REPORT
ON
HARDWARE

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What is hardware?

Hardware is the physical devices that can be touched and used to send or receive messages or information to and from one person to another person.

The components of a computer system are:

- Input devices- these get data into the computer.
- The main processor unit- this manipulates the data.
- The storage devices- these save data.
- The output devices- these display the data in soft or hard copy.
- The cables and connectors that join it all together.

There are three types of hardware. These are:

1) INPUT DEVICES

These are the tools used to enter data, commands and information into the computer's central processing unit (C.P.U). The most common input devices are:

- Keyboard
- Mouse
- Scanner
- Digital Camera
- Joy stick
- Roller ball
- Microphone.

Keyboard

This is the most common and widely used input device. It is used to key in data. Touching or pressing a key sends an electronic signal to the computer that interprets it as a character or function. Some special keyboards include touch sensitive keyboards, braille keyboards, mobile phone keyboards and Large-keyed colour coded keyboards, amongst others. Keyboards are divided into four main areas are:

♦ Function keys across the top
♦ Letter keys in the main section
♦ A numeric keypad on the right
♦ Cursor movement and editing keys between the main section and the numeric keypad.

Mouse

This is a pointing device used to control the movement and position of the cursor by moving the mouse around on a flat surface such as a desk. The standard mouse comprises casing, buttons and base. As technology has developed, the mouse has

evolved from its original design and now come in different styles to suit different requirements.

Scanner

This is an input device that reads words or graphics from a printed page and translates the pattern of light and dark (or colour) into a digital signal the computer can store and manipulate. The most common scanner is the flatbed scanner that works quite like a photocopier. Hand-held scanners are still used but, as flat board scanners are now quite inexpensive, their use is diminishing. They are only a few centimetres wide and this limits the amount of information that can be scanned to small areas.

Digital Camera

This looks just like a traditional camera but instead of recording an image on film, light intensities are converted into digital form that can be stored on a disk as a data file, similar to a word or Excel file. The digital camera is now more commonly and widely used than traditional camera because pictures can be previewed and if they are not good enough can be DELETED.

Joy Stick

These are used mostly when playing computer games. The handle in the centre of the joystick moves an object on screen and translates movements of the hand and fingers into the motion on a computer screen.

Rollerball

This is also known as a tracker ball. It is an upside down mouse that allows the user to point to selected items on screen. The user rotates the roller ball with his/ her fingers instead of pushing a mouse around a desktop. It requires very little space to operate and is commonly built into laptop computers in place of a normal mouse.

Microphone

This input device is sound sensitive and the microphones used with computer are the same as any other type of microphone. Because it is used mostly with voice recognition that translates spoken words into digital signals for the computer, it makes it possible to operate a computer without using any hands- it's hands free.

2) OUTPUT DEVICES

These are the devices used for retrieving information from the computer either through sight or hearing. The most common output devices are:

- Video Display Unit (VDU)
- Speakers
- Printers

Video Display Unit

This is otherwise known as monitor. It displays images generated by the computer's video adapter. They come in different sizes- 15, 17 19 and 21 inches. The sharpness or clarity of the image on the VDU is determined by its resolution. The resolution is measured in pixels. When it is looked at closely, it is obvious that the image is made up of tiny dots. Each dot is known as a pixel. The image made on the

screen is known as **the frame**. There are many types of VDU and the most common type is the flat screen VDU.

Printers

This gives the permanent (hard) copy of the information on screen. Most Pc's use a laser or ink-jet printer. The speed of the printer is counted in dots per inch or DPI- the higher the value, the higher the value, the faster the speed (and the greater the cost). There are many types of printers some of which are:

Inkjet printers
Laser printers
Dot-matrix printer

Speakers

Most PC's are fitted with a small internal speaker that will bleep to draw attention to the user for example if the wrong keys are pressed. On multimedia PCs additional speakers are attached to the computer to add better quality sound. The amplifier driving external speakers is built into the sound card or into one of the speakers themselves. The speaker is a very important part of the computer's hardware because not only does it alert you when something has gone wrong, it can also be used to listen to music and helps blind people because the results of their instructions to the computer can be read out to them.

