Basic Hardware components

Hardware represents the physical and tangible components of a computer i.e. the components that can be seen and touched. Examples of Hardware are following:

Input devices: keyboard, mouse etc.

Output divices: printer, monitor, speaker etc. Secondary storage devices: Hard disk, CD, DVD etc.

Internal components: CPU, motherboard, RAM etc.

Basic computer components

1. Central Processing Unit (CPU)

The CPU is the most important part of your computer. It basically is a component which performs the basic operations of the computer, processes the data received and coordinates the

flow of data between the various parts of the computer. It's more commonly known as the 'brain' of the computer.

2. Random Access Memory (RAM)

This is the part of the computer that hold the data which you are currently working on. It's a more volatile form of data storage, in the sense that if you suddenly encounter an electricity interruption, all the data you were currently working on will be lost. The more capacity your RAM has, the more data it can store temporarily, without slowing down your computer.

3. Hard Drive

This is a data storage medium which, unlike the RAM, saves the data even if there's a current failure or even when you turn it off. It houses all the programs you install, including your operating system, word processor, media players and other programmes you use. In addition, it also stores all your other data such as pictures, documents, spreadsheets, music and games. There are 2 types of hard drives, IDE and SATA. The latter is the one which is compatible with all modern computers.

4. Motherboard

This is the main circuit board of the computer, and all of your internal and external hardware of the computer is plugged into the motherboard. The speed at which the data travels across the motherboard is referred to as the BUS speed. Modern motherboards use the PCI Express (PCI-E) technology to increase the transfer rate of data across the motherboard.

5. DVD Drive / Burner

A DVD drive is a device which can read data stored on a DVD or CD, but cannot write anything on CDs or DVDs. To do this, you need a DVD writer (DVD Burner). Data is written on the DVD through a laser beam. A DVD Burner can also be used to burn data to CDs.

6. Ethernet Card

This is a circuit board which is connected to the motherboard, and which will enable your computer to connect to the Internet via an ADSL / DSL network, or to connect your computer with other computers in a network. In addition to an Ethernet card, you will need an external

component called a Router.

7. Sound and Video Card

The sound card is a circuit board plugged into your motherboard, which enable you to input sound and to provide audio output. A video card is another circuit board which enables your computer to display high quality videos. Both these components are embedded in the modern motherboards, and people purchase external ones only if they need higher quality sound or graphics.

Installing and Managing Core Computer Hardware

Installing and Managing Core Computer Hardware

No doubt, the way computer hardware are installed and managed tells on the efficiency of the general computing operations. Therefore, care must be taken while installing basic computer hardware components. There is process for installing all hardware components no matter how simple the process is. The consequence of not following such process is too enormous to bear when it comes to basic computing tasks (i.e at the operational level). Computer hardware engineer is responsible for all it takes to achieve efficient computer installation and management.

Among what it entails to manage computer hardware are hard disk installation, installation and replacement of Network Interface Cards (NICs), integrating Random Access Memory (RAM), installing Central Processing Unit (CPU), installing necessary drives with their drivers. Asides installation, there are quite a number of routine operations that are performed for effective management of computer hardware. These include keeping inventory of all workstations, servers, network components, printers, etc., (including location, installed software (and versions/patches), and configuration information. All these contribute to effective installation and management of computer hardware. Asides benefits in terms of operational efficiency, installing and managing hardware in a proper way also helps in reducing associated hazards. A practical illustration of this is the cabling procedure in a wired networked environment. For the

fact that, cat5 cables are fragile requires a kind of caution when laying this type of cable. Why? A bent sharply or kinked cable can never operate at full capacity. Similarly, poorly connected circuits in computer hardware can lead Electro-Static Discharge (ESD) which causes shock.

It is then important to site some basic hardware that need to be managed. Hardware systems involve drives (including disk and tape), serial (terminal, modem), parallel (printer), and networking hardware. Modern systems are used as workstations too and include video, sound, and other hardware that must be configured. Hardware is controlled in the operating system kernel by *device drivers*. These are small bits of code that have a common API (software interface) and are integrated into the kernel. Some device drivers manage virtual devices, rather than physical ones. Modern systems auto-detect new hardware at boot time, *if that hardware is powered up before the OS boots*. New hardware added once the system boots may or may not be auto-detected. Some hardware is considered *hot-pluggable* and will be auto-detected. This includes USB devices and some others. (Such devices are normally handled by a separate kernel subsystem and managed by separate commands.

