



Ethiopian TVET-System

Information Technology Support Service

Level I

LEARNING GUIDE #19

Unit of Competence:	Connect Hardware Peripherals
Module Title:	Connecting Hardware Peripherals
LG Code:	ICT ITS1 L01- LG-19
TTLM Code:	ICT ITS1 TTLM MO6 1019v1



LO1: Confirm Requirements of Clients

Instruction Sheet	Learning Guide # 19
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This learning guide is developed to provide you the necessary information regarding the following content coverage and topics –

- Introduction to computer and connecting peripherals
- Identify client requirements based on organizational standards
- Documenting and reporting client requirements and peripheral
- Taking action to ensure client support expectations

This guide will also assist you to attain the learning outcome stated in the cover page.

Specifically, upon completion of this Learning Guide, you will be able to:–

- Identify and confirm client peripherals requirements in accordance with organizational standards
- Document client requirements and peripherals needed in line with organizational standards and report findings to the appropriate person
- Verify client requirements with appropriate person in line with organizational standards and reporting procedures
- Take action to ensure client support expectations are covered by vendor warranty and support services

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 6.
3. Read the information written in the information “Sheet 1, Sheet 2, Sheet 3 and Sheet 4, Sheet 5 ” in page 3, 22, 29, 33 and 35 respectively.
4. Accomplish the “Self-check 1, Self-check t 2, Self-check 3 and Self-check 4, Self-check 5 in page 16, 27, 32, 34 and 37 respectively.
5. If you earned a satisfactory evaluation from the “Self-check” proceed to “Operation Sheet 1 in page 18.
6. Do the “LAP test” in page 20, 28.

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Information Sheet 1	Introduction to Computer and Connecting Peripherals
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1.1. Definitions of Peripheral Devices

External or tangible devices which are attached to the external part of the computer system unit. Any device connected internally or externally to a computer system unit and used in the transfer of data as well as processing information. A personal computer or workstation processes information and, strictly speaking, that is all the computer does. Data (unprocessed information) must get into the computer, and the processed information must get out /displayed from the system. Entering and displaying information is carried out on a wide variety of accessory devices called peripherals, also known as input/output (I/O) devices. Any input, output or external storage device connected externally or internally communicate with the computer's processors is termed as peripherals examples, monitor, keyboard, printer, disk, tape, graphics tablet, scanner, joy stick, paddle or mouse etc.

1.2. Categories of Peripherals and Device Drivers

Peripheral devices can be categorized in to three (3), Input device, Output devices and Internal and external storage devices.

- 1.2.1. **Device drivers:** - It is a small program that tells the computer how to communicate with input/output (peripheral) devices. Every peripheral device needs device driver to communicate with the computer system.
- 1.2.2. **Input device** - is a device that has been used as a means of input. It is any peripheral (piece of computer hardware equipment) used to provide data and control signals to an information processing system such as a computer or other information appliance. The common input devices are keyboard, mouse, and scanner.
 - ✓ **Keyboard** - The computer key board is used to input, or enter, letters, numbers, symbols, punctuations and commands into the computer. The standard keyboard layout is sometimes called QWERTY layout and it is the most common layout.



How keyboard works: - The keys are arranged in rows and columns. When a key is pressed, a unique row-and-column signal is generated and sent to the keyboard interface IC on the keyboard. The keyboard interface then converts the row-and-column signal into single byte code

called a Key code or scan code. When the key is released, a second signal is sent to the keyboard interface IC, which generates a break code. The keyboard interface IC then sends the scan codes by means of serial connection through the keyboard interface to the computer. The keyboard controller, located on the motherboard, converts the signals to parallel data and generates an interrupt so that the input can be serviced by the microprocessor.

- ✓ **Mouse** or a **pointing device** is any human interface device that allows a user to input spatial data to a computer. In the case of mice and touch screens, this is usually achieved by detecting movement across a physical surface. Analog devices, such as 3D mice, joysticks, or pointing sticks, function by reporting their angle of deflection. Movements of the pointing device are echoed on the screen by movements of the cursor, creating a simple, intuitive way to navigate a computer's GUI.



There are three different types of mouse such as:-

- ✓ **Mechanical mouse**: - The mechanical mouse consists of a ball that rolls one of two wheels inside the mouse. This wheel contains a circle of holes or notches that allow a LED light to be shined through and detected by a sensor, as each wheel spins they represent the X or Y axis for the mouse pointer. This mouse is much more accurate than the traditional mechanical mouse that used only wheels and rollers, however is not as good as an optical mouse.
- ✓ **Optical mouse** - Computer mouse that utilizes light-emitting diodes (LED) or laser as a method of tracking movement. These mice are more proficient than other computer mice. These mice are easily identified by examining the bottom of the mouse. If the mouse has no ball or has a light emitting from the bottom it's most likely an optical mouse. This mouse is much more accurate than the ordinary optical mechanical mouse that relies on the traction between the mouse ball and the rollers. One drawback to an optical mouse is they can have problems in bright lights. New optical mice no longer have

the disadvantages of earlier mice and are capable of being utilized on any surface. In comparison to the traditional Optical-Mechanical mouse, the Optical is a much better solution for a computer mouse.

- **Scanner** is a device that can scan or digitize images on paper and convert them to data that the computer can use. They can then be stored in a file, displayed on the screen, added to documents, or manipulated.



Other input devices Composite devices



- **Wii Remote with attached strap**

Input devices, such as buttons and joysticks, can be combined on a single physical device that could be thought of as a composite device. Many gaming devices have controllers like this. Technically mice are composite devices, as they both track movement and provide buttons for clicking, but composite devices are generally considered to have more than two different forms of input.

