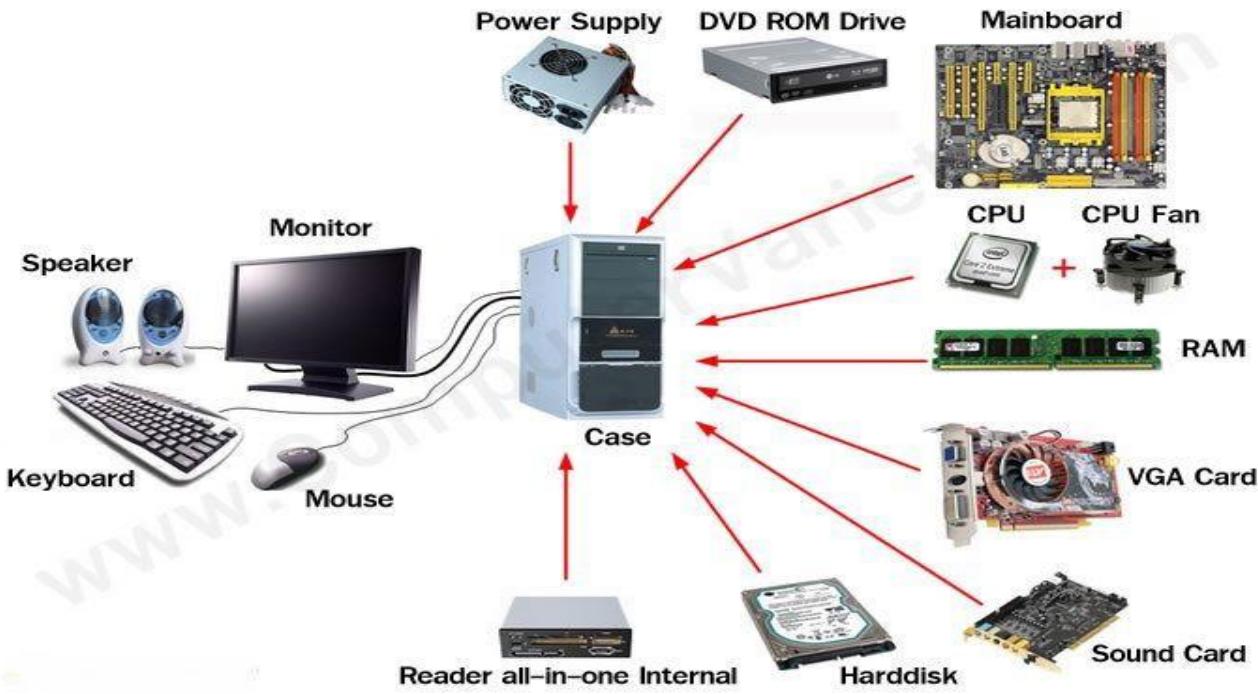


DEBRE MARKOS UNIVERSITY  
INSTITUTE OF TECHNOLOGY



SCHOOL OF COMPUTING  
Information Technology Academic Program



Laboratory Manual for computer maintenance and technical support  
(ITec3031)

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## **Table of Contents**

<b>Chapter one .....</b>	<b>1</b>
<b>Introduction to Computers .....</b>	<b>1</b>
<b>Experiment No: 1 Introduction to Computers .....</b>	<b>1</b>
<b>Experiment No: 2 Monitors .....</b>	<b>8</b>
<b>Experiment No: 3 Study of Key Board .....</b>	<b>10</b>
<b>Experiment no: 4 Familiarize the computer system layout: external parts, MOTHERBOARD, FDD, HDD, CD, and DVD and add on cards. ....</b>	<b>14</b>
<b>Chapter 2 .....</b>	<b>24</b>
<b>Basics of Preventive Maintenance and Troubleshooting.....</b>	<b>24</b>
<b>Chapter 3 .....</b>	<b>27</b>
<b>Safe Lab Procedures and Tool Use.....</b>	<b>27</b>
<b>Chapter 4 .....</b>	<b>29</b>
<b>Computer Assembly and disassembly.....</b>	<b>29</b>
<b>Experiment No: 5 Assembling a Desktop PC .....</b>	<b>29</b>
<b>Experiment No.6 Assembling and disassembling of laptop .....</b>	<b>36</b>
<b>Chapter 5 .....</b>	<b>53</b>
<b>Operating Systems .....</b>	<b>53</b>
<b>Experiment No.7 Installing and configuring operating systems.....</b>	<b>53</b>
<b>Experiment No.8 BIOS Setup Utility .....</b>	<b>66</b>
<b>    Simple Way to Refill and Reuse a Printer Cartridge .....</b>	<b>74</b>
<b>Experiment .No:10 Printer installation and servicing and troubleshoot .....</b>	<b>76</b>
<b>Experiment No 11 Scanner parts and their functions .....</b>	<b>85</b>
<b>Experiment No 12 Install, configure scanner with system, and troubleshoot the problems. ....</b>	<b>89</b>
<b>Experiment No 13 Hard disk management .....</b>	<b>92</b>
<b>References.....</b>	<b>96</b>

## LIST OF FIGURES

<b>Figure 1:-study of monitors.....</b>	<b>9</b>
<b>Figure 2 study of motherboard components.....</b>	<b>15</b>
<b>Figure 3 CPU.....</b>	<b>16</b>
<b>Figure 4 RAM.....</b>	<b>16</b>
<b>Figure 5 Hard disk components.....</b>	<b>18</b>
<b>Figure 6 Jumper block.....</b>	<b>20</b>
<b>Figure 7 CD-Rom.....</b>	<b>21</b>
<b>Figure 8 DVD-Rom.....</b>	<b>21</b>
<b>Figure 9 Power Supply .....</b>	<b>22</b>
<b>Figure 10 Access Slots.....</b>	<b>22</b>
<b>Figure 11back panel.....</b>	<b>36</b>
<b>Figure 12 processor.....</b>	<b>37</b>
<b>Figure 13 laptop battery .....</b>	<b>38</b>
<b>Figure 14 laptop keyboard .....</b>	<b>39</b>

## **Chapter one**

### **Introduction to Computers PC Hardware**

#### **Experiment No: 1 Introduction to Computers**

**Aim:** To understand Different generations and types of Computers- Hardware's- Parts of a Personnel Computer System –input output devices-memories- and Types of Languages and Software's.

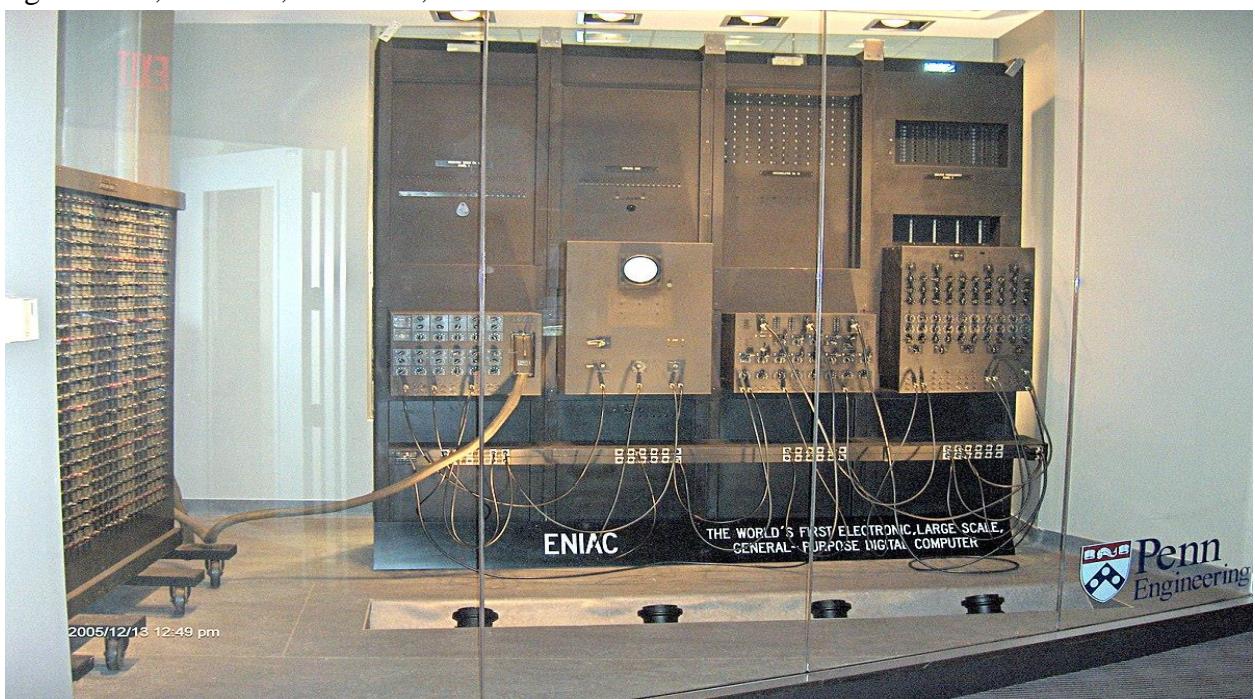
A computer is a device that accepts information (in the form of digitalized data) and manipulates it for some result based on a program or sequence of instructions on how the data is to be processed.

Based on Generations Computers can be classified in to 5 they are

##### **A) First Generation Computers**

The period of first generation was 1946-1959. The computers of first generation used vacuum tubes as the basic components for memory and circuitry for CPU (Central Processing Unit). In this generation mainly batch processing operating system were used. Punched cards, paper tape, and magnetic tape were used as input and output devices. The computers in this generation used machine code as programming language.

- Eg. ENIAC, EDVAC, UNIVAC, IBM-701



## B) Second Generation Computers

The period of second generation was 1959-1965. In this generation transistors were used that were cheaper, consumed less power, more compact in size, more reliable and faster than the first generation machines made of vacuum tubes. In this generation, magnetic cores were used as primary memory and magnetic tape and magnetic disks as secondary storage devices. In this generation assembly language and high-level programming languages like FORTRAN, COBOL were used. The computers used batch processing and multiprogramming operating system

- Eg IBM 1620, IBM 7094, CDC 1604 etc.

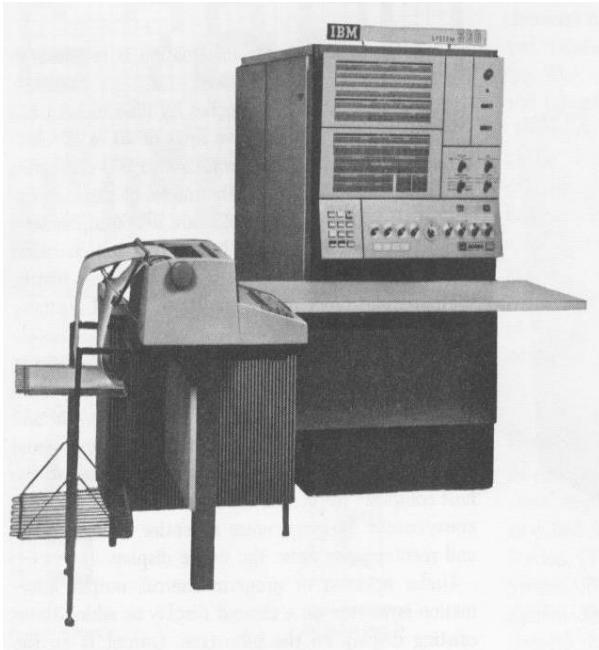


IBM 1620

## C) Third Generation Computers

The period of third generation was 1965-1971. The computers of third generation used integrated circuits (IC's) in place of transistors. A single IC has many transistors, resistors and capacitors along with the associated circuitry. The IC was invented by Jack Kilby. This development made computers smaller in size, reliable and efficient. In this generation remote processing, time-sharing, multi-programming operating system were used. High-level languages (FORTRAN-II TO IV, COBOL, PASCAL PL/1, BASIC, ALGOL-68 etc.) were used during this generation.

- Eg: IBM-360 series, Honeywell-6000 series



IBM-360 series

#### D) Fourth Generation Computers

The fourth generation was 1971-1980. The computers of fourth generation used Very Large Scale Integrated (VLSI) circuits. VLSI circuits having about 5000 transistors and other circuit elements and their associated circuits on a single chip made it possible to have microcomputers of fourth generation. Fourth generation computers became more powerful, compact, reliable, and affordable. As a result, it gave rise to personal computer (PC) revolution. In this generation time-sharing, real time, networks, distributed operating system were used. All the high-level languages like C, C++, DBASE were used in this generation.

Eg: DEC 10, STAR 1000, CRAY-1(Super Computer), CRAY-X-MP (Super Computer)



#### E) Fifth Generation Computers

The period of fifth generation is 1980-till date. In the fifth generation, the VLSI technology became ULSI (Ultra Large Scale Integration) technology, resulting in the production of microprocessor chips having ten million electronic components. This generation is based on parallel processing hardware and AI (Artificial Intelligence) software. AI is an emerging branch in computer science, which interprets means and method of making computers think like human beings. All the high-level languages like C and C++, Java, .Net etc., are used in this generation



Depending on Size the Computers are classified as follows

1. PC (Personal Computer):-It is a single user computer system having moderately powerful microprocessor
2. WorkStation :- It is also a single user computer system which is similar to personal computer but have more powerful microprocessor.
3. Mini Computer :-It is a multi-user computer system which is capable of supporting hundreds of users simultaneously.
4. Main Frame :- It is a multi-user computer system which is capable of supporting hundreds of users simultaneously. Software technology is different from minicomputer.

5. Supercomputer It is an extremely fast computer which can execute hundreds of millions of instructions per second.

#### Different Type Programming Languages

##### 1. Low-Level Language

Low-level languages are designed to operate and handle the entire hardware and instructions set architecture of a computer directly. Low-level languages are considered to be closer to computers. In other words, their prime function is to operate, manage and manipulate the computing hardware and components. Programs and applications written in low-level language are directly executable on the computing hardware without any interpretation or translation.

##### 2. High- Level Language

High level languages are designed to be used by the human operator or the programmer. They are referred to as "closer to humans." In other words, their programming style and context is easier to learn and implement, and the entire code generally focuses on the specific program to be created. However, every single program written in a high level language must be interpreted into machine language before being executed by the computer.

BASIC, C/C++ and Java are popular examples of high-level languages.

##### 3. Assembly Language

An assembly language is a low-level programming language for microprocessors and other programmable devices. It is not just a single language, but rather a group of languages. Assembly language implements a symbolic representation of the machine code needed to program a given CPU architecture.

**Hardware's:** Computer hardware refers to the physical parts of a computer and related devices. Internal hardware devices include motherboards, hard drives, and RAM.

**External:** hardware devices include monitors, keyboards, mice, printers, and scanners.



**Software:** Computer software, or just software, is a collection of computer programs and related data that provides the instructions for telling a computer what to do and how to do it. In other words, software is a set of programs, procedures, algorithms and its documentation concerned with the operation of a data processing system

### Types of Software

Practically computer systems divide software systems into three major classes

#### System Software:

System software is computer software designed to operate and control the computer hardware and to provide a platform for running application software. Operating system is a type of system Software. Examples are Windows, Linux etc.

## **Application software**

Application software, also known as an application or an app, is computer software designed to help the user to perform specific tasks. Examples include enterprise software, accounting software, office suites, and graphics software and media players

## **Programming software**

Programming software include tools in the form of programs or applications that software developers use to create, debug, maintain, or otherwise support other programs and applications

### Computer Programs

A computer program is a collection of instructions that performs a specific task when executed by a computer. A computer requires programs to function, and typically executes the program's instructions in a central processing unit. Single Line of a program is called instructions

### Different Parts of a Computer

**Input Devices:** "An input device is a hardware device that is used to provide input (data instructions) to a computer so that it can be processed". Besides the widely used input devices

like keyboard & Mice there are other different input devices that perform various input operations like a scanner scan images / documents. Webcams capture videos & images.

### Output Devices:

Output devices are used to communicate the processed information to the users. The output devices translate the processed data information to the users. The output devices translate the processed data in machine readable form to forms that can be interpreted by human. The most common types of output devices are monitor, Printer etc. Output can also be obtained in the form of drawings and voices. Mouse and keyboard input and running applications.

### **Exercise**

- 1. Discuss the difference and improvements on each generation of computers**
- 2. Discuss the difference between application, programming and system software**

## **Experiment No: 2 Monitors**

**Aim** To understand different types of monitors

A computer monitor is an electronic device that shows Output. Monitors often look similar to televisions. The main difference between a monitor and a television is that a monitor does not have a television tuner to change channels. Monitors often have higher display resolution than televisions. A high display resolution makes it easier to see smaller letters and fine graphics.

There are three types of computer displays:

### **1. Cathode Ray Tube (CRT)**

This monitor uses a Cathode Ray Tube (CRT). Cathode ray tube creates an image on the screen using a beam of electrons. CRT consists of one or more guns that fire a beam of electrons inside the screen. The screen is coated with very tiny Phosphor dots from inside.

The beam of electrons repeatedly falls on the surface of screen. Every beam fall takes only a fraction of second. CRT in color monitors consists of three guns. These guns generate red, green and blue (RGB) colors. The other colors are generated with a combination of these three colors. Nowadays, most of the CRT monitors are replaced by Flat Panel Monitors.

**2. Flat Panel Monitors:-** Flat Panel Monitors take less space and are lightweight. These monitors use much less power than CRTs. It does not emit harmful radiations. It is much expensive than CRT.

Notebook computers, PDA and cellular phones use flat panel monitors. Flat panel monitors are available in different sizes such as 15", 17", 18.5" & 20" etc. There are two types of Flat

Panel Monitors they are

#### **a) Liquid Crystal Display**

Liquid crystal display, also known as liquid crystal diode, is one of the most advanced technologies available at present. Typically, an LCD monitor consists of a layer of colour or monochrome pixels arranged schematically between a couple of transparent electrodes and two polarizing filters. Optical effect is achieved by polarizing the light in varied amounts and making it pass through the liquid crystal layer. At present, there are two types of LCD technology available. These include the active matrix or TFT and a passive matrix technology.

Among these, TFT technology is more secure and reliable, and generates better picture quality. On the other hand, passive matrix has a slow response time and is slowly becoming outdated.

Advantages:

These monitors are compact, lightweight, do not consume much desk space and electricity and can even be operated by using batteries

Disadvantages.

These monitors are very expensive. Secondly, image quality is not constant when viewed from different angles. Also, an LCD monitor's resolution is always constant. Any alterations can result in a reduced performance.

b) LED (Light-Emitting Diodes) Monitors

LED monitors are the latest types of monitors in the market today. Like LCD, it is again a flat panel display making use of light-emitting diodes for back-lighting instead of Cold Cathode Fluorescent (CCFL) back-lighting used in LCDs. Primarily, the display is of LCD only but the back-lighting is done by LEDs. LED monitors are said to use much lesser power than CRT and LCD. Thus, they are also considered environmental friendly.

Other core advantages of LED monitors are:

They produce images with higher contrast, Lifespan and durability of LED monitors is more than CRT or LCD monitors, do not produce much heat while running

**RESULT:** Studied about Different Types of Monitors



**Figure 1:-study of monitors**

### **Exercise**

- 1. Discuss the difference between CRT and LCD monitor**
- 2. What are the advantages and disadvantages of each types of monitors**

## Experiment No: 3 Study of Key Board

Aim: - To study about key board

Components Required: Key Boards

**Computer Keyboard:** A Computer Keyboard is a kind of typewriter device that consists of several buttons and keys that acts as an input device for Computer machine. After the evolution of punch cards and typewriter, the Computer Keyboard has been a major evolution for various Computer devices. It contains characters, letters, numbers and special characters, which are collectively known as Character keys used for entering text into the Computer device. The Computer Keyboard can be connected to a Computer through a cable or wireless connection. Every keyboard has a similar layout in English language called QWERTY and all the keys derived for the typewriter keys.



### Computer Keyboard Keys

The Computer Keyboard keys are all derived from the typewriter that helps you to input texts, numbers and various other function keys can be used. There are three different types of PC keyboards are the original PC keyboard with 84 keys, the AT keyboard with also 84 keys and enhanced keyboard with 101 keys. The keys found on a Computer keyboard can be categorized as Alphanumeric keys which contains numbers and letters, Punctuation keys that has comma, period, semicolon and other keys and Special keys with function keys, control, arrow, caps lock and others. Usually various Computer Keyboard contains similar keys like page up, page down, home, end, insert, pause, num lock, scroll lock, break, caps lock, print screen and other keys.

There are various types of Computer Keyboard with different keys layout like a capacitive key board, which is a register based, chiclet keyboard with elevated keys, gaming keyboard, multimedia keyboard and many more. But globally used keyboard in the English language called

QWERTY which is named after the sequence of the first six letters from the top left. It has all total 104 keys that include alphabetic characters, arrow keys, special keys, numbers keys and function keys.

### **Some Computer Keyboard Keys Information's**

**Windows key** is a four-pane key that helps you open any program and applications

**ESC Key** is used to interrupt or cancel the current process

**F1 through F12 Keys** are the function keys that has various uses

**Tab Key** helps to begin a line of text

**Caps Lock Key** enables or disables the letter in uppercase

**Shift Key** helps a user to type a single uppercase letter

**Ctrl Key** is used in keyboard shortcut key

**Fn Key** is used for performing special functions like brightness, contrast, switching

**Spacebar key** is used for creating empty space to separate words

**Arrows Key** with up, down, left and right buttons

**Backspace key** is similar to delete key for removing texts in a word

**Delete key** is used to remove text, file or other objects from system

**Enter key** is used to send the cursor to next line

**Insert key** toggles how text is inserted

**Break key** enables the user to break a computer from pause or other halted state

**Prt Sc key** helps you to take screenshot on your monitor

**Home key** returns to beginning of line, document, page or screen

**Page up key** helps to move up one page which is currently viewed

**Page down key** helps you move down the currently viewed page

**End key** moves the cursor to end of line, document or screen

**Numlock key** enables and disables the numeric keypad



## Types of Computer Keyboard

There are four major types of Computer Keyboard used worldwide depending on their size and numbers of keys are QWERTY, AZERTY, DVORAK and QWERTZ. But there are some other types of keyboards that have different connectors, types and sizes are-

**Apple Macintosh Keyboards** also called ADB keyboard as it connects to the Apple desktop bus and comes with two varieties in standard and extended which features 15 extra function keys.

**Ergonomic Keyboards** are broad and different shaped with spaces between two set of keys that makes you work easier.

**Personal Systems or PS/2 keyboards** are designed for the Computers integrated with PS/2 connector that are round pin and does not require USB ports

**Multimedia Keyboards** are similar to standard keyboard that has several additional keys and buttons for multimedia purpose like volume, brightness and video controls

**Gaming Keyboards** consists of programmable keys, macro functions or digital displays that can be used for playing games. It can be connected through wire by USB and also wireless.

**Membrane Keyboards** are often covered by transparent and plastic shell which is mostly use in medical facilities. It can also be used in mobile or landline phones.

**Internet Keyboards** are specially designed for the Internet users that include special keys like e-mail launch, browser launch, home, back and forward key.

**Wireless keyboards** are used without connectors that can be delivered through PS/2 or USB cables by electricity.

**On-screen Keyboard** is a visual keyboard that is displayed on Computer screen and used instead of physical keyboards.

### **Computer Keyboard Shortcuts**

Computer Keyboard shortcuts are very essential on PC that can help you to work fast and speed up the task in every case. There are almost 200 Computer Keyboard shortcuts to be used but here we will tell you top ten shortcut keys that are used regularly to speed up the task.

#### **Top Ten Computer Keyboard Shortcut Keys**

##### **Cut, Copy and Paste**

- Ctrl+C or Ctrl+Insert for Copy
- Ctrl+X for cut
- Ctrl+V or Shift+Insert for paste

##### **Undo and Redo**

- Ctrl+Z for undo any change
- Ctrl+Y to redo any undo
- Ctrl+F opens Find in any program
- Alt+Tab or Ctrl+Tab allows you switch between running applications
- Ctrl+P to open a print window
- Ctrl+Backspace to delete a full word of a single character
- Ctrl+S saves a file
- Ctrl+Home move the cursor to beginning of document and Ctrl+End will move the cursor to end of document
- Windows key+L will lock the Computer
- Ctrl+Alt+Delete will launch the Task manager
- Alt+F4 will close the currently running application

### **Exercise**

#### **Discuss the different types of function and special keys**

## **Experiment no: 4 Familiarize the computer system layout: external parts, MOTHERBOARD, FDD, HDD, CD, and DVD and add on cards.**

**Aim:-**To familiarize a computer system layout: external parts, Motherboard, FDD, HDD, CD / DVD drive and add on cards.

Components/Tools:

CASE,SMPS, Motherboard, FDD, HDD, CD / DVD drive, processor, PATA/SATA Cables, different types of RAM, and add on cards.

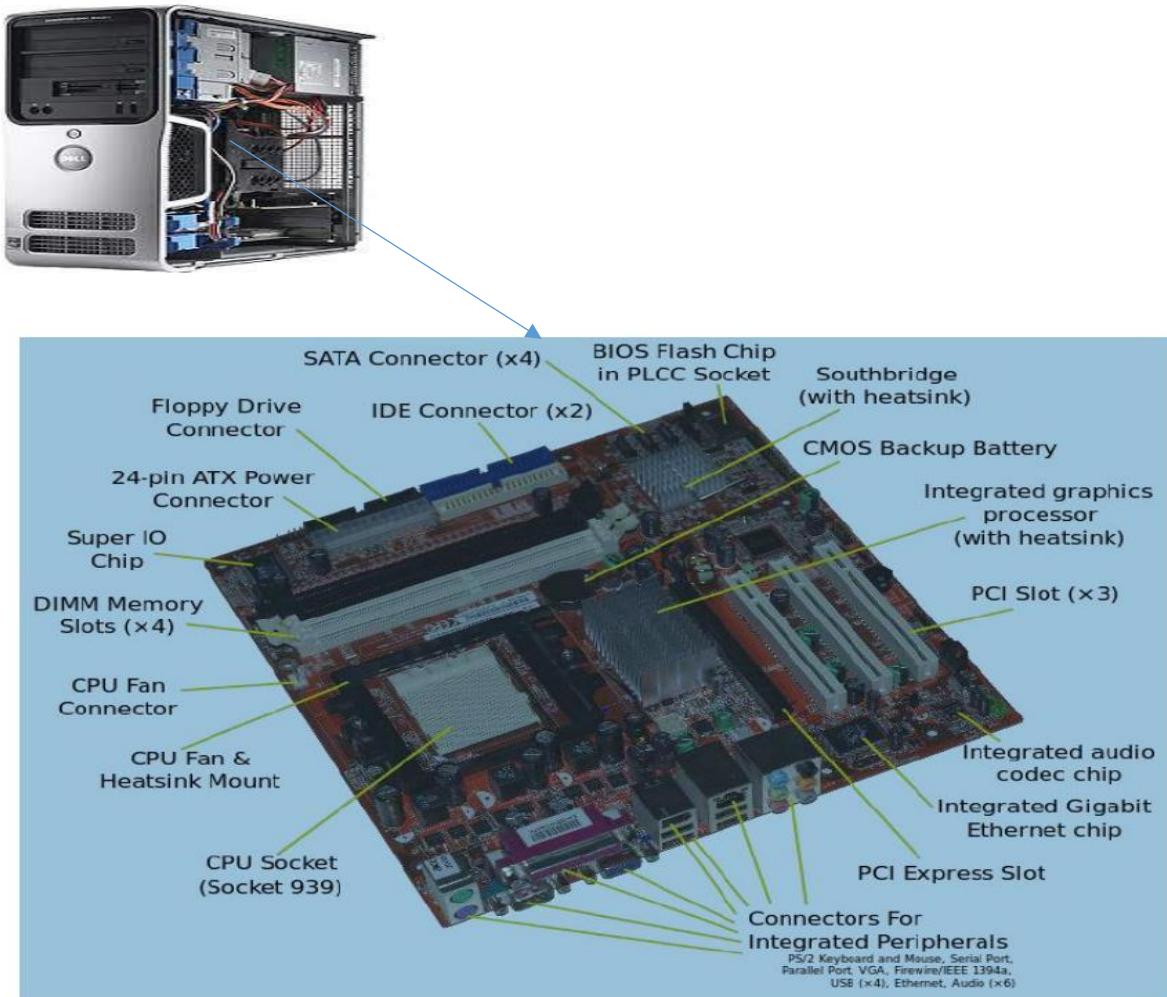


Front ports of computer system



Rare ports of computer system

**Motherboard:**

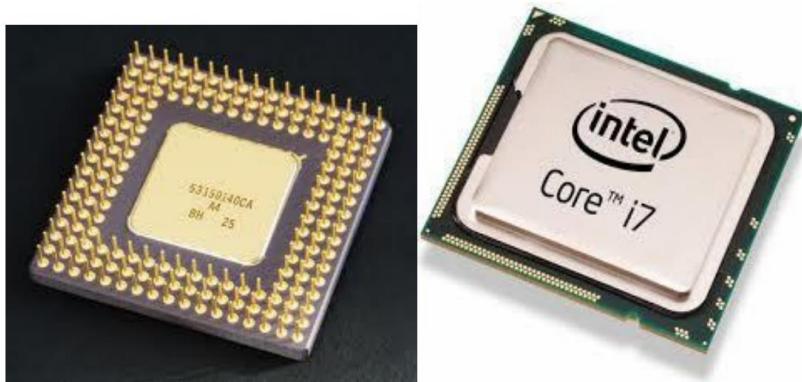


**Figure 2 study of motherboard components**

The motherboard has been an integral part of most personal computers. The motherboard is a common circuit board. Each circuit card performs a unique function in the computer and gets its power from the socket.

