

Supplemental Material
CIS 101 Computer Essentials
Computer Concepts Unit

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Additional Material for CIS 101 Concepts Test

People who are afraid of technology might still think of the computer as a tool for the mathematician or scientist. Perhaps it is thought that because the computer is a very complex piece of apparatus it can only be used by people with some understanding of the technology which created it. This is rather like saying it is impossible to become a car driver unless you understand how the internal combustion engine works.

What is even stranger is that "this myth persists" in the 21st century. Computers have, however, become more complex, and it is impossible to avoid using technical jargon when talking about them. Some understanding of the technology is essential. The analogy with the car is appropriate. When you learn how to drive a car you learn new technical terms such as *clutch* and *gearbox*. You do not have to understand how a clutch works, but you do have to know what it does and that if you fail to use it correctly you will do considerable damage to your car's gearbox. If you do understand a little bit more about your car you can also talk more intelligently with your local garage mechanic. At the very least, you have to know what kind of car - make and model, engine capacity, etc - you are driving.

Often called **microcomputers**, personal computers prior to 1982 were designed and built by a number of different manufacturers. Aimed at home and small business users, many of these systems provided the first taste of computing for many of today's developers and Information Technology managers. However, few of these machines shared common components; for example, a printer designed for one manufacturer's computer was not necessarily compatible with another, and all were limited by the technology around which they were based.

It was the 1981 launch of Intel's 16-bit 8086 processor that paved the way for the original **IBM PC**. This computer started to set standards and spawned the imitators that are being built in their millions today. A global industry of manufacturing, support, servicing and training has grown up around the PC. Although the technologies have changed, the oldest IBM PC and the latest multimedia machine share common principles of operation.

There are two main types of computers that are serious competitors in the market at present:

- The *Personal Computer* or *PC*.
- The *Apple Macintosh* - usually known as 'the Mac'.

The PC dominates the market, having become virtually a standard in business and education worldwide. The Mac still commands a dominant position in certain geographical areas and in certain industries, e.g. the printing and graphic design industry. There are literally hundreds of computers, trading under a variety of brand names that are manufactured to the same specifications as PCs. Apple equipment is usually marketed under its own name. The two main computer types referred to above are to some extent incompatible, and there may even be a compatibility problem between different types of computer produced by the same manufacturer. The implication of this is that you can only use programs that have been specially designed for your particular type of computer. There are ways around this problem, but when software suppliers ask you to specify precisely the type of computer you are using they are not being awkward; they need this information in order to provide you with the right kind of software. Similarly, a producer of videocassettes will ask you whether you are using a VHS or Betamax videocassette recorder, and a supplier of recorded music will want to know if you require it on audiocassette, a vinyl record or a CD.

Key Functions of a Computer

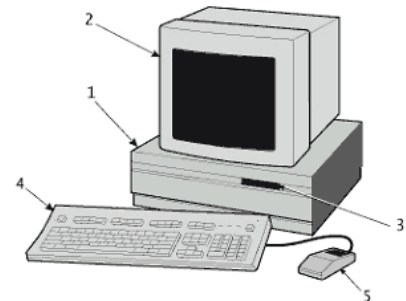
Before looking at specific computer components, it is worth taking a few moments to consider the four key functions that are performed by a computer: In 'techie' terms, these functions are called the "Processing Cycle"

- **Input** - Entry of raw data; for example, typing names and addresses on a keyboard or transmitting a picture from a digital camera.
- **Processing** - Manipulation of the raw data to produce useful information, the key purpose of a computer; for example, sorting or indexing the names and addresses or adding effects to the picture.
- **Output** - Transformation of the data into information, perhaps in a non-computerized format; for example, printing mailing labels from a database or displaying the picture in a brochure
- **Storage** - Retention of the data until it is needed; for example, filing names and addresses in a database or archiving your pictures for your web site.

Main components of a computer

A personal computer consists of the following main components:

- The *computer* itself is housed in a square or rectangular box, usually made of metal. Inside this box there is a lot of electronic circuitry, most of which is only of interest to the electronic engineer
- The *monitor*. This looks like a TV set and displays what is going on inside the computer and whatever you type at the keyboard.
- The *keyboard*. Much the same as a typewriter, this enables you to input commands to control the computer and, for example, to type text with the aid of a word-processing program.
- The *mouse*. A standard component of modern computers. A *pointing device* that enables you to select from choices displayed on the monitor and to help you control the computer's actions.
- The *disk drive*. All computers have at least one internal disk drive for the storage of programs and data.