Each device driver has a number known as the *major device number*. All hardware that uses the same driver uses the same major device number. Each individual device is also assigned a unique *minor number*. So if you have two identical hard drives, they will be assigned the same major but different minor numbers. Each hardware device used on your system is represented by an entry in /dev known as a *special file* ("special files" can receive or generate data, and usually correspond to specific hardware but not always).

Bus

A *bus* connects components in a computer system together. There are several buses in most computer which include PCI (now PCIe or *PCI express)*; AGP (*advanced graphics port*; which is used for graphics cards before and the FSB (*front side bus*).

The PCI bus connects expansion slots for peripherals as well as media drives (disk, DVD) to the rest of the system. Depending on the version the top speed is only up to 144 MB/sec. In PCI, each device is identified by a bus number, a device number, and a device function. A given computer might have several PCI buses which might be linked (one bus used to extend another

bus, joined through a PCI bridge) or independent (several buses all attached to the CPU), or some combination of the two. Generally, large high-end machines with lots of I/O expansion have more complicated PCI topologies than smaller or cheaper systems. Each device on a bus is assigned a device number by the PCI controller, and each device exposes one or more numbered functions. For example, many graphics cards offer integrated sound hardware for use typically the graphics capability will be function zero, the sound will be function 1. Only one device can use the bus at any given moment, which is why high-end machines often have multiple independent buses—this allows multiple devices to be active simultaneously.

> The FSB is the most important bus to consider when you are talking about the performance of a computer. It connects the processors (CPUs) to the system memory. When people talk about the speed of a computer, they mean the *clock speed*, which is used for the CPU and also determines the FSB speed (which is some *multiplier* value of the CPU speed: 1x, .5x, or .25x, the clock speed depending on the hardware). Note many systems default the FSB to the lowest supported speed, so you may be *underclocking* your system. Knowing what *overclocking* means in hardware management will explain the meaning of underclocking.

Overclocking is done through manipulating the CPU *multiplier* and the motherboard's front side bus (FSB) speed until a maximum stable operating frequency is reached. While the idea is simple, variations in the electrical and physical characteristics of computing systems can complicate the process. Several factors limit how much overclocking is possible: bus dividers, voltages, thermal loads, cooling techniques, and other factors can limit overclocking to 1.1x or 1.2x. Even then overclocking is likely to reduce the lifespan of the hardware.

Write Cache

Most modern disks now support an on-disk write cache, usually enabled by default. This cache accepts data from the OS and immediately tells the OS the data has been written. This allows the

drive manufacturer to quote more impressive disk speed numbers, but defeats the filesystem journaling mechanism. While this might be acceptable for home computers, workstations, or laptops, the risk isn't generally acceptable for a server or disks in a data center, unless redundant UPS and generators make the risk of power loss acceptable.

Modems

Generally speaking PCI (internal) modems have problems and external ones don't. To set up a modem, there is need to use the GUI program with several features that allows one to troubleshoot the modem setup.

USB

USB (universal serial bus) is a replacement for older serial ports. USB supports hot-plugging, which allows devices to be physically attached and removed at any time. USB supports much higher speeds than RS-232 serial ports (up to 480 Mbps, that's bits/second). There is almost no limit on the types of devices that can be attached using USB: flash disks, portable disks and other media drives, mice and keyboards (USB has replaced older PS/2 ports for these), cameras, microphones and speakers, NICs, etc. USB connected devices often include their own drivers in firmware, so no special OS drivers are needed.

Video Cards

Video cards (controllers) today have become very sophisticated. To allow high quality, high-speed graphics software, the bulk of the work of processing video has been off-loaded from the CPU to the video card. These now contain lots of RAM and even a CPU. In fact the graphics card/controller is often referred to as a *GPU* - Graphic processing Unit. Of course there are many different video formats, a few free and open and many proprietary ones. To use video (record, play, or convert to or from) you must have the correct *video codecs* installed. GPUs are so powerful that today they can be used for other purposes, such as code breaking. In face some computers contain multiple GPUs for intensive processing that multi-core CPUs can't do well.

Case Study 1: Cabling

Get a professional to run cables even it involves a kind of preliminary training. Cable types include crossover/null-modem, rollover, and straight-patch. Cables mostly have cheap and effective PVC insulation, but in a fire this give off deadly chlorine gas, so use plenum cables in human spaces. Handling cables can be tricky as a tug or kink can dramatically affect performance. There are "structured cabling" or EIA/TIA 568B standards: 100m overall, wiring closet on each floor, no more than 3m from host to outlet, 90m from outlet to wiring closet, and 9m of patch cables inside the closet.

