IT-ITES

# ENGINEER TECHNICAL SUPPORT LEVEL - 1

## (Participant's Guide)

## REFERENCE ID: SSC/Q0101

## WELCOME NOTE

Information Technology (IT) and Information Technology-enabled Services (ITeS) are one of the most significant growth stimulator of the Indian economy. IT industry has not only influenced the employment prospects of the people but also affected the social lives of the people by connecting them through network and social websites. The major segments of the Industry are IT Services, Business Process Outsourcing (BPO), engineering services, research and development and products. IT Products being manufactured in India include personal computers, servers, workstations, supercomputers, data processing equipment, printers, digitizers, etc. Much of the IT related activities are centered on services in Banking, Financial Services, Insurance, Telecommunication, Manufacturing, and Retail.

Indian IT Industry has been contributing substantially to India's Gross Domestic Product, exports and employment. The sector is responsible for enabling employment to an additional 8.9 million people in various associated sectors, such as security, transportation, housekeeping, catering, etc. It has grown tremendously over the last 15 years. The industry employs around 2.2 million people.

This job requires the individual to have thorough knowledge of various technology trends and processes as well as have updated knowledge about IT initiatives. He/she should be highly motivated and energetic with the ability to self-direct daily activities.

An Engineer Technical Support is the initial point of contact for company customers seeking assistance and support with the internet, desktop devices, calls and other business applications that are maintained by the support team. Primary responsibility of individuals at this job is to provide user support, managing Customer Service Desk application, responding to all incoming service requests and customer service; quickly diagnose technical issues and arrange solutions during normal operational business hours. He/she should be responsible for the smooth running of computer systems and ensuring users get maximum benefits from them.

The tasks of a Engineer Technical Support vary depending on the size and structure of the organization and may include installing and configuring computer hardware operating systems and applications; monitoring and maintaining computer systems and networks; dealing with staff/clients either face to face or over the telephone to help set up systems or resolve issues; troubleshooting network problems and diagnosing and solving hardware/software faults of computer systems.

The job of Engineer Technical Support requires the individual to have thorough knowledge of various technology trends and processes as well as have updated knowledge about IT initiatives. He/she should be highly motivated and energetic to timely respond to all issues, updates internal customers on status, solicits additional information, and troubleshoots issues. Engineer Technical Support can explore job opportunities in IT multi-national companies, private IT organizations, IT call centers, IT software or equipment suppliers, IT maintenance companies, etc.

This Student Handbook will help you learn and practice the skills required to become a Engineer Technical Support. You can highlight the important points and make notes too. The more you interact with the handbook, the more you learn.

It contains Activities to be performed in class and at home as well as Study Material for you to read.

This handbook will help you to learn better during the course and be useful later as a reference.

You will find this course material useful both for studying and as future reference. We welcome your feedback on any issue relating to this course and wish you all the best. Happy Learning!

**Objectives of the Course**

Upon completion of this course, you will be able to:

- Demonstrate the knowledge of modern computers and their parts and peripherals
- Communicate effectively at workplace
- Describe the use of various operating systems and software
- Demonstrate the knowledge of health, safety and security issues and follow best practices
- Demonstrate the knowledge of helpdesk system fundamentals
- Demonstrate the knowledge of fundamentals of network operating systems

## Table of Contents

| | | |
|---|---|---|
| | • Customer Query Resolution<br>• Workaround<br>• Follow Escalation Matrix to Resolve Customer Issues<br>• Seeking Advice and Guidance from Line Manager<br>• Update Customer on Time Required for Resolution of a Query<br>• Adhere to Timelines for Resolving Customer Issues<br>• Offer 100% Resolution of Customer's Complaints without Delay | |
| **Unit - 5** | **Dealing Remotely with IT Service Requests and Incidents**<br><br>• Introduction and Importance of Customer Service<br>• How to Improve your Customer Service Skills?<br>• Offering 100% Quality Assurance<br>• Benefits of Quality Monitoring<br>• Following Customer-Centric Approach<br>• Building Strong Customer Relationships<br>• Building Blocks of Customer Service Centre<br>• Technologies for Customer Service Outsourcing<br>• Types of Customer Service/Queries<br>• Dealing with Customer Queries<br>• The Importance of Resolving Customer Queries<br>• Standard Tools & techniques of Non-Voice Customer Handling<br>• Different Styles and Approaches when Working with Customers<br>• Identify Techniques for Conveying Concern and Commitment<br>• Questioning Techniques for Understanding Customer Queries<br>• Factors Affecting Customer Satisfaction<br>• Know who to Seek Advice and Guidance From<br>• Setting the Limits of Responsibility | **Page No.**<br><br>**(263-294)** |
| **Unit - 6** | **Query Classification, Tools & Knowledge Base**<br>• Channels for Submitting a Complaint<br>• Check Customer's Account Details for Accuracy<br>• Acknowledging and Recording the Complaint<br>• Update Customer on Time Required for Resolution of a Query<br>• Classifying Customer Queries<br>• Prioritizing Customer Queries<br>• Record Customer's Query, Request or a Complaint in the System<br>• Provide Excellent Customer Service<br>• Use Standard Tools, Templates and Scripts for Dealing with Customer Queries<br>• Guidelines for Offering a Solution to Customer | **Page No.**<br><br>**(295-310)** |
| **Unit - 7** | **Manage your Work to Meet Requirements**<br>• Establish and Agreeing on Work Requirements with Appropriate People<br>• Keeping Immediate Work Area Clean & Tidy<br>• Utilizing Time Effectively<br>• Using Resources Correctly and Efficiently<br>• Treating Confidential Information Correctly | **Page No.**<br><br>**(311-320)** |