#### **CPU:**

The CPU, or processor, is the heart of your computer no matter what type (PC, Server, and Laptop). There are many brands for processors such as Intel and Athlon all with different processors for your computer.

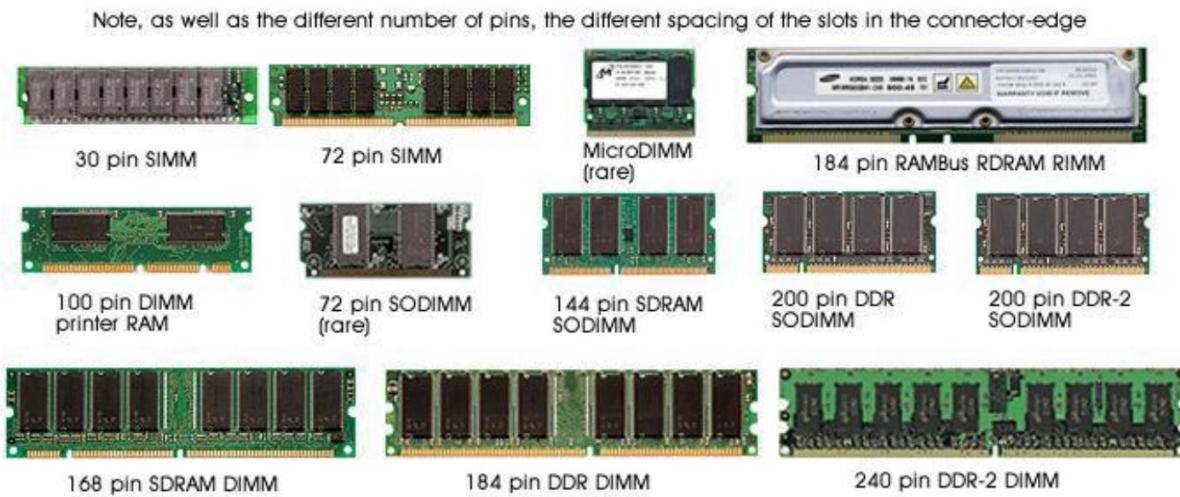


**Figure 3 CPU**

#### **RAM:**

Random Access Memory (RAM) is the form of memory contained in most computers.

When an application is running it stores its information in the RAM. When you close the application the information is deleted from the RAM.



**Figure 4 RAM**

#### **Hard-Disk Drive:**

A hard drive stores all your files and information in a permanent form unlike storing it in RAM (which is temporary). The larger your hard disk (drive) the more information and files you're able to store.

A Hard disk drive also hard drive, hard disk, or disk drive is a device for storing and retrieving digital information, primarily computer data. It consists of one or more rigid (hence

"hard") rapidly rotating discs or cylinders (called platters) coated with magnetic material, and with magnetic heads arranged to write data to the surfaces and read it from them. The cylinders spins and the heads moving over them to perform the read/write operations, it's life time around 5-8 years. Hard drives are classified as non-volatile, random access, digital, magnetic, data storage devices. Introduced by IBM in 1956. The first IBM drive,

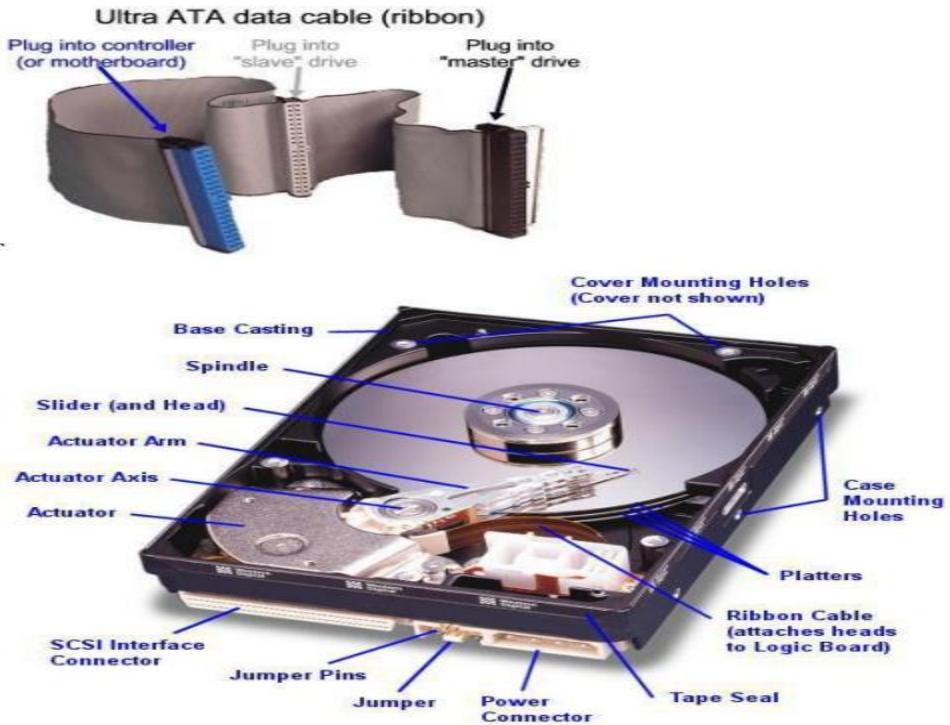
The 350 RAMAC, was approximately the size of two refrigerators and stored 5 million 6-bit characters (the equivalent of 3.75 million 8-bit bytes) on a stack of 50 discs. In 1961 IBM introduced the model 1311 disk drive, which was about the size of a washing machine and stored two million characters on a removable disk "pack.". In 1973, IBM introduced a new type of hard drive code named "Winchester."

### Magnetic recording

A hard disk drive records data by magnetizing a thin film of ferromagnetic material on a disk. Sequential changes in the direction of magnetization represent binary data bits. The data is read from the disk by detecting the transitions in magnetization. User data is encoded using an encoding scheme, such run-length limited encoding, which determines how the data is represented by the magnetic transitions.

A typical HDD design consists of a spindle that holds flat circular disks, also called platters, which hold the recorded data. The platters are made from a non-magnetic material, usually aluminum alloy, glass, or ceramic, and are coated with a shallow layer of magnetic material typically 10–20 nm in depth, with an outer layer of carbon for protection.

## **Hard Disk Components**



**Figure 5 Hard disk components**

**Platters** - A number of disks on which data is stored (the more disks, the greater the drive's capacity) the 5.25" platter were used in earlier days. Now a days it is replaced by the 3.5". The 2.5", 1 1/8", 1 1/3" & 1" platters are using in the laptop computers. Among this the 1" platter are known as "Micro drive". The material by which a disk platter is manufactured is Aluminum Glass or Glass Ceramic compounds. To hold the data on the substrate, it must be coated with magnetic media like Iron Oxide media or Thin Film media

## Tracks

Each side of the platter surface is divided into so many concentric circles is called tracks.

The track number starts from 0. The outermost track is given track no 0 and next 1 and so on... The innermost tracks will have the highest no. In a modern hard disk will have thousands of tracks on each platter.

## Sectors

It is the smallest addressable unit on a direct access storage device and can hold up to 512mb of data only. The storage capacity of the hdd will vary according to the number of sectors or tracks present in it.

## Latency Time

Latency is the average time it takes for a sector to be available the heads have reached a track. It is a factor in disk read and write performance. Decreasing the latency increase the speed of access to data or file.

**Motor** - To rotate the disks

**Head** - to read and write data (The heads "fly" over the surface of a disk supported by a few molecules of air)

**Actuator**- to move the heads over the disks(The figure A shows a device that has four disks (or platters). The white rings in each platter indicate a specific track. The white rings compose a cylinder.)

**Areal density:** Defines how tightly information is packed together on a medium. Increasing capacity per platter results in fewer parts, lower power consumption, less heat, and less noise.

Increasing areal density increases performance because the head reads bits quickly as more pass under the head in the same amount of time; a lower speed disk could outperform a higher speed disk. SMART (Self-Monitoring, Analysis, and Reporting Technology) is an industry-standard specification for EIDE and SCSI disks that allows the monitoring of disks for reliability and impending disk drive failures

### **Spindle Motor**

It is the main motor which rotates the platters of the hard disk. It is also called spindle motor because it directly connected to the spindle on which the platters are connected. It rotates at speed of 3600 to 7200 Rpm or more.

### **Logic Board**

All modern hard disks are made with an intelligent circuit board integrated into the hard disk unit. It contains the electronic components that controls various sections of the hard disk. It is also acts as an interface between the hard disk drive and the system

IDE/ SATA Connectors: used to connect with motherboard

### **Modes of Failure**

Hard drives may fail in a number of ways. Failure may be immediate and total, progressive, or limited. Data may be totally destroyed, or partially or totally recoverable.

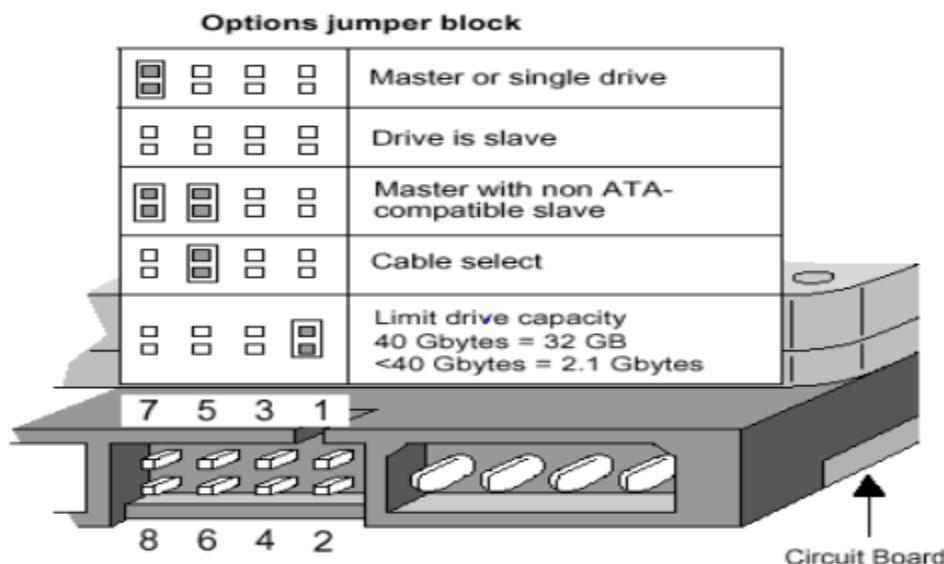
Earlier drives tended to develop bad sectors with use and wear, which could be "mapped out" so that they did not affect operation; this was considered normal unless many bad sectors developed in a short period. Later drives map out bad sectors automatically and invisibly to the user;

S.M.A.R.T. (SMART -Self-Monitoring, Analysis, and Reporting Technology) Information logs these problems. A drive with bad sectors may usually continue to be used.

Other failures, which may be either progressive or limited, are usually considered to be a reason to replace a drive; the value of data potentially at risk usually far outweighs the cost saved by continuing to use a drive which may be failing. Repeated but recoverable read or write errors, unusual noises, excessive and unusual heating, and other abnormalities, are warning signs. Some of the common failures seen are Head Crash, Bad Sectors, Strict ion, Circuit failure etc.

### Master/Slave Settings (in IDE Connectors)

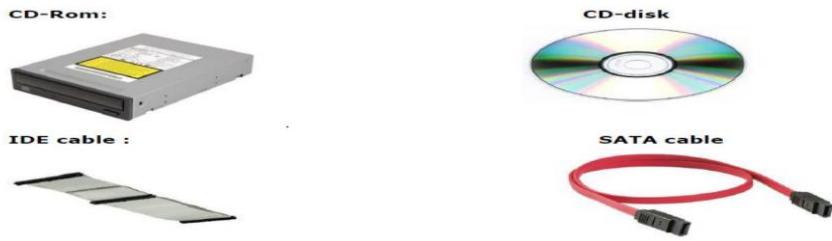
When connecting more than one hard drive to a computer on the same IDE controller, you generally have to assign one as the primary (master) and one as the secondary (slave). You do this by changing the jumpers on the hard drive next to the power connector. Normally, the drive will have a diagram to let you know which jumper should be set for a master drive and which to set for a slave drive.



*Figure 6 Jumper block*

### CD-ROM:

The CD-ROM is reads CD's. CD-ROM completely stands for Compact Disk Read Only Memory. CD's have much more data than a floppy disk. Using CD-RW you can make your own CD's and use them more like a floppy disk



**Figure 7 CD-Rom**

#### DVD-Rom:

DVD-ROM is a digital optical disc storage format. DVDs offer higher storage capacity than compact discs while having the same dimensions. Blank recordable DVD discs (DVD-R and DVD+R) can be recorded once, Rewritable DVDs (DVD-RW, DVD+RW, and DVD-RAM) can be recorded and erased multiple times.

#### Floppy Drive:

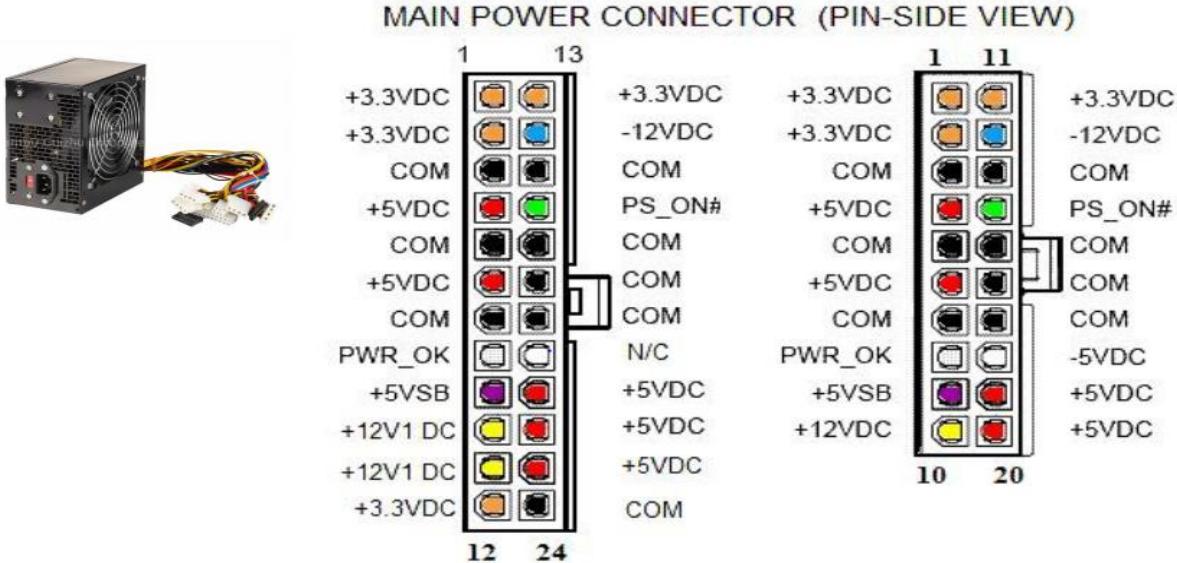
A floppy drive reads the popular floppy disk. Floppy disk is easy to use, rewritable, compact, and great for storing information. The floppy drive is simple and allows you to read, write to, and write over information stored on a floppy disk.



**Figure 8 DVD-Rom**

#### Power Supply:

The power supply is usually a small metal box in the top corner of a case (tower). You can see the power supply as below diagrams



*Figure 9 Power Supply*

#### Access Slots:

Access slots or expansion slots are openings in a computer where a circuit board can be inserted to add new capabilities to the computer. Examples of drives that may go here would be modems; USB drives, networking cards, video adapters, and sound cards.

#### IO card:



*Figure 10 Access Slots*

#### Result:

Thus the computer system layout in SMPS, Motherboard, FDD, HDD, CD, DVD and add on cards of the pc's are identified.

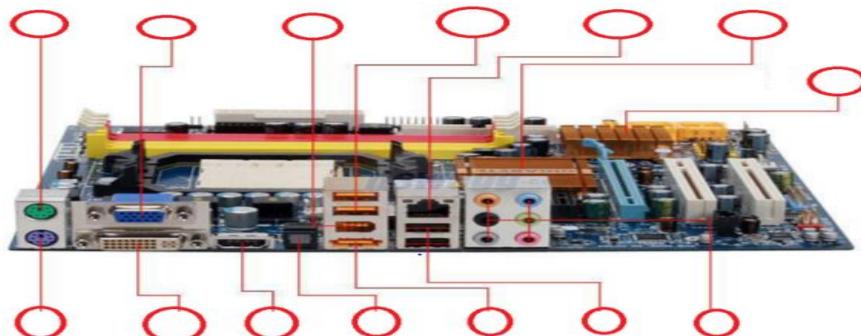
## Exercise

1. Label the internal components of computer.



- (A) Memory. Electronic components that store instructions while they are being processed by the CPU.
- (B) Power Supply. Unit that provides electrical power to the electronic components of the computer.
- (C) Floppy Disk Drive. Device used to read and write to floppy diskettes.
- (D) CPU. Central Processing Unit. The component that interprets instructions for operating the computer.
- (E) Video Card. Electronic device that outputs data to the monitor or CRT.
- (F) Hard Disk. Storage device containing multiple platters that store magnetic data.
- (G) CD/DVD. Optical storage disc. Uses lasers to write data on the disc.
- (H) Audio Card. Electronic device that outputs audio signals to the speakers.

2. Label the connectors and list them



A.	
B.	
C.	
D.	
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G.	
H.	
I.	
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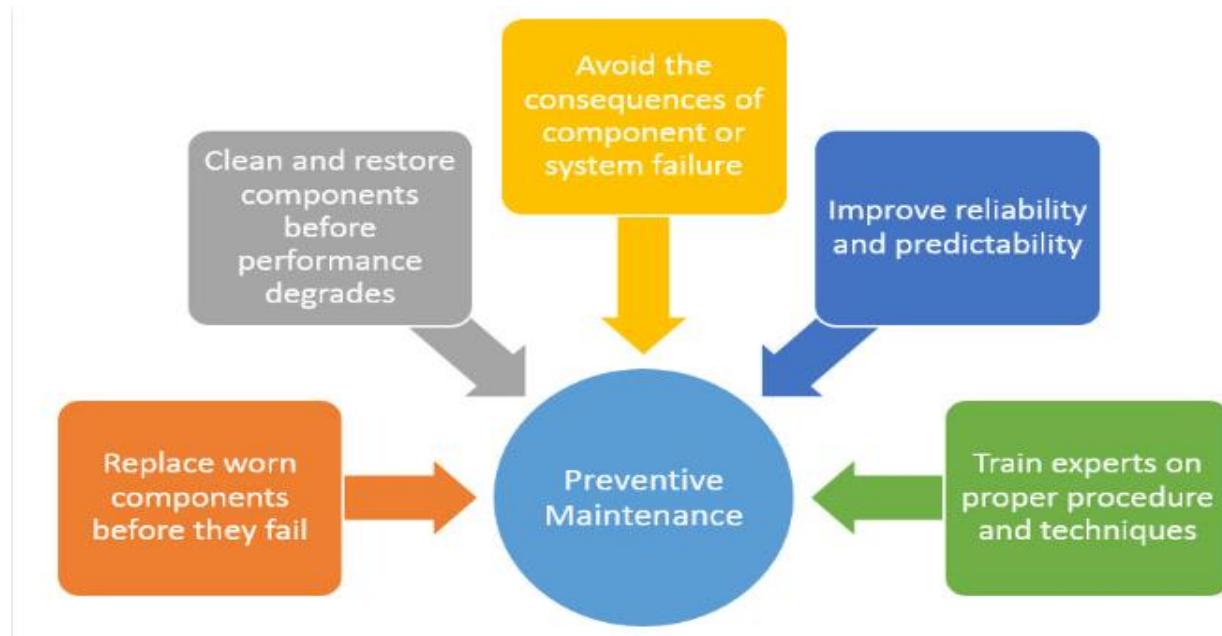
## Chapter 2

### Basics of Preventive Maintenance and Troubleshooting

#### 2.0. Introduction

Preventive maintenance is a regular and systematic inspection, cleaning, and replacement of worn parts, materials, and systems. Preventive maintenance helps to prevent failure of parts, materials, and systems by ensuring that they are in good working order. Troubleshooting is a systematic approach to locating the cause of a fault in a computer system. A good preventive maintenance program helps minimize failures. With fewer failures, there is less troubleshooting to do, thus saving an organization time and money.

Troubleshooting is a learned skill. Not all troubleshooting processes are the same, and technicians tend to refine their own troubleshooting skills based on knowledge and personal experience. Use the guidelines in this chapter as a starting point to help develop your troubleshooting skills. Although each situation is different, the process described in this chapter will help you to determine your course of action when you are trying to solve a technical problem for a customer.



#### 2.1 Purpose of preventive maintenance

Preventive maintenance is used to reduce the probability of hardware or software problems by systematically and periodically checking hardware and software to ensure proper operation.

## **Hardware**

Check the condition of cables, components, and peripherals. Clean components in order to reduce the likelihood of overheating. Repair or replace any components that show signs of abuse or excess wear. Use the following tasks as a guide to create a hardware maintenance program.

- ☞ Remove dust from fan intake
- ☞ Remove dust from power supply
- ☞ Remove dust from components inside the computer
- ☞ Clean mouse and keyboard
- ☞ Check and secure any loose cables

## **Software**

Verify that installed software is current. Follow the policies of the organization when installing security updates, operating system updates, and program updates. Many organizations do not allow updates until extensive testing has been completed. This testing is done to confirm that the update will not cause problems with the operating system and software.

Use the following tasks as a guide to create a software maintenance schedule that fits the needs of your computer equipment.

- ✓ Review security ,driver and software updates
- ✓ Scan for viruses and spyware
- ✓ Remove unwanted programs
- ✓ Scan hard drives for errors
- ✓ Defragment hard drives

## **Benefits**

Performing regular maintenance routines reduce potential hardware and software problems. Doing this will reduce computer down time and repair costs.

A preventive maintenance plan is developed based on the needs of the equipment. A computer exposed to a dusty environment, such as a construction site, will need more attention than equipment in an office environment. High-traffic networks, such as a school network, may require additional scanning and removal of malicious software or unwanted files. Document the routine maintenance tasks that must be performed on the computer equipment and the frequency of each task. This list of tasks can then be used to create a maintenance program.

Benefits of preventive maintenance are listed below. Can you think of any other benefits that preventive maintenance provides?

- Increase data protection
- Extend the life of components
- Increase equipment stability
- Reduce repair costs
- Reduce the number of equipment failures

## **2.2 Steps of the troubleshooting process**

Troubleshooting requires an organized and logical approach to problems with computers and other components. A logical approach to troubleshooting allows you to eliminate variables in a systematic order. Asking the right questions, testing the right hardware, and examining the right data helps you understand the problem. This helps you form a proposed solution to try.

Troubleshooting is a skill that you will refine over time. Each time you solve another problem, you will increase your troubleshooting skills by gaining more experience. You will learn how and when to combine, as well as skip, steps to reach a solution quickly. The troubleshooting process is a guideline that can be modified to fit your needs.

In this section, you will learn an approach to problem solving that can be applied to both hardware and software. Many of the steps can also be applied to problem solving in other work-related areas.

**NOTE:** The term customer, as used in this course, is any user that requires technical computer assistance.

### **Troubleshooting process includes:**

- Gather data from the customer
- Verify the obvious issue
- Try quick solutions first
- Gather data from the computer
- Evaluate the problem and implement the solution
- Close with the customer

## **Chapter 3**

### **Safe Lab Procedures and Tool Use**

#### **Introduction**

This chapter covers basic safety practices for the workplace, hardware and software tools, and the disposal of hazardous materials. Safety guidelines help protect individuals from accidents and injury and protect equipment from damage. Some of this guideline are designed to protect the environment from contamination by discarded materials. Stay alert to situations that could result in injury or damage to equipment. Warning signs are designed to alert you to danger. Always watch for these signs and take the appropriate action according to the warning given.

The workplace should have safety guidelines to follow to:

- Protect people from injury
- Protect equipment from damage
- Protect the environment from contamination

#### **Purpose of safe working conditions and procedures**

Safe working conditions help to prevent injury to people and damage to computer equipment. A safe workspace is clean, organized, and properly lighted. Everyone must understand and follow safety procedures.

Follow proper procedures for handling computer equipment to reduce the risk of personal injury, damage to property, and loss of data. Any damage or loss may result in claims for damage from the owner of the property and data.

The proper disposal or recycling of hazardous computer components is a global issue. Make sure to follow regulations that govern how to dispose of specific items. Organizations that violate these regulations can be fined or face expensive legal battles.

After completing this section, you will meet these objectives:

- Identify safety procedures and potential hazards for users and technicians.
- Identify safety procedures to protect equipment from damage and data from loss.
- Identify safety procedures to protect the environment from contamination.

#### **General Safety Guidelines**

Follow the basic safety guidelines to prevent cuts, burns, electrical shock, and damage to eyesight. As is best practice, make sure that a fire extinguisher and first-aid kit are available in case of fire or injury. Figure 1 shows a list of general safety guidelines.

**CAUTION:** Power supplies and monitors contain very high voltage. Do not wear the antistatic wrist strap when repairing power supplies or monitors.

**CAUTION:** Some printer parts may become very hot when in use and other parts may contain very high voltages. Make sure that the printer has had time to cool before making the repair. Check the printer manual for locations of various components that may contain high voltages. Some components may retain high voltages even after the printer is turned off.

### General Safety Guidelines

- 1 Remove your watch or any other jewelry and secure loose clothing.
- 2 Turn off the power and unplug equipment before performing service.
- 3 Cover any sharp edges inside the computer case with tape.
- 4 Never open a power supply or a monitor.
- 5 Do not touch areas in printers that are hot or that use high voltage.
- 6 Know where the fire extinguisher is located and how to use it.
- 7 Keep food and drinks out of your workspace.
- 8 Keep your workspace clean and free of clutter.
- 9 Bend your knees when lifting heavy objects to avoid injury to your back.

# **Chapter 4**

## **Computer Assembly and disassembly**

### **Introduction**

Assembling computers is a large part of a technician's job. As a technician, you will need to work in a logical, methodical manner when working with computer components. As with any learned trade, computer assembly skills will improve dramatically with practice.

Disassembling a computer is a straightforward task. In most cases, you will need to remove little more than the outer cover or shroud of the case to gain access to the memory, expansions slots/cards, and the CPU. Because there are many manufacturers, each seeking to establish its own unique marketing identity, each brand has some custom components or layout. The best strategy for efficient disassembly is to locate and use the manual that came with the computer.

### **Experiment No: 5 Assembling a Desktop PC**

**Aim:** To acquire the knowledge and skills required to assemble a PC and to learn customization of a PC according to specialized specifications.

**Components Required:** Cabinet, Mother board, Processor, SMPS, Hard Disk, Keyboard, Mouse Screw Driver, Needle nose pliers, Anti-static Wrist Strap etc.

The first step to assemble a computer is acquiring the parts. These parts include the internal components such as Power Supply Unit (SMPS), Motherboard, CPU, RAM, Hard Disk Drives, Optical Drives, and sometimes a Graphics Card. We also need external components such as Keyboard, Mouse,

Monitor and sometimes-other peripherals such as Printer, Scanner etc. A computer is made up of a case, also called a chassis, which houses several internal components, and the external components, including peripherals.

### **Safety precautions**

1. Static electricity is the biggest danger to the expensive parts of PC that we are about to assemble, even a tiny shock, much too small for us to feel, can damage the delicate Electronic traces, many times smaller than a human hair, that make up CPU, RAM and other chips. It's important to use an anti-static wrist strap. Once we have, the power supply installed in the case, clip the end of the wrist strap to the outside of the power supply. (Never plug your computer in while you are connected to it by a wrist strap.) This will ensure that you, the case and the power supply are connected to a common ground, in other words there will be no inequality of charge that will allow a spark to jump from you to the case. It is also helpful to have an antistatic mat to set the case and other components on.