#	Component	Function
1	System Unit	Contains hard disk storage
2	Monitor	Output
3	Floppy disk	Storage
4	Keyboard	Input
5	Mouse	Input

All Computer systems are made up of **Hardware** and **Software**.

Let's first discuss the hardware. Hardware is anything you can see, kick, drop, break or fall over, in other words the computer itself - which is a collection of electronic circuitry and other bits and pieces housed inside a metal box - and the essential devices you attach to it, such as the monitor, the keyboard and the mouse. Your home is full of hardware of a more familiar variety: a vacuum cleaner, a television set, a stereo, a washing machine, etc. The four main areas of hardware are:

- System Unit
- Input Devices
- Output Devices
- Storage Devices

Computer Hardware

The System Unit

The system unit is a plastic and metal box that houses components such as the motherboard, disk drives and power supply unit. There are two basic types of system case: **desktop** and **tower**. Both these types are available in different sizes. Be aware that while a small case may be desirable because it takes up less space, it has less room inside for installing extra devices and is less effective at cooling.

Desktop unit

A **desktop** unit is designed to sit horizontally on a surface, so that it is wider than it is long. If turned on its side, a CD-ROM or DVD tray would be oriented incorrectly. These are usually used for office or home PCs.



Tower unit

A **tower** unit is designed to sit vertically on a surface, so that it is higher than it is wide. Tower units come in three basic sizes: full, mid and mini.

- **Full-tower** cases are usually used for PC servers - these require the extra internal space for additional hard disks, interface cards and redundant power supply units.
- **Mid-tower** cases are used for high-end user PCs. These PCs do require extra devices and interface cards, but not as many as a server.
- **Mini-tower** cases are usually used for office or home PCs where the requirement for additional internal devices and interface cards is limited.



A mid-tower case (cover removed)

The most important part of the System Unit is the ‘mother board’ which holds the CPU.



The heart of every computer is the *central processing unit* or *CPU*, the computer's 'brain'. This is sometimes referred to as the *central processor*, *microprocessor* - or just *processor*. It is important that you know what kind of CPU your computer contains.

The CPUs of older PCs were numbered: 286, 386, 486. The 286 and 386 processors are now technically obsolete, and you are likely to have difficulty finding suitable software to run on computers equipped with them. 486 processors are on the way out, but many software applications are still available for 486 computers. Generally speaking, the higher the number, the faster the computer operates and the more sophisticated the software you can run on it. The central processors of newer PCs simply have a name: *Pentium*. Pentium processors run faster than the numbered processors found in older computers. The speed at which a computer operates is known as its *clock speed*. You will often find a computer described as follows:



- 486 50MHz or Pentium 200MHz

The abbreviation *MHz* stands for *MegaHertz*, a unit of measurement of the computer's clock speed, which need not concern the non-specialist. All you need to know is that 100MHz is faster than 50MHz and 200MHz is faster than 100MHz. Most modern software will not run satisfactorily on processors with a clock speed of less than 500MHz.

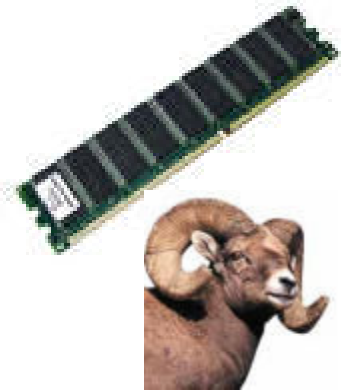
The motherboard also contains RAM and ROM memory

RAM - Random Access Memory

ROM - Read Only Memory

RAM

Inside the main casing of the computer are a number of *microchips* (technically known as *integrated circuits*) containing the computer's *memory*, which is usually referred to as *RAM (Random Access Memory)*. RAM is a sort of working area in which the computer stores the programs it runs, performs its calculations and stores intermediate results. RAM is emptied the moment the computer is switched off. The computer therefore has to have some means of storing programs and data permanently

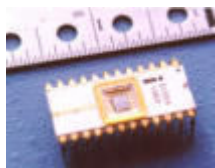


Do not confuse RAM with disk drives. Disk drives are used to store programs and data permanently and they have slower read/write times than RAM.