| | | |
|---|---|---|
| | • Working in line with Organization's Policy & Procedures<br>• Working within the Limits of Job Role<br>• Obtaining Guidance from Appropriate People<br>• Ensuring the Work to Meet the Agreed Requirements | |
| **Unit – 8** | **Working Effectively with Colleagues**<br>• Communicating with Colleagues<br>• Working Collaboratively with Colleagues<br>• Sharing Data/Information with Colleagues<br>• Following Proper Hierarchy and Work Culture<br>• Delivering Quality Work on Time<br>• Conflict Resolution and Multi-Tasking | **Page No.**<br><br>**(321-325)** |
| **Unit – 9** | **Sharing Data/Information in Standard Formats**<br>• Data/Information Sharing<br>• Understand the requirements of your job<br>• Checking Information for Completeness and Accuracy<br>• Check for Specificity of Information<br>• Complying to Relevant Standards, Policies, Procedures and Guidelines to Share Data/Information<br>• Recording Solutions for Queries<br>• Timely Sharing of Information | **Page No.**<br><br>**(326-333)** |
| **Unit – 10** | **Maintain a Healthy, Safe and Secure Working Environment**<br>• Complying with organization's current health, safety and security policies and procedures<br>• Reporting any identified breaches in health, safety, and security policies and procedures<br>• Identifying and correcting any hazards that you can deal with safely<br>• Reporting any hazards that you are not allowed to deal with to the relevant person<br>• Identify and recommend opportunities for improving health, safety, and security to the designated person<br>• Following Emergency Procedures<br>• Complete any health and safety records legibly and accurately | **Page No.**<br><br>**(334-336)** |
| **Unit – 11** | **Develop your Knowledge, Skills and Competence**<br>• Obtain Advice and Guidance from Appropriate People<br>• Identify the Knowledge and Skills for your Job Role<br>• Identify your Current Level of Knowledge, Skills and Competence<br>• Prepare a Plan of Learning & Development Activities<br>• Apply your New Knowledge and Skills in the Workplace<br>• Obtain Feedback from Appropriate People<br>• Review your knowledge, Skills and Competence on Regular Basis | **Page No.**<br><br>**(337-341)** |

# Unit 1 – Introduction to IT-ITES Industry

## Learning Objectives:

- Introduction to IT-ITES Industry
- Objectives of the Course
- Meaning of IT Helpdesk
- Roles & Responsibilities of Engineer Technical Support
- Required Skills to become an Engineer Technical Support

## Introduction to IT-ITES Services

Information Technology (IT) and Information Technology-enabled Services (ITeS) are one of the most significant growth stimulator of the Indian economy. IT industry has not only influenced the employment prospects of the people but also affected the social lives of the people by connecting them through network and social websites.

The major segments of the Industry are IT Services, Business Process Outsourcing (BPO), engineering services, research and development and products. IT Products being manufactured in India include personal computers, servers, workstations, supercomputers, data processing equipment, printers, digitizers, etc. Much of the IT related activities are centered on services in Banking, Financial Services, Insurance, Telecommunication, Manufacturing, and Retail.

Indian IT Industry has been contributing substantially to India's Gross Domestic Product, exports and employment. The sector is responsible for enabling employment to an additional 8.9 million people in various associated sectors, such as security, transportation, housekeeping, catering, etc. It has grown tremendously over the last 15 years. The industry employs around 2.2 million people.

Internet has made revolutionary changes with possibilities of online booking of tickets rail or air, filing Income Tax returns, online application for passports, online banking, etc. With an internet user-base of over 125 million, which is likely to grow to about half-a-billion over the next few years, and also an established base of 950 million mobile users, India will be a key player in the cyber-world.

With biometric technology fast maturing and becoming increasingly sophisticated, biometric solutions are starting to make serious inroads as a high-tech identity management and verification tool within the society. Such momentum has introduced the new possible markets for biometric data operator which has the largest impact on future societies. Future scope of the biometric systems in customer's identification and authentication is seen in access and attendance control, travel control, financial and other transactions requiring authorization, remote voting (authorization) and use in automatic working devices.

## Objectives of the Course

Upon completion of this course, you will be able to:

- Demonstrate the knowledge of modern computers and their parts and peripherals
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- Demonstrate the knowledge of helpdesk system fundamentals
- Demonstrate the knowledge of fundamentals of network operating systems

## IT Helpdesk

IT Helpdesk is a service providing information and support to computer users, especially within a company.

In a business enterprise, a help desk is a place that a user of information technology can call to get help with a problem. In many companies, a help desk is simply one person with a phone number and a more or less organized idea of how to handle the problems that come in.

In larger companies, a help desk may consist of a group of experts using software to help track the status of problems and other special software to help analyze problems (for example, the status of a company's telecommunications network).

Typically, the term IT Helpdesk is used for centralized help to users within an enterprise. A related term is call center, a place that customers call to place orders, track shipments, get help with products, and so forth.

The World Wide Web offers the possibility of a new, relatively inexpensive, and effectively standard user interface to help desks (as well as to call centers) and appears to be encouraging more automation in help desk service.

Some common names for a helpdesk include: Computer Support Center, IT Response Center, Customer Support Center, IT Solutions Center, Resource Center, Information Center, and Technical Support Center.

## Engineer Technical Support

Engineer Technical Support in IT-ITeS Industry is also known as Helpdesk Executive, Service Desk Executive, Technology Support Executive, IT Support Executive, and Helpdesk Coordinator.

An Engineer Technical Support is the initial point of contact for internal company customers seeking assistance and support with the company's intranet, desktop devices, and other business applications that are maintained by the support team.

Primary responsibility of individuals at this job is to provide user support, managing Customer Service Desk application, responding to all incoming service requests and customer service; quickly diagnose technical issues and arrange solutions during normal operational business hours. He/she should be responsible for the smooth running of computer systems and ensuring users get maximum benefits from them.

## Roles & Responsibilities of Engineer Technical Support

The tasks of a Helpdesk Attendant vary depending on the size and structure of the organization and may include:

- Installing and configuring computer hardware operating systems and applications;
- Monitoring and maintaining computer systems and networks;
- Dealing with staff/clients either face to face or over the telephone to help set up systems or resolve issues;
- Troubleshooting network problems and diagnosing and solving hardware/software faults of Engineer Technical Support.

## Knowledge & Skills for Working at an IT Help Desk

The job of Engineer Technical Support requires the individual to have thorough knowledge of various technology trends and processes as well as have updated knowledge about IT initiatives. He/she should be highly motivated and energetic to timely respond to all issues, updates internal customers on status, solicits additional information, and troubleshoots issues. Engineer Technical Support can explore job opportunities in IT multi-national companies, private IT organizations, IT call centers, IT software or equipment suppliers, IT maintenance companies, etc.

Here are some of the most commonly sought-after skills for a IT Help Desk Attendant

### The Necessary Skills

If you're an IT worker, these skills are the basics that IT help desks look for:

1. **Troubleshooting PC problems in real life**

Can you diagnose malware incidents quickly? Are you the person your neighbours/roommates/family call when they can't get the printer to work?

2. **You know when it's time to do an OS reload**

Knowing when to cut your losses is both an art and a science.

3. **You have good research capabilities on Google and other search engines**

When your grasp of terminology helps you do great research for figuring out unusual problems, your value to an IT help desk increases.

4. **You have your A+, Microsoft-certified desktop support technician, and Network+ certifications**

Help desk workers generally have an associate's or bachelor's degree, certifications, or diplomas in information technology and a handful of basic certifications.