2. Turn off your computer and unplug your Power Supply before installing or removing any components—if power is flowing to components as they are installed or removed, they can be seriously damaged.
3. Never cut the grounding pin off your power cord. This “safety ground” stands between you and potentially lethal voltages inside the power supply.
4. Be careful of sharp edges! Many lower-end PC cases have sharp, unfinished edges. This is especially so on interior surfaces, and where the case has been cut or punched-out. Use care and take your time to avoid cutting our hands. If your case has this problem, a little time with some sandpaper before you begin construction can spare you a lot of pain.
5. Dismantling discrete electronic components such as your Power Supply or Monitor is dangerous. They contain high voltage capacitors, which can cause a severe electric shock if we touch them. These hold a charge even when the unit is not plugged in and are capable of delivering a fatal shock.

## Assembly Procedures

1. Prepare the Mainboard (motherboard).



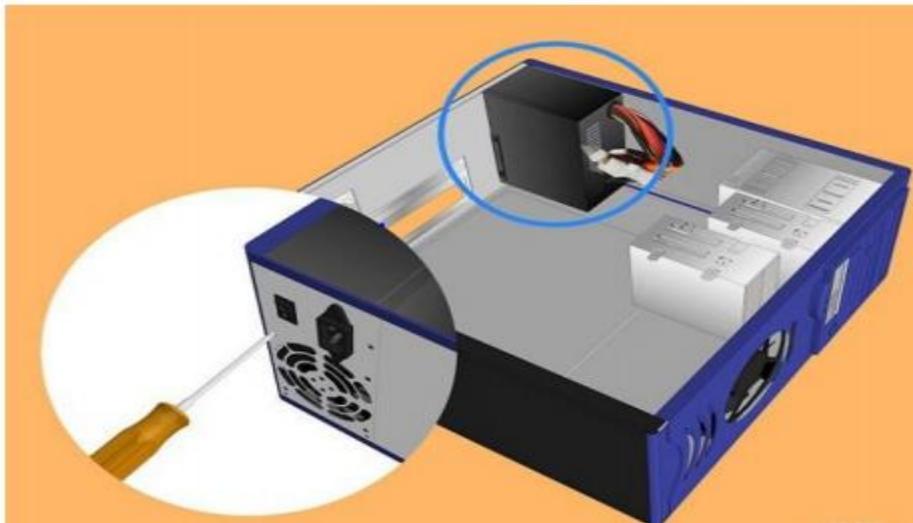
2. Mount the CPU in the socket of the Mainboard. You must choose the correct CPU for your motherboard, and install it according to its instructions. Be careful not to install the CPU in wrong. Not only would your computer not work, it could short-circuit and damage your motherboard. Connect the CPU cooler to the Main board.



3. Attach the RAM (memory) modules in the corresponding slots. The motherboard should have rows of lots that have 2 or 3 sections that are different lengths. Make sure the pins on the RAM cards line up with the pins on the motherboard connector. Don't get the RAM slots mixed up with PCI slots. The PCI slots are usually wider.



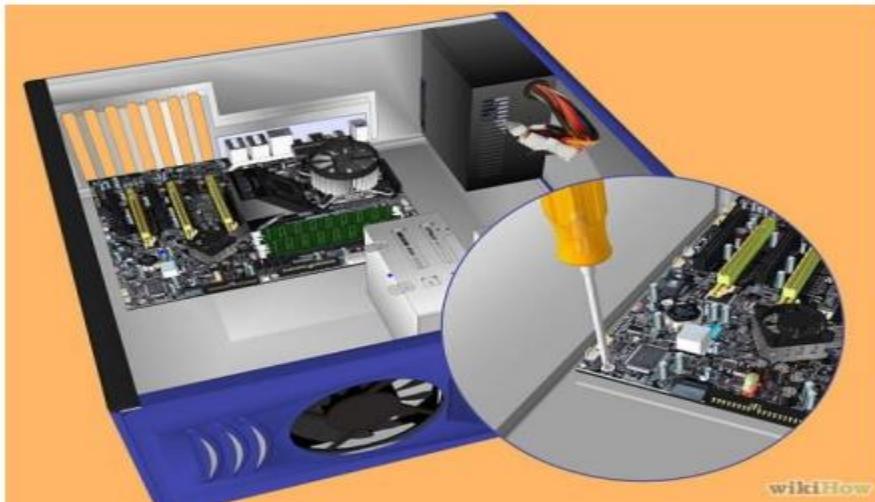
4. Open the case and mount the power supply which is M-ATX type. Make sure to connect all the connections to the drives and the motherboard.



5. Attach the Mainboard back plate to the case and check the Mainboard mounting positions. The motherboard's instructions should tell the position of the motherboard.



6. Suitably position the Mainboard in the case



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7. Mount the Hard disk and connect it to the power supply and the motherboard. There should be separate connections for the power supply and the motherboard. In SATA Hard disk case, should remove the jumper.



8. Connect the SATA connectors to the drives and the USB connectors and the case switches to the motherboard. The case and motherboard's instructions should tell where to connect the cables.



9. Connect the 20 or 24 pin ATX connector and the 4-pin power supply control connector to the motherboard.



10. Mount the DVD-ROM drive. After connecting the ATA cable to the device, hook it up to the power supply. Installing a Graphics Card (Add-on):



11. Remove the back panel covers that line up with the PCI-E slot. Almost all modern graphics cards use PCI-E. Some will require you to remove two of the protective plates as opposed to just one. You may have to punch the plates out of the case.



12. Insert the graphics card. You may have to bend a tab on the slot to allow the graphics card to be inserted. The tab will help lock the graphics card in place (this is more important for bulkier, high-end cards). Apply light, even force until the card is seated uniformly, and the back panel lines up.

13. Secure the card. Once you have inserted the card, use a screw to secure it to the back panel of the case. If you don't secure your card, you could end up damaging it in the long run.
14. Install any other PCI cards. If you have any other PCI cards that you are add, such as a dedicated sound card, the installation process is the same as the video card process.
15. Finally, close the cabinet case.

**Final Check:**

Motherboard jumper configurations are the settings for the processor operator.

- a. Drive jumper settings, master/ slave correct?
- b. Are the processor, RAM modules and plug in cards finally seated in there sockets?
- c. Did you plug all the cables in? Do they all fit really?
- d. Have you frightened all the screws in plug- in cards or fitted the clips?
- e. . Are the drive secure?
- f. Have you connected the power cables to all driver?

**Powering up for the first time:**

- I. Ensure that no wires are touching the CPU heat sink fan.
- II. Plug your monitor, mouse and keyboard.
- III. Plug in power card and switch the power supply.
- IV. If everything is connected as it should be
  - ✓ All system, fans should start spinning.
  - ✓ You should hear a single beep and after about 5-10 sec.
  - ✓ Amber light on monitor should go green.
  - ✓ You will see computer start to boot with a memory check.
  - ✓ Now check front LED'S to see if u plugged them in correctly.
  - ✓ Check all other buttons.
  - ✓ Power afford change any wrong settings.

**Result:**

Thus assemble PC with add on cards and check the working condition of the system successfully.

## **Experiment No.6 Assembling and disassembling of laptop**

**Aim:** To configure Assembling and Disassembling of Laptop to identify the parts .

### **Components / tools**

Laptop, screwdriver, anti-static wrist strap, magnifying glass.

### **Procedure:**

#### **Laptop assembly Guidelines**

- There are several types of small screws that are used throughout the laptop. Place these in small envelopes and write the component name on the envelope. Be organized and keep track of all the screws.
- We have to figure out how to remove the back panel



**Figure 11back panel**

- The first component to install is the processor. Take extreme care not to touch the pins in the socket during the process.



**Figure 12 processor**

- For wireless connectivity, our system uses a Mini-PCIe slot rather than the more common Mini-PCI variety. Be sure to connect the wires first before sliding the card into the slot.



- Most barebones notebooks use upgradable MXM graphics cards, which can be difficult to find at stores but are easy to install. Gamers should go with the most powerful MXM card available.

**Pop in the video card:**

To install the MXM graphics card, first find the baggie with three larger silver screws and two small black screws. Hold the card at about a 30-degree angle as you insert its edge connector into the video-card slot near the center of the motherboard. Press the card in and downward, and then use the two small black screws to secure it in place.

**Set up the drive:**

The motherboard SATA connectors are along the front, right edge, under the lip of the laptop's shell. Drop the drive into place and then carefully use your thumb to push the drive into the SATA connectors. Now use the remaining two screws to secure the drive in place.

**Add memory:**

The last internal components to install are the SO-DIMM memory boards. The two memory slots sit between the graphics card and the large silver finned heat sink, near the center of the motherboard.

**Final assembly:**

Now that all the hardware components are installed, find the four screws you removed from the ACE Door, slide the door back into place, and replace the screws. To prepare for power up, pop in the notebook's battery pack, connect the power brick, and plug it into a wall outlet. Finally, open the laptop's cover, cross your fingers on one hand, and use your other hand to press the power button.

## LAPTOP DISASSEMBLY GUIDELINES

Step 1 Unlock and remove the battery.



*Figure 13 laptop battery*

STEP 2. There are six spring-loaded latches securing the keyboard on the top. In order to open up the latch push on it with a small flathead screwdriver. When you push on the latch, it will move inside the case and the keyboard will lift up a little bit preventing the latch from moving back in the locked position. Do the same with all six latches.



STEP 3. Lift up the keyboard. Turn it upside down and place on the palm rest.

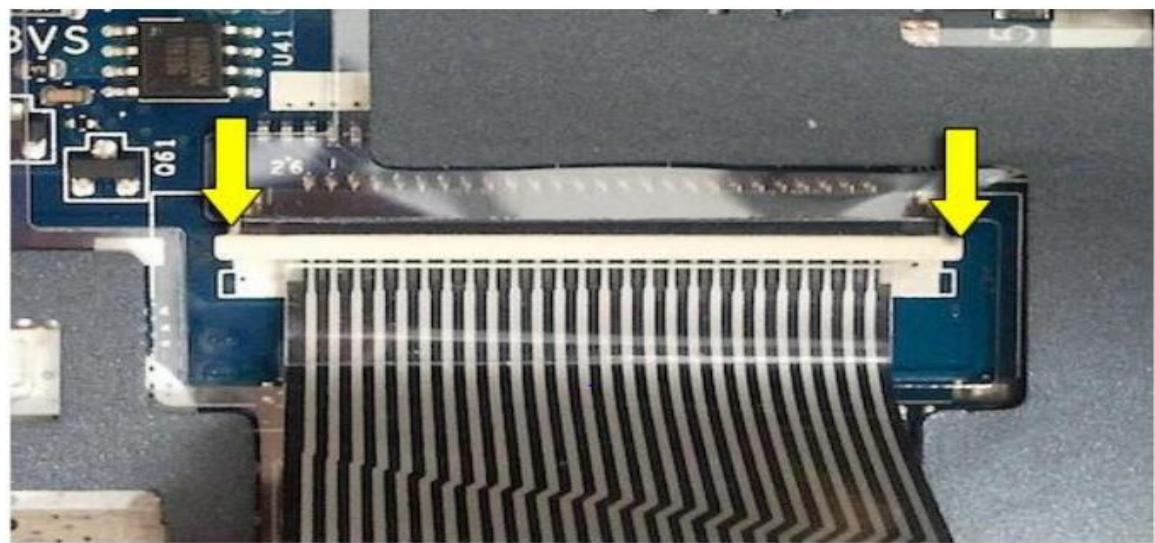


**Figure 14** laptop keyboard

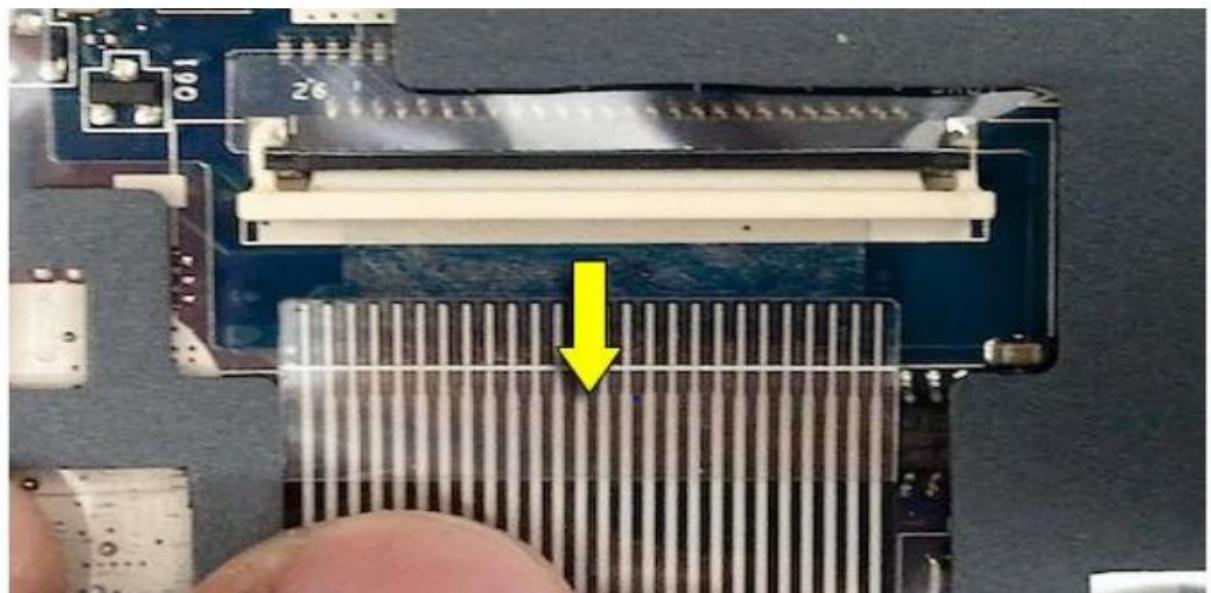
STEP 4. Before you remove the keyboard completely, it's necessary to unlock the connector and release the cable.



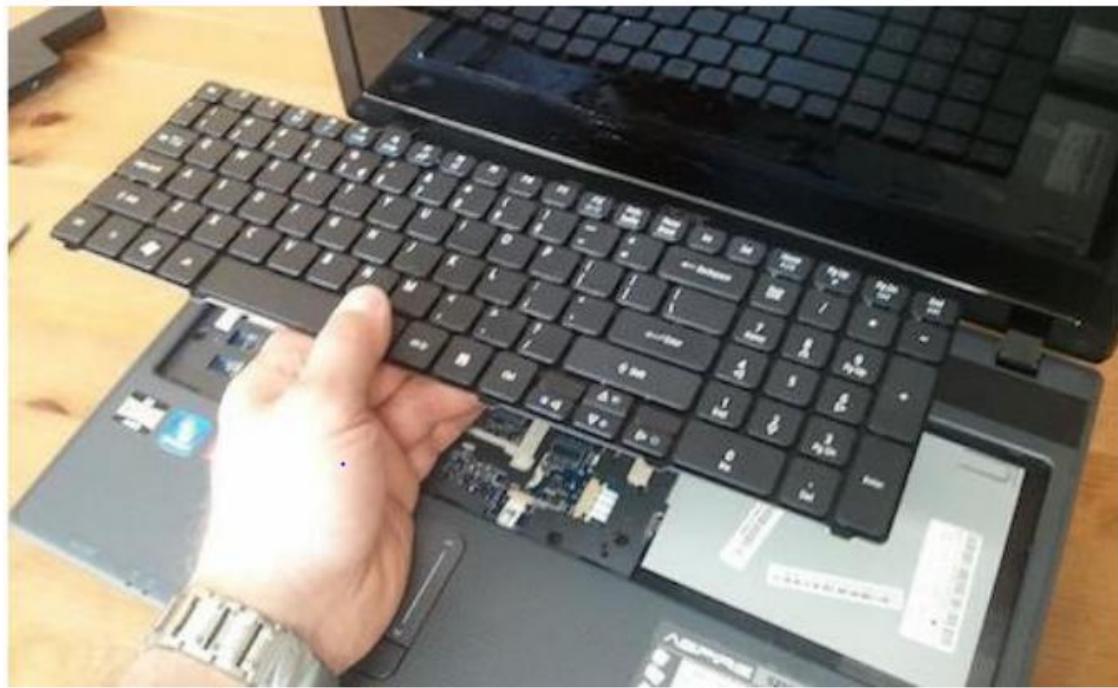
STEP 5. Slide the cable retainer about 1-2 millimeters to the shown direction.  
This will unlock the connector.



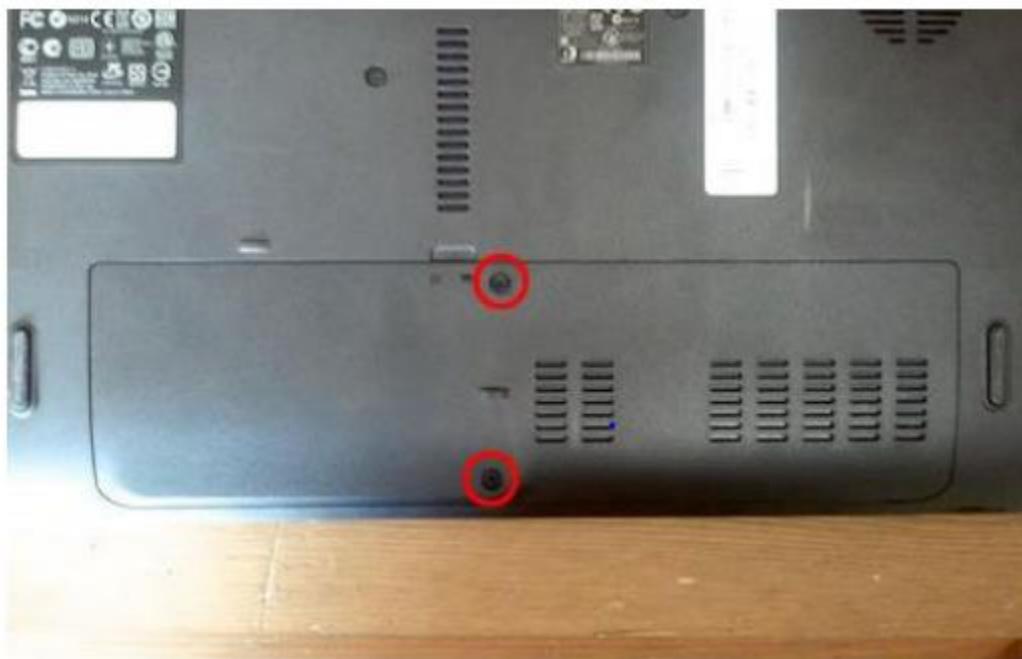
STEP 6. Pull the cable.



STEP 7. Remove the keyboard from the laptop.



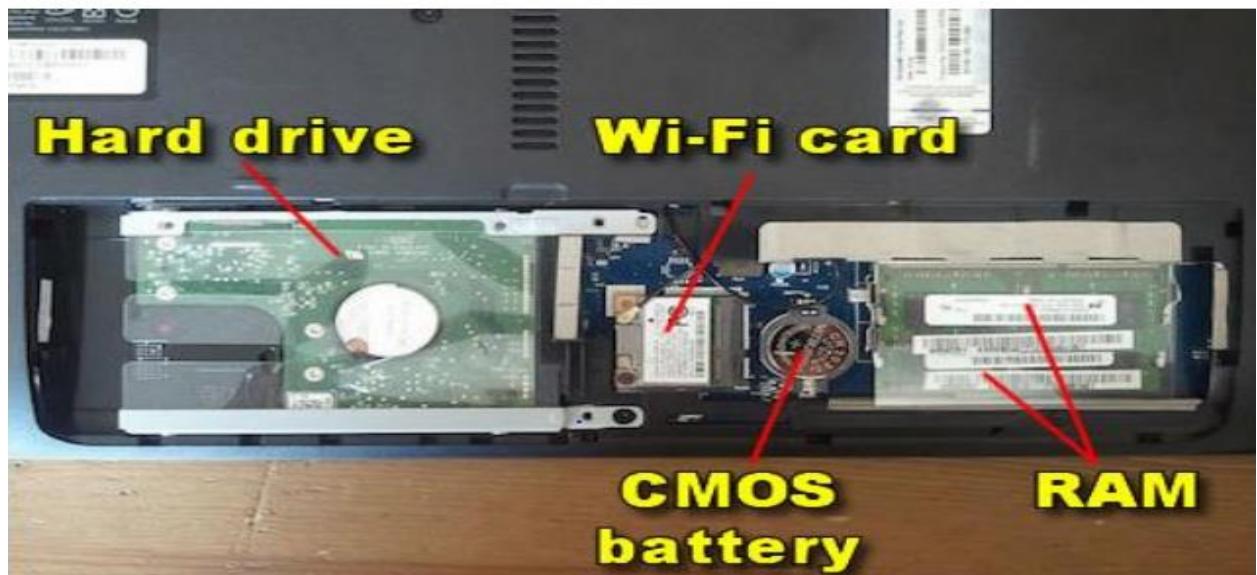
STEP 8. Remove two screws securing the service cover on the bottom.  
Remove the cover.



STEP 9. Under the cover you can access the hard drive, both RAM modules, Wi-Fi card and CMOS battery.

In order to remove the hard drive you will have to:

- Remove one screw securing the hard drive caddy.
- Slide the hard drive assembly to the left to disconnect it from the motherboard.



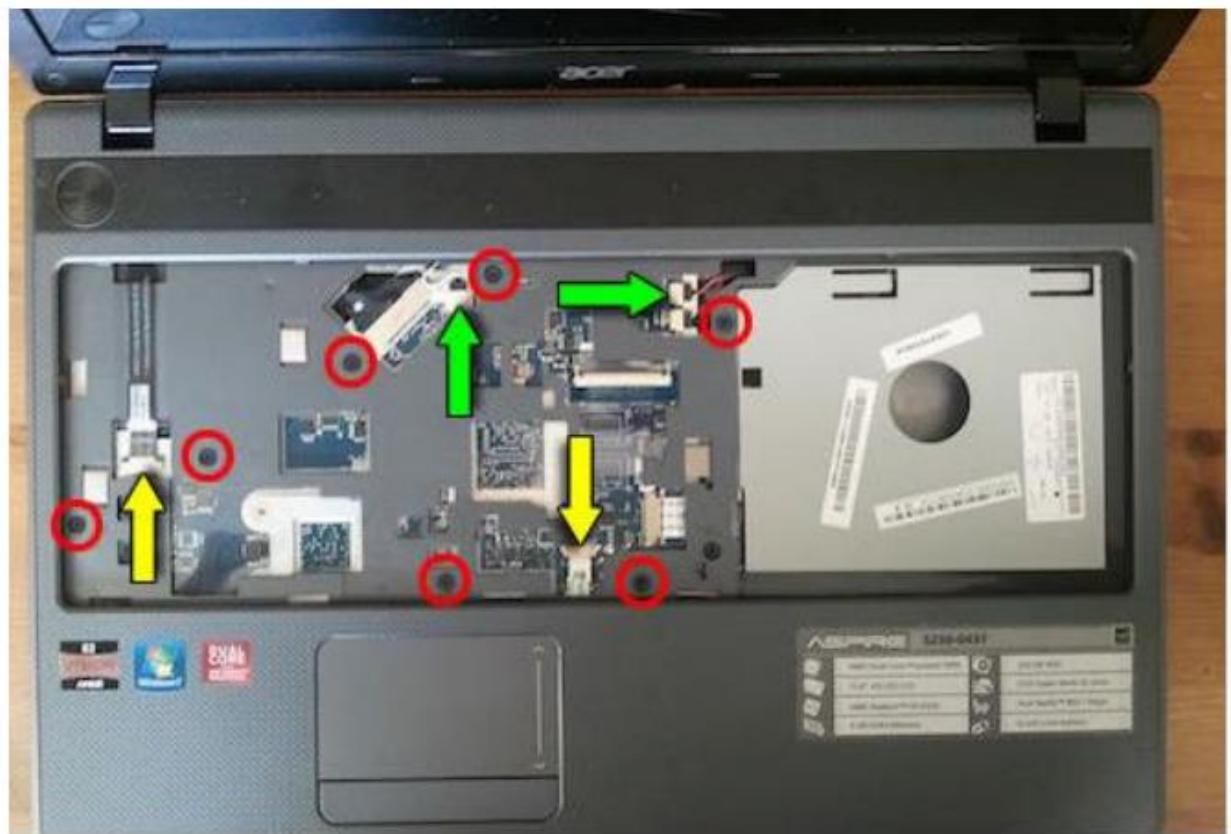
STEP 10. Remove one screw securing the optical drive.  
Slide the optical drive to the left and pull it out of the case.



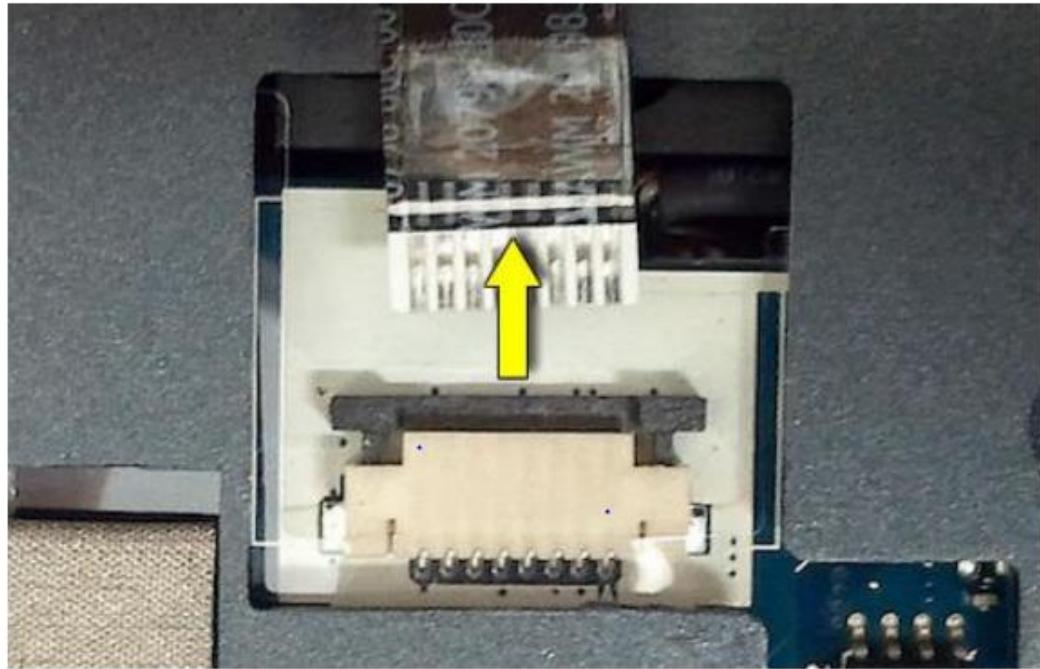
STEP 11. Remove all screws from the bottom.



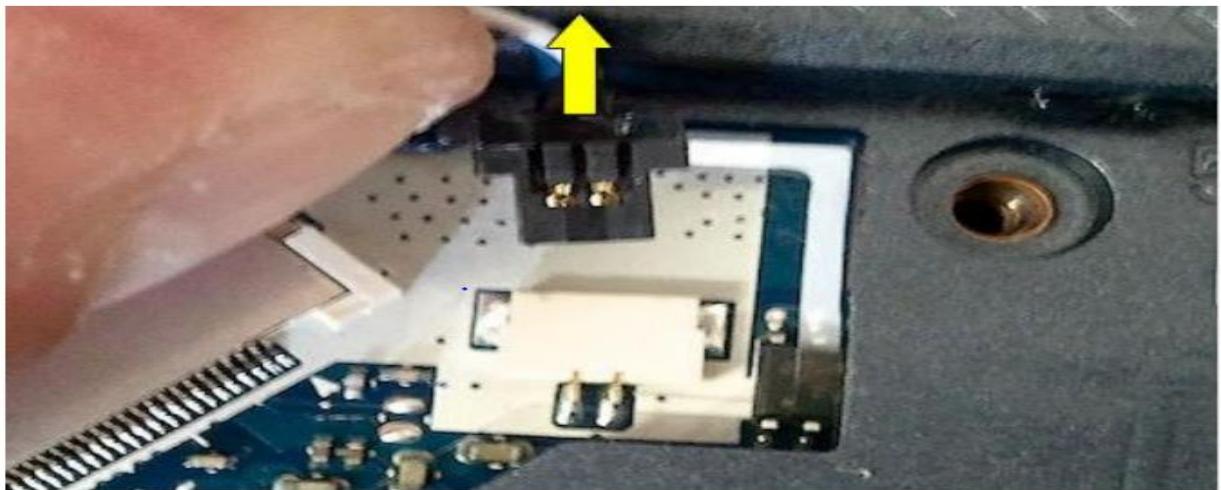
STEP 12. Remove screws securing the top cover (palm rest) assembly.  
Disconnect the power button cable, touchpad cable and both speaker cables.