Think of the difference between storage (hard drive) and memory (RAM) as the difference between cabinets and drawers in your kitchen and your kitchen countertop. The storage areas in the computer are like cabinets and drawers in your kitchen. When you are not cooking, your pots, pans, bowls and ingredients are all stored away in cabinets and drawers. When you are preparing a meal, however, you take things out of their storage places and put them on the countertop to use them. The countertop here is like the computer's memory. When you are finished cooking, the ingredients, pots, pans, and bowls all go back to their storage areas because you no longer need them and your countertop is wiped completely

RAM is measured in **megabytes (MB)**. New PCs are generally shipped with no less than **128MB** of RAM; however, many can be fitted with **1 GB** or more. Increasing the amount of RAM can significantly improve the performance of the system. It is the combination of the central processor and the amount of RAM a computer contains that determines how powerful the computer is.

ROM



Key programs that enable the computer to operate are stored in another set of microchips known as *ROM (Read Only Memory)*. ROM chips make up the computer's permanent memory, the place where it keeps the programs that tell it how to work. This ROM chip contains a set of instructions that the microprocessor uses when the PC is turned on or reset. For example, it contains the code that allows the microprocessor to communicate with the floppy disk drive and hard disk drive so that the operating system can be loaded. ROM is a special type of memory holding information that has been programmed into it during construction. The PC user cannot change this information.

Computer Hardware cont. Input Devices

Keyboard

A typical keyboard has four basic types of keys:

- Typing keys
- Numeric keypad
- Function keys
- Control keys



There is nothing daunting about the keyboard. Typing skills are essential if you wish to use a computer efficiently. For the non-typist there are a number of tutorial programs available to help you improve your keyboard skills.

The typing keys are the section of the keyboard that contain the letter keys, generally laid out in the same style that was common for typewriters.

As the use of computers in business environments increased, so did the need for speedy data entry. Since a large part of the data was numbers, a set of 17 keys was added to the keyboard which is called the numeric keypad. These keys are laid out in the same configuration used by most adding machines and calculators, to facilitate the transition to computer for clerks accustomed to these other machines.

In 1986, IBM extended the basic keyboard with the addition of **function** and **control** keys. The function keys, arranged in a line across the top of the keyboard, could be assigned specific commands by the current application or the operating system. Control keys provided cursor and screen control. Four keys arranged in an inverted *T* formation between the typing keys and numeric keypad allows the user to move the cursor on the display in small increments. The control keys allow the user to make large jumps in most applications. Common control keys include:

Home, End, Insert, Delete, Page Up, Page Down, Control (Ctrl), Alternate (Alt) and Escape (Esc).

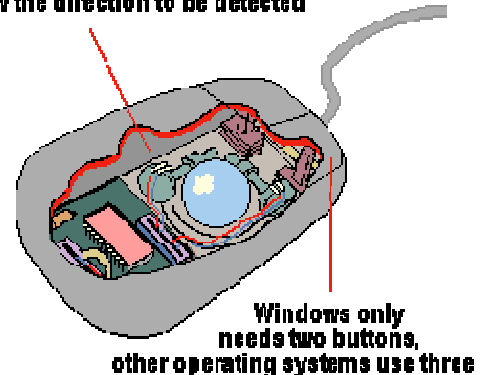
Another very common Input Device is the 'Mouse'.

In the early 1980s the first PCs were equipped with the traditional user input device - a keyboard. By the end of the decade however, a mouse device had become an essential for PCs running the GUI (Graphical User Interface) based Windows operating system.

Modern personal computers are equipped with a mouse, technically known as a *pointing device*. The mouse is used to control the position of the cursor on the screen and to initiate actions to be carried out by the computer. The mouse is attached to the computer by a cable and sits on a mouse mat that has the function of providing better traction for the ball located inside the mouse. The ball rotates as you move the mouse around on its mat. A more recent development is the optical or cordless mouse.

The optical mouse uses lasers instead of a ball to track the movement of the mouse! An alternative to a mouse is the *trackball*, which looks a bit like a mouse turned upside down. The trackball is operated by running one's palm or fingers over the ball.

**Two sensors on each wheel
allow the direction to be detected**



The function of the mouse is to enable the user to move the cursor around the computer screen and initiate actions without having to use the keyboard and without having to look away from the screen. The cursor on the screen follows the same path as the mouse on the mouse mat. As you move the mouse the cursor moves in the same direction. It is essential to learn how to control the mouse and to carry out the most important actions: point and click, double-click, left-click, right-click, click-and-drag, drag-and-drop - all of which are used in Windows applications.

A useful and entertaining way of learning how to use the mouse is to play the Microsoft Windows card game Solitaire. Playing this game involves virtually all the mouse actions you are likely to need.