- ✓ Game controller
- ✓ Gamepad (or joy pad)
- ✓ Paddle (game controller)
- ✓ Wii Remote

- **Imaging and Video input devices**

Video input devices are used to digitize images or video from the outside world into the computer. The information can be stored in a multitude of formats depending on the user's requirement.

- ✓ Digital camera

- ✓ Webcam
- ✓ Image scanner
- ✓ Fingerprint scanner
- ✓ Barcode reader
- ✓ 3D scanner
- ✓ Laser rangefinder

- **Medical Imaging**

- ✓ Computed tomography
- ✓ Magnetic resonance imaging
- ✓ Positron emission tomography
- ✓ Medical ultrasonography

- **Audio input devices**

In the fashion of video devices, audio devices are used to either capture or create sound. In some cases, an audio output device can be used as an input device, in order to capture produced sound.

- ✓ Microphone
- ✓ MIDI keyboard or other digital musical instrument

- **Printer**

In computing, a printer is a peripheral which produces a text and/or graphics of documents stored in electronic form, usually on physical print media such as paper or transparencies. Many printers are primarily used as local peripherals, and are attached by a printer cable or, in most new printers, a USB cable to a computer which serves as a document source. Some printers, commonly known as network printers, have built-in network interfaces, typically wireless and/or Ethernet based, and can serve as a hard copy device for any user on the network. Individual printers are often designed to support both local and network connected users at the same time. In addition, a few modern printers can directly interface to electronic media such as memory cards, or to image capture devices such as digital cameras, scanners; some printers are combined with scanners and/or fax machines in a single unit, and can function as photocopiers. Printers that include non-printing features are sometimes called multifunction printers (MFP), multi-function devices (MFD), or all-in-one (AIO) printers. Most MFPs include printing, scanning, and copying among their many features.



1.1.2. Output Device

An output device is any piece of computer hardware equipment used to communicate the results of data processing carried out by an information processing system (such as a computer) to the outside world. In computing, input/output, or I/O, refers to the communication between an information processing system (such as a computer), and the outside world. Inputs are the signals or data sent to the system, and outputs are the signals or data sent by the system to the outside.

Examples of output devices are:-

- **Speakers**

Computer speakers range widely in quality and in price. The computer speakers typically packaged with computer systems are small, plastic, and have mediocre sound quality. Some computer speakers have equalization features such as bass and treble controls.



- **Headphones**



Headphones are a pair of small loudspeakers, or less commonly a single speaker, held close to a user's ears and connected to a signal source such as an audio amplifier, radio, CD player or portable media player. They are also known as stereo phones, headsets or, colloquially cans. The in-ear versions are known as ear phones or ear buds. In the context of telecommunication, the term headset is used to describe a combination of headphone and microphone used for two-way communication, for example with a telephone.

- **Screen (Monitor):-** A monitor or display (sometimes called a visual display unit) is an electronic visual display for computers. The monitor comprises the display device, circuitry, and an enclosure. The display device in modern monitors is typically a thin film transistor liquid crystal display (TFT-LCD) thin panel, while older monitors use a cathode ray tube about as deep as the screen size.



The first computer monitors used Cathode ray tubes (CRTs), which was the dominant technology until they were replaced by LCD monitors in the 21st Century.

Originally computer monitors were used for data processing while television receivers were used for entertainment. From the 80s onwards, computers have been used for both data processing and entertainment, while televisions have implemented some computer functionality. The common aspect ratio of televisions, and then computer monitors, has also changed from 4:3 to 16:9.

1.1.3. The storage devices

Computer data storage, often called storage or memory, refers to computer components and recording media that retain digital data. Data storage is one of the core functions and fundamental components of computers. There are 3 types of storage devices:

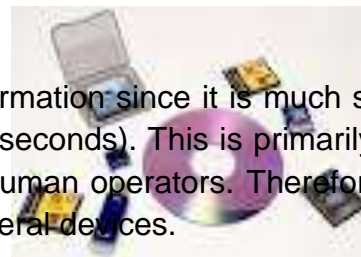
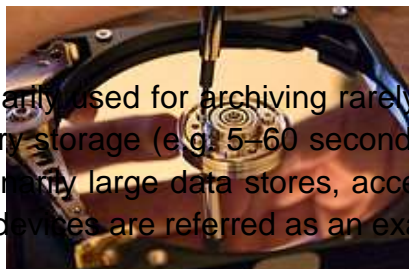
- **Primary Storage** – is also known as the main memory or a temporary storage device. It is fast in nature but can accommodate only few data. Data that has been stored in memory flushes off when you restart your computer, thus called temporary storage device.

It is the only one directly accessible to the CPU. The CPU continuously reads instructions stored there and executes them as required. Any data actively operated on is also stored there in uniform manner.



- **Secondary Storage** – Secondary storage (also known as external memory or auxiliary storage), differs from primary storage in that it is not directly accessible by the CPU. The computer usually uses its input/output channels to access secondary storage and transfers the desired data using intermediate area in primary storage. Secondary storage does not lose the data when the device is powered down—it is non-volatile. Examples of a secondary storage device are Internal Hard drive, external Hard Drive, Flash Disk, CD/DVD, Floppy disk, Memory card.

- **Tertiary Storage** - Tertiary **storage** or **tertiary memory** provides a third level of storage. Typically it involves a robotic mechanism which will mount (insert) and dismount removable mass storage media into a storage device according to the system's demands; this data is often copied to secondary storage before use.