3) STORAGE DEVICES

These are those devices that save data in the computer's hard drive or a disk drive. A disk drive is a storage device that transfers data to and from a magnetic or optical disc. The main storage devices are:

- The hard drive
- The floppy drive
- The CD- ROM drive
- DVD drive

The hard drive

This is the storage area (like a filing cabinet) where all the applications software used and created documents are kept. It is the main memory of the computer. They (hard drives) are measured in gigabytes (GB). Expensive computers usually have the largest hard drive (over 30GB). The hard drive houses the hard disks that are flat, round and rigid plotters that provide faster access to data than floppy discs and that are capable of storing much more data. Because they are rigid, they can be stacked such that one hard disc drive can access more than one platter (hard disk).

They come in sealed units that protect them from contaminants (like dust), which might interfere with the close head-to-disk tolerances.

The floppy drive

This is a removable storage area that enables files to be saved on a floppy disk so that data files can be taken between home and school or college and you make back-up copies of data files as a security measure. They are round, flat and made of a substance called Mylar. They have a magnetic surface that allows the recording of data and are covered in a protective plastic shell. The disc turns in the drive allowing the read/ write head to access the disk.

The CD-ROM drive

This uses the same technology as CD music disks and CD players. A laser beam reads the data from an optical disk rather than a magnetic disk. A typical CD holds around 650MB of data, which is equal to 450 1.4MB floppy disks. The CD - drive has a read only memory, which means you cannot alter or store data. However, CD writers are now available that enable data to be written to CD. These enable you to make copies of music on CD and are increasingly being used for backing up hard drives.

CONNECTORS, NETWORKS, NETWORK PROTOCOL

Cables connect the different components of a computer system. When a system is set up it is important to check the input or output devices are connected to the main processing units correctly or the computer won't operate.

The former means of connecting the computer were through Ports. **Ports** are sockets at the back of the main processor causing, which are used to attach the peripheral devices e.g. printer, monitor, keyboard, mouse and so on e.t.c. Cables from each peripheral plug into ports allowing data to be sent and received from the microprocessor. There are two types of ports

- Serial ports: - Transmits data one at a time. They are known as COM1, COM2 and are referred to as male connectors because they have pins
- Parallel ports: - This on the other hand transmits data in **bytes, which** is much faster than serial. Parallel ports are LPT1, LPT2 and are designated female connectors because they have receptacles for the pins.

Nowadays there are new connectors for computers. They are: -

♦ **USB** (Universal Standard Bus)

Allows a wide variety of computer peripherals to be easily connected to most PC's, Windows 98/2000 and this is a newfound saviour from parallel and serial ports. A compact USB port provide more superior (better quality) data transfer speed more than 99 times faster and compared to 25-pin parallel and DB-9 serial ports found on old updated computers it is fast and easy.

USB~~~~~~~1.5MBYTES

PARALLEL~~0.12MBYTES

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Serial plug	**115 kbits/s (.115Mbits/s)**	**Standard parallel port:**	**115 Kbytes/s (.115MBYTES/s)**
USB:	**12 Mybits/s (1.5MBYTES/s)**	**ECP/EPP parallel port:**	**3 MBYTES/s**
IDE:	**3.3-16.7 MBYTES/s**	**UltraIDE:**	**33 MBYTES/s**
SCSI-1:	**5 MBYTES/s**	**SCSI-2 (Fast SCSI, Fast Narrow SCSI):**	**10 MBYTES/s**
Ultra SCSI (SCSI-3, Fast-20, Ultra Narrow):	**20MBYTES/s**	**Wide Ultra SCSI (Fast Wide 20):**	**40 MBYTES/s**
Wide Ultra2 SCSI:	**80 MBYTES/s**	**Wide Ultra3 SCSI:**	**160 MBYTES/s**
FC-AL Fiber Channel:	**100-400 MBYTES/s**	**IEEE-1394:**	**100-400 Mbits/s (12.5--50 MBYTES/s)**

USB FAQ

Nowadays, people mostly use USB interface in peripheral connections such as USB- image scanners, colour inkjet printers, joysticks, and memory card readers. USB is used as the external Plug and Play standard for low cost, home computing peripherals. Plug and Play is a standard USB follows very effectively.