Case Study 1: Installing CPU

Installing a CPU is a very simple task that can be achieved in 15 - 20 minutes time. Here is the outline the process of installing a CPU on a new motherboard. To remove an old CPU, the process is essentially the same, except in reverse. Before installing a CPU, naturally, you must first select which CPU and motherboard will suit you (compatibility testing). Be sure to keep in mind that motherboards only have a certain socket size, and therefore only allow one type of CPU to be installed. The following steps should be followed while installing CPU:

- Remove the motherboard from the case.
- Pull up the lever beside the CPU's socket.
- CPU should simply drop into place without applying any force.
- Full the lever down to lock the CPU into place and secure the lever in its plastic retainer.
- Install the CPU fan to always keep the CPU cool.

Software Project Management

The following laws guides managing any software projects which all other aspects revolve round:

- Projects progress quickly until they are 90% complete. Then they remain at 90% complete forever.

- When things are going well, something will go wrong. When things appear to be going better, you have overlooked something.
- If project content is allowed to change freely, the rate of change will exceed the rate of progress.
- Project teams detest progress reporting because it manifests their lack of progress.

Generally, software project management takes the following sequence of steps:

1. Requirements Analysis
2. Design
3. Implementation
4. System testing
5. Delivery and Installation

Planning the way these steps are carried out determines the success of any software project management. Therefore, the process is considered as planning which is termed software project management plan.

Software Project Management Planning

From a popular adage that, "failing to plan signifies planning to fail". Software project is not left out in this regard. Thus, a software project is likely to fail without adequate planning. The plan specifies that all technical and managerial activities are required to deliver the deliverables to client. The implication of this is that what matters most is the end product of the activities in the project that matters and that such will be used in evaluating the activity. Another important concern in the planning is the schedule in terms of the time duration it takes to complete the project as well as the cost (human and material resources). Also, categories of people to manage the project must be tactically determined. In summary, the planning aspect of software project management can be viewed from three main perspectives which include tasks, activities and functions.

In addition, planning a software project requires a controlling document that will be a reference piece to monitor the project's achievement. All approaches, both technical and managerial that are meant to be employed in carrying out the software development aspects of a software project must b e clearly specified. Additionally, planning a software project requires a document in addition to the to the controlling document to contain the findings from the requirement analysis. Changes to this document infers corresponding changes in the controlling documents. It is a good software project management practice to have software project management plan to be part of project agreement.

Software Project Agreement is a form of document prepared for a client to define the scope, duration, cost and deliverables for the software project. The document equally specifies the actual software items, quantities, delivery dates and delivery location. The client in this case can either be individual or organization. The conformity of the requirement specified by the client determines whether the project deliverables will be accepted or not. The deliverables include the document, demonstration of functional requirement, demonstration of non-functional requirements and finally demonstration of subsystems.

The responsibilities in software project management can be categorized based on the following roles:

Planner, Analyst, Designer, Programmer, Tester, Maintainer, Trainer, Document Editor, Web Master, Configuration Manager, Group leader, Liaison, Minute Taker, Project Manager. These form three hierarchies as follow:

- Chief Executives
- Team Leaders
- Project Members

What is the need for software configuration management?

Configuration is the functional and physical characteristics of hardware or software as specified in technical documentation or achieved in a product.

Software configuration management is responsible for establishing and maintaining the *integrity* of the products of the software project throughout the software life cycle. It involves tasks like identifying configuration items, controlling changes and recording and reporting the change implementation status. Activities involved in configuration management include version and release management, change management, system building and configuration management planning.

Software Configuration Management serves as a roadmap to software quality assurance in following ways:

- It ensures that bugs are permanently corrected
- It ensures that software release is not duplicated
- Files are properly secured and maintained
- It avoids code redundancy
- It promotes distributed development by ensuring simplified concurrent development.

Baseline: A specification or product that has been formally reviewed an agreed upon, that thereafter serves as the basis for further development, and that can be changed only through formal change control procedures.

Version: An initial release or re-release of a computer software configuration item, associated with a complete compilation or recompilation of the computer software configuration item.