Computer Hardware cont. **Output Devices**

Monitors

There is a wide choice of monitors available for the PC, varying both in screen size and technology. In general, monitors range in size from 14" to 21" and use **Cathode Ray Tube (CRT)** or **Liquid Crystal Display (LCD)** technology.



The monitor displays text, pictures and video and shows you the results of any actions you perform with the keyboard or mouse. CRT technology is still the most prevalent system in desktop displays. Because standard CRT technology requires a certain distance between the beam projection device and the screen, monitors employing this type of display technology tend to be very bulky. Other technologies make it possible to have much thinner displays, commonly known as flat-panel displays..



LCDs require far less electricity and are currently the primary technology for notebook and other mobile computers. As flat-panel displays continue to grow in screen size and improve in resolution and affordability, they will gradually replace CRT-based displays. **Resolution** refers to the number of individual dots of color, known as **pixels**, contained on a display. Resolution is typically expressed by identifying the number of pixels on the horizontal axis (rows) and the number on the vertical axis (columns), such as 800x600.

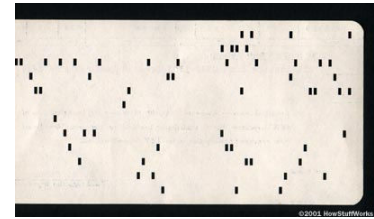
Printers

Nowadays most people use *laser printers* or *ink-jet* printers. Both laser and ink-jet printers are classified as “non-impact” printers, meaning they never actually touch the paper. The ink jet printer ‘sprays’ the image onto the paper using special ink. The laser printer ‘burns’ the image onto the paper using special powdered toner. These printers can produce output in any language or alphabet and also produce high-quality graphics. Modern printers can produce high-quality output in both black and white and in color. Color printers are more expensive but probably worth the investment. You will also still find older *dot-matrix printers* in use. They last for years and people are reluctant to throw them away. Dot-matrix printers are classified as “impact” printers. They produce their output by firing sets of tiny pins at an inked ribbon. The pins actually strike the paper.

Computer Hardware cont.

Storage Devices - Disk drives

Removable storage has been around almost as long as the computer itself. Early removable storage was based on magnetic tape like that used by an audio cassette. Before that, some computers even used paper **punch cards** to store information! Punch cards like the one on the right had holes that the computer interpreted as specific information



Modern removable storage devices offer an incredible number of options, with storage capacities ranging from the 1.44 megabytes (MB) of a standard floppy to the upwards of 20-gigabyte (GB) capacity of some portable drives. All of these devices fall into one of three categories:

- Magnetic storage
- Optical storage
- Solid-state storage

In the following sections, we will take an in-depth look at each of these technologies.

Magnetic Storage

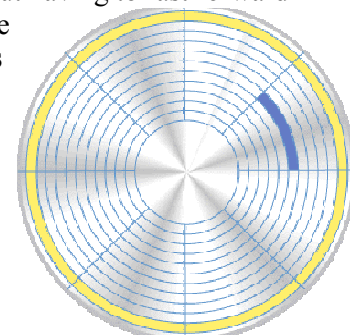
The most common and enduring form of removable-storage technology is **magnetic** storage. For example, 1.44-MB floppy-disk drives using 3.5-inch diskettes have been around for over 20 years, and they are still found on almost every computer sold today. In most cases, removable magnetic storage uses a **drive**, which is a mechanical device that connects to the computer. You insert the **media**, which is the part that actually stores the information, into the drive.

The media used in removable magnetic-storage devices is coated with **iron oxide**. This oxide is a **ferromagnetic** material, meaning that if you expose it to a magnetic field it is permanently magnetized. The media is typically called a **disk** or a **cartridge**. The drive uses a motor to rotate the media at a high speed, and it accesses (reads) the stored information using small devices called **heads**.

Magnetic disks or cartridges have a few things in common:

- They use a thin plastic or metal base material coated with iron oxide.
- They can record information instantly.
- They can be erased and reused many times.
- They are reasonably inexpensive and easy to use.

If you have ever used an audio cassette, you know that it has one big disadvantage -- it is a **sequential** device. The tape has a beginning and an end, and to move the tape to later song you have to use the fast forward and rewind buttons to find the start of the song. This is because the tape heads are stationary. A disk or cartridge, like a cassette tape, is made from a thin piece of plastic coated with magnetic material on both sides. However, it is shaped like a disk rather than a long, thin ribbon. The tracks are arranged in **concentric rings** so the software can jump from "file 1" to "file 19" without having to fast forward through files 2 through 18. The disk or cartridge spins like a record and the heads move to the correct track, providing what is known as **direct-access storage**. Some removable devices actually have a platter of magnetic disks, similar to the set-up in a hard drive. Tape is still used for some long-term storage, such as backing up a server's hard drive, in which quick access to the data is not essential.