Important Features of the NI USB-232 and NI USB-485 Serial Converters

The USB-232 and USB-485 serial converters add RS-232/485 serial ports to your computer. For example, if your existing computer has two RS-232 ports already, connecting the USB-232/2 (2-port converter) to the USB port results in two additional RS-232 ports that appear on screen as standard COM ports to give you COM ports 1, 2, 3, and 4. Because the USB-232 and USB-485 create standard Windows COM ports, the only modification your application may require is the change in the COM port number. No other part of your application will need to be changed because the COM ports integrate seamlessly into the Windows environment.

With the USB-232 and USB-485, you can also save time by using NI-VISA, which is a driver software architecture developed by National Instruments to unify instrumentation software. It is a single application-programming interface (API) to program serial instruments as well as GPIB, VXI, PXI, and Ethernet devices. For example, you could take an NI-VISA application written for a GPIB instrument and run it with an RS-232 instrument connected through the USB-232 to the USB port on your computer without modifying the application. This feature preserves your investment in application development time because you can switch between different connectivity technologies with almost no change in your design or code. It could also drastically reduce downtime when a piece of hardware needs replacement, because you can change the hardware interface seamlessly without modifying your application.

Additionally, with the USB-232 and USB-485 converters, you automatically detect which type of RS-232/485 device you have connected. This new technology checks whether a data terminal equipment (DTE) device or a data communications equipment (DCE) device is connected to the serial port. This auto detection feature enables the driver to send the appropriate data on each line of the serial cable. This technology eliminates the need for differentiating between straight and null modem cables. No matter what device type and what cable you are using, the driver sends the data on the correct lines with the USB-232 and USB-485 converters.

With the NI USB-232 and NI USB-485 converters, you can take advantage of widespread USB technology to connect to existing RS-232/485 communication equipment with newer computers that lack the correct serial communications ports. The USB-232 and USB-485 converters add COM ports to your computer, making it unnecessary to modify current applications using the RS-232/485 communication bus or other buses through VISA programming. The USB-232 and USB-485 converters also bring the ease-of-use capabilities of USB to RS-232/485 communication devices.

BENEFITS OF USB

It is a new technology that allows hardware to be automatically recognised when plugged in and this happens while computer is still on and running unlike ports. Using USB one does not need tiny DIPswitches, IRQ conflicts or internal adapter card installation. IEEE –1394 Fire wire is a more expensive device yet USB shares some of the features. It therefore saves money buying a device that is cheaper with almost all the same features as the same one.

Windows 98/2000 and Apple OS 8.x/9.x platforms are popular USB specification. Most USB peripherals provide drivers compatibility for these major operating systems. Other features of USB are SIMPLIFIED COMMUNICATION PROTOCOL which means that peripheral interface controllers can be components needed by fire wire adapters, results are cost saving and simplified and more understanding interfacing.

USB Socket as seen on Computer Cabinet

Pin out Description on Motherboard

Pin No.	Name	Description
1	VCC	+5voltage (max. 500mAmp)
2	D-	Data - (Input to computer)
3	D+	Data + (Output from computer)
4	GND	Ground for voltage

DISADVANTAGES OF USB

*Other computer equipment (such as Scanners, Digital Cameras, MP3 players, Storage Devices etc.) also use USB connections so you may find yourself having to unplug and replug the modem or the other devices if you don't have enough USB ports available.

(NB: However, you can also buy a USB port from a computer shop)

*USB modems are powered by your computers USB port, so if your computer is turned off, the modem is turned off.