STEP 13. Unlock and disconnect the power button and touchpad cables the same way you disconnected the keyboard cable.



STEP 14. Unplug both speaker cables as it shown on the following picture.



STEP 15 Start separating the top cover assembly from the bottom case.

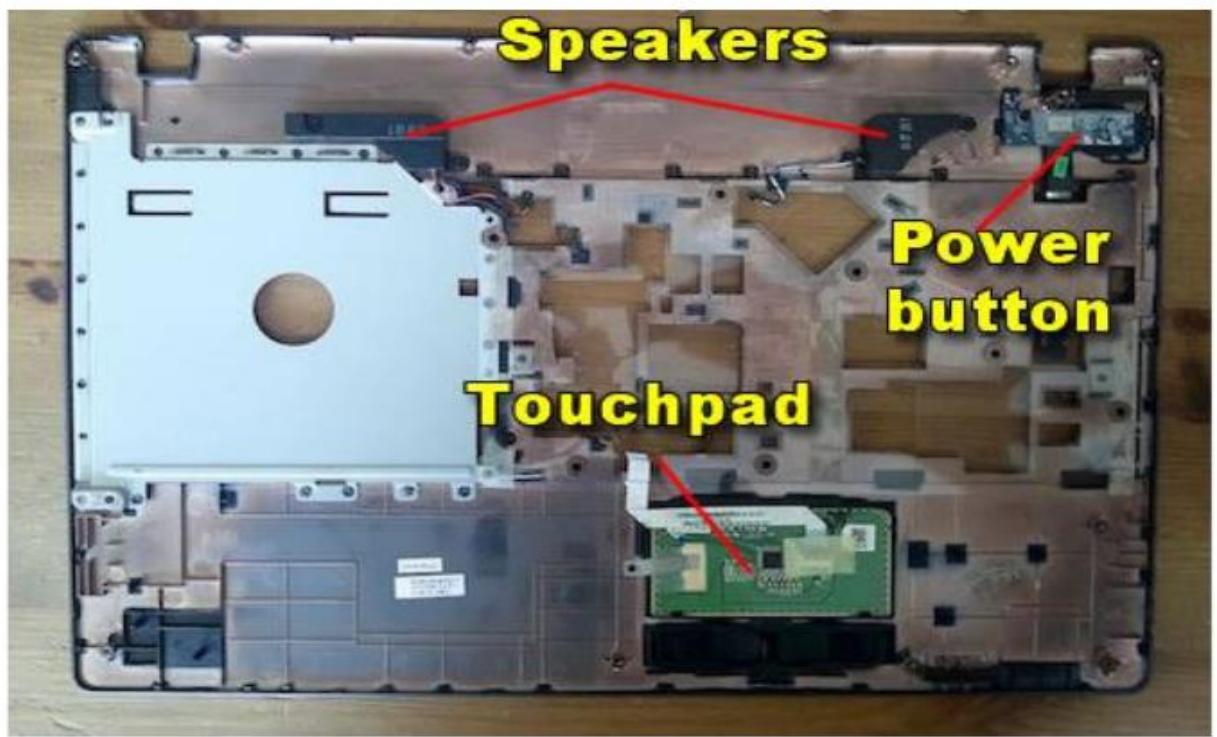


STEP 16. Remove the top cover assembly.



STEP 17. On the other side of the top cover you can access:

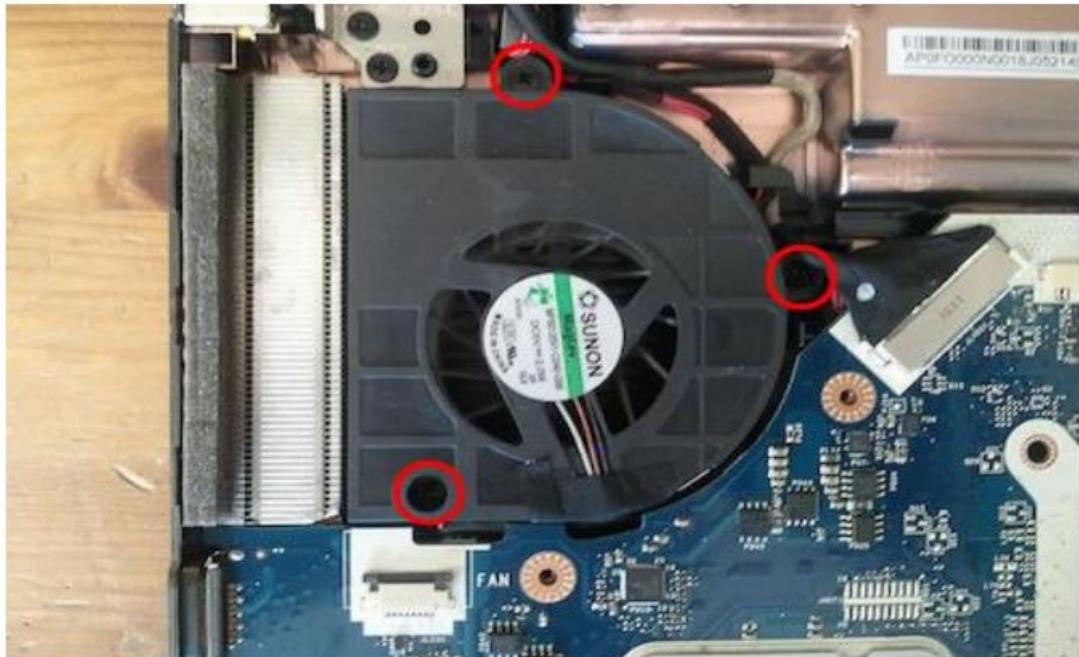
- Both speakers.
- Power button board.
- Touchpad.



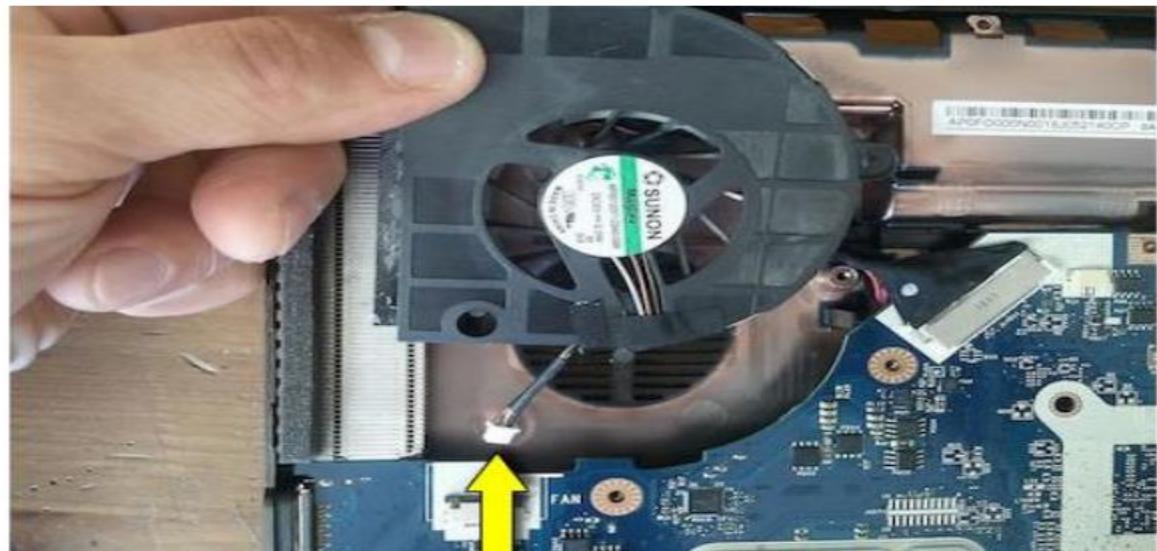
STEP 18. Now we are going to remove the cooling fan.



STEP 19. Remove three screws securing the fan.



STEP 20. Remove the fan from the case and disconnect the cable.  
The fan connector is located on the other side of the motherboard.



The following steps explain how to disassemble the display panel and remove the screen.  
STEP 21. There are two screw covers located in the lower left and right corners of the screen bezel.

Remove both covers with a sharp object. Remove both screws.



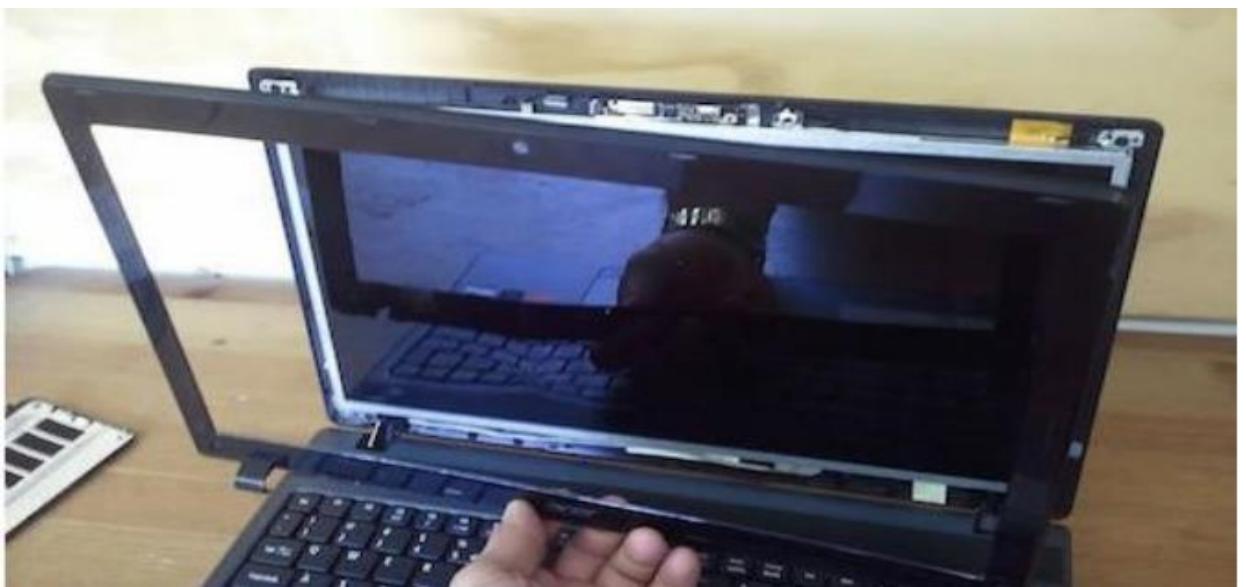
STEP 22. Insert fingers between the bezel and screen and start separating the bezel from the display cover(you can use a guitar pick to split the case.) Wiggle the bezel to unlock hidden latches.



STEP 23. Continue removing the bezel



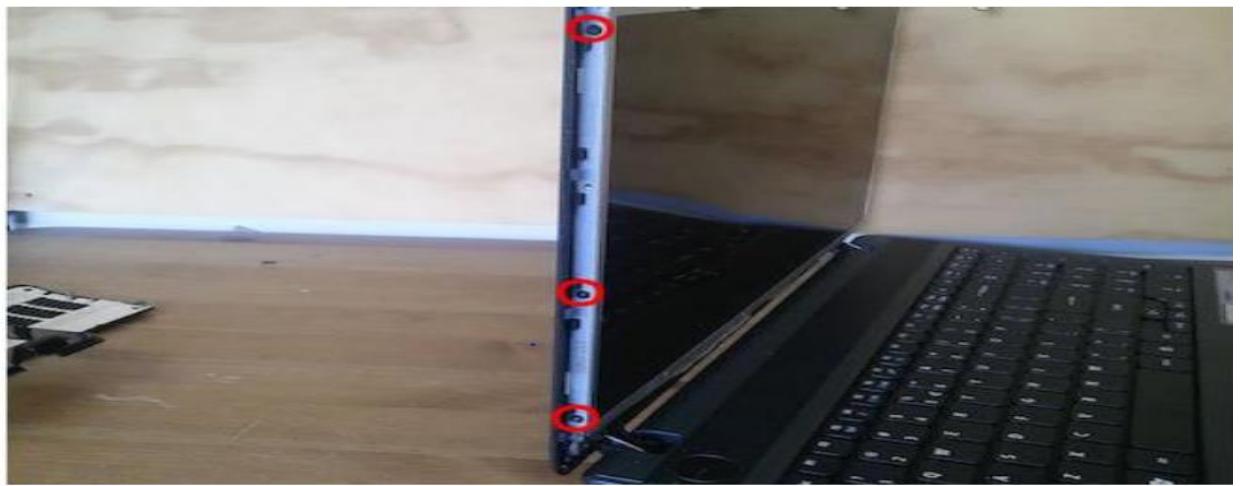
STEP 24. The bezel has been removed.



STEP 25. Remove three screw securing the screen to the right hinge bracket.



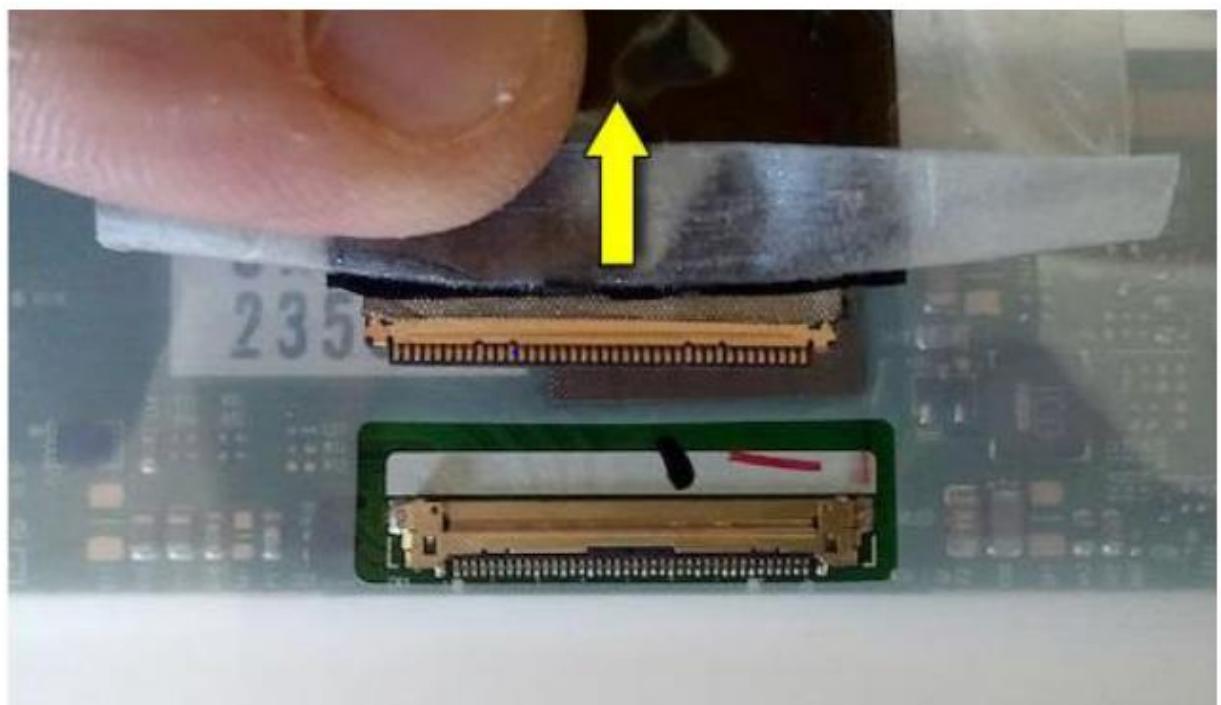
STEP 26. Remove three more screws from the left bracket.



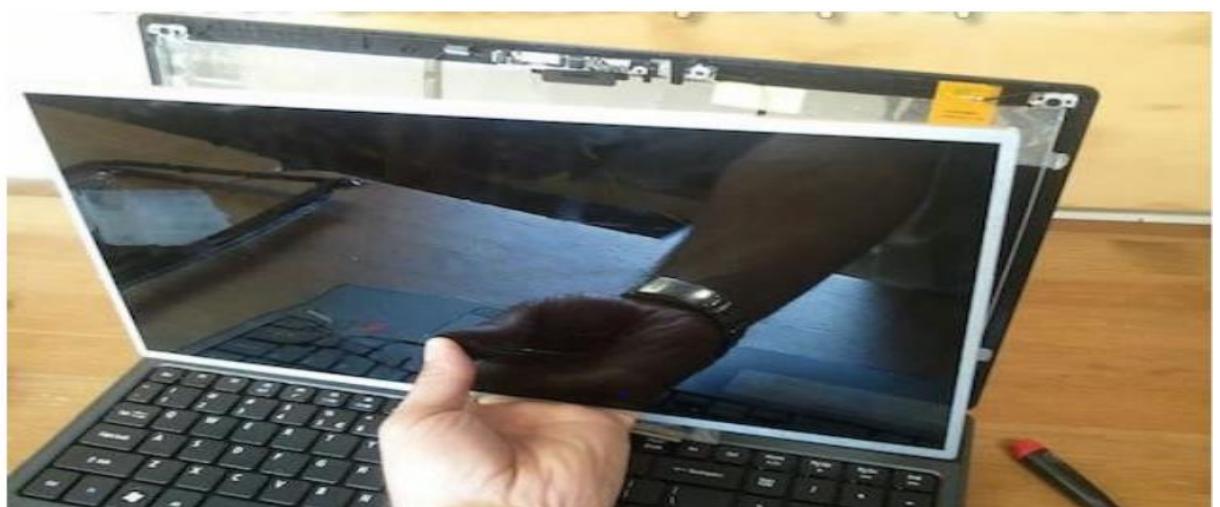
STEP 27. Separate the LCD screen from the cover. Now you can access the display cable in the back.



STEP 28. Remove sticky tape securing the connection.  
Unplug the display cable from the screen.



STEP 29. Remove the LCD screen completely and replace it with a new one if necessary.



**Result:**

Thus, the Assembling and Disassembling of Laptop to identify the parts are done successfully.

# **Chapter 5**

## **Operating Systems**

### **5.1. Introduction**

All computers rely on an operating system (OS) to provide the interface for interaction between users, applications, and hardware. The operating system boots the computer and manages the file system. Almost all modern operating systems can support more than one user, task, or CPU.

### **Experiment No.7 Installing and configuring operating systems**

**Aim:** To Install and Configure OS in a computer system.

**Components / tools**

Computer, Windows 10 and Ubuntu installation discs,

**Procedure:**

Ensure that your computer meets or exceeds the minimum system requirements to run Windows 10 and Ubuntu Linux:

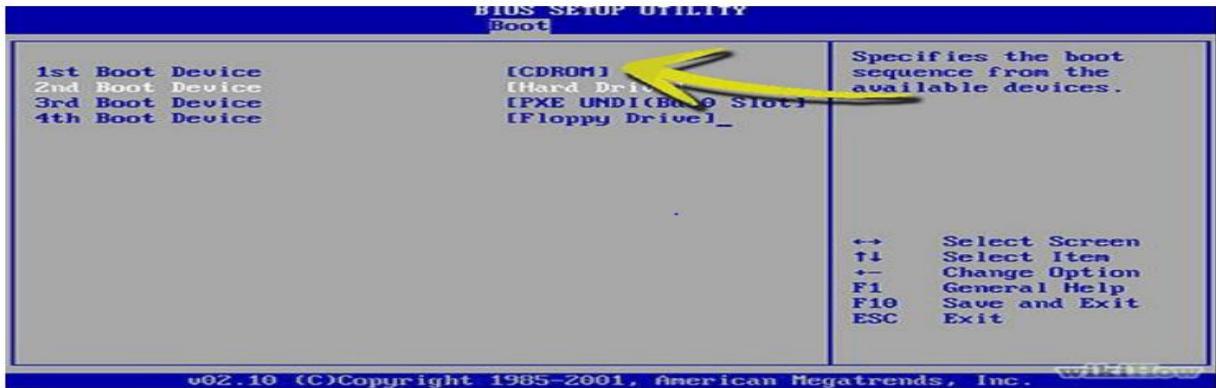
#### **A. Install Windows 10**

**Minimum requirements**

- ❖ 1 gigahertz (GHz) or faster 32-bit (x86) or 64-bit (x64) processor\*
- ❖ 1 gigabyte (GB) RAM (32-bit) or 2 GB RAM (64-bit)
- ❖ 16 GB available hard disk space (32-bit) or 20 GB (64-bit)
- ❖ CD or DVD-ROM
- ❖ Keyboard and mouse, or other pointing devices
- ❖ Network Interface Adapter required for Internet and Network Connectivity
- ❖ Ensure you have a Windows 10 Product Key. It is printed on a sticker on your software package. It is a string of 5 groups of characters (each 5 long), separated by dashes, resulting in 25 characters in all.
- ❖ It looks like this: HHHCF-WCF9P-M3YCC-RXDXH-FC3C6.
- ❖ When the software has almost finished installing, you will be asked for it. You need the product key to complete installing Windows.

**Steps installing windows 10**

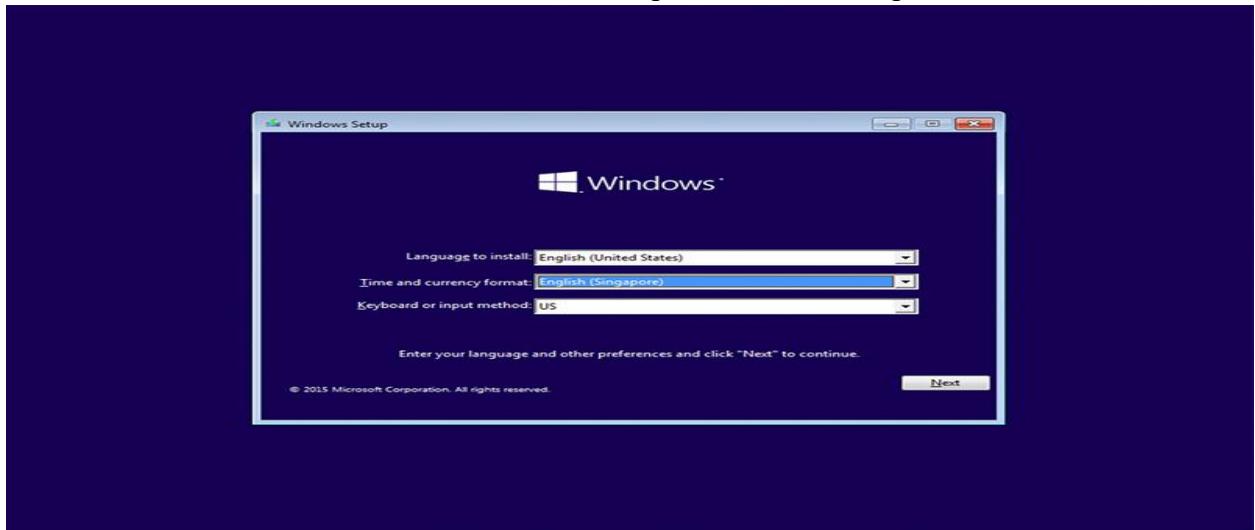
1. Before inserting the CD, you'll have to enter bios (in most cases by pressing DEL on system startup) and select your primary boot device CD-ROM Insert the Windows XP Installation Disc and start your computer. When prompted to "Press any key to boot from CD," press a key on the keyboard.



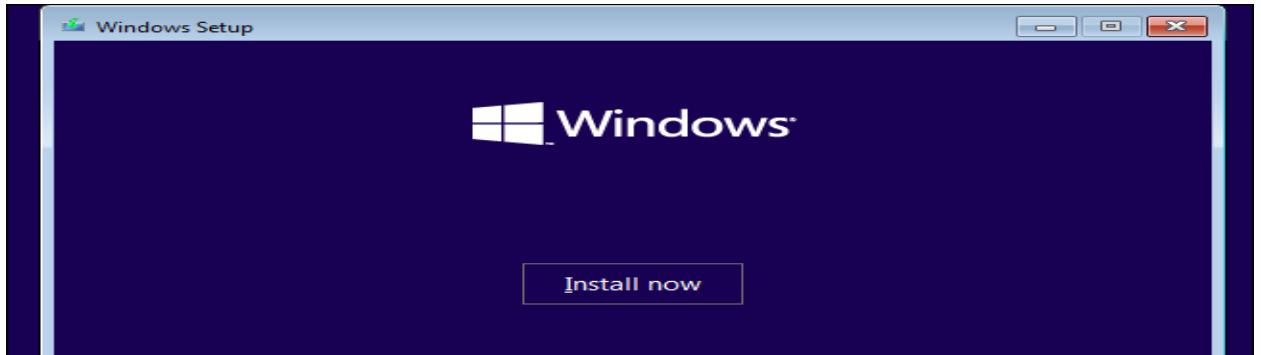
2. The installation program will check your hardware, install default-set drivers, and load files necessary for installation. When arriving at the "Welcome to Setup" screen, Press ENTER to begin the installation process.



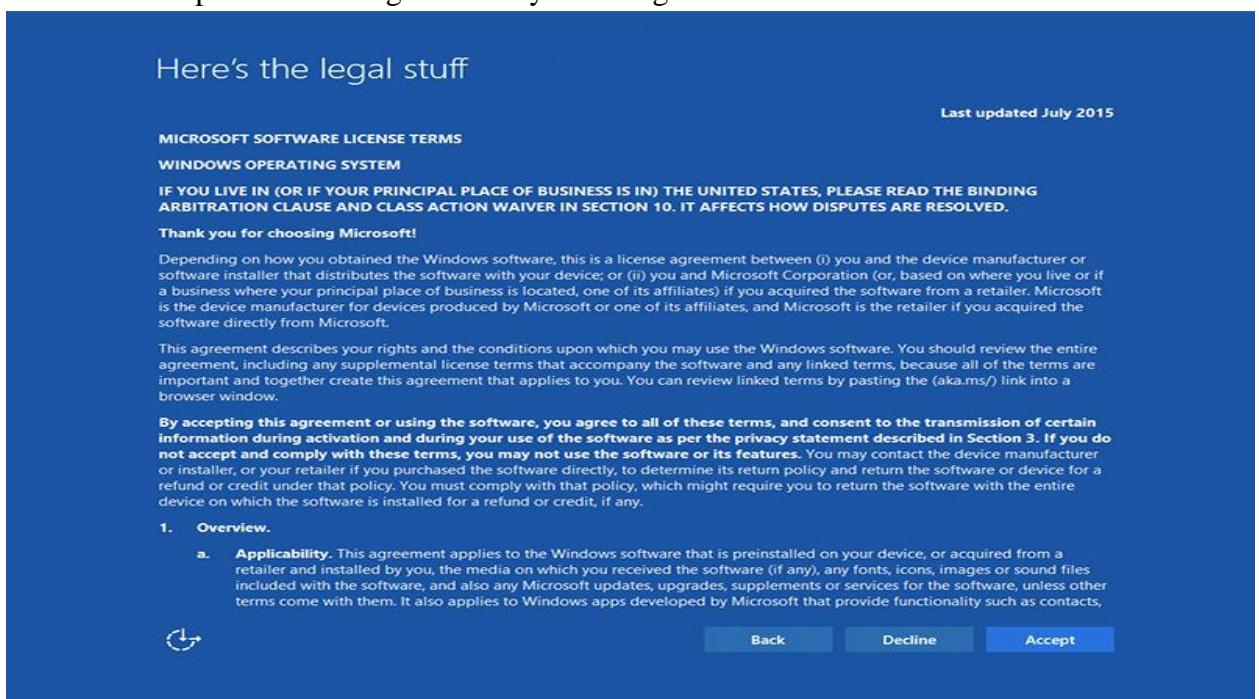
3. Now you will get the Windows Setup Window. This is the part to select Language for your windows. Select 'English' and click next. In addition, there will be a 'INSTALL NOW' button. Click on it and proceed to next step.



