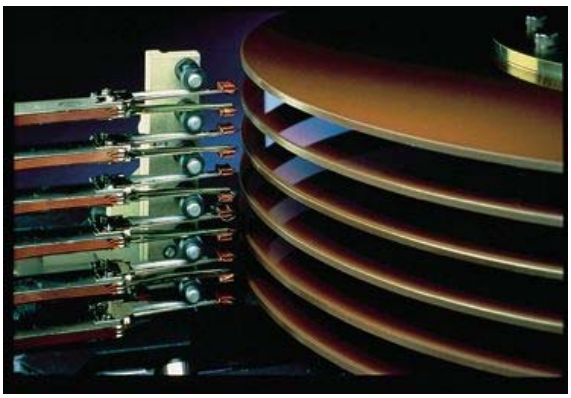


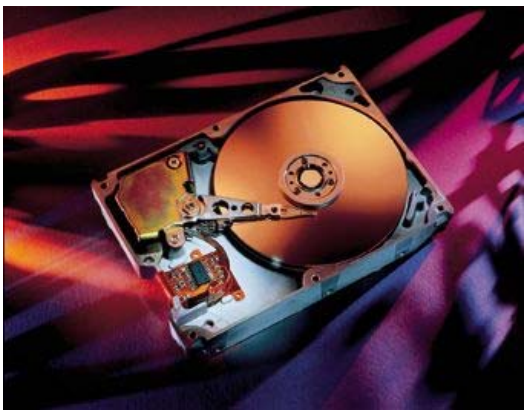
Internal hard disks

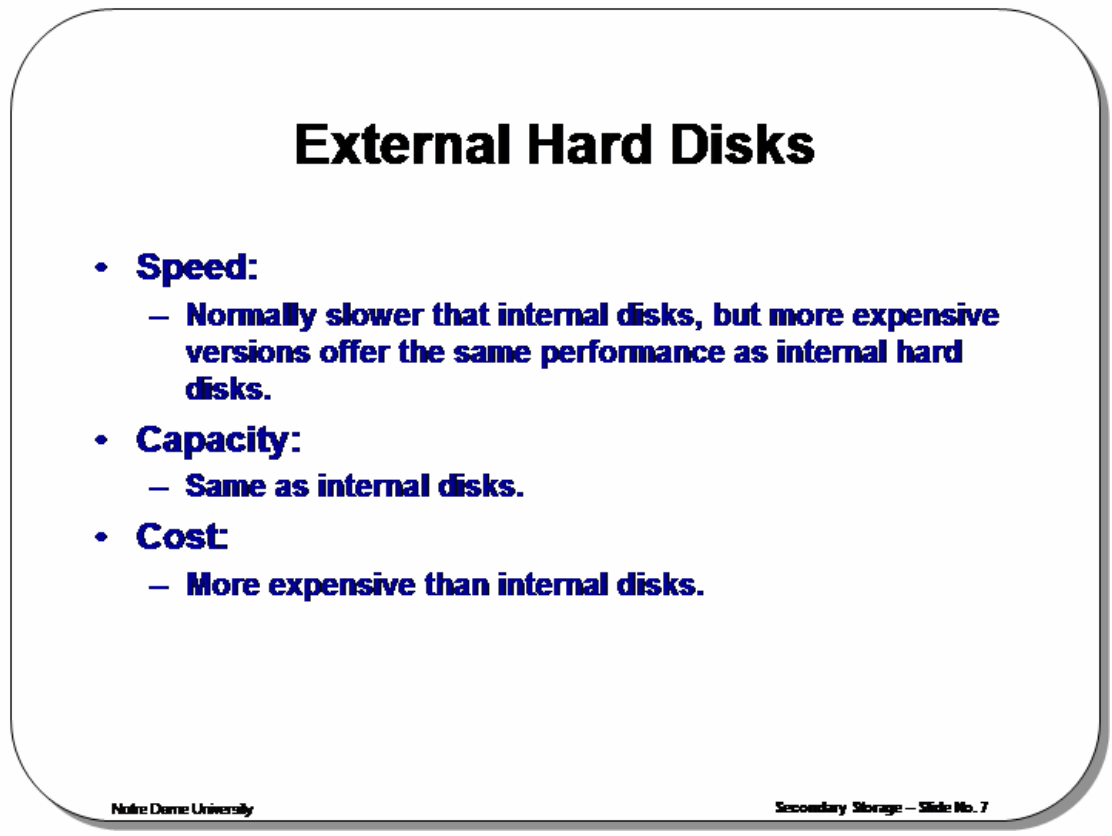
Speed: Very fast! The speed of a hard disk is often quoted as "average access time" speed, measured in milliseconds. The smaller this number the faster the disk. There are different types of disk, and commonly used types are known as EIDE and SCSI drives. SCSI is better for large network servers while EIDE drives are often better for desktop computers.