5. **You understand the importance of good customer service skills.**

After all, it isn't just about technology. It's about helping people do their jobs.

## Great Bonus Qualifications

Additional competence required to become a helpdesk professional are as follows:

1. **Excellent writing skills.**

If you write clearly and grammatically and can express technical problems and solutions that the average end user can understand, then you will be a big asset to an IT help desk, particularly if it uses help desk software that builds a knowledge base from resolved tickets.

2. **Great phone skills.**

Your phone interview is extremely important, not just for discussing qualifications, but also because your potential employer can gauge your phone skills. If you make it clear that you're listening, don't interrupt, and answer in a friendly and thoughtful manner, you're gold.

3. **Good mechanical skills.**

If you have skills making mechanical and electrical things work, this can be a big plus to an IT help desk.

Skills That Say, "Hire This Person Immediately."

There are few more skills that should prompt a smart IT recruiter to hire you:

1. **Direct experience with (or certifications from) software and hardware vendors**

If these match up with the vendors the employer uses, you have a huge advantage over applicants without this experience.

2. **Freelance developer experience**

   If you have freelance developer experience, not only do you have the technical skills necessary for IT help desk work, you also have the initiative and discipline to get things done without being micromanaged.

3. **Programming language certifications.**

If you have experience or certifications, you probably have the strong attention to details plus the analytical skills that any company would like to have in a help desk worker.

Great IT help desk workers and great help desk software are two of the best investments a company can make. A consistently updated knowledge base with resolved service tickets and a self-service portal that allows motivated end users to solve their own minor IT problems, help desk workers are free to tackle the more difficult IT issues that arise, allowing your business to run smoothly and prevent wasted time.

## Importance of Developing your Knowledge, Skills & Competence

More and more, job roles are requiring formal training qualifications either because of legislative requirements or to meet the requirements of specific employers. Developing your skills through further training provides significant benefits including:

1. **Increase Employment Opportunities**

Without doubt training provides increased employment opportunities. Today, even entry level roles in many industries require base level qualifications. By completing a training course, your employment opportunities become wider.

2. **Increased Career Development Opportunities**

Developing a career in a chosen field is something many of us aspire to. Experience alone, in many cases does not suffice when employers are seeking to promote their staff. By undertaking further training, the opportunity to develop your career is enhanced.

3. **Personal growth**

Training not only provides you with the skills in a particular area. By undertaking further training you build your networking, time management, and communication and negotiation skills.

4. **Increase your knowledge and understanding of your local industry**

Developing your local industry knowledge to supplement your growing skills is equally important.

## Exercise

**Answer the Following Questions**

1. What are the major segments of IT-ITES Industry? Give example.
_____
_____
_____

2. Describe role and responsibilities of a Technical Support Engineer.
_____
_____
_____

3. What is meant by an IT Help Desk?
_____
_____
_____

4. List out the necessary skills to become a Technical Support Engineer?
_____
_____
_____

5. What types of certifications are needed to become a Technical Support Engineer?
_____
_____
_____

# Unit 2 - Computer Fundamentals

## Learning Objectives:

- History of Computers
- Advantages & Disadvantages of Computers
- Hardware & Software
- Classification of Software
- System Software & Application Software
- Utility Programs
- Library Programs

## Fundamentals of Computer Systems

**History of Computer:** The computer as we know it today had its beginning with a 19th century English mathematics professor name **Charles Babbage**.

He designed the Analytical Engine and it was this design that the basic framework of the computers of today are based on. Generally speaking, computers can be classified into three generations. Each generation lasted for a certain period of time, and each gave us either a new and improved computer or an improvement to the existing computer.

**Generations of Electronic Computers**

| Generation | First Gen. I | Second Gen. II | Third Gen. III | Fourth Gen. IV |
|---|---|---|---|---|
| Technology | Vacuum Tubes | Transistors | Integrated Circuits (multiple transistors) | Microchips (millions of transistors) |
| Size | Filled Whole Buildings | Filled half a room | Smaller | Tiny - Palm Pilot is as powerful as old building sized computer |

## How Electronic Computers Have Progressed?

|  | UNIVAC<br><br>(1951-1970)<br><br>(1968 vers.) | Kenbak 1<br>(1971) | IBM PC<br><br>(1981) | Macintosh<br><br>(1984) | Pentium III |
|---|---|---|---|---|---|
| Circuits | Tubes,<br><br>Transistors, Integrated Circuits* | 130 Integrated Circuits | Intel 8088<br><br>Microchip - 29,000 Transistors | **Motorola 68000** | Intel P-III Microchip - 7.5 million transistors |
| Generation | I-II-III* | III | IV | IV | IV |
| RAM Memory | 512 K | 265 Bytes | 256 K | 640 K | 128 Mb |
| Speed | 1.3 MHz | 1 KHz | 4.77 Mhz | 8 MHz | 1000 MHz |
| Storage | 100 MB Hard Drive | none | Floppy Drive | Floppy Drives | Hard Drive, Floppy, CD-Rom |
| Size | Whole Room | Briefcase<br><br>(no monitor) | Briefcase + Monitor | Two shoeboxes (integrated monitor) | Small Tower |
| Cost | $1.6 million | $750 | $1595 | ~$4000 | $1500 |

### Advantages of Computer

Computer has made a very vital impact on society. It has changed the way of life. The use of computer technology has affected every field of life. People are using computers to perform different tasks quickly and easily. The use of computers makes different task easier. It also saves time and effort and reduces the overall cost to complete a particular task.

Many organizations are using computers for keeping the records of their customers. Banks are using computers for maintaining accounts and managing financial transactions. The banks are also providing the facility of online banking. The customers can check their account balance from using the internet. They can also make financial transaction online. The transactions are handled easily and quickly with computerized systems.

People are using computers for paying their bills, managing their home budgets or simply having some break and watching a movie, listening to songs or playing computer games. Online services like Skype or social media websites are used for communication and information sharing purposes.

Computer can be used as a great educational tool. Students can have access to all sort of information on the internet. Some great websites like Wikipedia, Khan's Academy, Code Academy, Byte-Notes provides free resources for students & professionals.
Moreover, the computer is being used in every field of life such as medical, business, industry, airline and weather forecasting.

### Disadvantages of Computer

The use of computer has also created some problems in society which are as follows.

**Unemployment:** Different tasks are performed automatically by using computers. It reduces the need of people and increases unemployment in society.

**Wastage of time and energy:** Many people use computers without positive purpose. They play games and chat for a long period of time. It causes wastage of time and energy. Young generation is now spending more time on the social media websites like Facebook, Twitter etc or texting their friends all night through smart phones which is bad for both studies and their health. And it also has adverse effects on the social life.