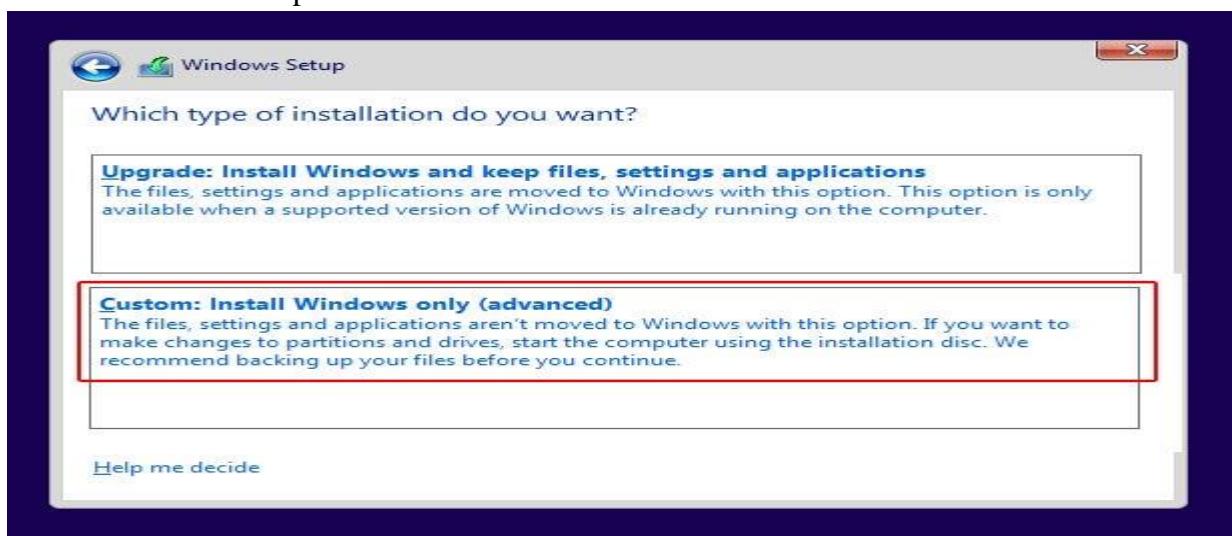
4. Click install now



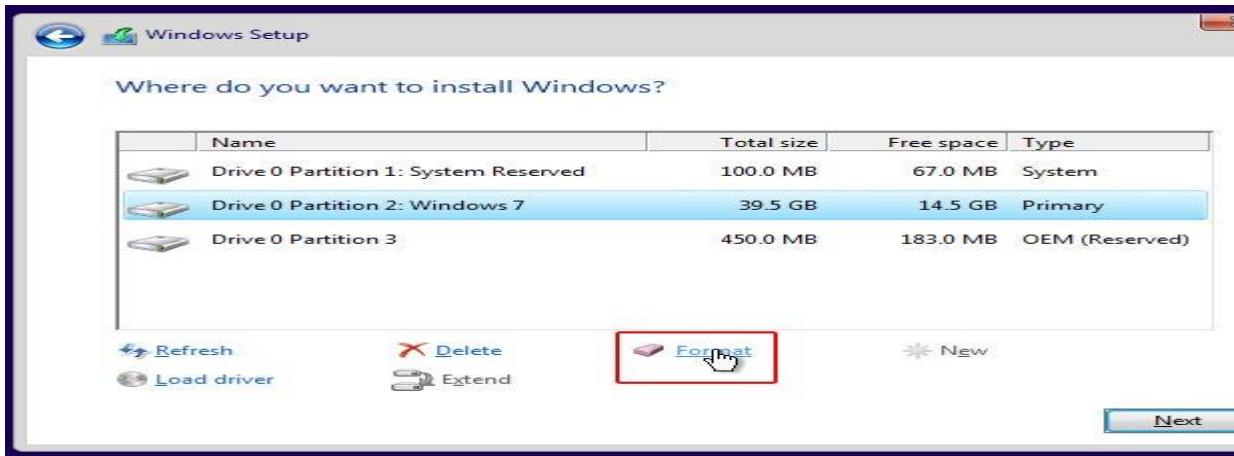
5. Accept the license agreement by checking the check box. And click Next button.



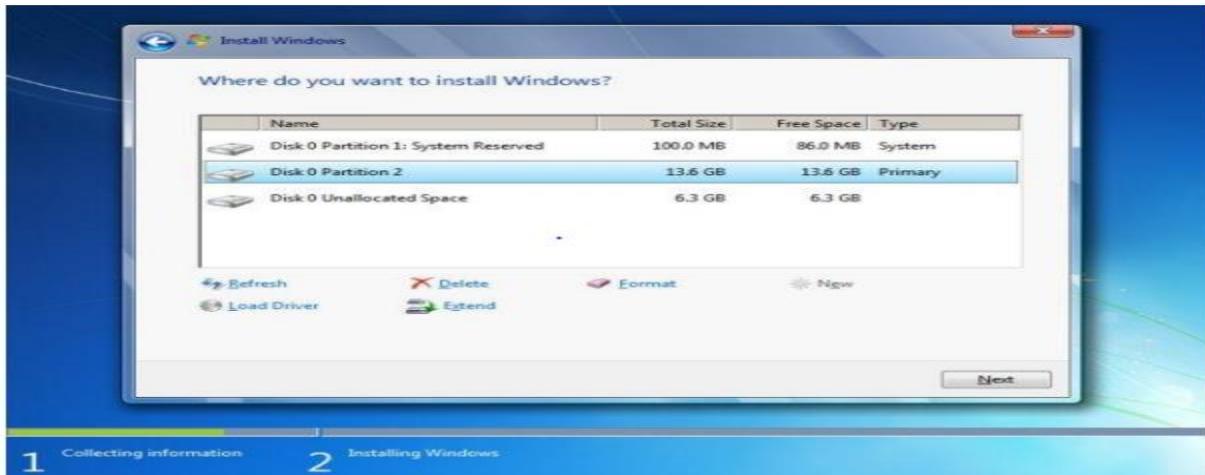
6. If you want to upgrade already existing Operating system select Upgrade. Click Custom option now.



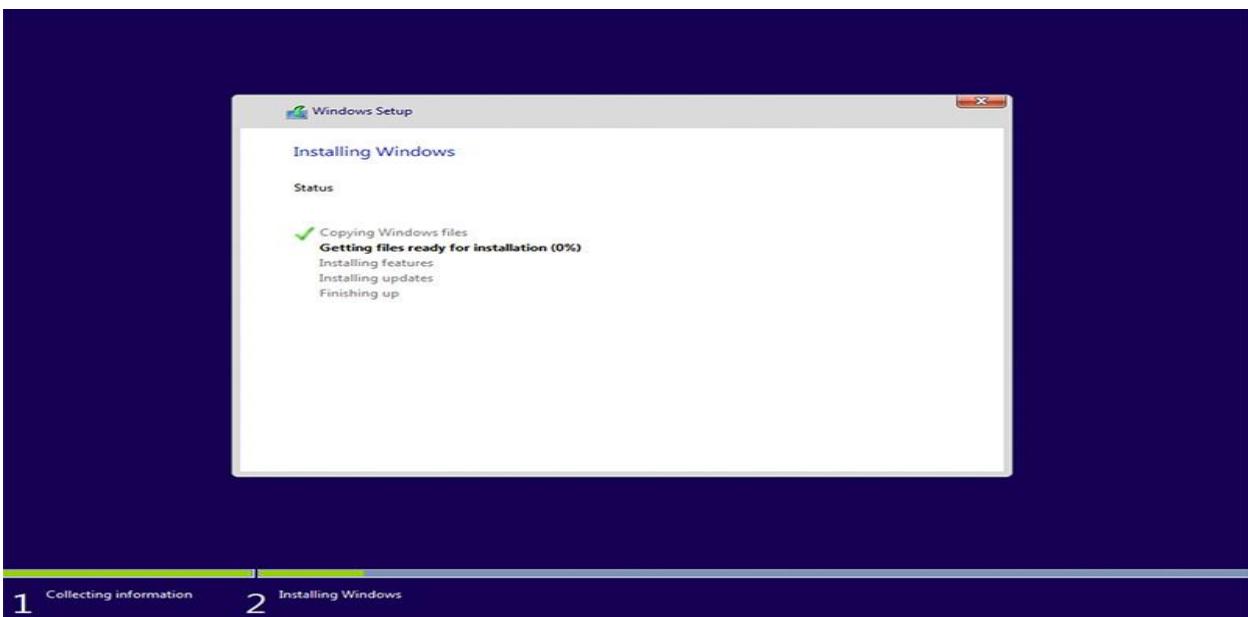
7. This is the important step. Here we can partition the hard disk and format the drive. If there is no partition in the hard disk, the window will be shown in right side. Click drive options to create/delete/format partitions



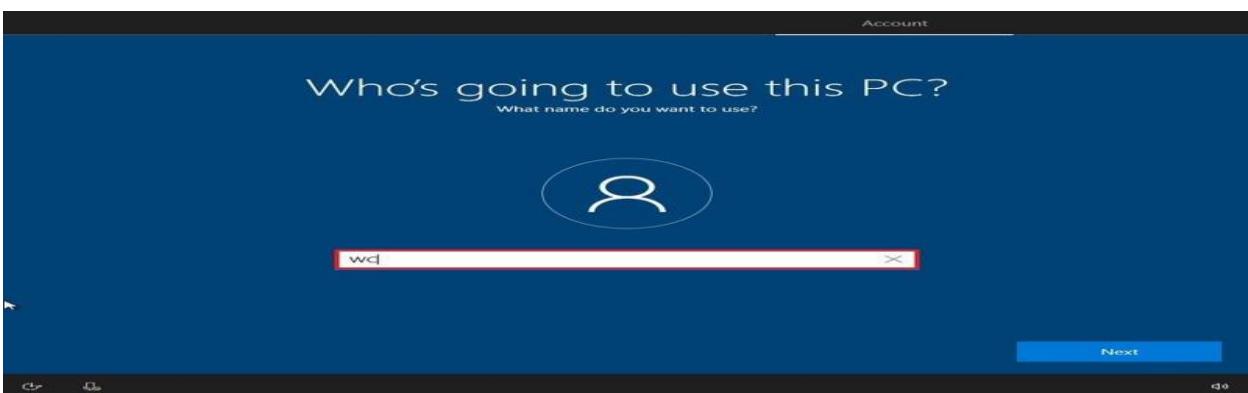
8. Create drives as required and select the drive you want to install Windows 7 and click next



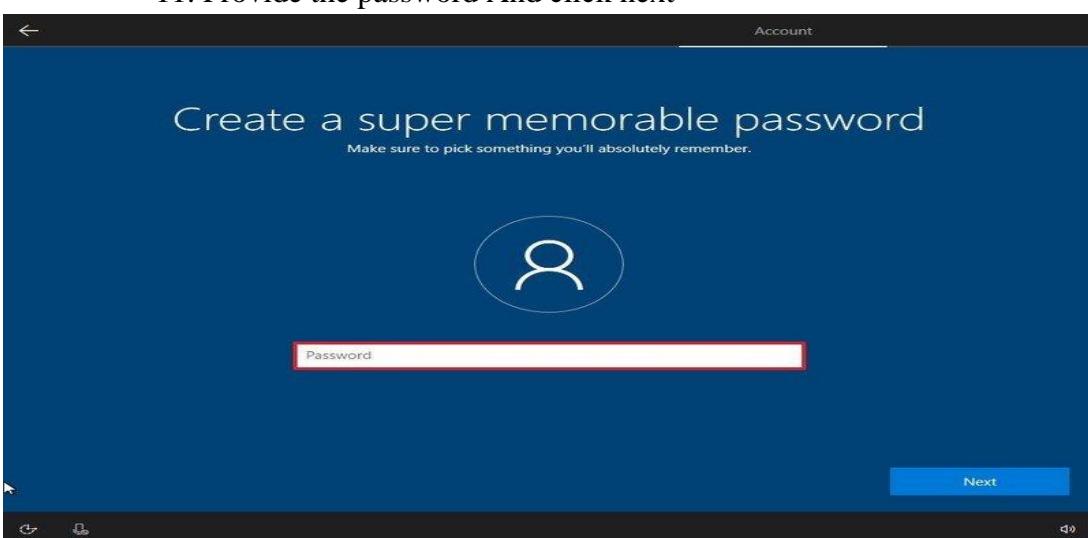
9. The installation process will start and take few minutes.



10. Provide user name

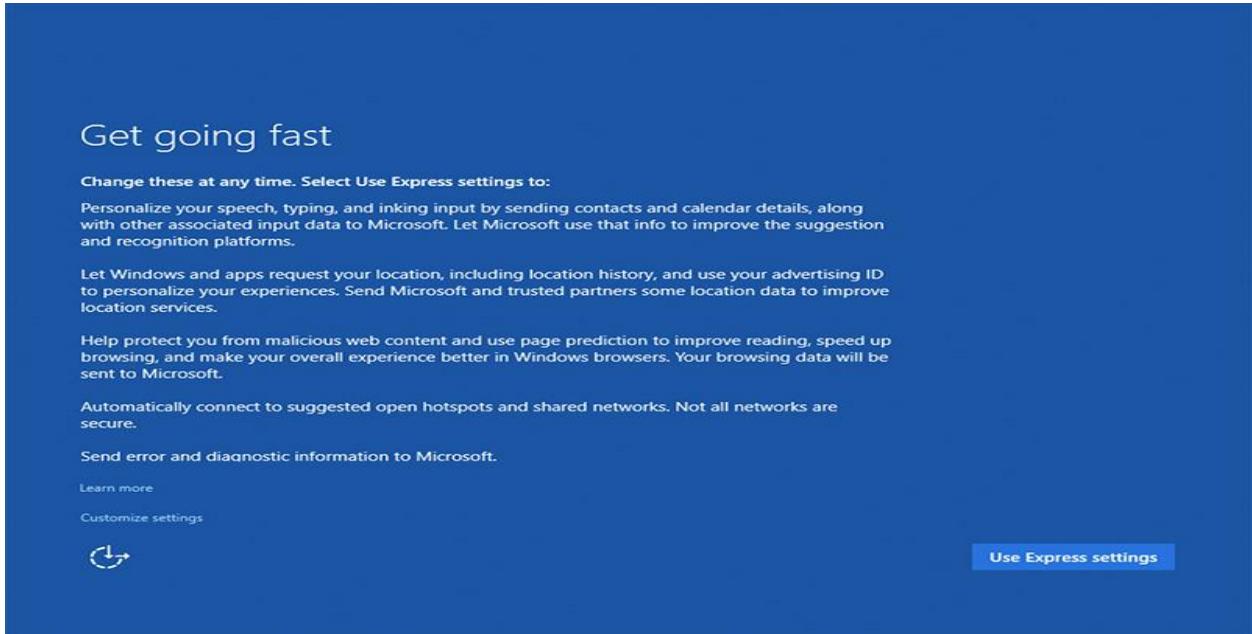


11. Provide the password And click next

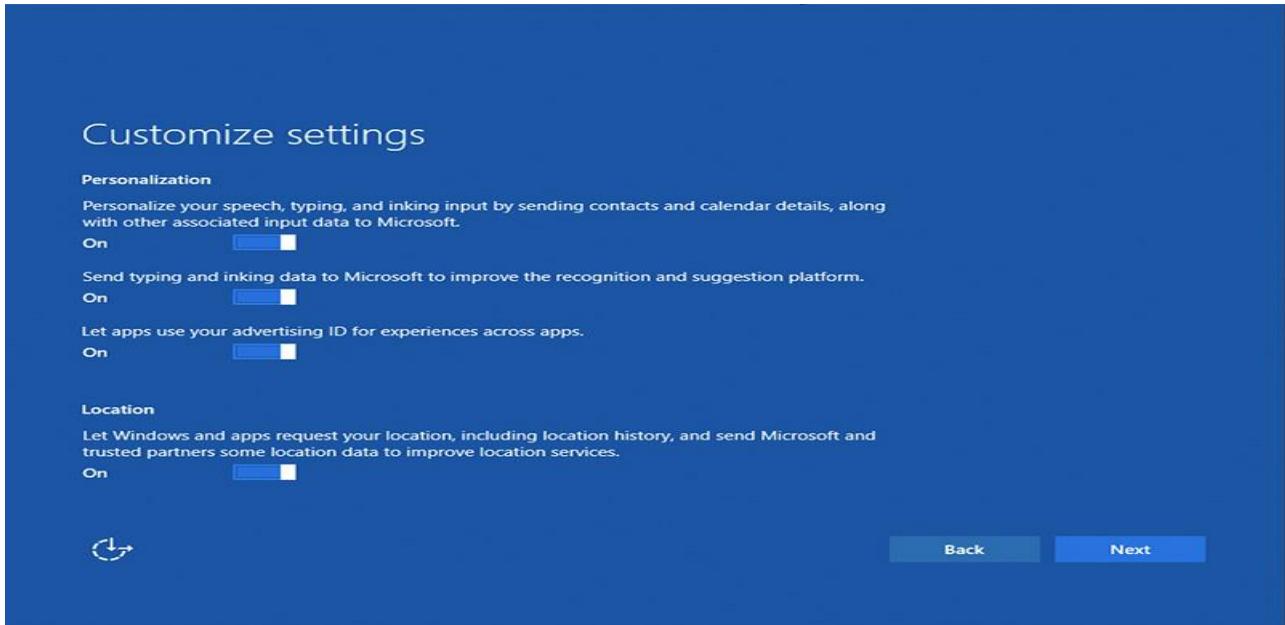


12. Re type the password to confirm and press Next

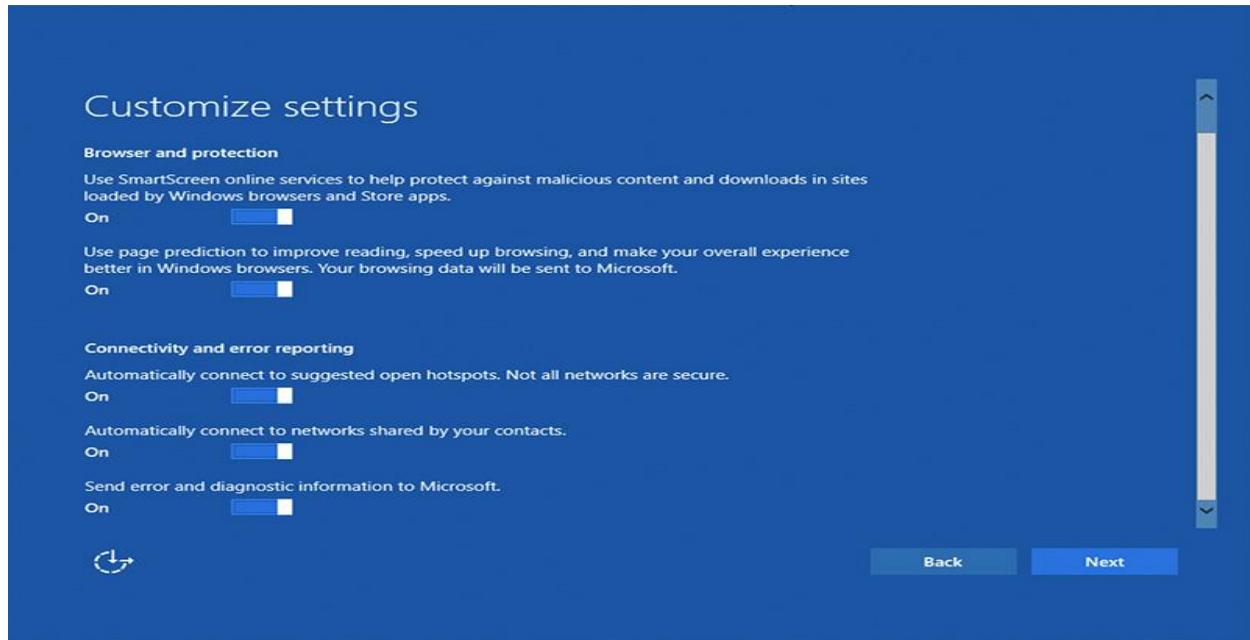
13. Before you can start using Windows, there are some personalization, location, browser and protection, and connectivity and error reporting settings that you can adjust. You can zip through all these by using the Express settings, which turn everything on, or you can hit the small print that says ‘Customize settings’ to customize them. We went for the latter.



14. If you choose to customize the settings, the first page deals with your contact, calendar, input, and location data. Read these carefully to decide if you want to turn the settings on or off.



15. The next page deals with browser data, connectivity, and error reporting. Again, read these carefully and toggle the switches accordingly.



16. The computer will restart and will boot with the new OS

## B. Install Ubuntu

### Step 1: Create a live Ubuntu USB or disk if it is not available

Download and create a live USB or DVD. In Windows, you can use tools like “universal USB installer” to create a live Ubuntu USB

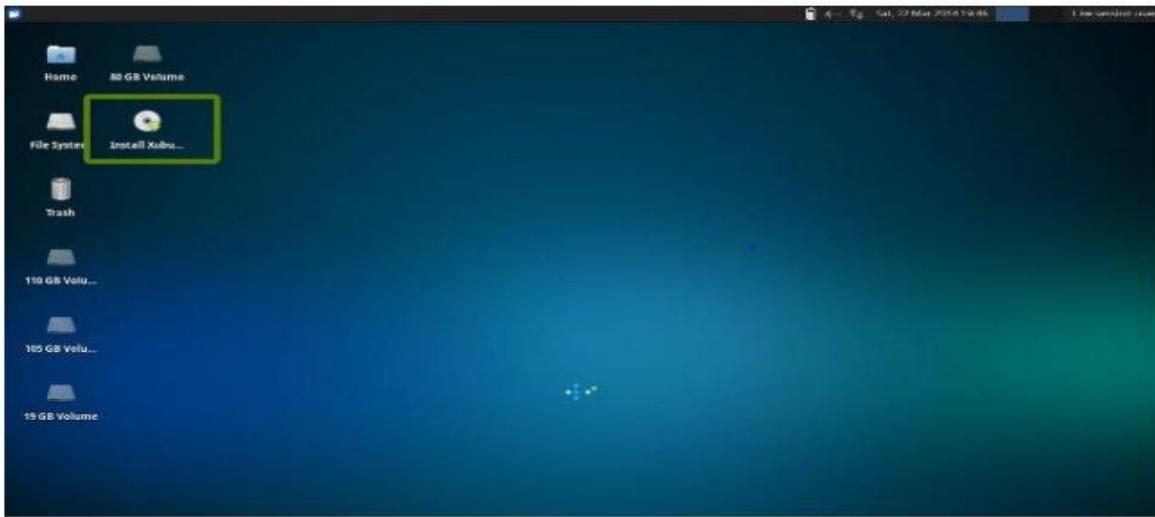
### Step 2: Boot in to live USB

Plug the live USB or disk in to the computer and restart the computer.

While booting the computer press F10 or F12 function key (defers from computer to computer) to go to the boot menu. Now, choose the option to boot from USB or CD/DVD.

### Step 3: Start the installation

It will take some time to boot in to the live USB or disk. Once booted, you will be immediately provided with option to either try Ubuntu or install Ubuntu. Even if you choose to try, you can find the option to install on the desktop:

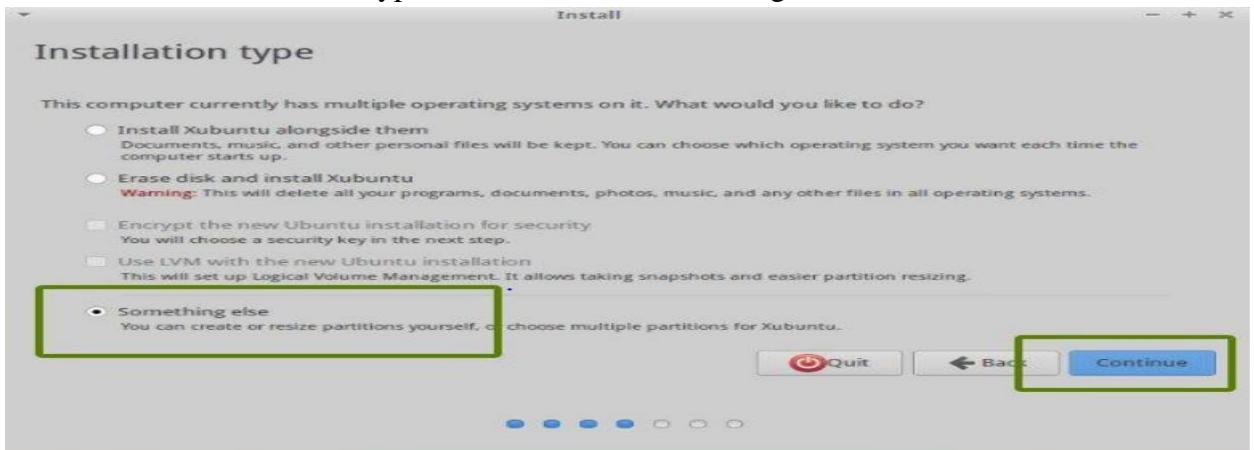


First few screens are pretty straight forward. Just choose press continue:



#### Step 4: Prepare the partition

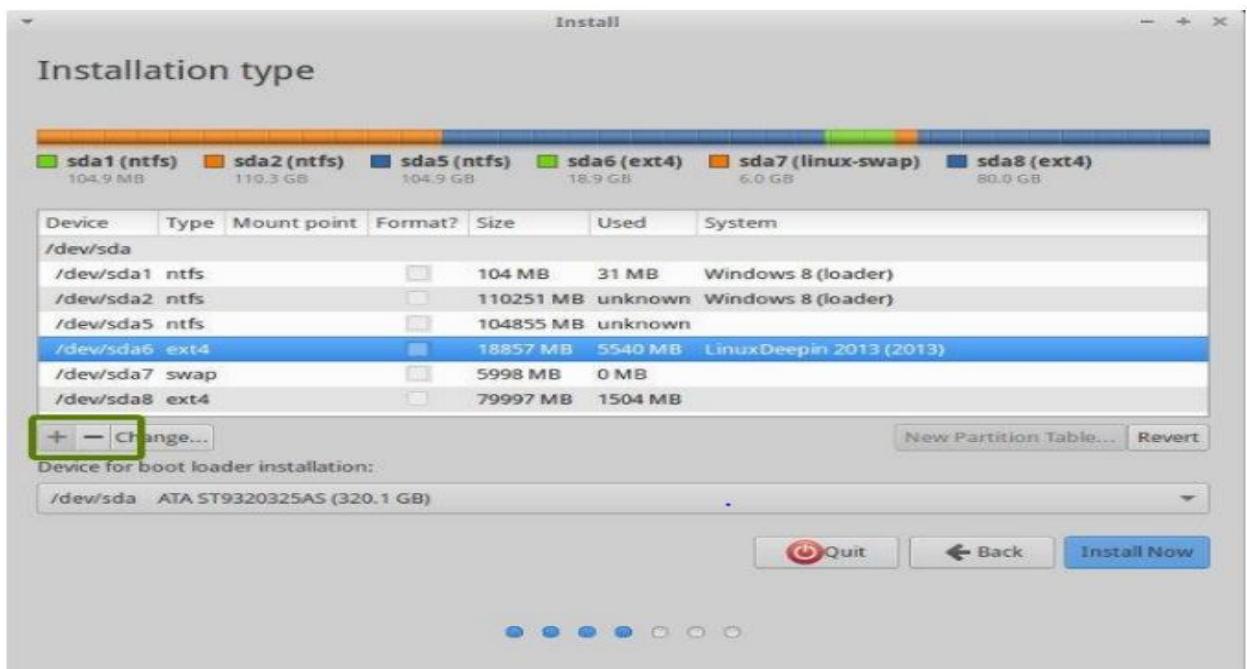
This is the most important part of the whole dual boot installation. Where to install Ubuntu? Windows is already installed here, so, we'll prepare a new partition for Ubuntu. In the Installation Type window, choose Something Else:



As you can see, it has 3 NTFS and some ext4 partitions. One of the NTFS partition consists of Windows installation. This should be untouched if you want to keep your Windows installation safe.

If there is no “free space”, you need to delete a NTFS or existing ext4 partition and create some free space. This will delete all the data in that partition

Click on the desired partition and press the – to delete the partition.