Capacity: Enormous! Often in excess of 200 Gigabytes. A Gigabyte is equivalent to 1024 Megabytes.

Cost: Hard disks costs are falling rapidly and normally represent the cheapest way of storing data.







External hard disks

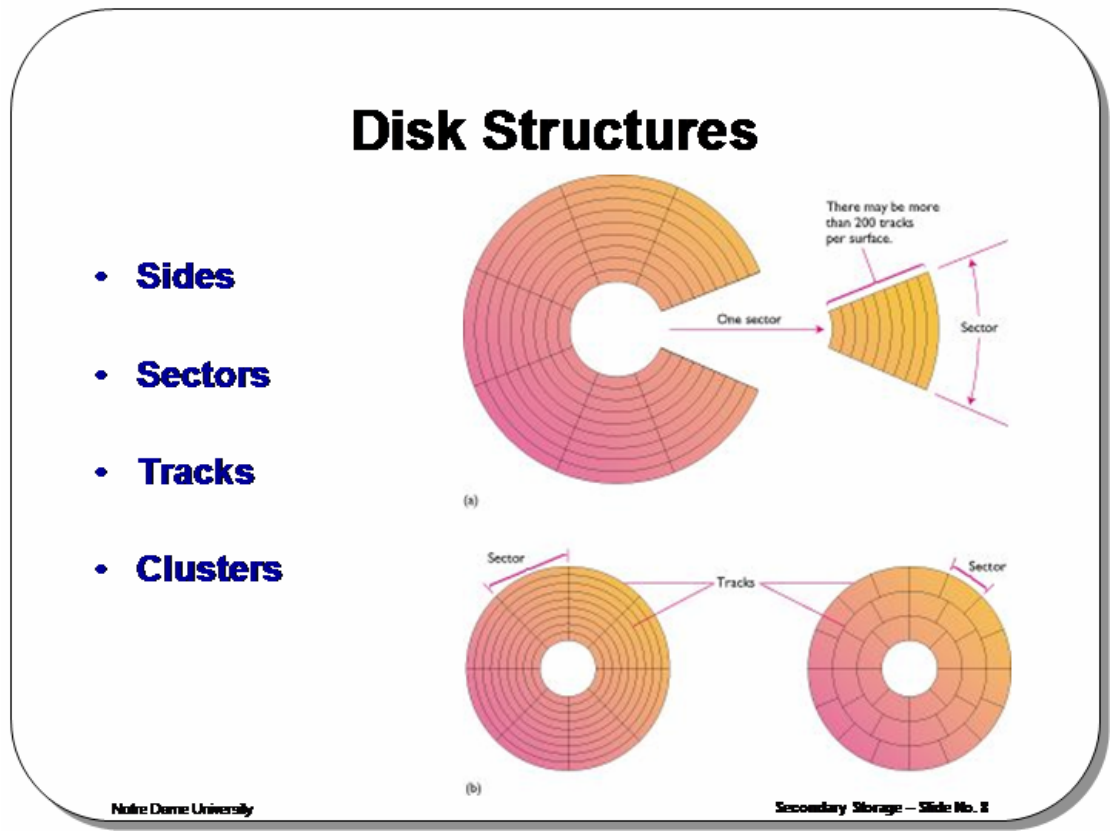
Speed: Normally slower that internal disks, but more expensive versions offer the same performance as internal hard disks.