It is primarily used for archiving rarely accessed information since it is much slower than secondary storage (e.g. 5–60 seconds vs. 1–10 milliseconds). This is primarily useful for extraordinarily large data stores, accessed without human operators. Therefore, external storage devices are referred as an example of peripheral devices.

1.1.4. Connectivity devices

The majority of external peripheral devices connect to the back of the computer's system unit with cables and connectors. The computer's system unit has a variety of ports available for use by different peripheral device cables.

A port is a socket that is used to connect the cables from peripheral devices to the computer or the position to plug peripheral devices.

- **Ports**

A port is an interface on a computer to which you can a device. Personal computers have various types of ports. Internally, there are several ports for connecting disk drives, display screens, and keyboards. Externally, Personal computers have ports for connecting modem, printer, mouse, keyboard, and other peripheral devices. The types of ports are:-

- ✓ **Serial ports:** is the oldest technology that is used to connect some types of mouse, keyboard, and other peripherals. As the name indicates, this port sends data serially that is one bit at a time. A serial port is also called male port since it consists of protruding pins. Its transfer rate is close to 10KBS data.
- ✓ **Parallel Ports:** are used primarily for connecting printers to your system. Because of this it is called LPT (line print) port. It is also called female port since it consists of holes. Parallel ports generate speeds of 100KBS and reflect transfers 10 times faster than serial speeds.
- ✓ **USB (Universal Serial Bus):** USB is a high performance-networking standard based on serial bus architecture. Most new computers and associated peripheral devices like printers and scanners support USB. USB

ports are used to connect just about any type of peripheral devices speed enhancements have greatly improved performance with USB 1.0 generating speeds at 14 MB/S and USB 2.0 attaining speeds of 480MB/S.

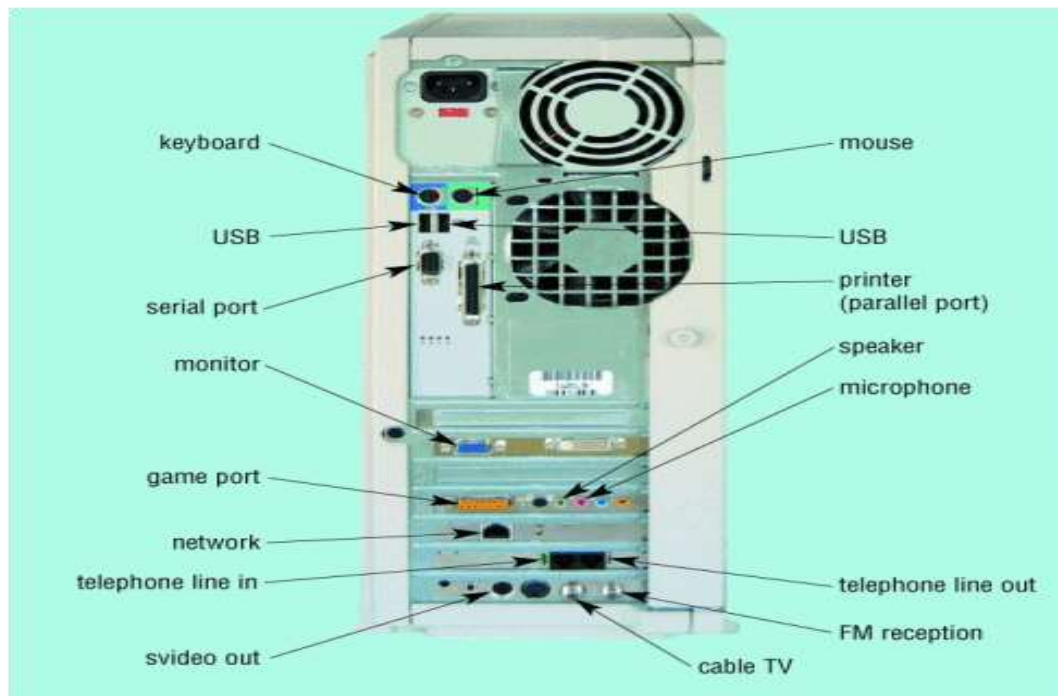


Figure: - Different types of ports at the back of system unit

There are several types of ports like serial port, parallel port, USB port, AGP port, power supply port and so on.

As the name suggests, the serial port transfers data serially one bit at a time. As a result, the serial port needs only wire to transmit 8 bits. The disadvantage is that it takes 8 times longer to transmit a byte. Also, it is necessary to send a start bit before each byte of data, a stop bit after the byte to mark the end of byte and a parity bit to help check the integrity of data. Serial ports come in the form of 9-pin or 25-pin male connector. Serial ports are often known as communication ports or RS232C ports. They are typically used to connect devices like old mouse and modem.



Parallel ports can send or receive a byte (8-bit) at a time. Unlike the serial port, these 8-bits are transmitted parallel to each other. Parallel ports come in the form of 25-pin female connector. Parallel ports are popularly used to connect printer, scanner, CD/DVD writer, zip drive, external hard disk drive, tape backup drive, etc.



To spare the user botheration of 8-pin, 25-pin, male, female connectors, the USB has been designed. It gives you a single, standardized, easy-to-use way to connect up to 127 devices to a computer. These devices include printers, scanners, mice, joystick, digital camera, web cameras, speakers, telephones, zip drives, network connections, scientific data acquisition devices, etc.



USB Port

The AGP (Accelerated Graphics Port) port is used to connect to graphic card that provides high-speed video performance typically required in games and other multimedia applications.