Computer Installation, Maintenance and Repairing

IT (2012)

for

Second Semester

Sample Answer & Question

1. Explain Hand Drive Physical Installation. (20 Marks)

The step-by-step procedures for installing a hard drive are as follows: * Check computer for an unused IDE connector. Typical Pentium-class and above PCs have provision for four IDE devices; if you have less, add your drive to an unused 40-pin connector on an IDE cable.

* Double-check the pin configuration. The colored (normally red or red-flecked) stripe on one edge of the cable goes to pin 1 of the hard drive's data connector. Reverse this, and the drive won't be capable goes to pin 1 of the hard drive's data connector. Reverse this, and the drive won't be capable of accepting identify, FDISK, or FORMAT. Most cable will be keyed to prevent improper installation.

* Slide the drive carefully into a drive bay of the correct size. Most hard drives, expect for a few very high-capacity SCSI drives meant for servers and the Quantum Bigfoot series, are 3 1/2 –inch wide and 1-inch high. Some case designs require that you attach rails to the side of the hard drive. If so, attach them to the drive using the screws supplied with either the case or the drive. Then slide the drive into the bay in the case until the rails latch into place.

* Attach the existing data cable connector to the back of the drive. In that case, attach the cable to the drive before you slide it into the drive bay and fasten it into place.

* Attach the appropriate power connector to the drive.

* Turn on the computer and listen for the new hard disk to spin up. If you don't hear anything from the drive, double-check the data and power cables.

* Restart the computer and access the BIOS setup screens to configure the new hard disk. At a minimum, you'll need to detect. If your BIOS has an auto type setting, I recommend you use it as it will configure most parameters automatically. For IDE hard drives above 528 million bytes, need to set LBA translation to access the drive's full capacity. Many systems have a Peripherals Configuration screen, which also allows you to set UDMA, PIO, and block

mode configurations for maximum drive performance. See your drive's documentation for the correct settings. Save the BIOS configuration, and exit the BIOS setup screen to continue.

* Restart the computer, and prepare to run FDISK to prepare the hard drive for formatting and use. Or you can use drive partitioning software.

2. Describe Hard Disk Installation Produces. Explain Hard Drive Physical Installation. (20 Marks)

To install a hard drive in a PC, you must perform some or all of the following procedures:

* Configure the drive
* Configure the host adapter
* Physically install the drive
* Configure the system
* Partition the drive
* High-level format the drive.

The step-by-step procedures for installing a hard drive are as follows:

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* Attach the existing data cable connector to the back of the drive. In that case, attach the cable to the drive before you slide it into the drive bay and fasten it into place.
* Attach the appropriate power connector to the drive.
* Turn on the computer and listen for the new hard disk to spin up. If you don't hear anything from the drive, double-check the data and power cables.
* Restart the computer and access the BIOS setup screens to configure the new hard disk. At a minimum, you'll need to detect. If your BIOS has an auto type setting, I recommend you use it as it will configure most parameters automatically. For IDE hard drives above 528 million bytes, need to set LBA translation to access the drive's full capacity. Many systems have a Peripherals Configuration screen, which also allows you to set UDMA, PIO, and block mode configurations for maximum drive performance. See your drive's documentation for the correct settings. Save the BIOS configuration, and exit the BIOS setup screen to continue.
* Restart the computer, and prepare to run FDISK to prepare the hard drive for formatting and use. Or you can use drive partitioning software.

3. Describe High-Level (Operating System) Formatting. (10 Marks)

The final step in the installation of a hard disk drive is the high-level format. The high-level format is specific to the file system. On Windows 9x and DOS systems, the primary functions of the high-level format is to create a FAT and a directory system on the disk so the operating system can manage files. Each drive letter created by FDISK must be formatted before it can be used for data storage. Usually, you perform the high-level format with the FORMAT. COM program or the formatting utility in Windows 9x Explorer. FORMAT.COM uses the following syntax:

FORMAT C: /S/V

This command high-level formats drive C:, writes the hidden operating system files in the first part of the partition, and prompts for the entry of a volume label to be stored on the disk. The FAT high-level format program performs the following functions and procedures:

1. Scans the disk (read only) for tracks and sectors marked as bad during the LLF, and notes these tracks as being unreadable.
2. Returns the drive heads to the first cylinder of the partition, and at cylinder (Head 1, Sector 1) writes a DOS volume boot sector.
3. Writes a FAT at Head 1, Sector 2. Immediately after this FAT, it writes a second copy of the FAT. These FATs essentially are blank except for bad-cluster marks noting areas of the disk that were found to be unreadable during the marked-defect scan.
4. Writes a blank boot directory.
5. If the /S parameter is specified, prompts the user for a volume label, which is written as the fourth file entry in the root directory.

