Computers: Inside & Out

Lesson 4: Storage

The purpose of storage in a computer is to hold data or information and get that data to the CPU as quickly as possible when it is needed. Computers use disks for storage: hard disks that are located inside and outside of the computer, flash drives, and floppy or compact disks that are used externally.

Floppy Disks

The original storage device when computers first came out was a floppy disk. A floppy disk is a very thin piece of plastic (see picture at right) that is coated with microscopic iron particles. This disk is much like the tape inside a video or audio cassette. It was mounted on a spindle inside a cardboard or plastic case. The spindle had two holes in it. When the disk is inserted into the disk drive, the drive hooks into those holes to spin the circle. This causes the disk inside to spin at about 300 rpm! At the same time, the silver metal cover on the end is pushed aside so that the head in the disk drive can read and write to the disk.

Floppy disks are the smallest type of storage, holding only 1.44MB. Floppy drives paved the way for more modern storage and are virtually obsolete, but, you might still see a floppy disk drive on older computers.

Hard Disks

Your computer uses two types of memory: primary memory which is stored on chips located on the motherboard, and secondary memory that is stored in the hard drive. Primary memory holds all of the essential memory that tells your computer how to be a computer. Secondary memory holds the information that you store in the computer.

Inside the hard disk drive case you will find circular disks that are made from polished steel. On the disks, there are many tracks or cylinders. Within the hard drive, an electronic reading/writing device called the head passes back and forth over the cylinders, reading information from the disk or writing information to it. Hard drives spin at 3600 or more rpm (Revolutions Per Minute) - that means that in one minute, the hard drive spins around over 3600 times!

Today's hard drives can be either internal or external and hold a great deal of information - sometimes over 1TB!
How Hard and Floppy Disks Work

The process of reading and writing to a hard or floppy disk is done with electricity and magnetism. The surfaces of both types of disks can be easily magnetized. The electromagnetic head of the disk drive records information to the disk by creating a pattern of magnetized and non-magnetized areas on the disk's surface. Do you remember how the binary code uses on and off commands to represent information? On the disk, magnetized areas are on and non-magnetized areas are off, so that all information is stored in binary code. This is how the electronic head can both write to or read from the disk surface.

It is very important to always keep magnets away from floppy disks, external hard drives and away from your computer! The magnets can erase information from the disks!

Compact Disks and DVDs

Instead of electromagnetism, CDs and DVDs use pits (microscopic indentations) and lands (flat surfaces) to store information much the same way floppies and hard disks use magnetic and non-magnetic storage. Inside the CD-Rom or DVD-Rom is a laser that reflects light off of the surface of the disk to an electric eye. The pattern of reflected light (pit) and no reflected light (land) creates a code that represents data.

CDs originally stored about 650MB, but now usually store about 700MB. This is quite a bit more than the 1.44MB that a floppy disk stores. A DVD or Digital Video Disk holds even more information than a CD, up to 1.4GB, because the DVD can store information on two levels, in smaller pits or sometimes on both sides.

Uses of Compact Disks

The most common use for compact disks (aside from playing music) is storage of software programs. When you purchase a computer game, the program that tells your computer how to run the game is stored on a CD. You move the program into your computer's memory by installing it. Some programs are transferred completely into your computer's hard drive. However, many programs are very large and would take up lots
of memory space on your hard drive. To keep that from happening, these programs are designed to only upload part of the program onto your computer. The rest of the program stays on the software. The program cannot be run from your computer unless you have the CD in the disk drive so that RAM can read the rest of the program from it.

With the introduction of CD-RW and DVD-RW (disk drives that can write to compact disks as well as read from them), CDs and DVDs can now be used for storage much like floppies. Using a CD-RW or DVD-RW, computer data can be backed up to a CD or DVD. All kinds of information that was too large to fit on floppy disks can now be saved on CD or DVD. Many people store music files or family photos on CD and full length movies on DVD.

**Flash Drives**

The newest and most common way to store information is on a flash drive. Flash drives are solid state, meaning they operate by electricity only, no magnetism, pits or lands. Inside these small, portable drives is a tiny circuit board with a computer memory chip (flash memory) that acts more like the RAM in a computer, except it holds all information until you erase it. The electronic circuitry is enclosed in a plastic or metal case. Flash drives connect to the computer using a USB (universal serial bus) port which also supplies the power to run the circuit board. The first flash drives held only 64MB of data but can now hold up to 64GB of information.

Flash drives also allow information to be transferred between different computers. Let’s say that you are working on a project using a computer at the library, but you don't finish it by closing time. There’s your project sitting in the computer. How do you get it home to finish it on your computer? You copy the information to a drive, take it home and upload the information into your computer from the drive. What an easy way to transfer information!

**Backup Math Worksheet**

**Vocabulary Worksheet**

Curriculum by Carol Welch. Modified by Mr. Coryell