Capacity: Same as internal disks.

Cost: More expensive than internal disks.

What is the difference between internal and external hard disks?

Internal hard disks are located inside your main computer unit, while external hard disks are joined to the main computer unit via a lead that you plug into the back of your computer unit. Some external hard disks will plug into the serial port (connector) located at the back of your computer. Other external hard disks require the installation of a special card within your computer that allows the connection of the external hard disk to the computer unit.



Disk Structures

How are disks structured? Each disk has two sides which are divided radially into sectors and then divided into circular concentric tracks. In addition, hard disks contain more than one disk, mounted vertically on top of each other.

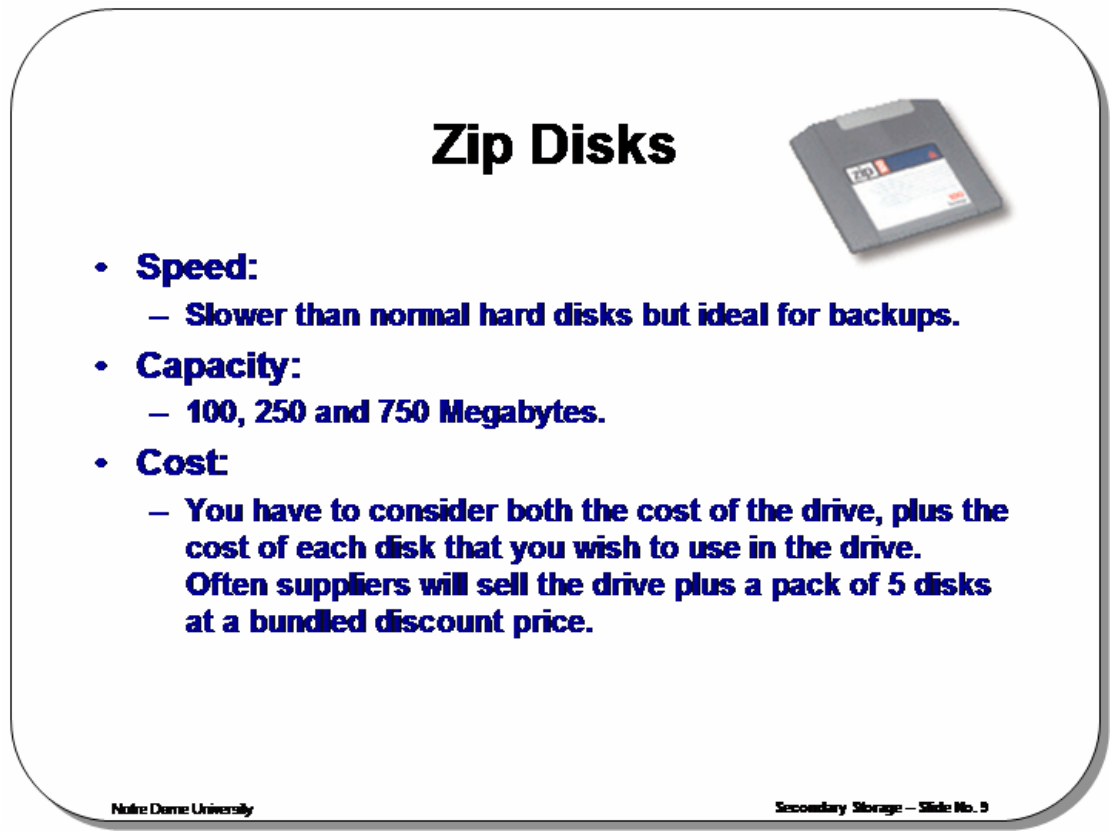
Sides Diskettes have two sides used to store data, called by beginners, side 0 and side 1. Hard disks are in fact made up of a number of physical disks, laid one above the other. Each disk is called a platter. Thus, if you have two platters, you have four sides capable of storing data.