If the /V parameter is speciafied, prompts the user for a volume label, which is written as the fourth file entry in the root directory.

4. Explain FDISK and FORMAT limitations. (10 Marks)

For using FDISK with care, but there are other limitations you should keep in mind:

* FDISK doesn't provide any help with issues of drive letter changes.
* FDISK requires FORMAT before the drive is ready for use.
* FORMAT must check the entire drive before making it ready for use.

* FDISK and FORMAT are designed for a single operating system environment, with no provision for multiboot options (Windows 9x and NT or Windows 9x and Linux, for example).

* DSISK and FORMAT offer no procedure for migrating data to a new drive, and XCOPY is tricky to use

* FDISK and FORMAT might cause conflicts with existing CD-ROM drives, which often use the next available drive letter after the existing hard drive

Typical features of automatic disk installation programs include the following:

- Replacement for SDISK and FORMAT.
- Database of drive jumpers for major brands and models
- Drive copy function.
- CD-ROM drive letter relocation utility.
- Menu-driven or wizard-driven process for installing new hard drive

Optional override of BIOS limitation of large hard drives.

Explain Floppy Drive Installation Produces. (10 Marks) A floppy drive is one of the simplest types of drives to install. In most cases, installing a floppy disk drive is a matter the drive to the computer chassis or case, and then plugging the power and signal cables into the drive. Some type of bracket and screws are normally required to attach the drive to the chassis are designed to accept the drive with no brackets at all. Any brackets, if needed, are normally included with the chassis or case itself. When you connect a drive, make sure the power able is installed properly. The cable is normally keyed so you cannot plug it in backward. Also, install the data and control cable. If there is no key is in this cable, use the colored wire in the cable as a guide to the position of pin 1. this cable is oriented correctly when you plug it in so the colored wire is plugged into the disk drive connector toward the cut-out notch in the drive edge connector. If the drive LED stays on continuously when the system is running, that is a sure sign you have the floppy cable on backward.

Release: The formal notification and distribution of an approved version.

Possible ways of assigning responsibilities

One-to-One

Ideal but often not worth to be called a project

Many-to-Few

Each project member assumes several roles

Danger of overcommittment

Need for load balancing

Many-to-"Too-Many"

Some people don't have significant roles

Bystanders

Loosing touch with project

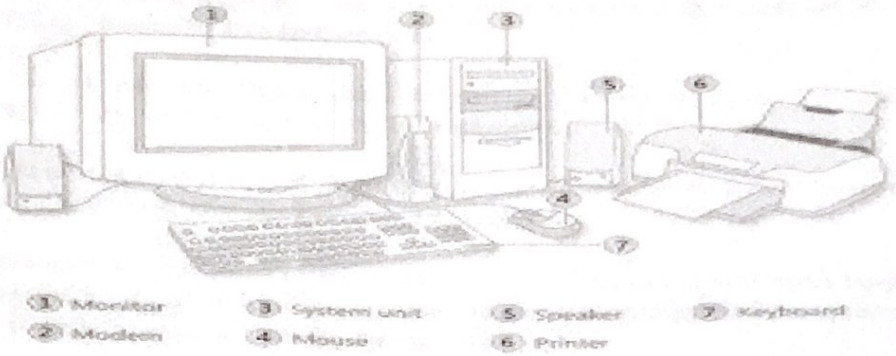

Figure 1: A set of computer

Description

There are three basic Component units of computer system namely;

1. The Central Processing Unit (CPU)

a) Casing and Power pack
b) Motherboard
c) Processor with heat sink
d) Memory
e) Floppy drive
f) Hard disk drive
g) CD-ROM/DVD drive
h) Video Graphic Adapter (VGA)
i) Sound card
j) Cooling fan
k) Power/IDE (Integrated Digital Electronics) cable
l) Hardware nuts, screws
m) Operating system software

2. The input devices

a) Keyboard
b) mouse.

3. The output device

a) Monitor
b) Speakers
c) printers.

Computer Operations

This has to do with the ways by which we can maintain the computer system and concerning the repairs too. I am going to discuss computer operations the following subheadings;

- **The Principle of Maintenance and Repair**

In setting your computer, it is important to select hard flat, stable surface in a location where it would not be exposed to rain, direct sunlight or extreme cold. In addition your computer should not be operated in a dusty or dirty location or near equipment that generates a magnetic field.