AGP Slot

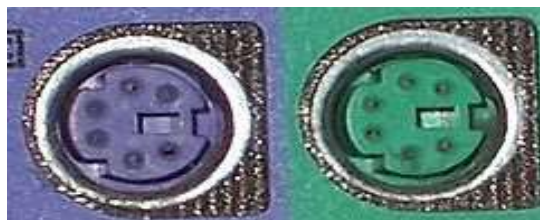


<http://www.computerhope.com>

Alternatively referred to as an Ethernet port, the LAN port is a port connection that allows a computer to connect to a network using a wired connection. In the picture to the right, is a close up example of what a LAN port looks like for a network cable using an RJ-45 connector. In the case of this example, the two led lights will blink when that port is active and receiving activity.



The PS/2 connector is a 6-pin Mini-DIN connector used for connecting some keyboards and mice to a PC compatible computer system. Its name comes from the IBM Personal System/2 series of personal computers, with which it was introduced in 1987. The PS/2 mouse connector generally replaced the older DE-9 RS-232 "serial mouse" connector, while the PS/2 keyboard connector replaced the larger 5-pin/180° DIN connector used in the IBM PC/AT design. The PS/2 designs on keyboard and mouse interfaces are electrically similar and employ the same communication protocol. However, a given system's keyboard and mouse port may not be interchangeable since the two devices use a different set of commands. Today this connector has all but been replaced by USB.



A power supply is a device that supplies electrical energy to one or more electric loads. The term is most commonly applied to devices that convert one form of electrical energy to another, though it may also refer to devices that convert another form of energy (e.g., mechanical, chemical, solar) to electrical energy. A regulated power supply is one that controls the output voltage or current to a specific value; the controlled value is held nearly constant despite variations in either load current or the voltage supplied by the power supply's energy source.

Every power supply must obtain the energy it supplies to its load, as well as any energy it consumes while performing that task, from an energy source.



A Video Graphics Array (VGA) connector is a three-row 15-pin DE-15 connector. The 15-pin VGA connector is found on many video cards, computer monitors, and some television sets. On laptop computers or other small devices, a mini-VGA port is sometimes used in place of the full-sized VGA connector.

- **Terminals**

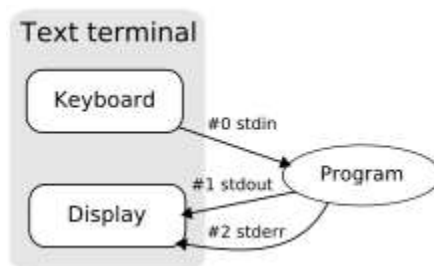
A **computer terminal** is an electronic or electromechanical hardware device that is used for entering data into, and displaying data from, a computer or a computing system.



The function of a terminal is confined to display and input of data; a device with significant local programmable data processing capability may be called a "smart terminal" or fat client. A terminal that depends on the host computer for its processing power is called a dumb terminal or thin client. A personal computer can run software that emulates the function of a terminal, sometimes allowing concurrent use of local programs and access to a distant terminal host system.

- ✓ **Types of text terminals**

The **System console** is a text terminal used to operate a computer. Modern computers have a built-in keyboard and display for the console. Some Unix-like operating systems such as Linux, FreeBSD and Mac OS X have virtual consoles to provide several text terminals on a single computer.



A **terminal emulator** is a computer program in a graphical windowing system that lets the user operate a text terminal in a window. This lets applications for text terminals run under a modern graphical user interface. Popular terminal emulators include xterm and rxvt.

1.1.5. Connectors

- **CAT5 network cable** - This cable allows the computer to communicate to other computers over a network. It also provides networked computers access to the Internet.



- **VGA cable** - This cable is usually permanently connected to a monitor. Small screws hold the cable in place.



- **USB cable** - Most PC's now have these fast and versatile ports on the front and back. They can be used for portable storage devices, digital cameras, scanners, video cameras, printers, keyboards and mice - just about everything!



- **Power cord** - This is a standard "kettle cord" that connects the computer to the AC outlet on the wall and the power supply of the computer. This MUST be unplugged if you are ever doing any maintenance work inside the computer.



- **Printer cable** - This is a 25-pin "D" shaped connector that connects printers to the parallel port on a computer. (Newer printers may connect with a USB plug.)



- **PS2 cable** - On most computers these days, this connection is used for both the mouse and the keyboard. This plug has 6 pins.



- **Audio cable** – This is used to connect the speaker to the audio port.



Self-Check 1	Written Test
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Name: _____ Date: _____

Instruction: Answer all the questions listed below, if you have some clarifications- feel free to ask your teacher.

1. What do you call the external or tangible devices which are attached to the external part of the computer? **(1 point)**
2. What is the small program that tells the computer how to communicate with input/output (peripheral) devices? **(1 point)**
3. Given the different computer peripherals, group them by writing each of it where categories they belong on the table below: **(1 point each)**
 - a. Mouse
 - b. Monitor
 - c. Core i3 chip
 - d. Printer Cable
 - e. Serial cable
 - f. Printer
 - g. Scanner
 - h. Speaker
 - i. LCD Monitor
 - j. PS2 cable
 - k. Dual Core chip
 - l. Keyboard

Input Devices	Output Devices	Internal Storage devices	Internal Storage devices

Note: Satisfactory rating – 12 points above / Unsatisfactory - below 12 points.
You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____



Short Answer Questions



Operation Sheet – 1	Steps to Connect Hardware Peripherals
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This procedure provides basic instructions for connecting the computer's external peripheral devices to the system unit. You will use these procedure/steps when interconnecting new computer peripheral device components that you have/had either assembled or purchased. I do not attempt to cover the connection of every conceivable peripheral, but the more common peripherals are as follows:-