Sectors Disk sectors resemble the slices of a cake. A 3 1/2” diskette has 18 sectors on it. The number of sectors on a hard disk will vary from disk to disk.

Tracks Tracks are concentric circles, imprinted on the disk, where the data is laid down. A 3 1/2” diskette has 80 tracks. The number of tracks and sectors contained on a hard disk will vary from disk to disk.

Cylinder A cylinder is a series of particular tracks taken as a vertical section through the physical disk structure.

Clusters DOS uses the concept of a cluster for storing files. A cluster is made up of one or more sectors and is the minimum unit of disk storage.



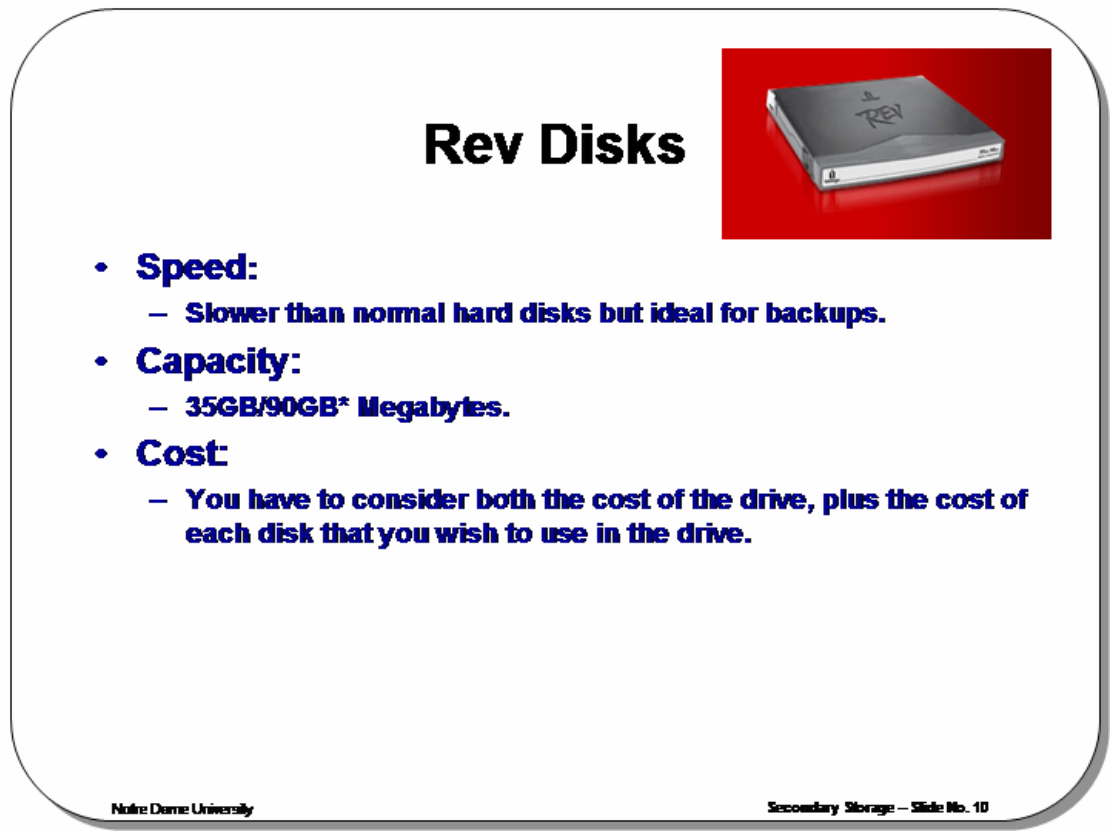
Zip drives

You can install a Zip drive into your computer and then you can insert Zip disks into that drive. The great thing about these disks is that you can remove one disk and replace it with another, in exactly the same way that you can place different diskettes in your diskette drive. They are great for backing up data and for exchanging data between non-networked computers.

Speed: Slower than normal hard disks but ideal for backups.

Capacity: 100 or 250 Megabytes.