Adequate measures should be taken to maintain system reliability and effectual reduction in system downtime. Computer requires a steady and smooth sinusoidal (AC) wavelength in it is power supply to operate effectively.

Contrary to this expectation, A.C supply suffers many anomalies such as surges, spikes, sags, and total black outs that endanger the reliability of the Computer systems.

Surges: These are small over voltage conditions that occur over relatively long periods. This can create overheating in the computer power supply and cause an eventual damage.

Spike: It is a transient and large over voltage conditions that occur over relatively long periods. This can create overheating in the computer power supply and cause an eventual damage.

Sags or Brownout: Are under voltage conditions caused by excessive electrical load on AC circuit. Equipment such as air conditioners, photocopiers, deep freezers etc in response to under voltage conditions, the computer can draw excessive current that will lead to overheating.

Blackout: It is complete of electrical power due to faults from the generating plant, transmission or distribution lines. It can lead to loss of data, corruption of files that were actively processing during its occurrence and other possible faults on peripherals such as electro-photographic printer.

- **Power Protection Devices**

Surges Supressors: Are designed to absolve over voltage conditions caused by surges ad spikes. It operates by clamping voltages above a certain level, it is however not a perfect solution to power protection.

Stabilizers: This employs a more effective device that surge suppressors regulate the over voltage supply. Through this, it also tolerates an under voltage to a certain level.

The Uninterrupted Power Supply (UPS): This is the best in
Power protection through its working principles. It attends to all power problems of surges, spikes, sags and blackout. It provides a modulated DC that enables the computer to run from battery power continuously. AC only keeps the batteries charged. It is not an alternative to AC power supply. When there is a power failure, it will only provide power for limited time to allow the user to save data and shut down. Unnecessary long usage after the A.C failure will drain the batteries and shorten its life sp

Hardware Installation
This has to do with the physical connection of computer system together with its peripherals. Connect the stabilizer to the power source if it exists. Then connect the UPS to, the output of the stabilizer, Output of the UPS powers both the system unit and the monitor. Interface the monitor, Printer and other peripherals through their signals/communication cables to the system unit. Then put on the switch on the monitor first and then the system unit. If the system is a branded system like IBM, etc, the first time' it is powered it will expand all the pre- loaded software from the factory; It is after this process that the system can be put to use.

- **Preventive Maintenance**

Preventive maintenance is the key to obtaining years of trouble free service from the computer system. A properly administered preventive maintenance program pays for; itself by reducing problem behavior, data loss and component failure and by ensuring long life for the system.

- **Hardware Troubleshooting**

Troubleshooting is the process of detecting and correcting faults associated with system components. Some common troubleshooting problems associated with certain hardware components and possible solutions are presented below.

- **Floppy Drives**

Problems: The drive is not accessible.
Possible cause/solution: The first thing to do in this situation is to determine if the diskette is bad (several diskettes can be tested). The diskette can be tested in a different system where the floppy drive is known to be working. If they are accessible in the other system, then the first drive could be dirty or out rightly faulty. If cleaning the red/write head does not solve the problem, then a replacement or further repairs on the drive might be necessary.

Problem: Error writing to dick.
Possible cause/solution: This problem indicates that the floppy controller is communicating properly with the computer but simply cannot access the diskette. The diskette should be tested and if it okay, the read/write head should be cleaned. If the problem persists, then it migh lie within the electronic of the drive.

Problem: A floppy drive light that is perpetually on.
Possible cause/solution: This indicates that the floppy driver ribbon cable (data cable) is not properly connected. The red strip must align with pin I on the board and on the drive.

Problem: An "invalid error message.
Possible cause solution: This suggests that the computer does not recognize, the presence of the floppy drive, implying the drive is not communicating properly with it. Proper connection must then be made to correct the problem.

- **Hard Drives**

Problem: The computer does not boot properly.
Possible cause/solution: This problem can arise as a result of the hard disk not being accessed by the system. The system can be booted with a startup disk and if the problem is not solved, it should be ensured that the hard disk is properly connected and detected. Check if the ribbon cable is bad or poorly connected. Also, check the jumper setting (for a master/slave configuration).