**Data Security:** The data stored on a computer can be accessed by unauthorized persons through networks. It has created serious problems for the data security.

**Computer Crimes:** People use the computer for negative activities. They hack the credit card numbers of the people and misuse them or they can steal important data from big organizations.

**Privacy violation:** The computers are used to store personal data of the people. The privacy of a person can be violated if the personal and confidential records are not protected properly.

**Health risks:** The improper and prolonged use of computer can results in injuries or disorders of hands, wrists, elbows, eyes, necks and back. The users can avoid health risks by using the computer

in proper position. They must also take regular breaks while using the computer for longer period of time. It is recommended to take a couple of minutes break after 30 minutes of computer usage.
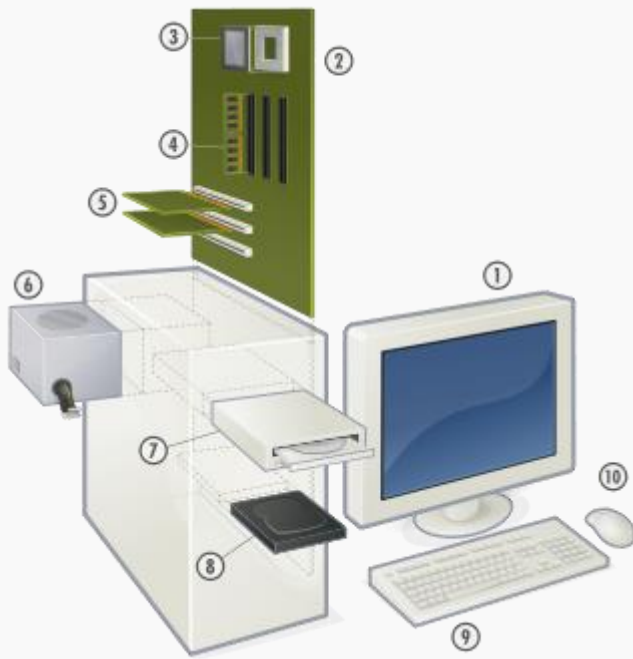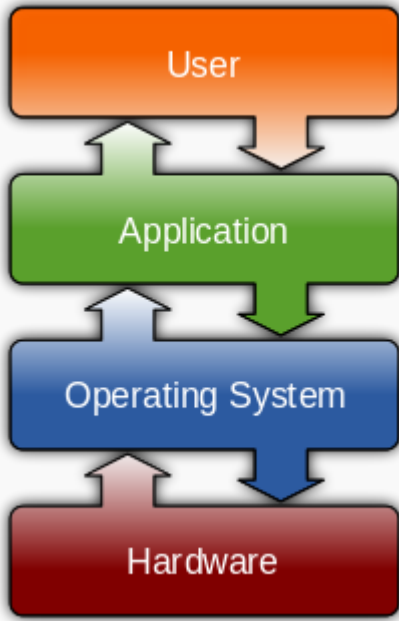
**Impact on Environment:** The computer manufacturing processes and computer waste are polluting the environment. The wasted parts of computer can release dangerous toxic materials. Green computer is a method to reduce the electricity consumed and environmental waste generated when using a computer. It includes recycling and regulating manufacturing processes. The used computers must be donated or disposed of properly.

## Hardware and Software

Hardware and Software have a symbiotic relationship, this means that without software hardware is very limited; and without hardware, software wouldn't be able to run at all. They need each other to fulfill their potential.
**Hardware** - Physical components that make up a computer system.

**Software** - Computer programs and related data that provide the instructions for telling computer hardware what to do and how to do it.

| Standard hardware components | The relationship between Hardware and Software |
|---|---|
| <br><br>Hardware of a modern personal computer, can you name all the components? | <br><br>A layer structure showing the relationship between various layers of software and hardware |

<u>**Classification of Software**</u>: You have probably used a lot of software over the years, here we are going to study the different classifications (types) of software that are out there.

**Software can perform many different tasks:**

The two main classifications of software that all programs fit under are:

- **System software**
- **Application software**

Without software, most hardware would sit there doing nothing or perform specific tasks. To make most hardware run we need to use software, and your task here is to select the correct type of software for each job.

**System software:** Software designed to operate the computer hardware and to provide a platform for running application software.
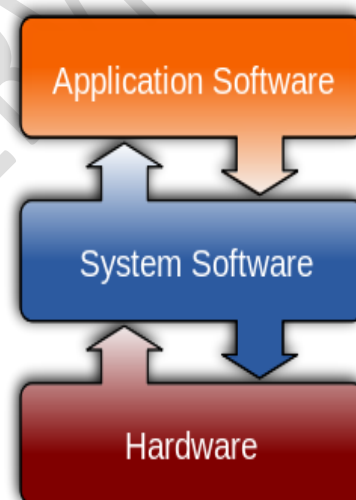
Modern computers are complex machines involving many different parts. To keep it running well you will need system software. System software will handle the smooth running of all the components of the computer as well as providing general functionality for other programs to use, tools to speed up the computer, tools to develop new software and programs to keep you safe from attacks. There are several different types of system software that we will look at in more detail very shortly:

- <u>**Operating Systems**</u> are a collection of programs that *make the computer hardware conveniently available to the user* and also *hide the complexities of the computer's operation*. The Operating System (such as Windows 7 or Linux) interprets commands issued by application software (e.g. word processor and spreadsheets). The Operating System is also *an interface between the application software and computer*. Without the operating system, the application programs would be unable to communicate with the computer.

- **Utility programs** are small, powerful programs with a limited capability, they are usually operated by the user to maintain a smooth running of the computer system. Various examples include file management, diagnosing problems and finding out information about the computer etc. Notable examples of utility programs include copy, paste, delete, file searching, disk defragmenter, disk cleanup. However, there are also other types that can be separately installable from the Operating System.

- **Library programs** are a compiled collection of subroutines
- **Translator software** (Compiler, Assembler, Interpreter)

**Application Software:** Software designed to help the user to perform specific tasks. GIMP is an example of photo editing general purpose application software.

Application software is designed for people like me and you to perform tasks that we consider useful. This might be the ability of a scientist to work out statistical information using a set of results or someone who wants to play the latest computer game. There are several categories of Application software that we'll look into shortly:

- General purpose application software.
- Special purpose application software.
- Bespoke application software

Operating system software: An operating system (OS) is a set of programs that manage computer hardware resources and provide common services for application software. The operating system is the most important type of system software in a computer system. Without an operating system, a user cannot run an application program on their computer (unless the application program is self booting).