Cost: You have to consider both the cost of the drive, plus the cost of each disk that you wish to use in the drive.



Rev drives

A Rev drive is similar in concept to a Zip drive. The main difference between them is that a Rev drive can hold a lot more data. But, the disks are not the same as used in a Zip drive and as a result, you cannot use a Zip disk in a Rev drive or a Rev disk in a Zip drive.

Rev drives are advertised as a faster and more reliable media for backups than traditional tape devices.

Speed: Slower than normal hard disks but ideal for backups**.**

Capacity: Normally 35 Gigabytes but may hold up to 90 Gigabytes of compressed data assuming 2.6:1 data compression using "high" compression setting in Iomega Automatic Backup Pro software. This capacity may vary since compression is data and software dependent.

Cost: You have to consider both the cost of the drive, plus the cost of each disk that you wish to use in the drive.

More information: http://www.iomega.com

Magnetic Tape Storage

Learning Module Objectives

When you have completed this learning module you will have:

- Seen about Tape Backup.
- Seen about DAT.

Tape Backup

- Used for regular backing up of data.
- Can store a vast amount of data at a low cost .
- DAT (Digital Audio Tape) devices are commonly used for backups. Fast and reliable.

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Tape backup

A tape backup unit allows for regular backing up of your data. These tapes can store a vast amount of data at a low cost.

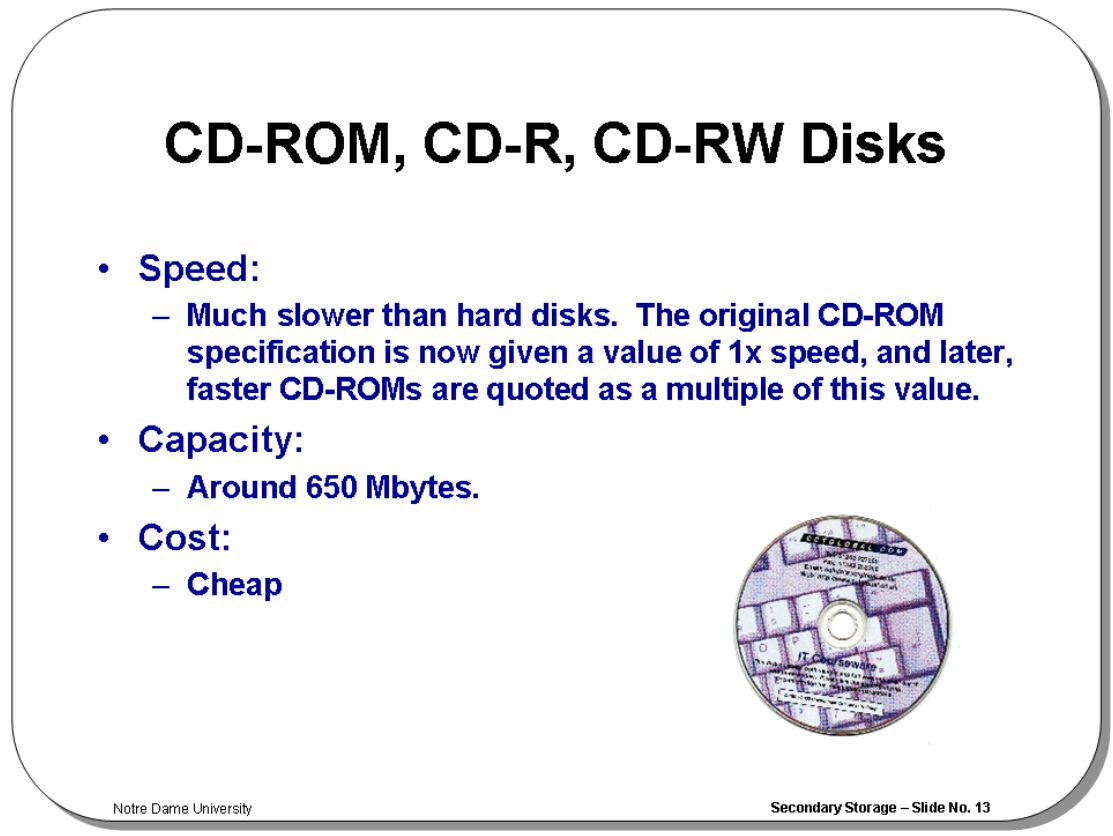
DAT (Digital Audio Tape) devices are commonly used for backups. The DAT tapes that they use can backup enormous amounts of data (i.e. over 4 GBytes per tape). The devices are also fast and reliable.