Data is stored on the surface of a platter in **sectors** and **tracks**. Tracks are concentric circles, and sectors are pie-shaped wedges on a track, like this.

The read/write heads ("writing" is saving new information to the storage media) do not touch the media when the heads are traveling between tracks. There is normally some type of mechanism that you can set to protect a disk or cartridge from being written to. For example, electronic optics check for the presence of an opening in the lower corner of a 3.5-inch diskette (or a notch in the side of a 5.25-inch diskette) to see if the user wants to prevent data from being written to it.

Most computers have at least one internal floppy disk drive. The floppy disk drive is designed to accept 3.5-inch floppy disks, which usually have a capacity of 1.44 *megabytes*. This is big enough to store the text of a substantial novel. Before a floppy disk can be used, it has to be *formatted*. To do this you insert the disk into the disk drive and run a special formatting program which puts invisible markers on the disk. This program divides the disk up into tracks and sectors, which are to a computer person what latitude and longitude are to a geographer. This enables the computer to locate where it has stored any data it records on the disk. Most suppliers are now selling pre-formatted floppy disks - a great time saver.

Floppy disks are used mainly to store smaller programs that the user might wish to purchase or for storing data that has been created by the user and which the user may wish to use on a variety of different computers, e.g. a text created with a word-processor. Nowadays, most programs available for sale are so big that they would need to be stored on a dozen or more floppy disks. For this reason, programs are usually sold on CD-ROMs or DVD ROMs, which have an enormous storage capacity.

A floppy disk is made of a circular disk of flexible plastic that is coated in a magnetic material and held inside a rigid plastic case. They typically hold 1.44MB of data, compared with the Gigabytes that are stored on a hard disk. Floppy disks are also considerably slower than hard disks.

The main advantage of floppy disks is that they are portable and can be used for transferring data between PCs, and for storage of data away from the PC itself. Most floppy disks are now the HD (High-Density) 3½" type and have a capacity of 1.44MB. These have superseded the earlier 720KB (Double Density) disks. Earlier floppy drives had a 5¼" disk and a maximum capacity of 1.2MB. These may be found on very old machines, or on those that have a second drive added for backward compatibility.

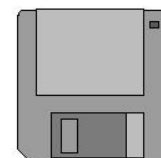
Floppy disks need to be treated with respect. First, they like the same room temperatures as you do. Do not freeze them or overheat them! Second, they don't like magnets or electric motors - these can destroy the data on floppy disks. Third, avoid sliding back the protective metal cover and don't touch the exposed plastic surface of the disk.

Floppy disks are inserted into a slot in the front of the drive. It is impossible to fully insert a disk into a 3½" drive unless it is inserted the correct way.

To write protect a floppy disk

Disks may be protected in a similar way to audio and videocassettes so they are not accidentally overwritten.

1. Turn the floppy disk face down.
2. Locate the slider on the right hand side.
3. Move the slider so that a hole appears. The disk is now read-only. An error message will be displayed when attempting to save a file to a disk that is write-protected. Use the write-protect feature wherever possible to prevent anyone, including yourself, from accidentally erasing or over-writing files.
4. To allow the disk to be written to, move the slider back to hide the hole.



3½" Floppy Disk
Write Protect Slider (at back)

Save at least one copy of a file on a different disk in case the original disk becomes damaged or lost.

Hard Disk Drives

The hard disk drive is a sealed unit consisting of a set of rigid magnetic disks enclosed within a metal case which is mounted internally in the PC. The hard disk is pre-formatted when you purchase your computer and will probably contain a number of pre-installed programs, e.g. the Windows operating system and communications software. Hard disks are also known as fixed disk drives.

Hard disks are capable of storing much more data than floppy disks. Most new PCs are supplied with drives in excess of 50 gigabytes (GB), and disks are currently available with capacities in excess of 200GB. This high capacity is achieved in two ways:

- Data can be packed more tightly onto the disk
- A number of disks can be mounted together onto a single spindle

Hard disks are considerably quicker than floppy disk drives as they rotate much faster and the data is more densely packed. This allows much quicker access to data than a floppy disk. When there is no disk activity for a few seconds, the motor on a disk drive can be automatically switched off to prevent excess wear on the disk drive. The disk is sealed in a dust-free casing to protect the magnetic surfaces. Due to the rotational speed of the disk and the gap between the read/write heads and disk, the disk surface is left vulnerable to dust. The considerable quantities of data now held on modern hard disk drives, means that a disk failure can be disastrous. It is therefore imperative that any files on a hard disk are backed up systematically and regularly.