Time-sharing operating systems schedule tasks for efficient use of the system and may also include accounting for cost allocation of processor time, mass storage, printing, and other resources. For hardware functions such as input/output and main memory management, the operating system acts as a middleman between application programs and the computer hardware, although the application code is usually executed directly by the hardware it will frequently call the OS or be interrupted by it. Operating systems can be found on almost any device that contains a computer, from mobile phones and video game consoles to supercomputers and web servers.

Examples of popular modern operating systems include Android, iOS, Linux, Mac OS X and Microsoft Windows.

**Utility Programs:** Utility software is a type of system software designed to help analyze, configure, optimize and maintain the computer. A single piece of utility software is usually called a utility or tool. Utility software should not be

confused with application software, which allows users to do things like creating text documents, playing games, listening to music or surfing the web. Rather than providing these kinds of user-oriented or output-oriented functionality, utility software usually focuses on how the computer infrastructure (including the computer hardware, operating system, application software and data storage) operates.

Due to this focus, utilities are often rather technical and targeted at people with an advanced level of computer knowledge.

**Examples of utility software include:**

- **Virus scanner** - to protect your system from Trojans and viruses
- **Disk defragmenter** - to speed up your hard disk
- **System monitor** - to look at your current system resources
- **File managers** - to add, delete, rename and move files and folders

**Library Programs:** Library programs are collections of resources used to develop software. These include pre-written code and subroutines.

Illustration of an application which uses libraries file to play an Ogg Vorbis media file:-



Library programs contain code and data that provide services to other programs such as interface (look and feel), printing, network code and even the graphic engines of computer games. If you have ever wondered why all Microsoft Office programs have the same look and feel, that is because they are using the same graphical user interface libraries. For computer games a developer might not have the time and budget to write a new graphics engine so they often buy graphical libraries to speed up development, this will allow them to quickly develop a good looking game that runs on the desired hardware. For example Battlefield 3 and Need for Speed both use the same Frostbite engine.
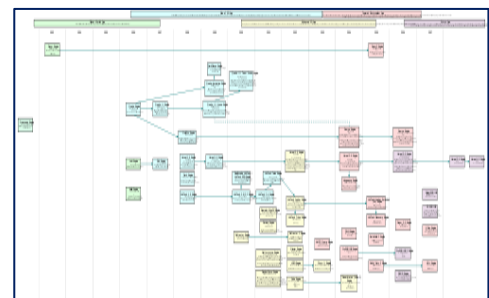


The History of Game Engine

**Translator Software:** The final type of system software that you need to know is translator software. This is software that allows new programs to be written and run on computers, by converting source code into machine code. There are three types that we'll cover in a lot more detail shortly:

- Assembler - converts assembly code into machine code
- Interpreter - converts 3rd generation languages such as java script into machine code one line at a time
- Compiler - converts 3rd generation languages such as C++ into machine code all at once

**Application Software**
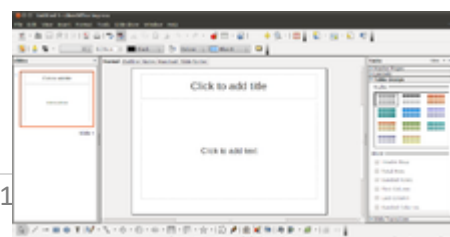
General purpose application software: General purpose application software is a type of software that can be used for a variety of tasks. It is not limited to one particular function. For example a word processor could be classed as general purpose software as it would allow a user to write a novel, create a restaurant menu or even make a poster.

Examples of General purpose application software include: Word processors, Spreadsheet and Presentation software.

**Special Purpose Application Software:** Special purpose application software is a type of software created to execute one specific task. For example a camera application on your phone will only allow you to take and share pictures. Another example would be a chess game, it would only allow you to play chess.



Other examples of special purpose application software are web browsers, calculators, media players, calendar programs etc. Again, make sure that you don't use brand names!

**Bespoke Application Software:** Bespoke application software is tailor made for a specific user and purpose. For example a factory may require software to run a robot to make cars, however, it is the only factory making that car in the world, so the software required would have to be specially built for the task. Other examples might include software for the military, missile/UAV operations, software for hospitals and medical equipment, software being written inside banks and other financial institutions.

There are several things to consider before purchasing bespoke software, on the plus side:

⊕ Software is built for and will meet your precise needs.
However, you must also consider-

⊖ Software will be expensive as you have to cover all of the production costs

⊖ It may take some time to develop the software, when special purpose software could be brought straight away

⊖ The software is more likely to be buggy as it probably won't have thousands of clients using and testing it

**Types of Program Translator**

**Assembler:** An assembler translates assembly language into machine code. Assembly language consists of mnemonics for machine op codes so assemblers perform a 1:1 translation from mnemonic to a direct instruction. For example: LDA #4 converts to 0001001000100100. Conversely, one instruction in a high level language will translate to one or more instructions at machine level.

**Advantages of using an Assembler:**

⊕ Very fast in translating assembly language to machine code as 1 to 1 relationship

⊕ Assembly code is often very efficient (and therefore fast) because it is a low level language

⊕ Assembly code is fairly easy to understand due to the use of English-like mnemonics

**Disadvantages of using an Assembler:**

⊖ Assembly language is written for a certain instruction set and/or processor

⊖ Assembly tends to be optimized for the hardware it's designed for, meaning it is often incompatible with different hardware

⊖ Lots of assembly code is needed to do relatively simple tasks, and complex programs require lots of programming time

**Compiler:** A Compiler is a computer program that translates code written in a high level language to a lower level language, object/machine code. The most common reason for translating source code is to create an executable program (converting from a high level language into machine language).

**Advantages of using a Compiler**

⊕ Source code is not included; therefore compiled code is more secure than interpreted code

⊕ Tends to produce faster code than interpreting source code

⊕ Produces an executable file, and therefore the program can be run without need of the source code

**Disadvantages of using a Compiler**

⊖ Object code needs to be produced before a final executable file, this can be a slow process

⊖ The source code must be 100% correct for the executable file to be produced

**Interpreter:** An interpreter program executes other programs directly, running through program code and executing it line-by-line. As it analyses every line, an interpreter is slower than running compiled code but it can take less time to interpret program code than to compile and then run it — this is very useful when prototyping and testing code. Interpreters are written for multiple platforms, this means code written once can be run immediately on different systems without having to recompile for each. Examples of this include flash based web programs that will run on your PC, MAC, games console and Mobile phone.