Optical Disk Storage

Learning Module Objectives

When you have completed this learning module you will have:

- Seen about CD Drives.
- Seen about DVD Drives.

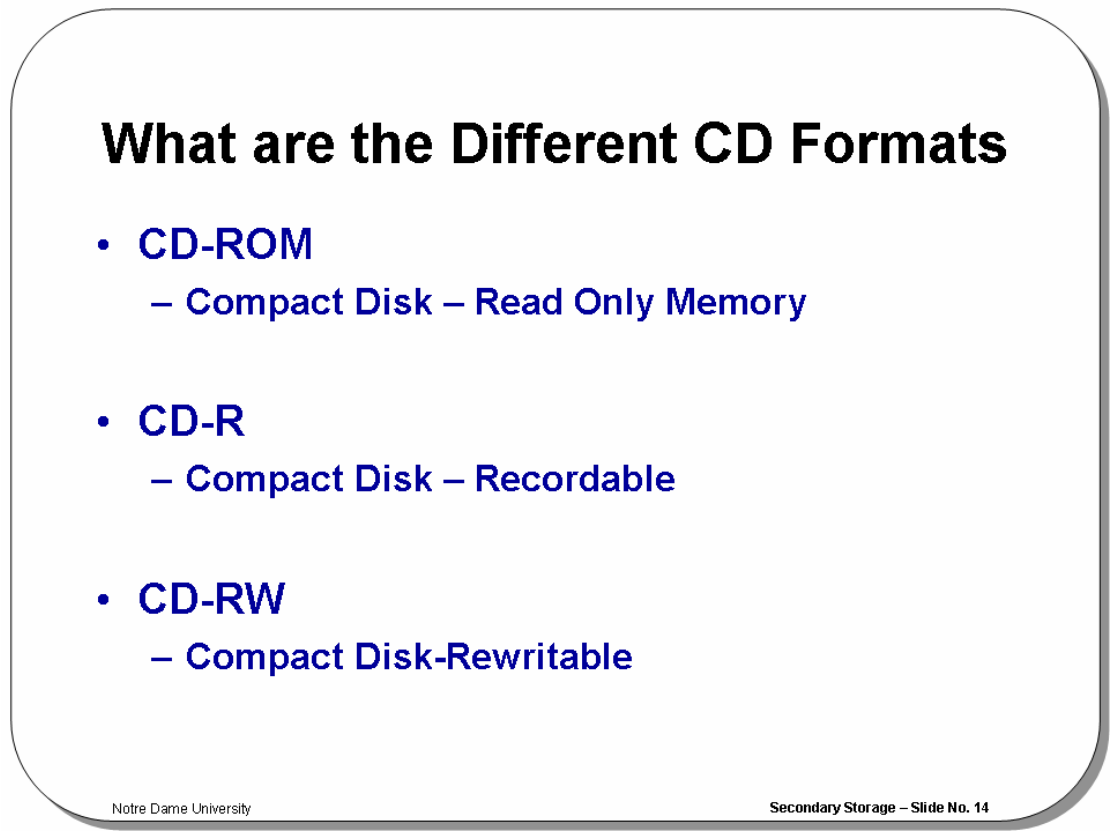


CD-ROM Disks

Speed: Much slower than hard disks. The original CD-ROM speciation is now given a value of 1x speed, and later, faster CD-ROMs are quoted as a multiple of this value. Thus, a 50x CD-ROM is 50 times as fast as the original 1x speed CD-ROM specification.

Capacity: Around 650 Mbytes.

Cost: Below $100 each.