In this picture you can see the **platters**, which typically spin at 3,600 or 15,000 rpm when the drive is operating. These platters are manufactured to amazing tolerances and are mirror-smooth (notice the interesting self-portrait of the photographer!)



The **arm** that holds the read/write heads is controlled by the mechanism in the upper-left corner, and is able to move the heads from the hub to the edge of the drive. The arm and its movement mechanism are extremely light and fast. The arm on a typical hard-disk drive can move from hub to edge and back up to 50 times per second -- it is an amazing thing to watch! The vast majority of hard drive arms are manufactured right here in Sioux Falls by Hutchinson Technologies!

Optical Storage Devices

The optical storage device that most of us are familiar with is the **compact disc (CD)**. A CD can store huge amounts of digital information (700 MB) on a very small surface that is incredibly inexpensive to manufacture. The design that makes this possible is a simple one: The CD surface is a mirror covered with billions of tiny bumps that are arranged in a long, tightly wound spiral. The CD player reads the bumps with a precise laser and interprets the information as bits of data.

The spiral of bumps on a CD starts in the center. CD tracks are so small that they have to be measured in **microns** (millionths of a meter). A human hair is approximately 60 microns wide. The CD track is approximately 0.5 microns wide, with 1.6 microns separating one track from the next.

Most of the mass of a CD is an injection-molded piece of clear polycarbonate plastic that is about 1.2 millimeters thick. During manufacturing, this plastic is impressed with the microscopic bumps that make up the long, spiral track. A thin, reflective aluminum layer is then coated on the top of the disc, covering the bumps. The tricky part of CD technology is reading all the tiny bumps correctly, in the right order and at the right speed. To do all of this, the CD player has to be exceptionally precise when it focuses the laser on the track of bumps.

CD-ROM



CD-ROM stands for *Compact Disk Read Only Memory*. A CD-ROM is an optical disk on to which data has been written via a laser. It looks much the same as an audio CD but can contain text, sound, pictures and motion video. Once written, the data on disk cannot be altered, hence the term *Read Only*. CD-ROMs can store up to 700 *megabytes* of data. Most modern computer programs and multimedia materials are supplied on CD-ROM. Compared to other computer media, the CD-ROM's storage capacity is impressive. A standard high-density floppy disk (1.44Mb) can store a 500-page novel. A

single CD-ROM, however, can comfortably accommodate 500 medium-length novels, a 12-volume encyclopedia, the complete works of Shakespeare, or a whole year's edition of a newspaper. It is this enormous storage capacity that makes CD-ROMs attractive. When graphics and audio and video recordings are stored in computer-readable format they take up much more space than text, and they can only be made available to consumers in reasonable quantities if they are stored on CD-ROM. Floppy disks would simply not have enough space for large audio or video files.

In order to 'read' a CD-ROM disk, your computer needs to have a CD-ROM 'drive'. This is a very common and necessary drive with today's computers. CD-ROM drives are S-L-O-W compared to hard disk drives. They are available in a variety of different speeds, the speed being described thus: 2x, 12x, 24x 48x, double-speed, 12-times, 24-times, etc. This indicates the speed at which data can be pulled off the CD-ROM drive - the so-called *spin-rate* - 150 kilobytes per second being the original 1x spin-rate. A high spin-rate helps speed up data transfer, which is crucial when playing sound or video. A very low spin-rate (2x, 4x) may cause hiccups when audio and video recordings are played

CD-R or CD RW

CD-R stands for Compact Disk Recordable. CD-RW stands for Compact Disc Rewritable. The technology for reading a CD-R or CD-RW disc is similar to a CD-ROM in that it uses a laser system to read the information from the disc. The benefit of a CD-R is that you can record (burn) your own information on to a CD disc. You can burn your own data files, music files or some types of video files. Once you finish adding data to a CD-R, you can not add additional data to the disc. A CD-RW allows you to do the same thing, but you can also erase the old data and reuse the disc. Most computers today have a CD drive that will allow you to use all three types of CD's.