Problem: A "Missing Operating System" message during booting.
Possible cause/solution: If this message shows even if an OS has already been installed, it is likely that some necessary system files for booting are missing or corrupt. To so1ve the problem, boot the system with a startup disk and at the system prompt A:\>, type sys c: <ENTER>. This command copies the system tiles into the hard disk (C) so that it can be bootable. It could also be that there are bad sectors formed in the disk as 'a result not frequent abrupt failure such that titles found in such sectors are not accessible. A full system scan can he run in situations like this.

Problem: The hard disk slow.
Possible cause/solution: This can arise due to fragment sectors on the disk such that file access time is increased. To solve this problem, a defragmentation process may need to be carried out on the disk. This process arranges files into a proper order creating extra space 1 the disk and improving file access time.

- **The CD-ROM**

Problem: The CD-ROM cannot be accessed.
Possible cause/solution: Ensure that the disc is properly inserted (positioned). Test the disc in a different drive and if it is not working, clean the CD's surface using methylated spirit and a soft piece of cloth. If the drive itself is the problem. ensure that it has been detected by the system. If it has been detected, establish proper connection. Also, check to see to that the CD-ROM jumper is configure to a slave.

- **Sound Devices**

Problem: The speakers fail to produce sound.
Possible cause/solution: First stage (checking the physical speakers

- Check to see that the volume is set high enough.
- Ensure that the speakers are plugged to the sound' card.
- Ensure that the power cable is properly attached and the speakers are turned on.
- Try the speakers in another system.
- Ensure that the sound card is properly and securely seated in the expansion slot.

Second Stage (Checking the audio software):-

- Make sure that the mute option has been enable and that the software control volume is adjusted to a sufficient level.
- Ensure that the proper resources and device drivers are available.

ii. **Problem:** The right sounds are not produced.

- Possible solution: Try another sound file
- Replace CD and try it with the sound file. If the problem persists, try to reinstall the sound application itself (with the motherboard CD).

- **Monitor and Video**

Problem: The computer beeps continuously at startup and won't boot properly.
Problem cause/solution: This is an indication of a missing monitor or a missing or 'faulty video card. Check to ensure that the monitor is properly connected to the video card. Check the functionality of the video card.
Problem: Complete lack of picture.
Possible solution: Move the mouse or press a key on keyboard. If the problem persists, check the video components and ensure that the monitor' is properly connected. Also, check to see that the brightness is at the adequate level. Try swapping monitors.
Problem: Flickering monitor.
Possible solution: Replace the monitor with another to see if the problem
continues. If the problem persists, then the refresh rate might need to be reset.

Problem: Screen elements replicated all over the screen.
Possible Cause/solution: This is due to irregular or improper video. Resolution setting (which is common with old video cards) adjusts the resolution from the video control panel

- **The CMOS Battery**

Most CMOS problems are associated with wrong system settings for the system components. The major remedy is to correct the setting, in SETUP and save them. If this does not work, then change the CMOS battery.

- **Power Supply**

Problem: No power supply.
Solution: Ensure that there is proper contact from the mains.

Problem: The computer keeps rebooting on its own.
Possible cause/ solution: Check the power supply.
Voltage fluctuation can cause this problem. Determine the incoming voltage and ensure that the required is achieved, possibly with the use of stabilizer.

- **The Mouse**

Problem: The mouse pointer does not move on the smoothly

Possible cause/solution: Check to see if the roller is dirty and clean it thoroughly.

Problem: The mouse pointer does not move screen.
Possible cause/solution: This problem indicates that the computer cannot communicate properly with the mouse and therelorecanl1ot receive the appropriate signals to move the mouse. This may be as a result of a missing or corrupt mouse driver. To fix the problem, manually load a missing driver from the setup disc that came with the mouse. Also, you can turn off the system and boot again as most Operating Systems would automatically detect the mouse sitting. The mechanism is like a conversation between a group of people, if two people speak at the same time, they both stop and then one starts to speak again.

Conclusion

In this paper, there was diversified and a superior level of experiences most relevant to computer hardware thereby projecting any company or establishment to a high level with satisfactory service to their customers. Investigated and resolved hardware and software related faults as well as quality of service issues, while implementing strict prevention maintenance routine that achieved 99.9% availability of superior quality of service and on unmatched service delivery to thousands of our customer.