CD-ROM (Compact Disk – Read Only Memory)	As originally introduced CD-ROM drives are only capable of reading information from CDs, they cannot record anything.
CD-R (Compact Disk – Recordable)	CD-R drives allow you to write once on special CD-R media which can then be read by CD-ROM, CD-R and CD-RW drives.
CD-RW (Compact Disk-Rewritable)	CD-RW drives allow you to erase and record on CD-RW disks many times, however some compatibility problems may be encountered when trying to read a CD-RW disk on a CD-ROM drive.

DVD Disks

- Speed:
  - Much faster than CD-ROM drives but not as fast as hard disks.
- Capacity:
  - Up to 17 Gbytes.
- Cost:
  - Slightly higher than CD-ROM disks.

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DVD Drives

Speed: Much faster than CD-ROM drives but not as fast as hard disks.

Capacity: up to 17 Gbytes.

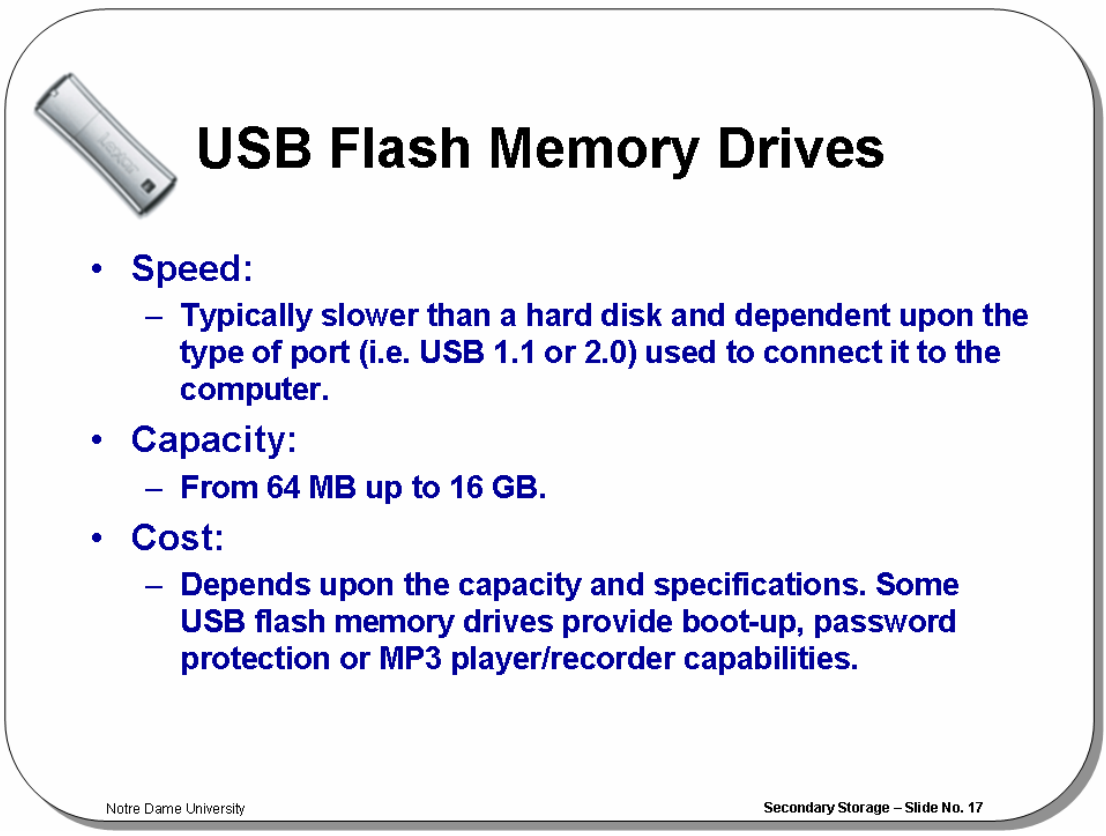
Cost: Slightly higher than CD-ROM drives.

Solid State Storage

Learning Module Objectives

When you have completed this learning module you will have:

- Seen about Flash Memory.
- Seen the various formats that Flash Memory is available in.