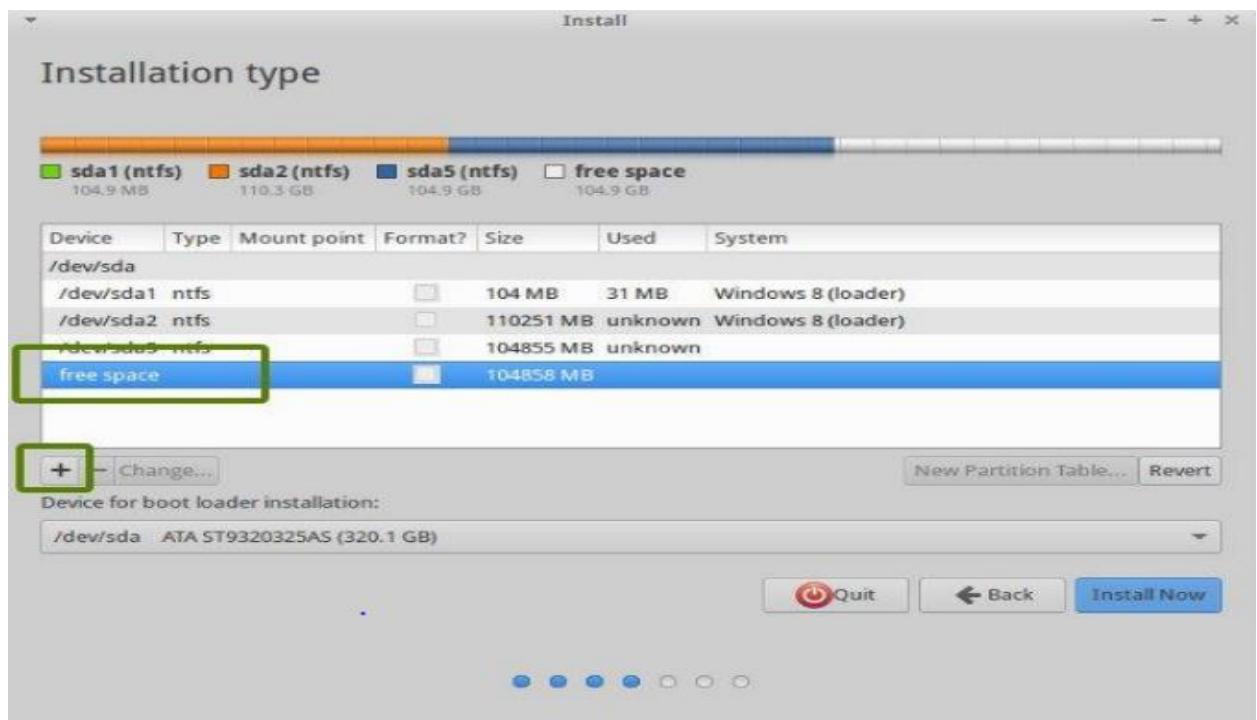


### Step 5: Create root, swap and home

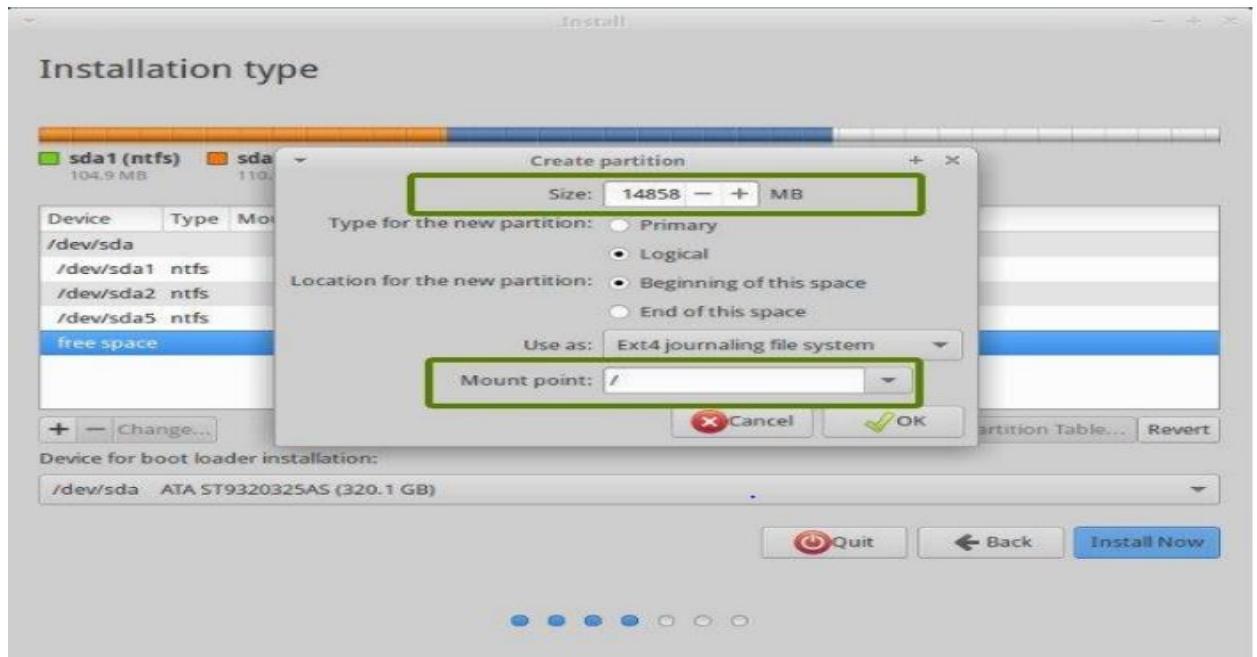
Once you have some free space on your hard drive, it is time to install Ubuntu on it.

Now, there are several ways to do it. We have to create minimum a Root, a Swap and a Home partition.

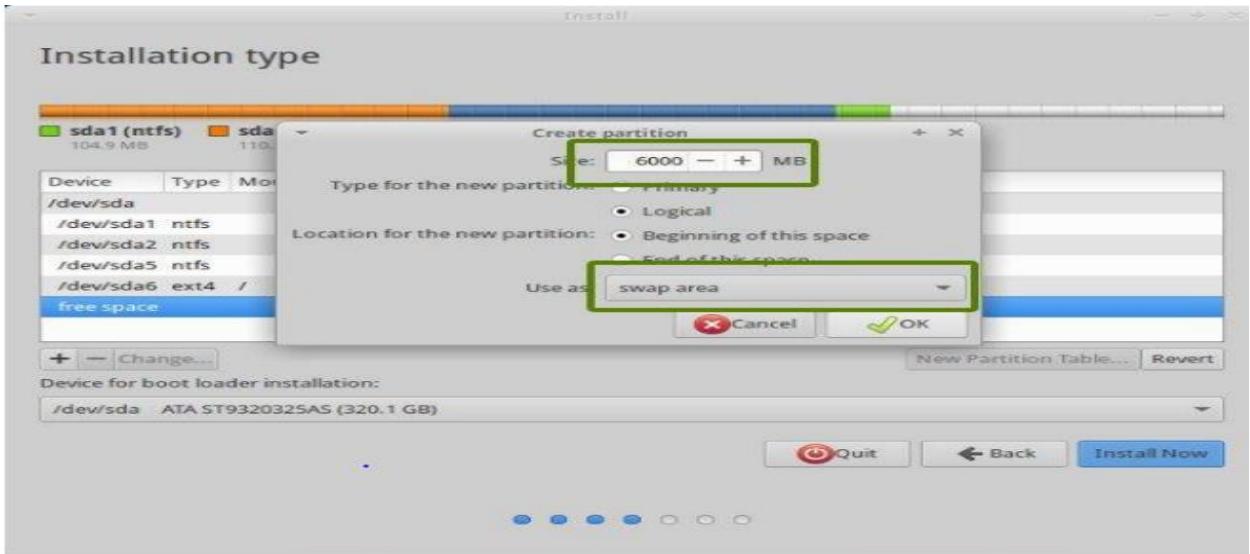
Create a root partition first. Choose the free space available and click on +.



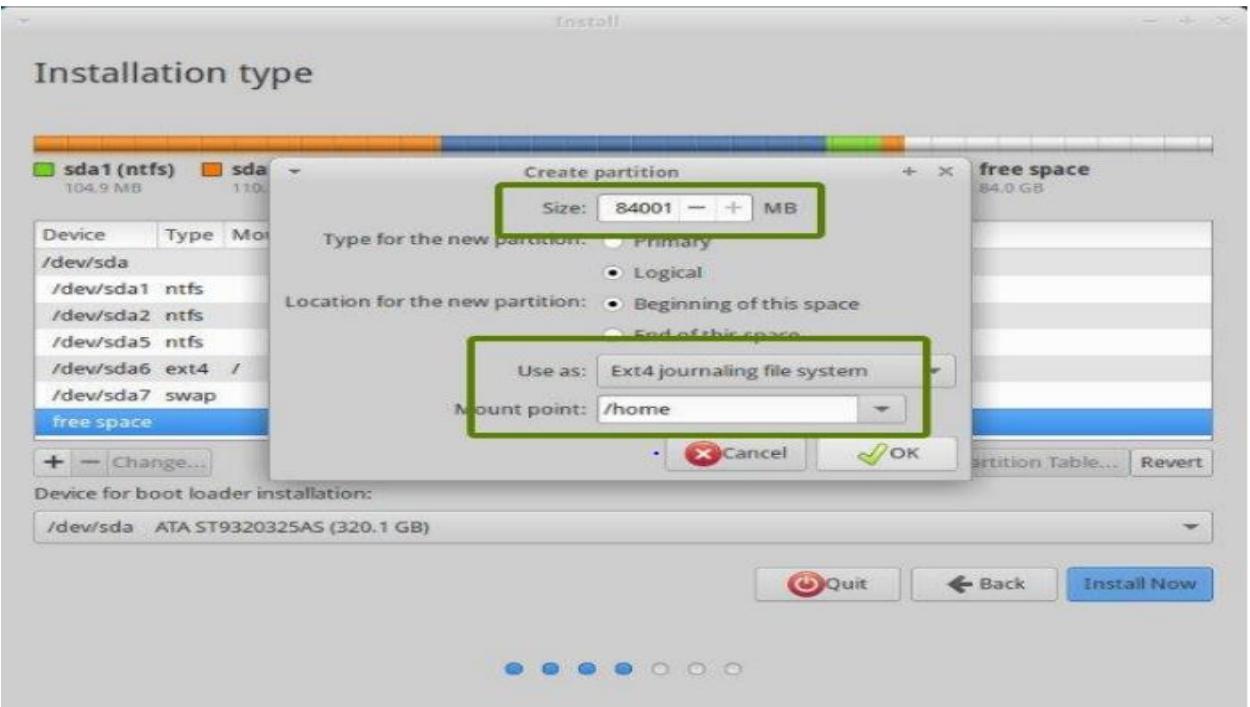
Here, choose the size of root directory, choose ext4file system, and mount point as / (i.e. root):



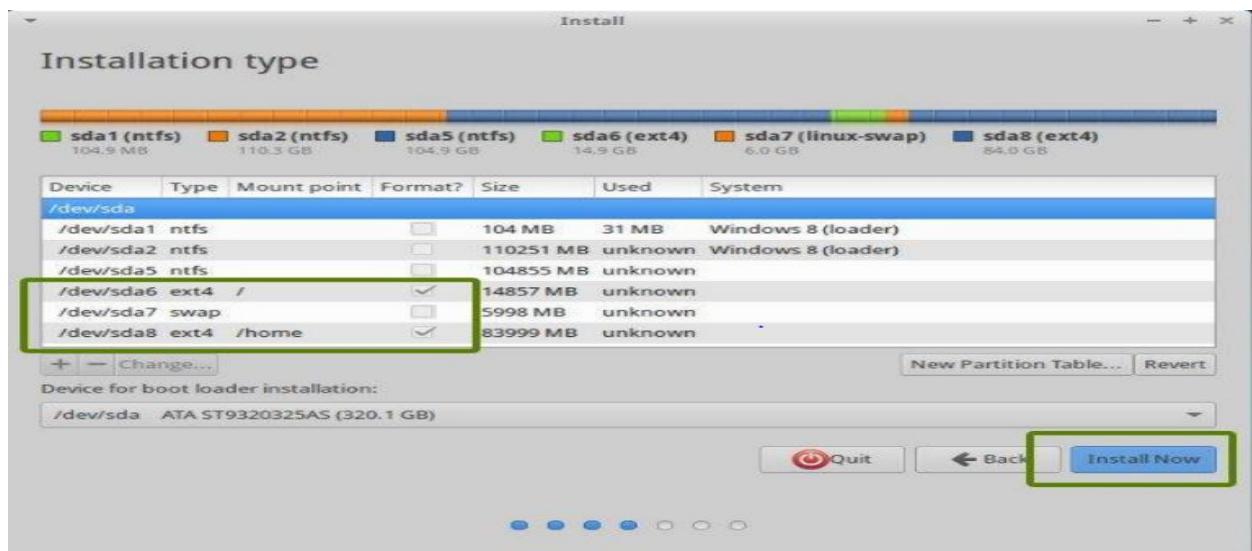
Next step is to create swap partition. It is advised by many that Swap should be double of your system's RAM size. You can choose the swap size accordingly.



The next step is to create Home. Try to allocate the maximum size to Home because this is where you'll be downloading and keeping the files.

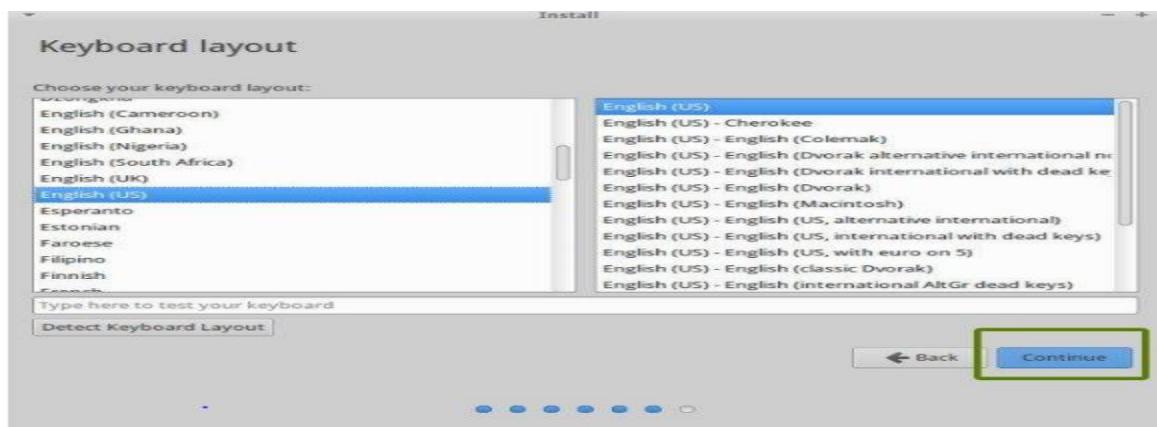
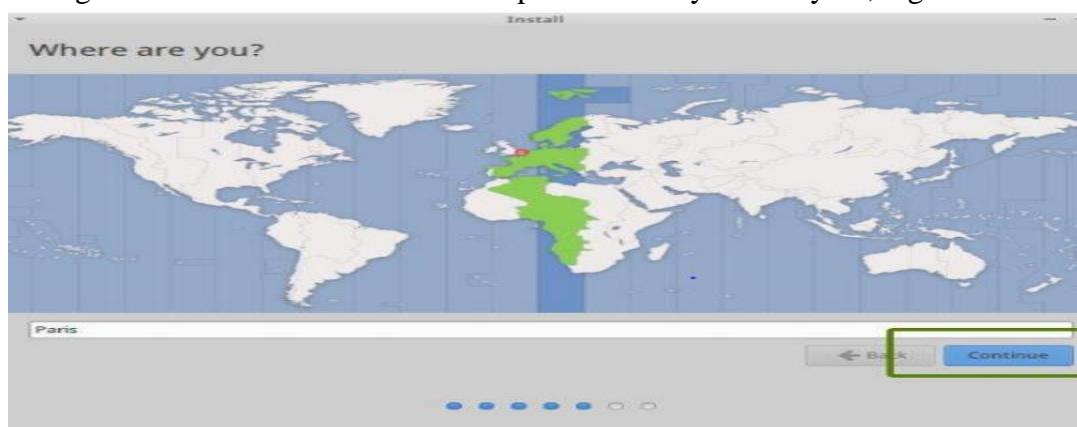


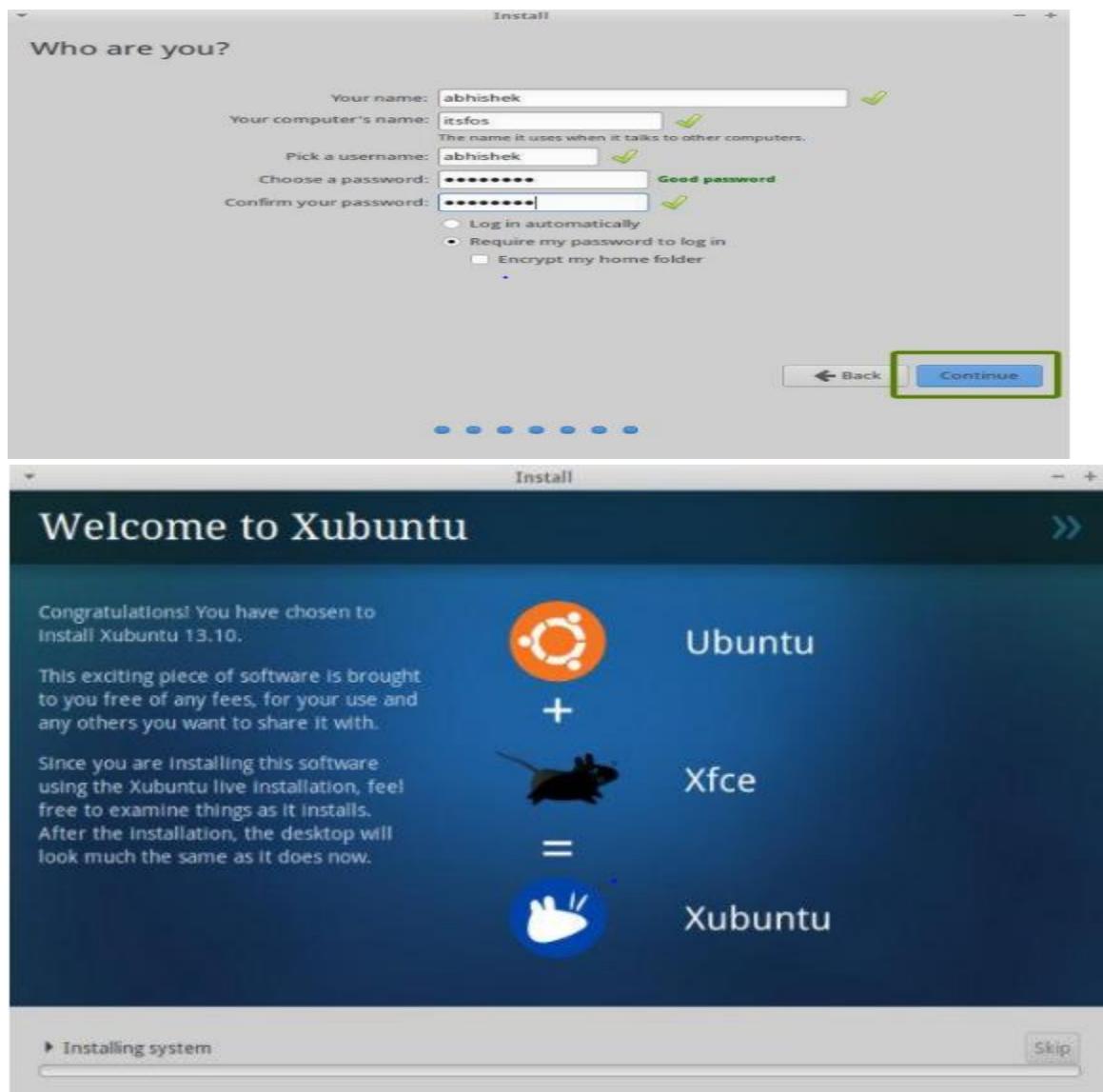
Once you have created Root, Swap and Home partitions, click on Install Now button.



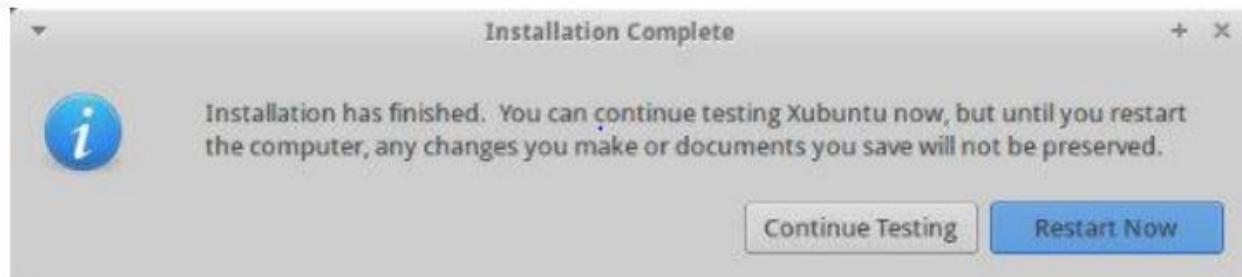
### Step 6: Follow the trivial instructions

If you successfully created the partitions as mentioned above, you will be taken through a number of screens to select options like keyboard layout, login credentials etc.





Once the installation is over, you will be presented with the option to keep trying live version or to restart the system.



On next boot, you will see the option of XUbuntu in the grub screen.

**Result:**

Thus, the Dual OS installation was done successfully.

## **Experiment No.8 BIOS Setup Utility**

**Aim:** To Understand the BIOS Setup Utility.

**Objective:** To know and understand the features available in BIOS Setup utility and common errors in POST (Power on self-Test)

**Components Required:** PC

The BIOS Setup Program or CMOS Setup Program is the System configuration and setup program, which runs from System BIOS. It is a menu-driven program. It enables us to configure the motherboard and chipset settings, date and time, passwords, disk drives, Boot options and many other basic system settings. The configurations done by BIOS Setup Utility are stored in a special CMOS RAM.

**Accessing the BIOS Setup Utility** The BIOS Setup Utility can be activated only by pressing a special key or key combinations during the

POST. The correct key to press is normally displayed onscreen during POST. The key or Key combinations used by major BIOS vendors are

AMI BIOS – Press F1 or Del during POST

Phoenix BIOS – Press F1 or F2 during POST

Award BIOS – Press Del or Ctrl+Alt+Esc during POST

On newer Intel Motherboard based PCs, press F2 to enter BIOS Setup program.

BIOS Setup Menus typical Setup menu is shown in the figure A. This menu includes Main, Advanced, Security, Power, Boot and Exit.

### **BIOS Setup Screens Overview:**

<b>Screen</b>	<b>Description</b>
Main	General product information, including BIOS type, processor, memory, and time/date.
Advanced	Configuration information for the CPU, memory, IDE, Super IO, trusted computing, USB, PCI, MPS and other information.
PCI	Configure the server to clear NVRAM during system boot.
Boot	Configure the boot device priority (storage drives and the DVD-ROM drive).
Security	Set or change the user and supervisor passwords.
Chipset	View the configuration of server chipsets.
Exit	Save changes and exit, discard changes and exit, discard changes, or load optimal or fail-safe defaults.

## **Setting the Boot Device Priority**

Using the Boot menu in the BIOS Setup Utility, we can change the boot drive order.

1. Select Boot menu by pressing Left Arrow (←) or Right Arrow (→). Boot Menu is shown in figure B.

2. Select Boot Device Priority item from Boot menu by pressing Up Arrow(↑) Down Arrow (↓) and press Enter. Now Current Boot Device Priority is displayed as in Figure C. To change Boot Device Priority, press + (Plus) or – (Minus).

3. Press F10 to save the changes made and exit from the BIOS Setup Program.

**BIOS Power-On Self-Test (POST) Events:** Almost all computers run a series of diagnostic tests called a "Power On Self-Test" (or POST) when they start up. These check everything from the motherboard to the keyboard. Only after POST is passed does the computer try to start up the operating system. When the POST is successfully completed, the computer beeps once.

If the computer beeps more than once, or if it does not beep at all, it means it failed the POST and never even got to the operating system. If the computer beeps more than once it is trying to tell you what is wrong. Each BIOS vendor (such as AMI and VIA) has their own "Beep Codes", but here are some common examples of what the codes mean. For example, a long, continuous beep usually means a stuck key on the keyboard or a problem with the system's motherboard. Check your computer's manual or look on the BIOS Company's web site for a chart of what the beeps mean.

## **Common Post Trouble Shooting Steps**

- I. Remove new hardware

If any new hardware has been recently added to the computer, remove that hardware to make sure it is not the cause of your issue. If your computer works after removing the new hardware, it can mean a few things. Either the new hardware is not compatible with your computer, a system setting needs to be changed, or the new hardware is defective

- II. Remove any disks or USB devices

- III. Disconnect external devices

- IV. Reconnect and check power cords

- V. Check all fans

- VI. Check all cables

- VII. Remove the RAM

If you continue to experience the same problem with all the above hardware removed, remove the RAM from the motherboard and turn on the computer. If the computer has a different beep code or if your computer was not beeping and is now beeping, turn off your computer and try the below suggestions. Make sure to turn off the computer each time you are adding and removing the memory and then turning the computer back on to see if the suggestion resolves the issue.

Re-insert the memory into the same slot.

If you have more than one stick of memory, remove all but one stick of memory and try rotating through each stick.

Try one stick of memory in each slot.

If you can get the computer to boot with one or more of the sticks of memory installed, it is likely you are dealing with some bad memory. Try to identify which stick of memory is bad and replace it.

**Result:** Familiar with BIOS Setup

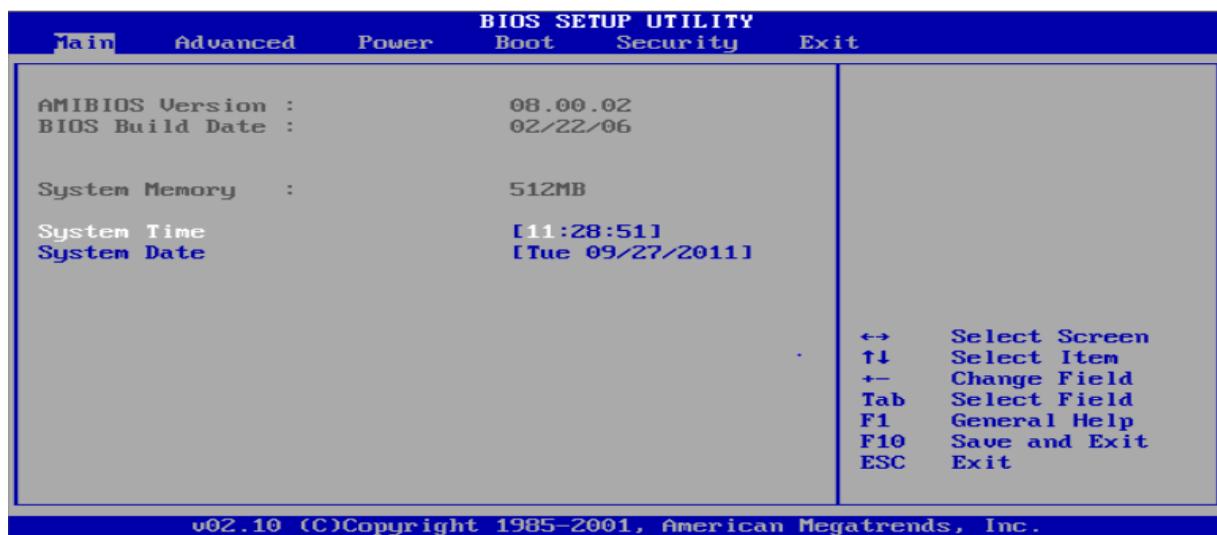
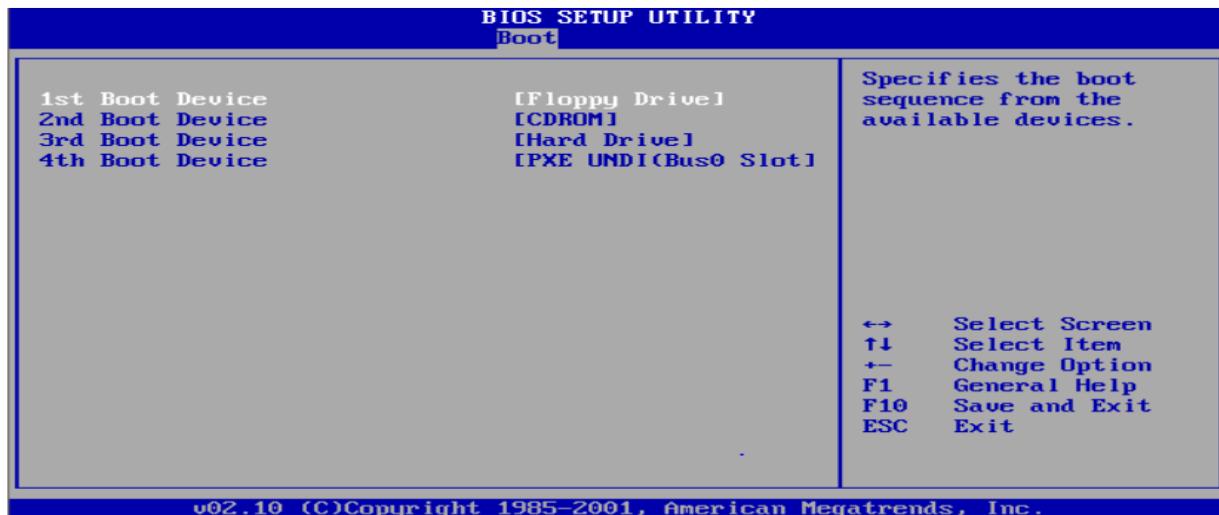


Figure A : Main Menu



B: Boot Menu



C: Boot Device Priority

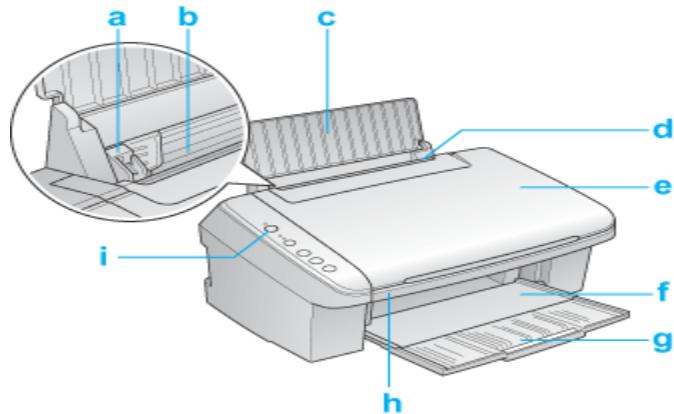
## Experiment .No:9 Printer ports, Parts and Control Panel Functions

**Aim:** To discuss the printer ports, parts and control panel functions

### Printer ports



## Printer Parts

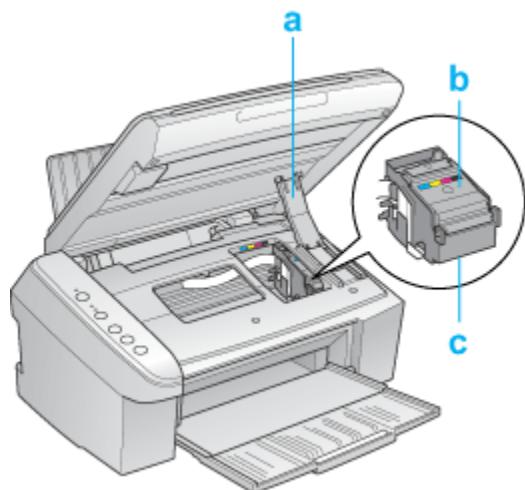


- a. Edge guide: Helps load the paper straight. Adjust the left edge guide so that it fits snugly to the width of your paper.
- b. Sheet feeder: Feeds a stack of paper automatically.
- c. Paper support: Supports the paper loaded in the sheet feeder.
- d. Feeder guard: Prevents objects placed on the document cover from falling inside the printer when opening the document cover.
- e. Document cover: Open and close when you place a photo or document.
- f. Output tray: Receives ejected paper.
- g. Output tray extension: Supports the ejected paper.
- h. Scanner unit: Open and close when you replace an ink cartridge.
- i. On button: Turns the printer on and off.



a. Document table: Place originals face down on the glass.

b. Control panel:



a. Scanner unit support: Holds the scanner unit open when you replace an ink cartridge.

b. Cartridge cover: Holds the ink cartridges in place.

c. Print head: Prints ink on your paper.