1. **Connect power to monitor:** Attach the power cord to the back of the monitor and connect it to your power protection device.
2. **Connect monitor to case:** Attach the video cable to the monitor and to the system case. On modern systems the cable will have a male connector on both ends, each of which has 15 pins. Note that on some monitors, the data cable is integrated into the monitor itself instead of there being a detached cable. Some newer high-end monitors also may use five round BNC connectors to attach to the monitor instead of a D-shell 15-pin connector.
3. **Connect power to case:** Attach the power cord to the back of the PC and plug it into your power protection device.
4. **Connect keyboard:** Attach the keyboard to the back of the system case using the round connector. Depending on your system you will have either a large-diameter five-pin connector or a smaller six-pin connector. The connector is keyed and can only be inserted one way. On ATX systems, make sure you use the correct connector, because the keyboard and mouse connectors are the same size and shape.
5. **Connect mouse:** Attach the mouse to the back of the system case. Depending on your mouse you will have either a D-shaped 9-pin connector (serial mouse) or a small, round, six-pin connector (PS/2 mouse). If using a PS/2 mouse, make sure you use the correct case connector, because the keyboard and mouse connectors are the same size and shape.
6. **Connect phone line to modem (if applicable):** If your system has an internal modem in it, connect the phone cord to the appropriate jack. Most modems have two jacks; one is to connect the modem to the wall and the other is a "pass-



through" for you to attach a phone to. You want to attach to the one that is normally labeled "Line" or "Wall" and connect the other end to your phone jack on the wall.

7. **Connect sound devices to sound card (if applicable):** If you have a sound card in your system, you will want to attach either your home stereo or your computer speakers to it, depending on which you are using.
8. **Connect printer (if applicable):** If you have a printer, connect the printer cable to it and then the other end to the parallel port on the back of the PC. This connector is D-shaped and will only go in one way.
9. **Connect other peripherals (if applicable):** Depending on your system you may have other peripherals you will want to hook up as well.



LAP Test	Practical Demonstration
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Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within --- hour.

A. Connecting Hardware Peripherals to System Unit

1. **Set the keyboard** directly in front of where you'll be working and set the mouse to the right if you are right-handed or to the left if you are left-handed. Run the keyboard and mouse cables to the back of the computer and plug them into the PS/2 ports, with the keyboard going into the left port and the mouse going into the right port. If the ports are placed vertically, there will be a keyboard icon and a mouse icon next to each port. If the keyboard and/or mouse are USB, plug them into the USB ports.
2. **Set the monitor** on your desk in front of the keyboard and plug the power cable into an electrical outlet. Plug the monitor cable into your video output port located on the back of your video card. If you have an integrated video card (the video output chip is part of the motherboard), then the video port will be located below the USB and PS/2 ports.
3. **Plug the network cable end into the jack** on the back of your network card, which should be located below your video card. The network cable end looks like a wide telephone line end, and the network port resembles a wide phone jack. The network cable end can only be inserted one way; with the push-to-release tab side going into the same side as the notch on the network jack.
4. **Plug the phone line into your modem, if necessary:-** the modem will have two ports that both fit the phone cable, but one will be marked "PHONE" and one will be marked "LINE." You want to plug the phone line into the "LINE" port. The "PHONE" port enables you to connect a phone into your computer, which you can use when not using the modem to connect to the Internet. If you have an external modem instead of an internal unit, you can plug the external modem cable into the serial port on your computer.
5. **Plug your printer into a free USB port** or, if your printer connects via a parallel plug, insert the parallel plug into the parallel port. The parallel port is a 25-pin trapezoidal plug that will be located near the PS/2 ports and serial port.

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6. **Plug your speakers'** power cable into an electrical outlet and plug the sound cable into the speaker-out port on the back of your sound card. There will be up to three sound ports on the back of the sound card. These ports are commonly color coded, with the speaker-out port being green, the headphone or line-out port being orange or yellow, and the microphone input port being pink.

7. **Plug your webcam, camera,** external storage device and other assorted USB-interface peripherals into the USB ports, which will likely be located in several places on the exterior of your computer. USB ports can handle a wide variety of devices and are small and rectangular. The plug for a USB device is flat and rectangular and is about 12 millimeters in length. USB plugs can only be inserted into a USB port one way, so if it can't be inserted in one direction, **flip** the plug over and try again.



Information Sheet 2	Identifying and Confirming Client Peripherals
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2.1. System Development Life Cycle

To determine appropriate hardware peripheral devices needed within an organization, it is important to clearly understand what your client needs. Since, the clients don't have a clear idea of what they want until they have been presented with a series of options. Working out clients' needs requires careful planning and organisation. The system development life cycle is a methodology that computer consultants often follow to help them properly investigate the client's information technology needs within the organization. The first three stages of the system development life cycle are:-

- Planning
- Analysing
- Designing

Planning stage involves identifying the client's current technology and taking into account any limitations. During the planning phase it is necessary to find out information including:

- ✓ System specifications
- ✓ Connections available
- ✓ Budget constraints
- ✓ Available timeframe
- ✓ Availability of physical space for work activities

A feasibility study can be performed to provide a preliminary investigation report to the client about benefits, costs and impact to the organisation. Additionally, a project request form allows a client to document their initial request.

System specification is important to find out the specifications of the computer system you are planning to connect the peripheral device to. Many newer types of peripheral devices require a specific amount of memory, CPU speed, hard disk space, and may only be compatible with certain operating systems. You also need to be aware of the peripheral's system requirements. The manual for the peripheral device as well as the manufacturer's website will help you determine the minimum system specifications.