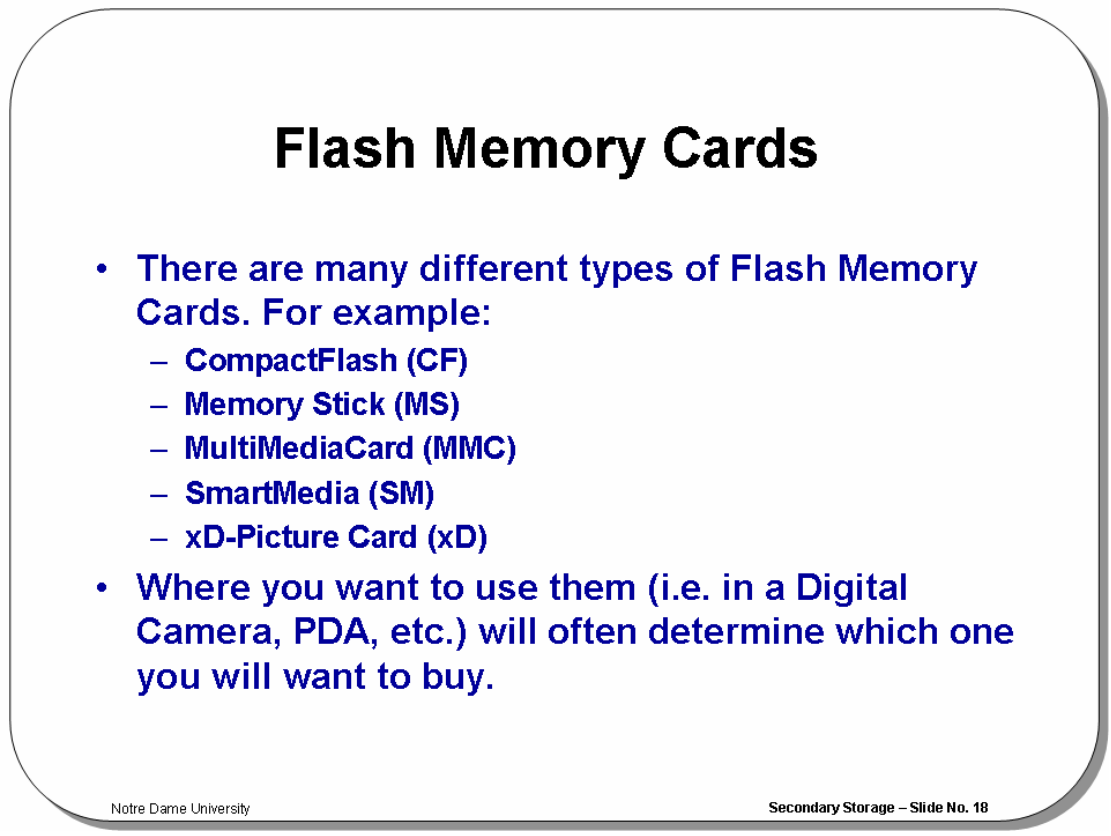


USB Flash Memory Devices

Speed: Typically slower than a hard disk and dependent upon the type of port (i.e. USB 1.1 or 2.0) used to connect it to the computer.

Capacity: From 64 MB up to 16 GB.

Cost: Depends upon the capacity and specifications. Some USB flash memory drives provide boot-up, password protection or MP3 player/recorder capabilities.



Flash Memory Cards

Flash memory cards offer a variety of storage capabilities for many of today's digital devices (i.e. Digital Cameras, PDAs, etc.). The type you buy is often determined by the equipment you want to use it in, for example, Memory Stick was developed by Sony for use in their digital devices.

Many flash memory card readers are also available which will allow you to transfer data to and from your flash media card to your computer. Often these readers will support multiple types of flash memory cards so you can quickly and easily transfer data from many different memory cards without having to connect and disconnect many separate devices.

Prices will vary depending upon both the brand and size of the flash memory card you purchase.