*Some operating systems (such as Win 95, NT4, early versions of Linux, Windows 3.x etc) are not USB compatible.

APPLICATIONS OF USB

USB peripheral devices such as USB keyboard, USB mouse, USB scanners and others can easily be connected to USB computers with minimal hardware and software set up requirements. USB can have capable bi-directional data flow, allowing innovative technology as force feedback to other software configurable devices. USB to SCSI, Parallel, Serial, RJ45 Ethernet adapters are ideal for computing applications.

FIREWIRE

- Known as IEEE-1394
- Has high speed, low cost interconnection standard
- Flexibility and speed in mind
- This is another generation of Plug and Play
- Standard speeds are 100,200,400mbps.
- Ideal for connecting high-end consumer electronics like digital A/V equipment also specialised computer peripherals.
- Fire wire does not require the computer to be rebooted to recognise newly connected devices also is USB, fire wire is capable of higher data transfer
- It is also better applied to high-band width multi- media applications such as digital A/V peripherals.
- It was bided from e-bay starting from £1

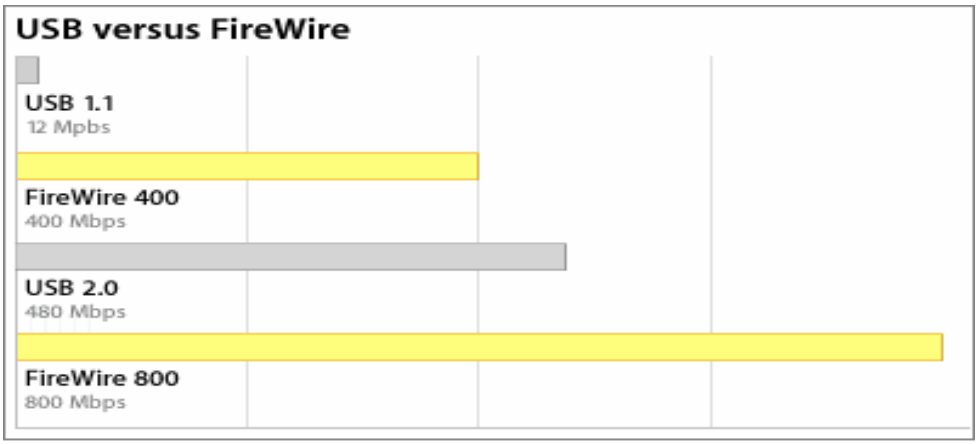
System Requirements

PC Users

- Built-in Fire Wire port or a Fire Wire PCI adapter (OHCI compliant)
- Minimum 32 MB RAM
- Minimum 200 MHz processor
- Windows 98 SE (second edition) or higher
- CD-ROM drive

Macintosh Users

- Fire Wire-enabled Macintosh computer
- Minimum 32 MB RAM
- Mac OS 8.6 or higher
- CD-ROM drive



Due to the speed and efficiencies of FireWire 800, in many cases the effective bandwidth is more than twice that of USB 2.0.

BENEFITS OF FIRE WIRE

1. The devices are addressed dynamically and instantly when connected and yet does not require host computer to be restarted.
2. Unlike SCSI, no cable termination is required and devices can be connected in different configuration.
3. Ultra-high sped capabilities of fire wire make it a perfect match for connecting digital air peripherals.

The main disadvantage of Fire wire is that it is very expensive and so most people could not afford. Old computers do not have the fire wire connectors and because of the high quality they will throw away the old for the new contributing to waste.

Fire wire Adapter

Is a 1/0 card installed in computer and provides a number of fire wire ports. Star Tech.com has 3-port and 4-port PCI 1/0 fire wire cards as well as Card bus version for notebook computers.

Fire wire cable

Connects fire wire adapter to fire wire peripherals. The cable is 6-wire shielded twisted pair type.

3 PORT PCI ADAPTERS.