DVD-ROM



After a lifespan of ten years, during which time the capacity of hard disks increased a hundred-fold, the CD-ROM finally got the facelift it required to take it into the next century when a standard for DVD, initially called digital video disc but eventually known as Digital Versatile Disc, was finally agreed during 1996. For computer users, however, DVD means more than just movies, and while DVD-Video grabbed most of the early headlines, it was through the sale of DVD-ROM drives that the format made a bigger immediate impact in the marketplace. In the late-1990s computer-based DVD

drives outsold home DVD-Video machines by a ratio of at least 5:1 and thanks to the enthusiastic backing of the computer industry in general and the CD-ROM drive manufacturers in particular; by early in the new millennium there were more DVD-ROM drives in use than CD-ROM drives.

With the same overall size as a standard 120mm diameter, 1.2mm thick CD, DVD discs provide up to 17GB of storage with higher than CD-ROM transfer rates and similar to CD-ROM access times and come in four versions:

- DVD-5 is a single-sided single-layered disc boosting capacity seven-fold to 4.7GB
- DVD-9 is a single-sided double-layered disc offering 8.5GB
- DVD-10 is a 9.4GB dual-sided single-layered disc
- DVD-18 will increase capacity to a huge 17GB on a dual-sided dual-layered disc

Solid State Storage

Despite the different brands and names you've heard for USB (Universal Serial Bus) flash drives – JumpDrives™, Pocket drives™, Pen drives™, and Thumb drives™ – they all pretty much operate the same way. The difference is mostly in price, capacity, design, functions and features (for example, some have built-in MP3 players). What's really important, though, is what they share: They're all pluggable, portable, and powerful! USB flash drives share some other characteristics, too.



- USB flash drives weigh about the same as a car key – in fact, some USB flash drives are so lightweight that hypothetically it could take 14 ants to carry one!
- USB flash drives are about the size of a stick of gum.
- USB flash drives currently can hold up to two gigs of data – that's over 650 three-minute songs (33 hours) recorded as MP3s or about three times the content of a standard compact disc.
- If you share a computer, USB flash drives are a great way to store personal information – use them instead of the computer's hard drive.



Byte, Kilobyte, Gigabyte, Mosquito Byte: What does it all mean?

Bit: We measure the information stored in a computer's memory and disk drives using **bits**. A bit is the smallest unit of measurement. A bit is simply an **on** or an **off** signal which passes through the computers circuitry. Every piece of software can be broken down into a series of on or off signals or its **Binary Code**. Bit is an abbreviation for **Binary digit**.

Byte: 8 bits grouped together equal one byte. A byte is still a very small piece of information--one byte is equal to one character or one letter of the alphabet. Since a byte can only hold a very small piece of information, we often think in terms of kilobytes, megabytes, and gigabytes.

Kilobyte (KB): Normally defined as 1,024 bytes, although many people round it to 1,000. An average word-processing document will consume about 100 kilobytes.

Megabyte (MB): Defined as roughly 1,000 kilobytes or 1,000,000 bytes. While documents are usually measures in kilobytes, whole programs are measured in megabytes. A few years ago, when you purchased a new program at the store, it most often came on a floppy disk. Each floppy disk holds up to 1.44 megabytes of information. Programs were smaller then, so you would only need a few disks to hold the whole thing. These days, the size of programs have become much bigger, so that virtually all new programs come on CD-ROM. A CD-ROM can hold over 650 megabytes!

Gigabyte (GB): Defined as roughly 1,000 megabytes. The increasing size of programs has resulted in larger hard drives. Hard drives used to be measured in megabytes -- a computer from 1988 might have had a 30-megabyte hard drive! Now, the average hard drive in a new computer is at least 20 gigabytes.

			Rounded size (bytes)	Actual size (bytes)
Bit	b	Storage for 1 switch		
Byte	B	8 Bits (8 switches)		
Kilobyte	KB	2 ¹⁰ bytes	1,000	1,024
Megabyte	MB	2 ²⁰ bytes	1,000,000	1,048,576
Gigabyte	GB	2 ³⁰	1,000,000,000	1,073,741,824
Terabyte	TB	2 ⁴⁰	1,000,000,000,000	1,099,511,627,776
Petabyte	PB	2 ⁵⁰	1,000,000,000,000,000	1,125,899,906,843,624
Exabyte	EB	2 ⁶⁰	1,000,000,000,000,000,000	1,152,921,504,606,846,976
Zettabyte	ZB	2 ⁷⁰	1,000,000,000,000,000,000,000	1,180,591,620,717,411,303,424
Yottabyte	YB	2 ⁸⁰	1,000,000,000,000,000,000,000,000	1,208,925,819,614,629,174,706,176

Earlier you learned that a computer system is made up of Hardware and Software. Let's now discuss Software. There are two basic types of computer software: System software and Application software.