2.2. Computer Peripherals Requirement Considerations

Desktop hardware, such as a desktop computer itself, is the most common type of IT hardware purchased by a small business and/or organization. The cost of hardware

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depends on its specification, which in turn is determined by some key components. When you buy hardware component of computer system, you will need to decide what the specification of these key components should be under taken. Among these the basic ones are as follows:-

The processor is the driver of the computer. Processors are usually differentiated by speed, measured in gigahertz (GHz). The higher the GHz, the faster the computer will run. You should buy the fastest processor you can afford, but a 3 GHz processor will normally be enough for most business functions, e.g. word processing and spreadsheets, together with some multimedia.

Memory is used by the processor to run programs. Generally, the more random access memory (RAM) you have, the better your computer will run when using several programs at once. Your computer should have enough memory to make the most of the processor speed. For a 3 GHz processor, for example, you should have around 2-3 gigabytes (GB) of RAM.

The hard disk is used to store the data you create in your business, as well as the programs you use. Its capacity is much greater than the RAM. An office computer with a 3 GHz processor should have at least 200 GB of hard disk space, but if you intend to use a single desktop PC as the main storage location for all your business data, you will need at least 500 GB.

External plug-ins, such as DVD-R/RW, or CD-R/RW drives can be used to supplement your computer.

The monitor is the computer's display screen. Liquid Crystal Display (LCD) or flat screen monitors offer reduced bulk and lower power consumption, relative to cathode ray tube (CRT) monitors. Monitors are normally measured diagonally in inches - typically 19, 22 or 24. Larger or wide-screen monitors allow you to compare two documents on-screen. Many monitors have an aspect ratio - the proportion of image width to height - of 16:10, although screens with a 16:9 ratio are becoming more widely available and offer higher resolution.

Display adapter software requiring a better than average computer graphics display, like graphics editors and high-end games, often define high-end display adapters in the system requirements.

- **Software requirements**

Software Requirements deal with defining software resource requirements and pre-requisites that need to be installed on a computer to provide optimal

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functioning of an application. These requirements or pre-requisites are generally not included in the software installation package and need to be installed separately before the software is installed.

- **Platform**

In computing, a platform describes some sort of framework, either in hardware or software, which allows software to run. Typical platforms include a computer's architecture, operating system, or programming languages and their run time libraries.

Operating system is one of the first requirements mentioned when defining system requirements (software). Software may not be compatible with different versions of same line of operating systems, although some measure of backward compatibility is often maintained. For example, most software designed for Microsoft Windows XP does not run on Microsoft Windows 98, although the converse is not always true. Similarly, software designed using newer features of Linux Kernel v2.6 generally does not run or compile properly (or at all) on Linux distributions using Kernel v2.2 or v2.4.

- **Web browser**

Most web applications and software depending heavily on Internet technologies make use of the default browser installed on system. Microsoft Internet Explorer is a frequent choice of software running on Microsoft Windows, which makes use of ActiveX controls, despite their vulnerabilities.

- **Other requirements**

Some software also has other requirements for proper performance. Internet connection (type and speed) and resolution of the display screen are notable examples.

Examples

Following are a few examples of system requirement definitions for popular PC games and trend of ever increasing resource needs:

For instance, while StarCraft (1998) needed:

- ✓ Windows 95 or NT or superior
- ✓ Pentium processor at 90 MHz or higher
- ✓ 16 MB RAM
- ✓ 80 MB available in the hard disk
- ✓ CD-ROM, 2x or higher



- ✓ DirectX 3.0 or higher

As a cost-saving consideration, for a small enterprise, getting the exact client specifications would be a good consideration but for a big enterprise, getting the high end hardware would be of great choice. Considering the future hardware trend would also be a deciding factor. If the price of a specific peripheral remains the same for a long period of time, you could consider buying a high end one since over time the price remains the same while you get a higher hardware performance. Otherwise, choose a medium range peripherals or just exactly what your organization need since for a short period of time the price lowers so you could have an opportunity of upgrading it to a high end one in the future at a low cost. Another factor is what operating system are you going to use? Below are the hardware requirements for installing Windows XP and Windows 7:

- **Hardware Requirements for Windows 7 system**

If you want to run Windows 7 on your PC, here's what it takes:

- ✓ 1 gigahertz (GHz) or faster 32-bit (x86) or 64-bit (x64) processor
- ✓ 1 gigabyte (GB) RAM (32-bit) or 2 GB RAM (64-bit)
- ✓ 16 GB available hard disk space (32-bit) or 20 GB (64-bit)
- ✓ DirectX 9 graphics device with WDDM 1.0 or higher driver

After you have determine your organization needs, you can now start documenting your hardware needs, to help you decide on the specifications, canvassing would be a great idea. There were several sites in the net where you can browse and compare the price of the different medium range to high end computer peripherals. One by one you can list down the hardware specs for your client. The list below will help you in documenting your chosen hardware:-

- ✓ Processor
- ✓ RAM or Memory
- ✓ Hard Disk size
- ✓ Video Card
- ✓ LAN Card
- ✓ DVD drive
- ✓ Sound Card
- ✓ Mouse
- ✓ Keyboard
- ✓ Monitor

One deciding factor to consider in buying computer peripherals is the warranty and after sales support service. A cheaper price would vary greatly on the performance, durability

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and warranty. Mostly, the cheaper it gets, the less durable and less warranty you could expect. Oftentimes, the good warranty and after sales service they provide, the better the quality of the products they have. Do not risk buying the cheaper one if you're not sure of the quality. After you have finalized your hardware specifications, you can now forward it to the right person for budget considerations and finally for procurement.