**Advantages of using an Interpreter**

⊕ Easier to debug check errors) than a compiler

⊕ Easier to create multi-platform code, as each different platform would have an interpreter to run the same code

⊕ Useful for prototyping software and testing basic program logic

**Disadvantages of using an Interpreter**

⊖ Source code is required for the program to be executed, and this source code can be read making it insecure

⊖ Interpreters are generally slower than compiled programs due to the per-line translation method

## Exercise

**Answer the Following Questions**

1. Describe a few advantages of computers?
_____
_____
_____

2. What is an operating system?
_____
_____
_____

3. What is utility software?
_____
_____
_____

4. What is application software?
_____
_____
_____

5. Describe briefly: the compiler and interpreter.
_____
_____
_____

# Unit 3 - Basic PC Troubleshooting (Hardware/Software)

## Learning Objectives:

- Booting of DOS/Windows
- Types of Computer Cards
- Processor & Motherboard
- Installation of SMPS
- Dismantling & Assembling Computer
- Installing & Connecting Various Types of Hard Disk Drive
- Configuring, Partitioning & Formatting of Hard Disk Drive
- Installing Motherboard
- DOS & Windows Installation/Configuration
- Antivirus Download
- Printers Driver Installation
- Uninstalling the Drivers
- Hard Disk Booting Issue
- Network Connectivity Issue
- Setting up a Wi-Fi Network
- Common Browser Issues & Troubleshooting
- Safe Mode & its Use
- Remote Desktop
- Windows & MS-Office Shortcuts

**1. Booting the Computer, DOS**

The objective of this activity is to enable the learners to boot the computer in DOS platform.

First, explain the learners about Booting.

**Booting** means starting or restarting the Computer.

When we start the Computer, there is an operation which is performed automatically by the Computer which is known as Booting. While booting, computer will check all the hardware and Software those which are installed or attached with the System and this will also load all the Files those which are needed for running a computer.
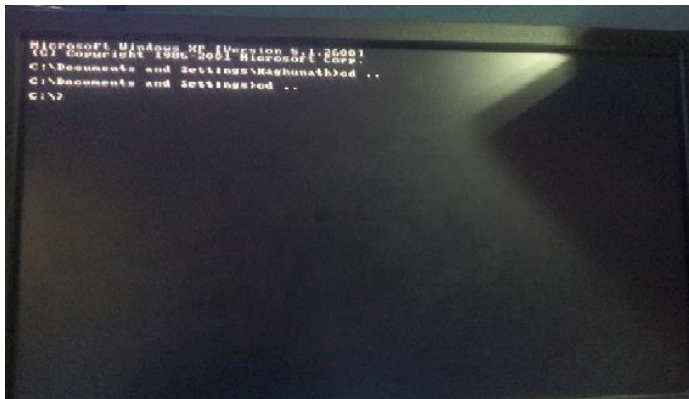
Second, show a practical demo of the DOS booting process with the help of a projector.

The DOS booting process includes the following steps:

- Turn the power button ON

- Turn ON the monitor

- Wait for the DOS window to start

- Automatically the DOS will start when the c:\ prompt appears

- Now DOS is ready for use.



**Note:**

- The facilitator should show how a DOS OS screen looks so that the learners will be able to differentiate DOS from other OS.

Today DOS is pre-installed in the computers by the manufacturer itself. This procedure is for the basic knowledge of the learners.

**2. Booting of Windows OS**

The purpose of this activity is to enable the learners to boot the computer in Windows platform and know the difference between various OS booting procedures.

**Preparation by the facilitator**

- Windows installed Computer or Laptop

- Screen shots of Windows

**Windows** is an operating system developed by Microsoft for personal and professional use.

There are many versions of Windows like Vista, XP, Windows 7 and Windows 8. The most recently used is Windows 8 OS.

The Windows booting process includes the following steps:

- Turn the power button ON

- Turn ON the monitor

- Wait for the Windows to start

- Automatically the Windows will start and is ready for use.
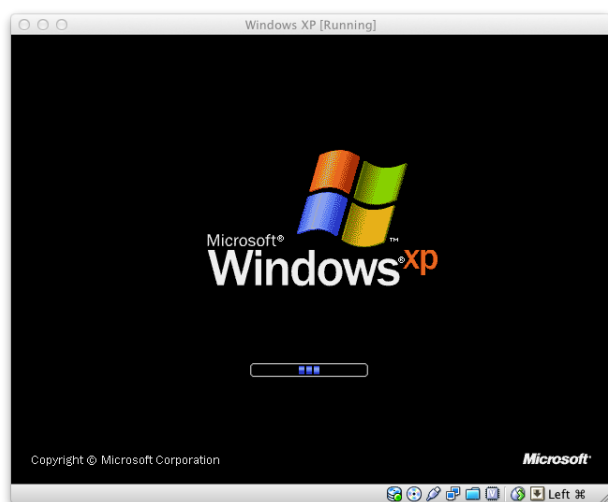
**Difference between DOS and Windows:**

- DOS is a single user OS, Windows is Multiuser.

- DOS is a single tasking OS, Windows is Multitasking.

- DOS supports 2 GB of maximum memory; Windows supports 2 TB or more memory.

Windows is easier and faster compared to DOS. Windows is more user-friendly and has more features as compared to DOS.

**3. Types of Computer Cards**

**a) Motherboard**

- It is known as circuit board or main board or system board.

- It contains electronic component of a system.

- CPU, memory, drives and cards are all connected to mother board directly or through cables.

- It is also known as the "back bone" of computer.



**b) Controller Cards**

- It controls the transfer of data from a computer.

- It is a hardware which connects mother board with other parts of computer like Keyboard, mouse and hard drive.

- Controllers are in-built in mother board as chip.

- In order to add additional components, controller card in necessary (like SCSI or PCI hard drive).

**c) Display Card**

- Is also known as video card or graphics card.

- It is an expansion card which helps in viewing images in more clear graphics.

- This is also installed in mother board.

**d) Sound Card**

- It is also known as audio card.

- It helps in controlling the input and output of sound signal of computer.

- The sound card converts incoming digital audio data into analog audio so that the speakers can play it.

**e) AGP's**

- It is known as Accelerated Graphics Port.

- It is another port where graphics controller can directly access the main memory.

**f) Fax and Modem Card**

- It helps a computer to send and receive documents as faxes on a phone line.

- It is designed to send and receive documents to and from a fax machine.

**g) TV Tuner Card**

- It is a computer hardware that is used to receive signals and watch television on computer screen or pc.

**Ethernet card**

- This card allows the computer to connect to high speed internet connections by connecting to an Ethernet cable from card to modem.

**4. Processor & Motherboard**

**Processor** is the brain of the computer.

It is also called as **CPU (Central Processing Unit).**

Its basic job is to receive input and provide the appropriate output. The processor tells what the computer must do or not do.