## Control Panel Buttons



Button	Function
⊕ On	Press to turn the printer on and off.
ⓧ Stop	Stop button. Press to cancel scanning or printing. The sheet being printed is ejected. Press and hold for three seconds to clean the print head (when the  light is off).
◊ Color Photo	Press to copy a 4 × 6 in. (10 × 15 cm) photo in color without a border.
◊ B&W Text	Press to copy an A4 document in black and white. Press and hold for three seconds to print with a border.
◊ Color Text	Press to copy an A4 document in color. Press and hold for three seconds to print with a border.

## Lights

**Note:**

All lights except the On light turn off after ten minutes if no buttons are pressed. Press any button except the On button to return the lights to their former state.

Light	Pattern	Status
On	On	The printer is on.
	Flashing slowly	The printer is active.
	Flashing quickly	The printer is turning off. The printer is charging ink cartridges.
	On or flashing	An error has occurred.
	On	One or more ink cartridges are expended or missing.

	Flashing slowly	One or more ink cartridges are low on ink. You can continue printing until it is expended.
	Flashing quickly	The printer is charging ink cartridges.

## Error indicators

You can identify many common printer problems using the lights on your printer. If the printer stops working and the lights are on or flashing, use the following table to diagnose the problem, then follow the recommended corrective measures.

Lights	Problem and solution	
	<b>Paper out</b>	
	No paper is loaded.	Load paper into the sheet feeder, and then press one of the  start buttons. The printer resumes printing and the light goes out.
	<b>Paper jam</b>	
	Paper has jammed in the printer.	
	<b>Ink expended</b>	
	An ink cartridge is expended or not installed.	Replace the ink cartridge with a new one. If the light is still on after you have replaced the cartridge, it may not be installed correctly. Reinstall the ink cartridge so that it clicks into place.
	<b>Wrong cartridge</b>	
	The currently installed ink cartridge cannot be used with the printer.	Replace the incompatible cartridge with an appropriate ink cartridge.
	<b>Incorrectly installed ink cartridge</b>	
	An ink cartridge is not installed correctly.	Reinsert the ink cartridge.
	<b>Ink low</b>	
	An ink cartridge is nearly expended.	Obtain a replacement ink cartridge. To determine which cartridge is nearly expended, check the ink cartridge status.

	<b>Waste ink pad service life ended</b>	
	Waste inkpad in the printer is saturated.	Contact your dealer to replace it.
All lights flashing	<b>Problem with the printer</b>	
	There is a problem with the printer.	Turn the printer off and then back on. If the error does not clear, contact your local authorized service center or contact Epson for a referral.

### Simple Way to Refill and Reuse a Printer Cartridge

Printer ink is one of the most expensive things that you will run into when you set up your home office.

You start out taking dozens of pictures with your new digital camera, download them onto your computer, and print a few and then suddenly: the print cartridge runs out of ink.

If you follow this how-to guide and refill your print cartridge instead of buying a new one, you can save literally hundreds of pounds in printer ink.

#### Steps

1. Purchase an ink refill kit at an office supply store. Many office supply and discount stores carry this inexpensive kit. (It usually costs about half the price of an average printer cartridge.) You can also find these kits at online retailers.
2. Gather your kit, a roll of paper towels, and some clear scotch tape together on a large flat working surface, a table or desk.
3. Remove the empty cartridge from your printer. (Remember to close your printer lid or door while you are working.)
4. Cover your hands with a pair of disposable plastic gloves while you work with the messy ink.
5. Take a paper towel and fold it in half twice. Work over the paper towel to catch any leaking ink.
6. Place the empty cartridge on it.
7. Read the instruction manual included with the refill kit to learn how to refill your particular type of cartridge. (The following instructions are just a general guide).

8. Locate the fill holes on the top of the cartridge. The depressions can be felt by rubbing your finger across the label. Some cartridges have more than one hole, but only one leads to the ink reservoir that you will refill. This hole will have a sponge in it.
9. Use a sharp pencil to pierce the refill holes in the top of the ink cartridge or you can take the top label off with a knife or screwdriver (Correct places can also be found in the kit instructions).
10. In addition to black, there are three colors of ink: magenta, cyan, and yellow. Follow the kit instructions on which hole to insert each colour OR push a toothpick into the holes to identify the colors as markings on the printer cartridge are sometimes there to fool you into putting the wrong colors into the cartridge ink chambers.
11. Insert the long needle of the refill ink bottle deeply into the correct hole penetrating the foam down into the bottom of the cartridge. It is important not to push air into the cartridge foam while refilling. (An air pocket will keep the ink from reaching the print head causing the cartridge not to print.)
12. Slowly, add the ink. Carefully watch to be sure that you do not over-fill.
13. Stop quickly as soon as you see a bit of ink oozing out of the hole. Without letting go of the bottle, slowly release the air, sucking a little ink back out of the ink cartridge, before you remove the needle completely.
14. Carefully dab the cartridge contacts on the paper towel, you should see a splotch of the ink leaking out onto the paper towel.
15. Cover the hole with a small piece of clear scotch tape. (This works better than the seal dots included in the kit.) Make sure that no ink is leaking out of the top holes. (That's where the clear tape comes in handy.) Be careful not to cross contaminate the colors.
16. Repeat steps 11-15 for each ink colour.
17. After you have refilled all three colours, carefully blot (don't wipe or rub) the cartridge print head on a folded piece of paper towel. You may need to do this several times. Do this until it stops bleeding and you see an even stripe of three colours showing up on the towel.
18. If the blot shows the colours either faded or not at all, blot on wet paper towel and again on dry, to get the ink flowing.
19. Replace the ink cartridge into the printer. Never, ever install a leaking print cartridge.
20. Immediately print something, anything, just to get the ink flowing. Print several test pages, preferable photos with a lot of different colours.

21. Follow the cleaning or priming cycles for your specific printer.

## **Experiment .No:10 Printer installation and servicing and troubleshoot**

**Aim:** Printer Installation and Servicing: a) Head Cleaning in dot matrix printer b) Install and configure Dot matrix printer and Laser printer c) Troubleshoot the above printers. d) Check and connect the data cable connectivity

**Components/Tools:**

Computer with windows 7 OS, Dot matrix printer, Ink jet printer, Laser printer, Driver software's, Screwdrivers, printer head cleaning kit,

**Procedure:**

I. Head Cleaning in dot matrix printer:

- ✓ Adjust the print head spacing.
- ✓ Check the tension on the print head positioning belt. Use a non-fibrous swap dipped in alcohol to clean the print.
- ✓ Clean the printer roller surface.
- ✓ Clean the gear train of the paper handling motor.
- ✓ Apply light oil to rails.
- ✓ Move the carriage assembly to distribute the oil.

II. Install and configure Dot matrix printer and Laser printer:

I. To Install and configure Dot matrix printer:

Procedure

**Method 1**

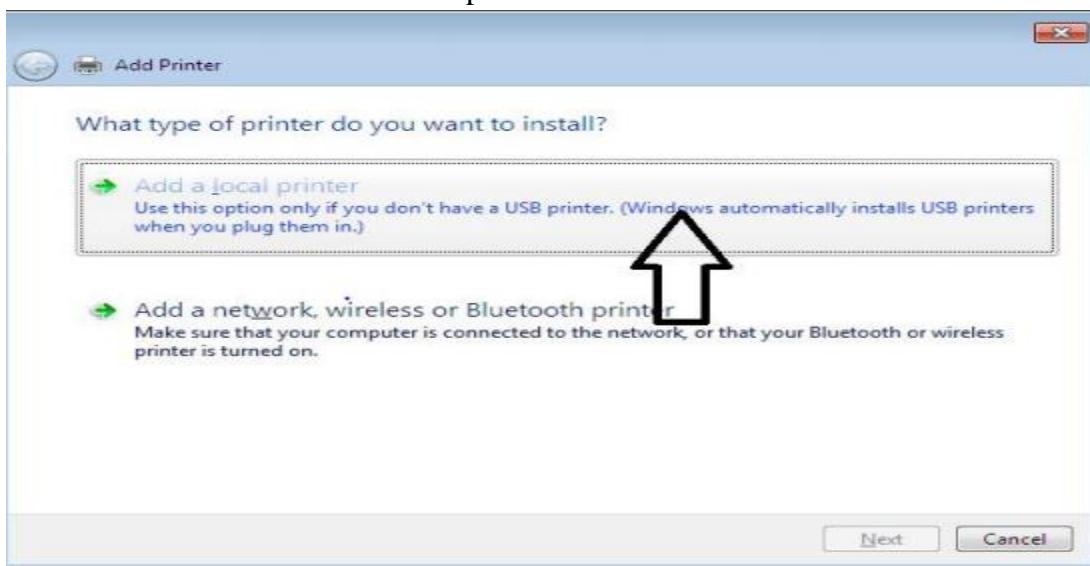
1. Every printer should come with the software used to install a printer in Windows or your operating system.
2. After everything has been plugged in turn the computer on.
3. Insert the CD that came with the printer. If the CD does not automatically start, open My Computer, double-click on the CD drive, and then click the Setup or Install file. If you have downloaded the drivers, run the downloaded setup file.
4. Follow the installation wizard and once completed your software is installed.
5. Test the printer to make sure it is working.

**Method 2**

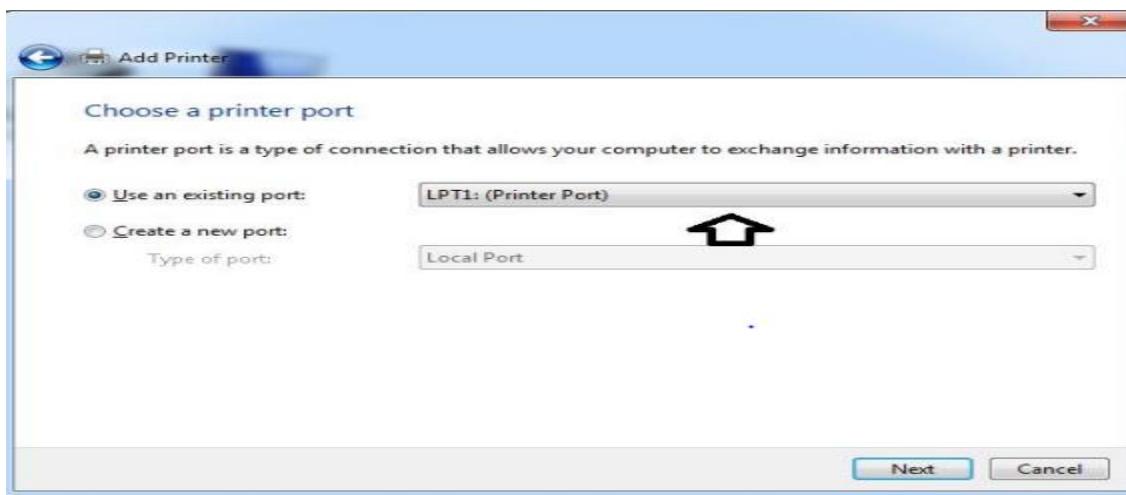
- i. Connect the power cable to printer. Connect data cable of the printer to computer
- ii. Go to Start > Device and Printers and click “add printer”



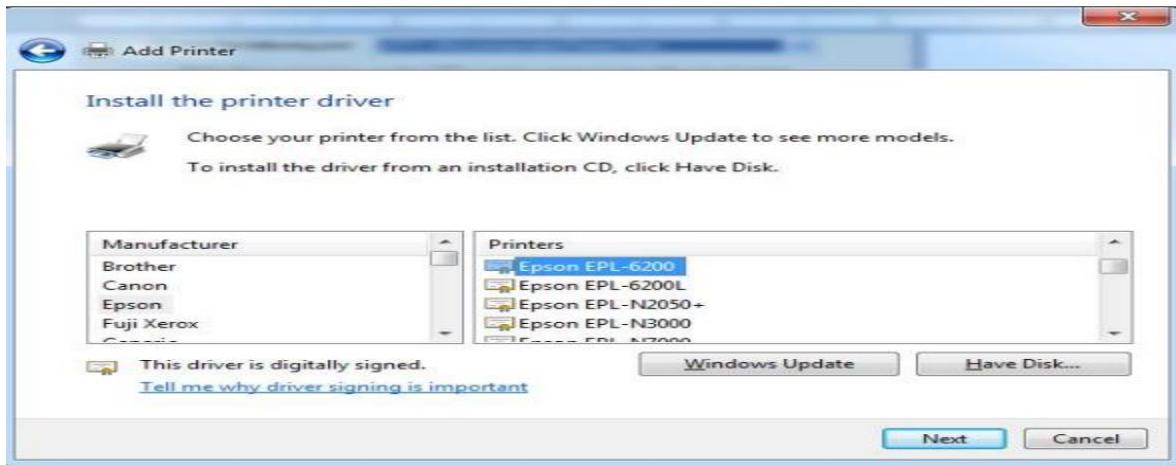
iii. Select local printer and click next



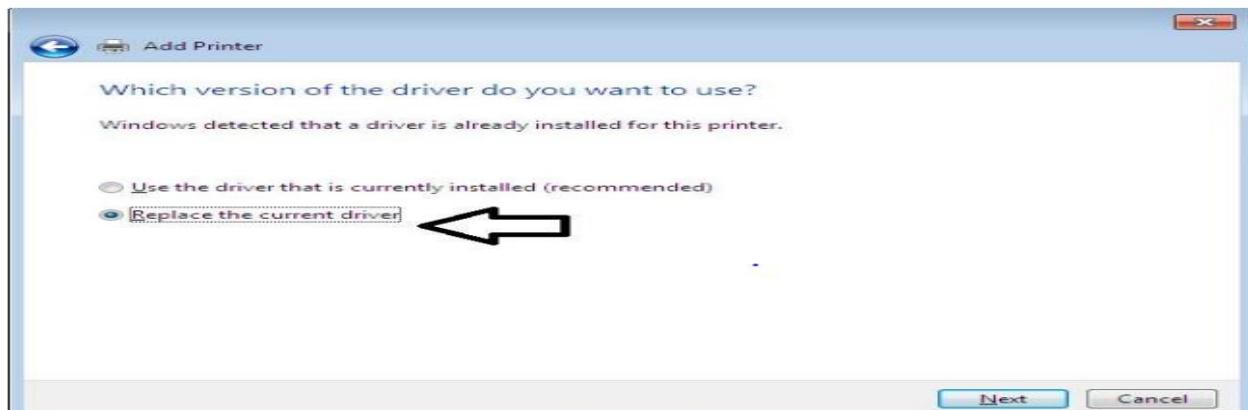
iv. On the Choose a printer port page, make sure that the Use an existing port button and the recommended printer port are selected, and then click next.



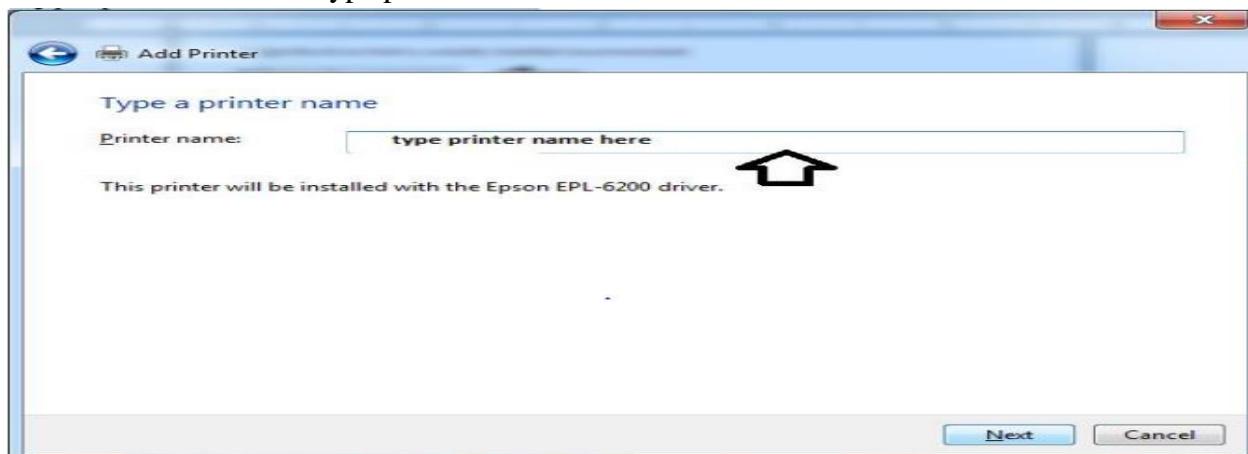
- v. Select the Manufacture and model and click next button. if the model is not in the list, click “have disk” button and in browse window locate the driver



- vi. If there is an existing driver that you want to replace select it and click next

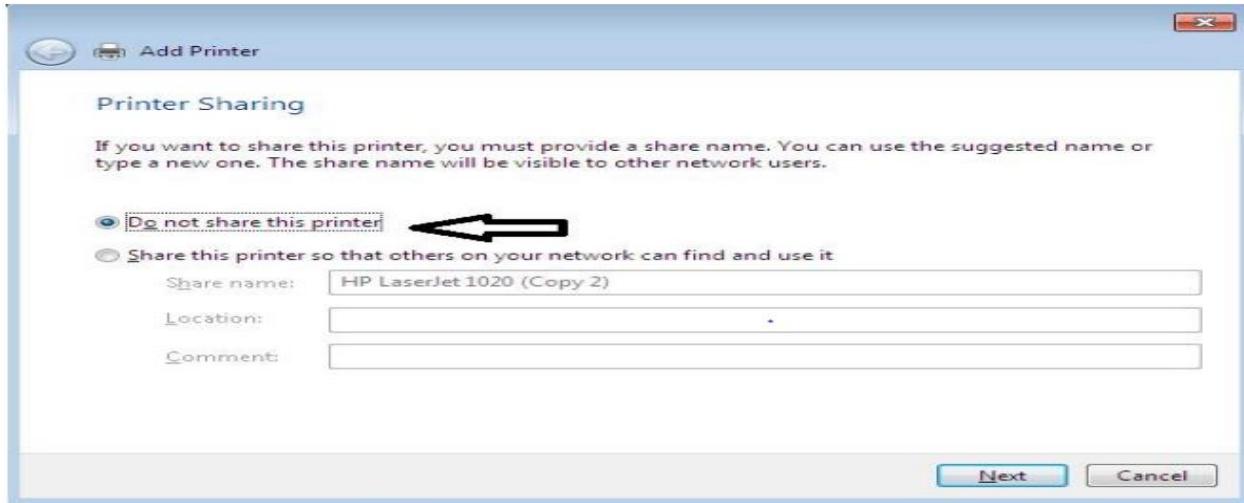


- vii. Type printer name and click next

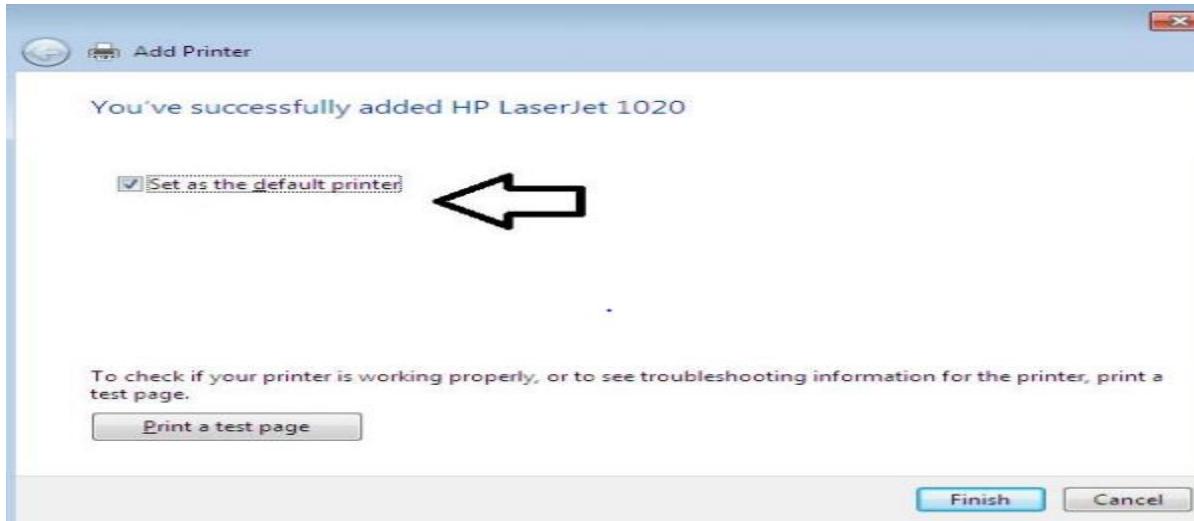


- viii. Computer will install driver

- ix. If windows ask to share the printer click “do not share printer” and click next. Otherwise select share this printer and provide “share name”, comment etc.



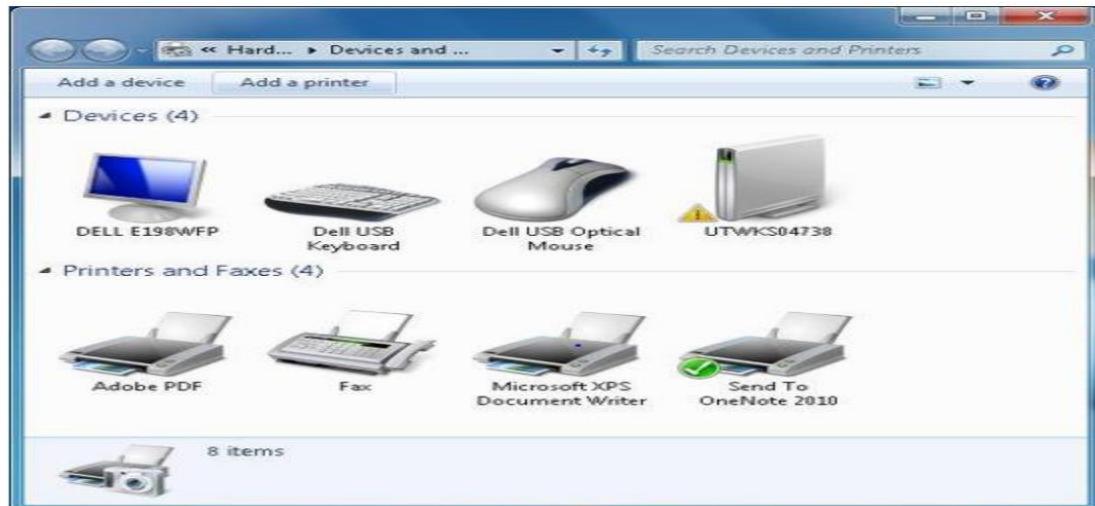
- x. if you want to set this printer as default select the check box and click finish



- xi. Then, follow the instructions on the computer screen.  
xii. After installation restart the system and check the printer

II. To Install and configure Laser printer:

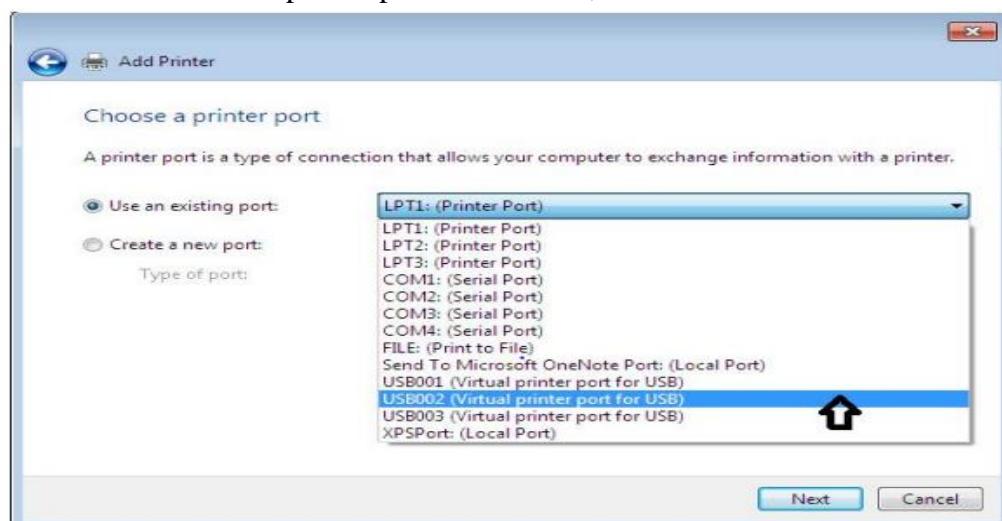
1. Connect the power cable to printer. Connect data cable of the printer to computer
2. Go to Start > Device and Printers and click “add printer”



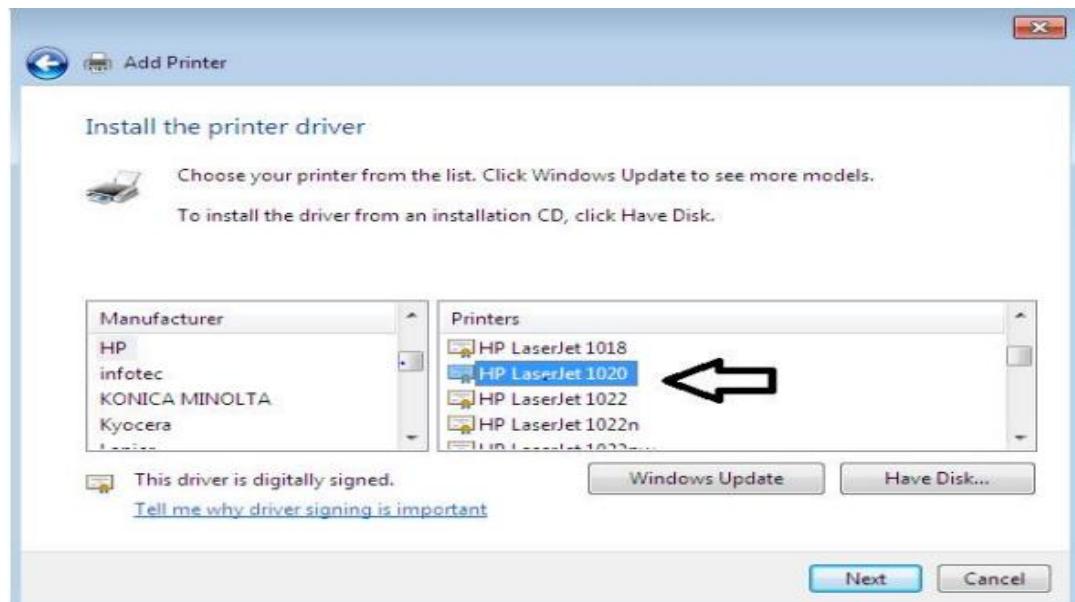
3. Select local printer and click next



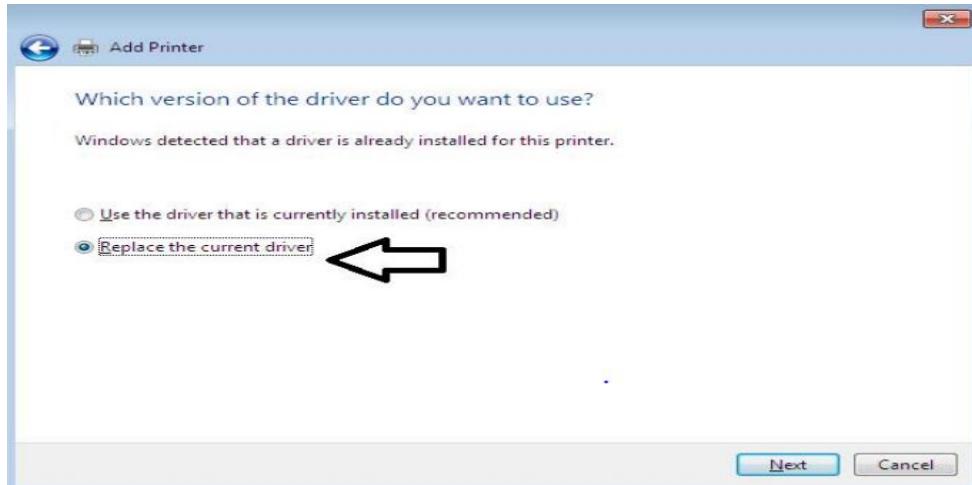
4. On the Choose a printer port page, make sure that the Use an existing port button and the recommended printer port are selected, and then click Next.