Software

Software is the word used to describe the programs that run on computers. For example, Microsoft 'Word' is actually a *computer program* - or a suite of programs - a set of instructions that make the computer behave as a word-processor. More specifically, this kind of software is known as **application software**. You normally purchase software on floppy disks or on CD-ROMS. There is a growing tendency for computer programs to become more and more complex, consisting of a large number of modules that will not all fit on to one floppy disk, and CD-ROMs have taken over from floppy disks as the main storage media.



A program that is purchased as a suite of modules on several floppy disks or on CD-ROM will have to be installed on the computer's hard disk before it can be used. An *installation program* is therefore often included in the suite so that you do not have to know too much about the technicalities of computing in order to get started. This is also known as a *set-up program*.

Operating systems

Software producers and retailers will probably assume you know enough about the basics of computing to be able to install computer programs yourself. This implies that you have a basic knowledge of the computer's *operating system*, a suite of programs that is supplied with every computer to facilitate what are generally known as *housekeeping tasks*, e.g. copying software from one disk to another, examining the contents of a disk or removing unwanted software from a disk.

Operating systems vary from computer to computer. Older PCs use a system known as *MS DOS* (Microsoft Disk Operating System), technically known as a *character user interface* or *CUI*. Apple Macs and modern PCs make use of a *graphical user interface* or *GUI*, an operating system which makes extensive use of graphic images, or *icons* to use the technical term. PCs are usually supplied with a GUI known as Microsoft Windows.



The icons represent events that you wish to make happen, e.g. copying a program from a floppy disk to the hard disk. Using a mouse, you cause the cursor to zip around the computer screen and point to an icon. Clicking a button on the mouse's 'back' triggers whatever action that particular icon represents. GUIs make life easier, as you don't have to learn sets of unmemorable commands, which was the main drawback of MS DOS.

It is important to know which operating system your computer uses: e.g. MS DOS, Windows 3.1, Windows 95, Windows 98, Windows NT, Windows 2000 or Windows XP. If you are using a newer PC it is most likely to run under Windows XP. Without **system** software installed on a computer, your computer is basically an expensive boat anchor!

Networks

Computer networks are a way of distributing and sharing programs and information between different users connected to the network. There are different types of networks, which are described below. The Internet itself is a huge, open network. The advantage of a network is that only one copy of a program or only one copy of relevant data has to be stored on the *server*, i.e. the hardware/software that controls the network or only one copy of '*Office*'. It is also possible to set up a network without a server, a so-called *peer network*, where no computer is the 'boss' but all users connected to the network can share programs and data. **Kazaa** is an example of peer network.

LANs, WANs

A LAN or Local Area Network is often confined to a single room or building, the computers or workstations on the network being connected by cable or by a wireless signal to a central *server*. If the cables can be run between multiple buildings, then the LAN can serve a whole school or university campus. This describes our network here at STI.

A WAN or Wide Area Network can span any distance. Businesses with branches in several different towns or countries are often connected via a WAN. Communication between sites is usually provided by the local telephone service or a specialist communications company. However, only those employees of that business can access the WAN network.

Information for this handout was provided by Robert Reid, CIS Instructor. Information was also obtained from several web sites. You are encouraged to visiting these sites to gain even more information.

Additional Resources

1. **Boston Digital Bridge Foundation ‘Connecting People With Their Potential’:**
[http://www.tghboston.org/Public_tgh.nsf/DocViews/11D9475C51DD261D85256DE8004C41A3/\\$FILE/Intro+to+Computers+Section+1.pdf](http://www.tghboston.org/Public_tgh.nsf/DocViews/11D9475C51DD261D85256DE8004C41A3/$FILE/Intro+to+Computers+Section+1.pdf)
2. **BWDMA** <http://tutorials.bwdma.co.uk/read/id/384>
3. **California State University, Sacramento:**
<http://www.csus.edu/indiv/b/benveniste/lecture1/link1.htm>
4. **How Stuff Works ‘Computer Channel’:** <http://computer.howstuffworks.com>
5. **Information and Communications Technology for Language Teachers:**
http://www.ict4lt.org/en/en_mod1-2.htm#anchor416802
6. **The PC Technology Guide:** <http://www.pctechguide.com>