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Chapter 5: BIOS BASICS

5. Explain BIOS Hardware/Software.

(15marks)

BIOS Hardware / Software

The BIOS itself is software running in memory that consists of all the various drivers that interface that hardware to the operating system. The motherboard ROM BIOS is most often associated with hardware rather than software. This is because the initial software drivers needed to get the system running. As system becomes more complex , new hardware was added for which no motherboard BIOS drivers exists. Rather than requiring a new motherboard BIOS that would specifically support the new devices, it was far simpler and more practical to copy any new drivers that were necessary onto the system hard disk and configure the operating system to load them at boot time. Some drivers, however , must be active during boot time. By putting the ROM -based driver right on the card, you didn't have to change your motherboard ROM to have built-in support for new devices, especially those that needed to be active during boot time.

- Video cards: All have an onboard BIOS.
- SCSI adapters: Those that support booting from SCSI hard drivers or CD-ROMs have an onboard BIOS. Most newer SCSI adapters support booting from a SCSI CD-ROM.
- Network cards: Those that support booting directly from a file server have what is usually called a boot ROM or IPL (initial program load) ROM onboard. This enables PCs to be configured on a LAN.
- Y2k boards : Boards that incorporate BIOS fixes to update the century byte in the CMOS RAM. These boards have a small driver contained in a BIOS,which monitors the year byte for a change from 99 to 00. When this is detected , the driver updates the century byte from 19 to 20.

6. Briefly explain ROM, PROM, EPROM, EEPROM /Flash ROM.

(20 marks)

ROM (True or Mask ROM)

Most ROMs were manufactured with the binary data already "cast in" or integrated into the die. The die represents the actual silicon chips . These are called Mask ROMs because the data is formed into the mask from which the ROM die is photolithographically produced.

Mask ROM are exactly to pre recorded CD- ROMs . CD-ROM is fast manufactured as a blank and then the data is written to it by laser.

PROM

PROMs are a type of ROM that is blank when new and that must be programmed with data .The PROM has been avabiable in size from 1 KB (8 KB) to 2MB (16MB) or more. They can be identified by path numbers which are 27 nnnn-where the 27 indecates the TI type PROM and the nnnn indicates the size of the chips in KB (not bytes) .

Although these chips are blank when new, they are preloaded with binary 1's A blank PROM can be programmed . This requires a special machine call a device programmer .

Each binary 1 –bit can be thought of as a fuse, which is intact. Most chips run on 5 volts, but when a PROM is programmed , a higher voltage is placed at the various addresses with the chip.

PROM chips are used at OTP chips . The act of programming a PROM takes anywhere from a few seconds to a few minutes , depending on the size of the chip and the algorithm used by the programming device. A typical PROM programmer has multiple sockets .This is called gang programmer and can program several chips at once.

EPROM

An EPROM is a PROM that is erasable. An EPROM chip can be easily recognized by the clear quartz crystal window set in the chip package over the die.

The purpose of the window is to allow the ultraviolet light to reach the chip die because the EPROM is exposure to intense UV light. The window is quartz crystal.

The UV light erase the chip by causing a chemical reaction .To work , the UV exposure must be at a specific wave length (2,537 Angstroms) , at a fairly high intensity (12,000 uw/cm2) ,in close proximity (2 cm-3cm, or about when 1 inch) ,unless and last for between 5 and 15 minutes duration.

Professional type EPROM eraser that can handle up to 50 chips at a time. The quartz crystal window on an EPROM is covered by type, which prevent accidental exposure to UV light.

7. Describe system components and explain processor, floppy disk and removable drives, CD/DVD-ROM drive, keyboard and pointing device (Mouse), Video card and Display, sound card and speakers. (20 marks)

System Components

The components used in building a typical PC are fuse and power supply, Motherboard, Processors with heat sink.

Memory	Video card and display
Floppy drive	Sound card and speakers
Hard disk drive	cooling fans
CD-ROM/DVD drive	cables
Keyboard	Hardware (nuts, bolts, screw and brackets)
Pointing device (mouse)	Operation system software

Processors

The motherboard should have one of the following processor sockets or slots:

Super 7: Supports the Intel Pentium, Pentium MMX, AMD K5, K6, K6-2, K6-3 Cyrix 6x86, 6x8xMx and MII Processors.

Socket 370 (also called PGA 370): Supports the socket versions of the Intel Celeron processor.

Slot 1 (also called SC-242): Support the slot versions of the Intel Celeron, Intel Pentium II and Pentium III processors

Slot 2 (also called SC-330): Supports the Intel Pentium II Xeon and Pentium Xeon processors.