- **Budget constraints**

While planning the connection of hardware peripheral devices, it is important to be aware of the client's available budget. A client needs to determine whether the benefits that will be gained from the peripheral device justify the financial outlay. Factors including the organisation's size, the necessity of the peripheral device to the organisation, number of people requiring the device, will all contribute to the organisation's allocation of a budget. Costs will sometimes prohibit an organisation from proceeding with the purchase of equipment. Another cost to consider is ongoing maintenance. A laser printer, for example, may initially be more expensive to purchase than an inkjet printer. However when you consider that some inkjet cartridges can cost nearly as much as an inkjet printer, it may be more practical to choose a laser printer, where toner costs are more reasonable.

- **Available timeframe**

The time available to complete a task also needs to be considered when identifying client requirements. If, for example, a peripheral device is needed urgently, it will be necessary to quickly find out which suppliers can immediately provide the peripheral equipment.

- **Physical space restrictions**

Before considering acquiring any peripheral device, planning needs to be done to work out where and how the peripheral will reside. The following questions need to be considered:

- ✓ What physical space is available to accommodate the device?
- ✓ Are power points in a near proximity if the device needs them?
- ✓ If a peripheral does not have access to a suitable power source, problems may occur including the overloading of power boards and power leads causing dangerous obstructions to users of the equipment.
- ✓ Will the installation of the device mean other equipment needs to be relocated?
- ✓ Could the device cause disruption or impact on the safety of users?



Self-Check 2	Written Test
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Name:- _____ Date: - _____

Instruction: Answer all the questions listed below, if you have some clarifications- feel free to ask your teacher.

1. What are the three (3) stages of the system development life cycle? **(3 points)**
2. In planning phase, what five (5) information is necessary to find out? **(5 points)**
3. The processor's speed has been measured in what? **(1 point)**
4. How many processors speed in Ghz is needed for most business functions, e.g. word processing and spreadsheets, together with some multimedia? **(1 point)**
5. If you have 3 Ghz processor's speed, how much ideal memory (RAM) size you must have? **(1 point)**
6. An office computer with a 3 GHz processor should have at least how many GB of hard disk space? **(1 point)**
7. What can we use to supplement your computer's memory? **(1 point)**
8. Which monitor is better in terms of electric consumption? **(1 point)**
9. What are the 3 Software requirements needed in before buying a PC? **(3 points)**
10. What are the Hardware Requirements for Windows 7 operating systems in terms of: **(4 Point)**
 - ✓ Processor
 - ✓ RAM or Memory
 - ✓ Hard Disk size
 - ✓ Video Card

Note: Satisfactory rating – 18 points above / Unsatisfactory - below 18 points
You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions

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LAP Test2	Practical Demonstration
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Name: _____ Date: _____
 Time started: _____ Time finished: _____

Instructions: You are required to perform the following individually with the presence of your teacher.

1. Showing the ports below, demonstrate what peripheral was needed for each port



2. Name 3 ports where mouse can possibly be connected to.
3. Give at least 4 peripherals that can be connected via USB ports.
4. What is the difference between Serial and Parallel ports?

Note: - Your teacher will evaluate your output either satisfactory or unsatisfactory. If Unsatisfactory, your teacher shall advise you on additional work. But if satisfactory, you can proceed to the next topic.



Information Sheet – 3	Documenting and Reporting Client Requirements and Peripherals
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3.1. Feasibility study

A feasibility study can be carried out to show the client benefits, approximate costs of the new equipment and the impact on the organisation when documenting and reporting client requirements needs. Several hardware devices can also be recommended to the client. The aim of the feasibility study is to recognise the best solution under the circumstances by identifying the effects of this solution on the organisation. After undertaking a feasibility study, it may be discovered that a simple solution is possible. Take the example of an organisation that would like to update their monitors so that they can have better screen resolution. Changing the monitors' internal settings could be a very simple solution to obtain an improved resolution.

A feasibility study can also reveal that a client's peripheral requirements are not achievable. The requirements may exceed budget, or the requested peripheral devices may not be compatible with the current computer system. The results of a feasibility study can be determine whether or not an organisation proceeds with the purchase and installation of the peripheral devices based on client needs and organizational guidelines and standards.

- **Client Request Form**

An initial request for hardware peripheral devices can be documented using a project request form. This form documents information from both the client and the computer consultant in order to document preliminary requirements. Typical information requested on a project request form includes:-

- ✓ Project title
- ✓ Date received
- ✓ Completion date
- ✓ Project number
- ✓ Description of problem
- ✓ Objectives
- ✓ Anticipated benefits
- ✓ Person requesting
- ✓ Constraints.

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- **Sample Client request form**

Request date: Required

Request information:

First name: **Last name:**

Department or division: **Telephone:**

Email:

Client title:

Client information:

What is the purpose of the proposed client needs?

What are the benefits of the client requirements?

Other information or comments:

3.2. Analyzing



In the analysis phase, the client's requirements are investigated in more depth. It is important to try to gain as much information from the client as possible, in order to obtain an accurate understanding of the situation. Detailed client requirements, such as:-

- ✓ Specific features of the device required
- ✓ The number of people who will need to use device
- ✓ Support expectations
- ✓ Training requirements can all be obtained during this phase through, interviews, questionnaires, checklists and observations are some methods that consultants use to gather information. If a device is to be used by a large group of users, a questionnaire or checklist could be constructed to find out what features are required by the majority of users. Interviewing users can provide a better way of finding out specific information.

- **Interviews**

A well-prepared interview can help provide you with valuable information about your client requirements. Information that has been collected during the planning stage can also give you some useful background information when preparing questions.