The way brain is to the human body, the same is processor for the computer. As a human body is useless without a brain, a computer also cannot be used without the processor.

**Main Features of a Processor are:**

- ALU (Arithmetic Logic Unit)
- CU (Control Unit)

**Uses:**

It helps in performing all arithmetic and logical operations

It also helps in taking instructions from the memory stored in the computer and then executes them.
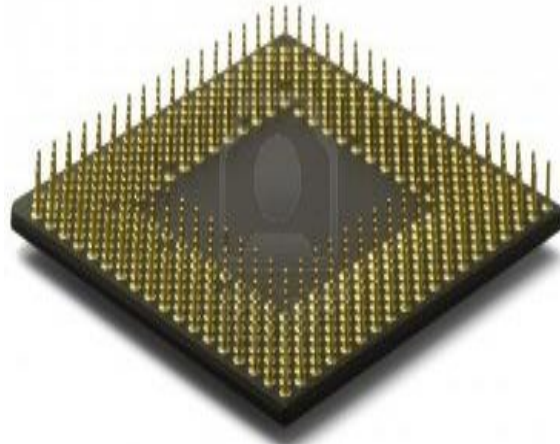
**Note:**

The facilitator should explain how to carefully handle the processor without causing any damage to it.

Front view



Back view

**Types of Processor**

- Dual core
- Quad core

**Dual-Core Processor** is a CPU with two processors or "execution cores" in the same circuit.

Because the two processors are linked together, they can perform operations up to twice as fast as a single processor can.

**Quad-Core Processor** has four processing cores in a single chip. It is similar to a dual-core CPU, but has four separate processors (rather than two), which can process instructions at the same time.
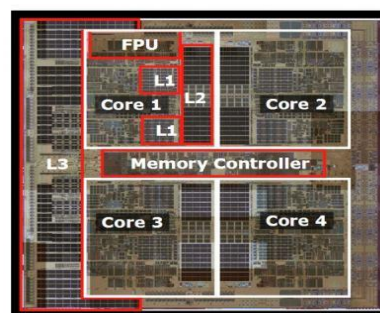
Today the most recently used is a Quad-core processor in all the industries.

**Note:**

Carefully handle the processors without causing any damage.
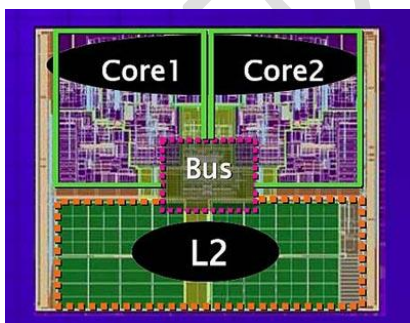


Dual Core



Quad Core

**5. SMPS**

- It means Switching Mode Power Supply (SMPS).

- The power supply in computer is controlled by SMPS.

- SMPS system is highly reliable, efficient, noiseless and compact.

**Installation of SMPS**

- Power supply is controlled by SMPS.

- If SMPS is damaged then it will not start.

- Lay down CPU with its side and remove side panel.

- Gently place the SMPS inside the case so that its screw hole lines up with the holes in the case.

- Power chord input should be facing outside the case.

- Fix the screws properly.

- 12V ATX connector (4-8 pin) giving power to mother board.

- A main pin connector to motherboard (20/24 pin).

- Power supply to hard drive and CD drive connectors.

- Each connector is designed to prevent it from being improperly inserted.

- First insert 24pin connector in motherboard for hard drive.

- 4 pin connectors for IDE drives and serial ATA power connectors.

- Now slide the side panel again easily.

- Installation is finished now.

**Types of SMPS**

- AT SMPS

- ATX SMPS

- BTX SMPS

**AT SMPS**

- It stands for Advanced Technology.

- It has 12pin power connector but they are all old SMPS.

- They are used in Pentium-I, Pentium-II, Pentium-III CPU's.
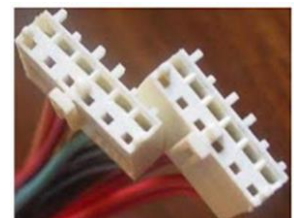
**ATX SMPS**

It stands for Advanced Technology Extended.

- It has 20pin power connector.

- They are used in Pentium-III, Pentium-IV, and AMD CPU's.

**BTX SMPS**

- It stands for Balanced Technology Extended.

- It has 24pin power connector.

- They are used in dual core, Quad core, i3, i5, i7 and latest AMD CPU's.

**NOTE:** All SMPS looks same but they are differentiated with the **connector** used.

**6. Dismantling Computer (Demo)**

- Unplugging of all the cables connected to the computer

- Outer Shell/Casing removal

- Removal of system fan

- Disconnection of power supply

- Removal of CD/DVD drives

- Removal of Hard-disk and portable hard-drive (if present)

- Mother-board separation

- Removal of RAM and other Expansion cards

- Connectivity center cables

- Power Button & Power LED and HDD LED

- Removal of Processor fan from the processor

a) **Removal of System Fan**

**Items Required:**

- A computer

- Screw-driver

The purpose of this activity is to enable the learners to know the process of removal of system fan.

Most computers have two fans:

1. The system fan: the one blowing air into the computer.

2. The CPU fan: the one blowing air onto the CPU heat sink.

**Steps:**

- Start by removing the system fan first. It is located at the back side of the computer, the side with all the component plugging.
- First, unplug the fan from the motherboard. You can find the plug by following the wire from the fan. It should be labeled "SYS_FAN1". Next, you will have to unscrew the fan from the outside.
- You should now be able to lift the fan out of the PC.

**b) Disconnection of Power Supply**

**Items Required:**

- A computer
- Screw-driver

The purpose of this activity is to enable the learners to know the method of disconnecting system's power supply.

The power supply is a large metal box located at the upper-back part of the computer. They sometimes come with an on/off switch that is accessible from the back of the computer. The main power cord also plugs into the back of the power supply.

The power supply supplies power to every component in a computer, therefore it has the most wires out of every other component in the computer. The first thing you will do is unplug every wire coming from the power supply. The listed below is everything that you need to disconnect:

- Motherboard (very large connector/plug)
- CD/DVD drive[s] power
- Internal hard drive power
- Portable hard drive slot power

Once everything is unplugged, unscrew the four screws holding the power supply in place, on the back of the computer. Next, push the power supply from the outside and then lift it out.

**c) Removal of CD/DVD Drive**

**Items Required:**

- A computer
- Screw-driver

The purpose of this activity is to enable the learners to know the process of removal of CD/DVD drive.

**Note:**

There is mostly one CD/DVD drive, but in some cases there might be two. If so, follow this step twice.