Questions asked of a client may be specific or open ended. Specific questions generally mean that the client will give a yes/no response or a specific answer. Open-ended questions, however, generally commence with 'how' or 'why'. These types of questions help to discuss and clarify issues and establish a firmer understanding of client requirements. For example, some questions you may want to ask during an interview to replace an existing printer could include:-

- ✓ How will a new printer solve existing printer issues?
- ✓ Who will be using the new printer the majority of the time?
- ✓ What will be the new printer key purposes? Eg. Letters, Advertising brochures, Information from the internet.

- **Questionnaires**

Questionnaires are helpful when you need to gather information from a number of clients. A number of questions incorporating short answers, multiple choice and true/false choices can help you quickly determine what kinds of features the majority of clients are requiring.

- **Checklists**



In a similar manner to questionnaires, checklists that ask clients to choose what features they would like from a specific peripheral device can also provide an efficient way to determine a set of popular requirements.

- **Observations**

Even informal observations of current business procedures can provide another way of determining client needs. Observing users as they go about their day-to-day tasks can confirm, if current peripheral devices are not working properly or assessing the need for a new peripheral devices.

3.3. Designing

The design phase enables you to figure out an effective solution. All the information you have gathered via questionnaires, interviews, observations and during planning can be assessed to determine the best way of satisfying client requirements.

There will often be several peripheral devices that are capable of performing the job satisfactorily. An evaluation grid can be created to show the client each device's functionality.

Table3.1. the example below illustrates an evaluation grid that could be used for appraising scanners.

Specifications	Scanner 1	Scanner 2	Scanner 3
Price			
Optical resolution (dpi)			
Dimensions			
Operating system			
Software included			
Comments			

Once client requirements have been clarified, all requests for hardware peripherals need to be documented clearly in a concise form. An organisation will often have its own organizational standards (for example, report templates, guidelines) to which you will need to adhere. The documentation will also need to be checked and confirmed by the client before a request for purchase is sent to the preferred supplier.



4.1. Demonstrate client requirements in line with organizational standards

Verifying client requirements with appropriate person in line with organizational standards, guidelines and reporting procedures when demonstrating client requirement needs of hardware peripheral devices within different organization.

All users can test hardware peripherals, confirm client satisfaction and make amendments as required for client, in line with procedures and guidelines to demonstrate client requirements.

- **Ensure client support expectations**

When it comes to client support, your clients have certain expectations which they expect you to meet consistently. They see you as a single point of contact for assistance in the utilization of the organization's computing resources, and to provide that assistance in a timely and professional manner. They expect you to provide:-

- ✓ Connectivity
- ✓ Hardware and software support
- ✓ Consultation and training
- ✓ General information and technology recommendations
- ✓ Web-accessible information etc.

Your client expects that where equipment become defective that they will be fixed promptly. One way to fulfill this requirement is to know which pieces of equipment are under warranty so that the appropriate action may be taken.



Self-Check – 4	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:-

1. Ensure client support expectations when connecting hardware peripherals? (4 points)
2. Demonstrate client requirements while connecting hardware peripherals? (4 points)

Note: Satisfactory rating - 8 points

Unsatisfactory - below 4 points

You can ask your teacher for the copy of the correct answers.

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5.1. Agreements for Warranties and Support

Before acquiring hardware peripheral devices, it is vital to assess what kind of warranties, service and support, prospective suppliers will provide.

- **Warranties**

A warranty is an agreed upon term which covers a computer or computer component. Generally, most computers have a 1 or 3 year warranty. This warranty may or may not cover the service, repair and replacement of computer parts.

An extended warranty is an available option provided by manufacturers or third-party companies that provides additional support and/or repair of a computer or other hardware devices beyond its standard warranty.

- **Service and support**

It is important to know what kind of support services are offered by the prospective suppliers. There are many questions to consider such as:

- ✓ If a device requires repairs does it have to be sent back to the supplier (called 'Return to base') or will they provide on-site visits?
- ✓ What is the average response time if service is required?
- ✓ What kinds of maintenance and repair costs could be incurred during the duration of use of the device?
- ✓ Will the device require regular servicing? If so, how many services will be necessary over a one-year period?



- **Summary**

There are a large variety of peripheral devices that can be connected to a computer for input, output, storage or communication purposes. Before acquiring any hardware peripheral device it is fundamental that you have a clear understanding of what the client requires and/or needs. This requires a considerable amount of planning and analysis of needs. Examining system specifications, checking availability of ports, physical space, and confirming budgets and time frames are just some considerations that need to be taken into account. Methods such as interviewing, questionnaires and observation can all assist gathering this information.

Once client requirements have been clarified, suggested solutions need to be documented to the client in accordance with organisational standards. A solution can comprise a suggested list of products. Once the product has been chosen this needs to be verified by the client. Before proceeding with the purchase, it is also important that the warranty and support agreements of the supplier will be satisfactory for the client's needs.



Self-Check – 5	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:-

Instruction: - Say true or false for the following question

1. It is important to know that support services are offered for the prospective suppliers of the equipments. (4 points)
2. Standard warranty and support services are not necessary for the users of hardware peripherals devices. (4 points)

Note: Satisfactory rating - 8 points

Unsatisfactory - below 4 points

You can ask your teacher for the copy of the correct answers.

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List of Reference Materials

- **Winn L Rosch.** The Winn L. Rosch Hardware Bible (6th Edition).
- **Christopher A. Crayton Joel Z. Rosenthal Kevin J. Irwin.** The A+ Certification & PC Repair Handbook (Networking Series).
- **Richard Palmer.** Maintenance Planning and Scheduling Handbook, 2nd Edition (McGraw-Hill Handbooks).
- The A+ e-books and IT Essential Presentation and different URLs resources.



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