The CD/DVD drive is one of the easiest components to remove. First, unplug the ribbon from the back of the drive. Once that is completed, pull on the tab securing the drive in place and then push it out from the inside.

If you don't have a second drive, there should be a flat piece of metal covering the drive slot. Follow the inscribed instructions to remove it.

**d) Removal of Hard-disk and Portable Hard-Drive (if present)**

**Items Required:**

- A computer
- Screw-driver

The purpose of this activity is to enable the learners to know the process of removal of hard-disk/portable hard drive.

Explain about the system fan and its removal.

First remove the connector at the back of the slot, and unplug the other end from the motherboard. Also unplug the SATA cable from the motherboard and the hard drive. The portable hard drive slot is secured the same way the CD/DVD drive is, with a tab. Pull on the tab and then slide the slot out.

To remove the hard drive from the side of the slot, unscrew the four screws securing it in place. You must be very careful so that the hard drive does not drop, as it is very delicate.

**e) Mother-board Separation**

**Items Required:**

- A computer
- Screw-driver

The purpose of this activity is to enable the learners to know the process of removal of motherboard.

- Unplug all the cables connecting to the motherboard.
  - ➢ Power supply
  - ➢ ATA cable
  - ➢ Speaker and other connections to the mother-board.
- Slowly unscrew the mother-board from the unit.
- Remove the mother-board outside from the unit.

**Note:**

Be careful as the parts and the pins on the mother-board are very delicate and may get damaged easily.

**f) Removal of RAM and other Expansion Cards**

**Items Required:**

- A computer
- Screw-driver

The purpose of this activity is to enable the learners to know the process of removal of RAM and other expansion cards.

First remove the RAM slowly from the mother-board.

RAM allows for the near instantaneous transfer of information to and from the CPU.

The more RAM you have, the faster your computer runs. Most computers have 4 RAM slots and two RAM chips.

To remove the RAM, push down on both tabs which are located at both ends of the RAM, holding the RAM in place.

**Examples of Expansion cards:**

- Bluetooth
- Wireless Internet
- Ethernet
- TV

Different computers come with different set of cards.

There should be a single screw on top of each expansion card slot, whether it is occupied or empty.

Remove the screws on the occupied card slots. Once the screws are removed, you should be able to remove the cards by pulling them upward carefully.

Some expansion cards have cables leading to other parts of the computer. You will have to unplug any cables attached to an expansion card.

**g) View Connectivity Center Cables**

**Items Required:**

- A computer
- Screw-driver

The purpose of this activity is to enable the learners to view the connectivity center cables.

Most new computers have a connectivity center located at the front of the computer.

The connectivity center is the area on the front of the computer where there are many input sections, like:

- USB
- Firewire
- Microphone
- Headphones
- Video etc.

Do not remove the whole connectivity center in this step, but just unplug all the cables coming from it. Do that (unplug all cables), then unplug the wires leading from the power button, HDD light, and power light.

**h) View Power Button & Power LED and HDD LED**

**Items Required:**

- computer
- Screw-driver

The purpose of this activity is to enable the learners to know the dismantling of the computer.

**Note:**

There is mostly one CD/DVD drive, but in some cases there might be two. If so, follow this step twice.

There is a zip tie holding the wires/cables for the front connectivity center and front power button/LEDs. Cut it.

To remove the chassis, press in on the tabs that are located on the chassis' side. Refer to the pictures to see the tabs. Once the tabs are being pressed in, pull the whole chassis out of the computer.

To remove the LEDs from the "chassis", push them from the front with a screw driver. To remove the button, you will need to push it from the back, the side with the wires.

**i) Removal of Processor-fan from the Processor**

**Items Required:**

- A computer
- Screw-driver

The purpose of this activity is to enable the learners to know the dismantling of the computer.

First, unplug the fan from the motherboard.

Now find the plug by following the wire from the fan. Next, you will have to unscrew the fan from the outside.

**Note:** Do the unscrewing carefully. You should now be able to lift the fan out of the PC.

**7. Assembling of Computers (Demo)**

**Items Required:**

- Screw driver
- Mother board
- CDs/DVD drive
- RAM card
- Hard drive
- Motherboard
- Screws
- SMPS
- Screw to tighten them.
- Hard drive
- Mounting screw
- Drive bay
- CD Drive

The objective of this activity is to enable the learners to understand:

- Handling of tools (screw driver) and how to hold it

- Importance of handling the parts sensitively

    o If mishandled, can be damaged

    o If dropped, can be damaged

- After disassembling, view all these parts carefully. Assemble back only the disassembled parts.

- See what has been removed from desktop.

- These are the parts what you need to assemble back.

- Keep the parts safely.

**Fixing RAM**

- Hold motherboard firmly.

- See the holes and screw them properly.

- Fix ram in motherboard on slot.

**Fixing SMPS**

- Hold the SMPS from inside.

- Give support from inside and tighten the screw.

- After tightening the SMPS, give it power by attaching its cable to motherboard.

**Install Hard Drive**

- There will be many bays available to choose from in which you would want to install hard drive.

- Take the screw driver and screw the drive in that bay.

- Make the connection with the mother board.

**Fixing CD drive**

- Slide the CD drive from outside.

- Hold the CD drive from inside and slide it into the case.

- Screw the case properly.

- Give connections from CD drive to the motherboard.

**Enclose parts with Case Panel**

- Slide back the case panel.

- Screw the panel tightly.

- After complete assembling, turn ON and check if the computer is working properly.

- If yes, then computer starts booting.

**Hard Disk Drive**

- It stores and gives quick access to large amount of data.

- It is used for permanent storage of data.

- Most computers come now with internal build hard disk drive connected to the mother board.

**Types of Hard Disk Drives**

- IDE.

- SATA.

- SCSI.

- External removable Hard Disk Drive.

**IDE**

- **I**ntegrated **D**rive **E**lectronics **D**rive

- It is also known as PATA (**P**arallel **A**dvance **T**echnology **A**ttachment)

- It usually has 40 pins.

- It sends 8bit of data at a time.

- Two drives can be connected in a single PATA cable.

**SATA (S**erial **A**dvance **T**echnology **A**ttachment **D**rive)

- SATA Drives have usually 7 pins, 4 pins in pair of two for sending and receiving data and 3 pins to ground for earthing.

- Bit by bit data transfer.

- Only one drive can be connected in a single SATA cable.



**SCSI**

- **S**mall **C**omputer **S**ystem **I**nterface **D**rive

- SCSI Drives have usually 50 to 68 pins.

- It can be attached or removed from system in running condition.

- Maximum of 16 drives can be connected in a single SCSI cable.