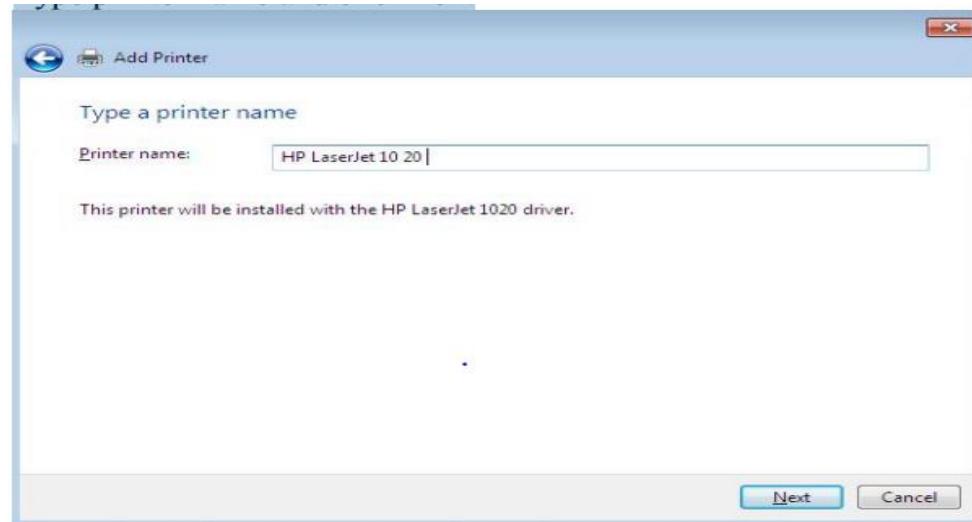
5. Select the Manufacture and model and click next button. if the model is not in the list, click "have disk" button and in browse window locate the driver.



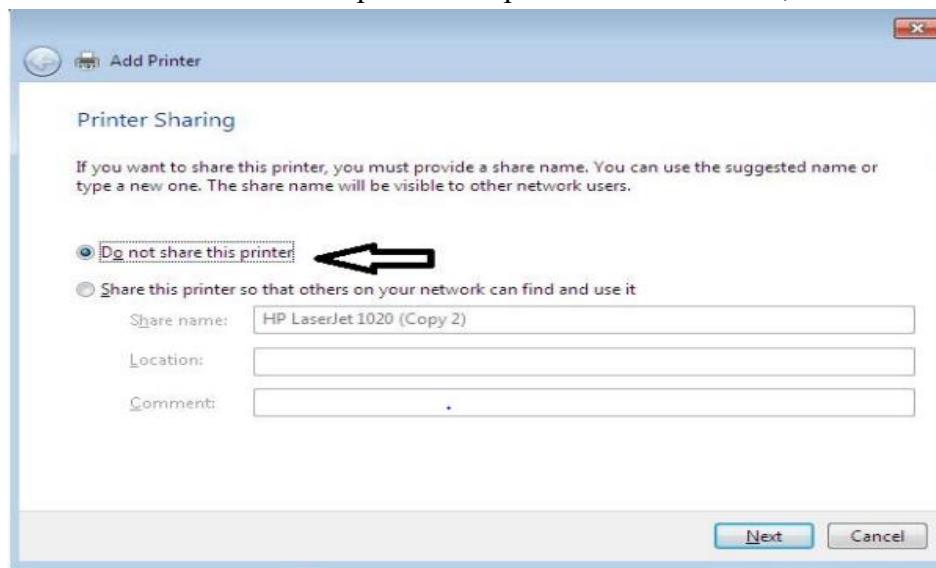
6. if there is an existing driver that you want to replace select it and click next



7. Type printer name and click next



8. Computer will install driver
9. If windows ask to share the printer click “do not share printer” and click next. Otherwise select share this printer and provide “share name”, comment etc.



10. If you want to set this printer as default select the check box and click finish



11. Then, follow the instructions on the computer screen.
12. After installation restart the system and check the printer.

### III. Troubleshoot the Dot-matrix/ink jet/ laser jet printers

#### Common problems

- Printer does not function
- The printer does not print during self-test.
- Printer not ready error message displayed.
- Carriage does not move.
- Paper empty-not sensing.
- No ribbon feed.
- Head pins problem and coils check.

#### General Trouble shooting methods

- ✓ If the computer printer does not turn on, make sure power is on at the outlet, and then check to be sure that all cable connections are secure. Check the electrical cord. Also, make sure that the cover is closed properly.
- ✓ If the printer turns on but does not print, or print is distorted, check software configurations. Then turn the printer off, wait a few seconds to clear the memory and turn it back on. If necessary, reboot the computer.
- ✓ If the unit still does not print or print is distorted, check for a loose belt (dot matrix only) and tighten, and remove and clean the print head (dot matrix and ink-jet printers only). If necessary, install a new factory-authorized head.
- ✓ You also can run a self-test following instructions in the computer printer owner's manual. If the test fails to identify the problem, contact a service center.
- ✓ If the print on the page is smeared or streaked, clean all rollers, platen, and rails (dot matrix or ink-jet printers) or clean the print head or print cartridge and the corona wire of a laser printer. If the wire is broken, you will need to have it replaced by a professional.
- ✓ Reboot your computer. This generally solves most printing problems.
- ✓ Print a test page. If that prints and the application you are using does not, you probably will need to contact the application's vendor for support.
- ✓ Try reinstalling the printer driver
- ✓ Offline: Press the Go or Online button. If this does not change the printer display to

Online: Power the printer off for 1 minute and then turn it back on.

- ✓ Paper Jam: Open the doors and remove any paper, being careful not to tear it and lose pieces inside. Paper may also be lodged under the toner cartridge so you may have to pull it out. If you
- ✓ believe you have removed the paper but the display still says Paper Jam, power the printer off
- ✓ For 1 minute and turn it back on. If the jam is severe, contact the printer vendor for their expertise to rectify the problem.
- ✓ Processing Job: If the printer displays Processing Job but nothing is printing the job may just be really large and taking a while to print. If it has not printed after 5 minutes, press the Cancel Job button on the printer. If the job will not cancel, power the printer off for 1 minute and turn it back on. IO or Other Error :Most IO errors will be cleared by powering the printer off for 1 minute and turning it back on. You may also need to check to make sure the network cable

**IV. Check and connect the data cable connectivity:**

- ✓ See whether the cables are inserted fully into the printer port and computer port.
- ✓ Check for any bent pins in the printer connector. If bent pins present straighten it.
- ✓ Check the type of the cable to be used USB cables should not be longer than 15 feet.
- ✓ Check the continuity of the cable using multi meter.

**Result:**

Thus Installation, Configuration and troubleshooting of printers done successfully.

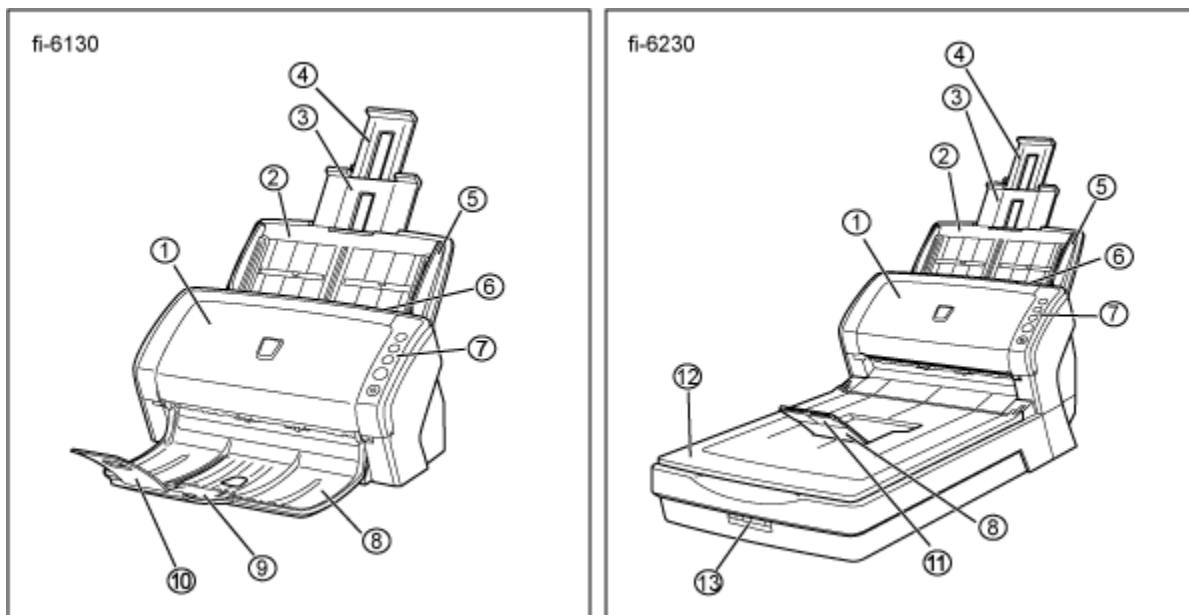
**EXERCISE**

1. What is device driver software?
2. What are the commonly used colors in color printer?
3. How will you set/reset save toner/ economic mode printing for laser printer?
4. What are the advantages of dot matrix printer over laser/inkjet printer?

## Experiment No 11 Scanner parts and their functions

**Aim:** To describe the scanner parts and their functions.

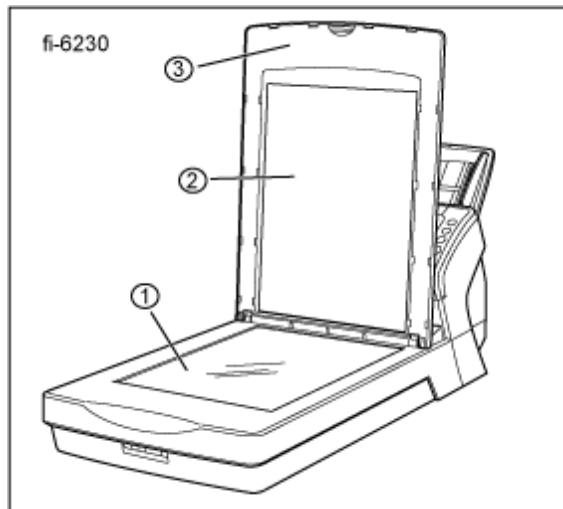
### Front



No.	Name	Function
1	ADF (Automatic Document Feeder)	Transports the document to the reading position automatically.
2	ADF paper chute	Holds in place the document pages / sheets that are fed into the ADF.
3	Paper chute extension 1	
4	Paper chute extension 2	
5	Side Guide	Adjusted to the width of the paper in order not to scan skewed pages.
6	ADF open lever	Pull this lever toward you to open the ADF.
7	Operator panel	This panel consists of a Function No. Display, four operating push buttons, and a LED.
8	Stacker	Scanned documents are ejected from the ADF onto this stacker.
9	Stacker extension 1 [fi-6130 only]	
10	Stacker extension 2 [fi-6130 only]	

<b>11</b>	Stacker extension [fi-6230 only]	
<b>12</b>	Flatbed (FB) [fi-6230 only]	Place documents on the glass sheet by sheet for single-sheet scanning.
<b>13</b>	Transport lock switch [fi-6230 only]	Used to lock the carrier unit inside the flatbed during transportation.

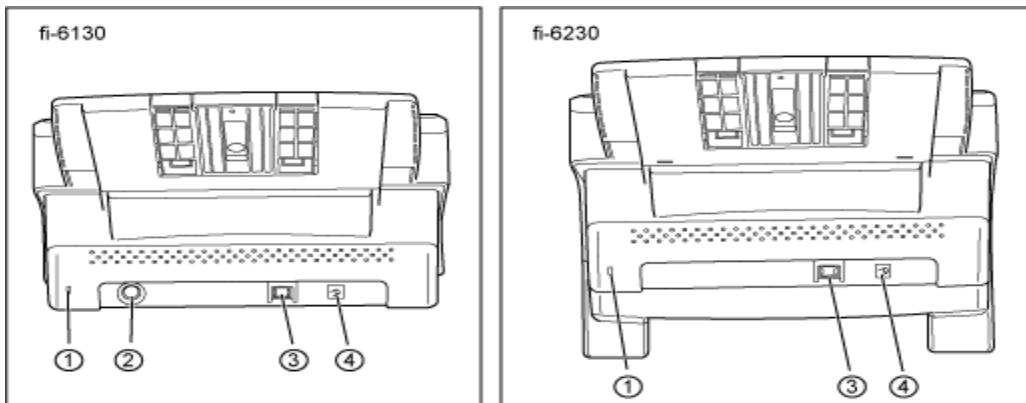
## ■ Inside



No.	Name	Function
<b>1</b>	Document bed	Place documents on the glass when scanning through the flatbed.
<b>2</b>	Document holding pad	Holds documents down on the document bed.
<b>3</b>	Document cover	Holds the documents loaded at the reading position when closed.



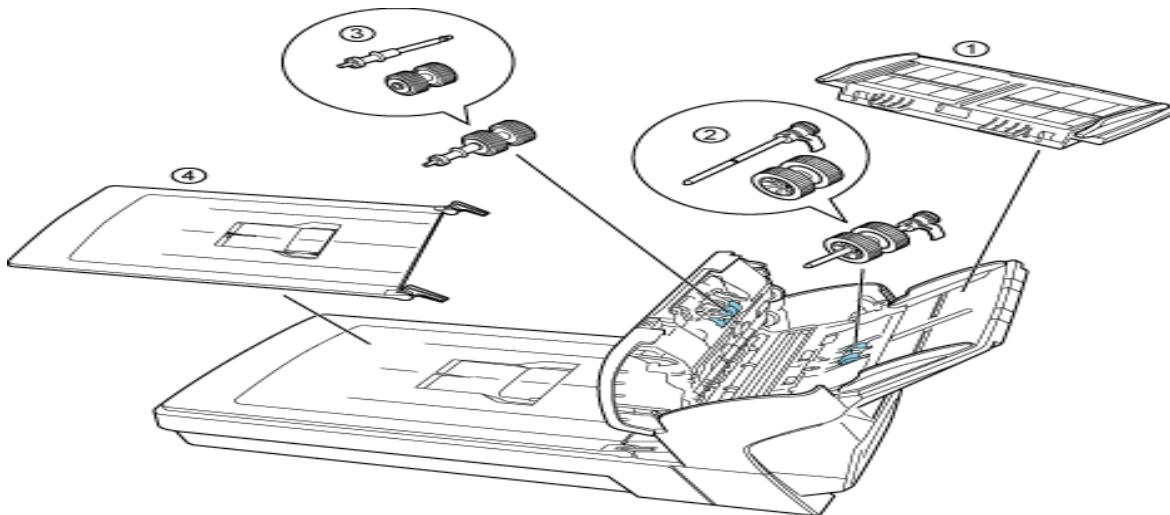
## Rear



No.	Name
1	Security Slot
2	EXT connector (for imprinter connection) [fi-6130 only]
3	USB connector
4	DC inlet

## Removable Parts

Parts that can be removed from the scanner are displayed below.

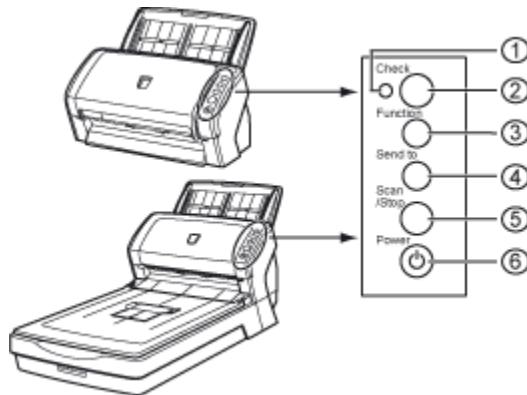


No.	Name
-----	------

<b>1</b>	ADF paper chute
<b>2</b>	Pick roller
<b>3</b>	Brake roller
<b>4</b>	Document cover [fi-6230 only]

### functions of the operator panel

The operator panel is located on the right side of the scanner. This panel is comprised of a Function Number display, four buttons, and a LED.



No.	Name	Function
<b>1</b>	Check LED	Lights when an error occurs.
<b>2</b>	Function Number Display	Indicates the function number and error status.
<b>3</b>	Function Button	Changes the Function activated by the Send to button (*).
<b>4</b>	Send to Button	<u>Launches the linked application software (*).</u> Resets an error.
<b>5</b>	Scan/Stop Button	<u>Launches the linked application software (*).</u> Resets an error. Cancels ongoing scanning.
<b>6</b>	Power Button/LED	Turns the scanner ON and OFF. Lights when the scanner is turned ON.

## Indications on the Function Number Display

Indication	Function
8	Blinks only one time upon turning on the scanner.
P	Indicates that the scanner has been turned ON and is being initialized.
0	Indicates that initialization will soon end.
1	Indicates that initialization has ended successfully. This status is called "Ready Status."
J U	Indicates that a recoverable error occurred during scanning with the image scanner. <u>"J" or "U" and an "error number" is displayed alternately.</u> When an error is indicated, press the [Scan] button or [Send to] button to return to the Ready Status ("1").
E F C H A L	Indicates that an abnormality (alarm) occurred in the image scanner during its initialization or during scanning documents. <u>"E", "F", "C", "H", "A", or "L" and an "alarm number" are displayed alternately.</u> When the alarm number is displayed, press the [Scan] button or [Send to] button to return to the Ready Status ("1"). If this alarm occurs, turn the power off and on again. If the alarm continues after turning the power on again, contact the dealer where you bought the scanner or an authorized FUJITSU scanner service provider.

## Experiment No 12 Install, configure scanner with system, and troubleshoot the problems.

**Aim:** To Install and configure Scanner with system in a computer system.

Components / tools

Computer with windows 7 operating system, scanner Device driver software

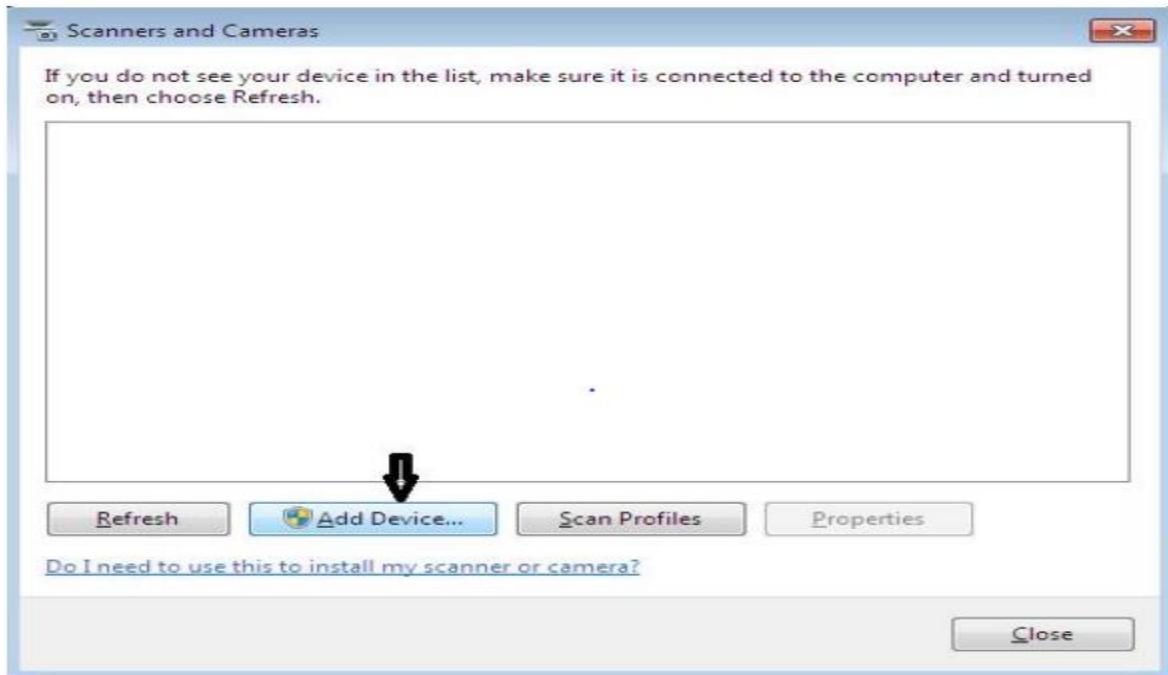
Procedure:

Plug and Play installation:

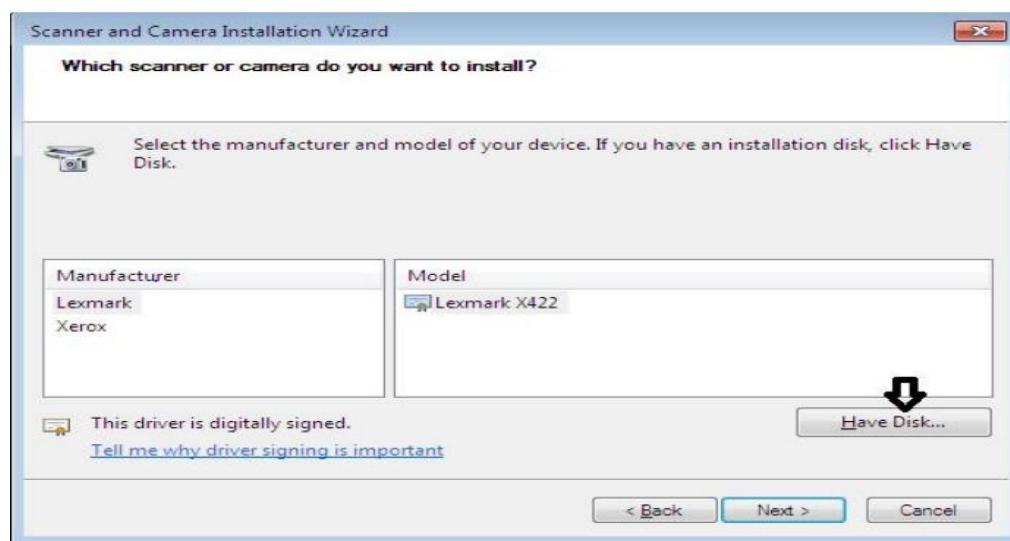
1. Plug your scanner into your computer.
2. The Scanner and Camera Wizard starts or.
3. Double-click Add Device.
4. Follow the instructions on your screen.

**To Install and configure Scanner:**

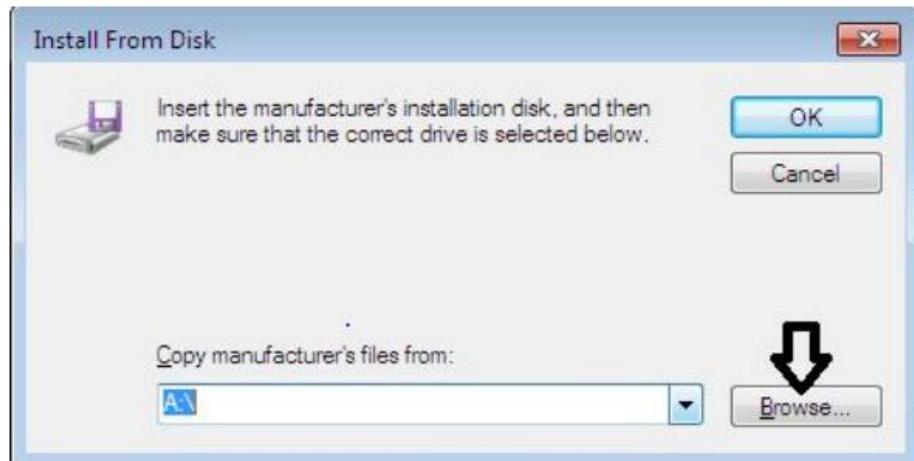
- i. To open Scanners and Cameras, click Start, click Control Panel, and then click Scanners and Cameras.



- ii. It displays already installed scanner. Select “add device” and click next in the next
- iii. Select the manufacture and model if it available. Otherwise select “Have disk”



- iv. The next window ask the driver i.e. manufactures installation disk. Click browse



- v. Locate the driver file and click open. Then it will install the driver for the scanner Notes
- vi. If you have a Plug and Play camera, Windows detects it and installs it automatically
- vii. If your camera or scanner is not Plug and play, follow the installation instructions that came with the device
- viii. If your camera or scanner is not listed in the Scanner and Camera Installation Wizard, try to install it using Device Manager.

**Result:**

Thus the Installations and configuration of Scanner to the pc are done successfully.

**EXERCISE**

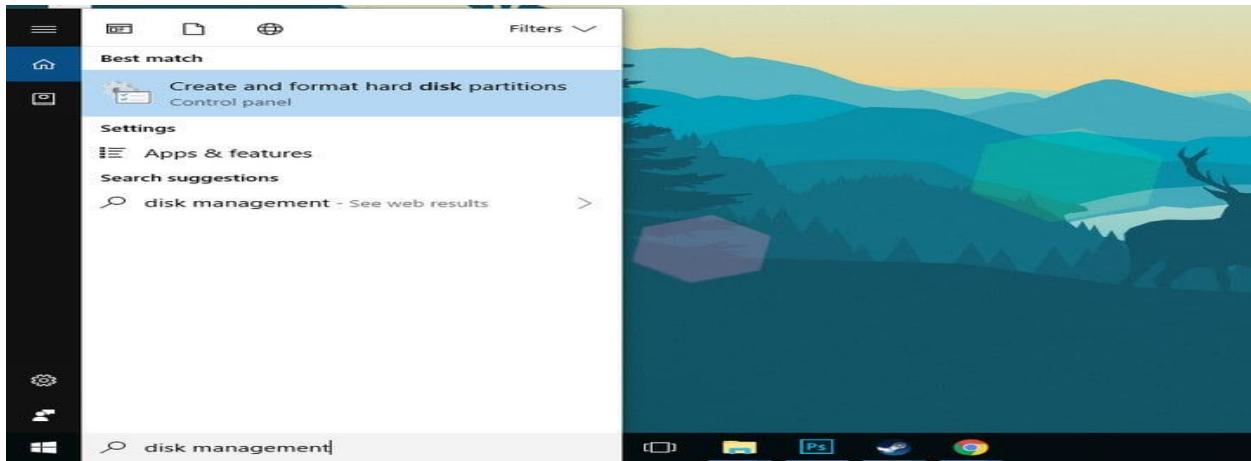
1. How scanner works?
2. How can you print scanned document

# Experiment No 13 Hard disk management

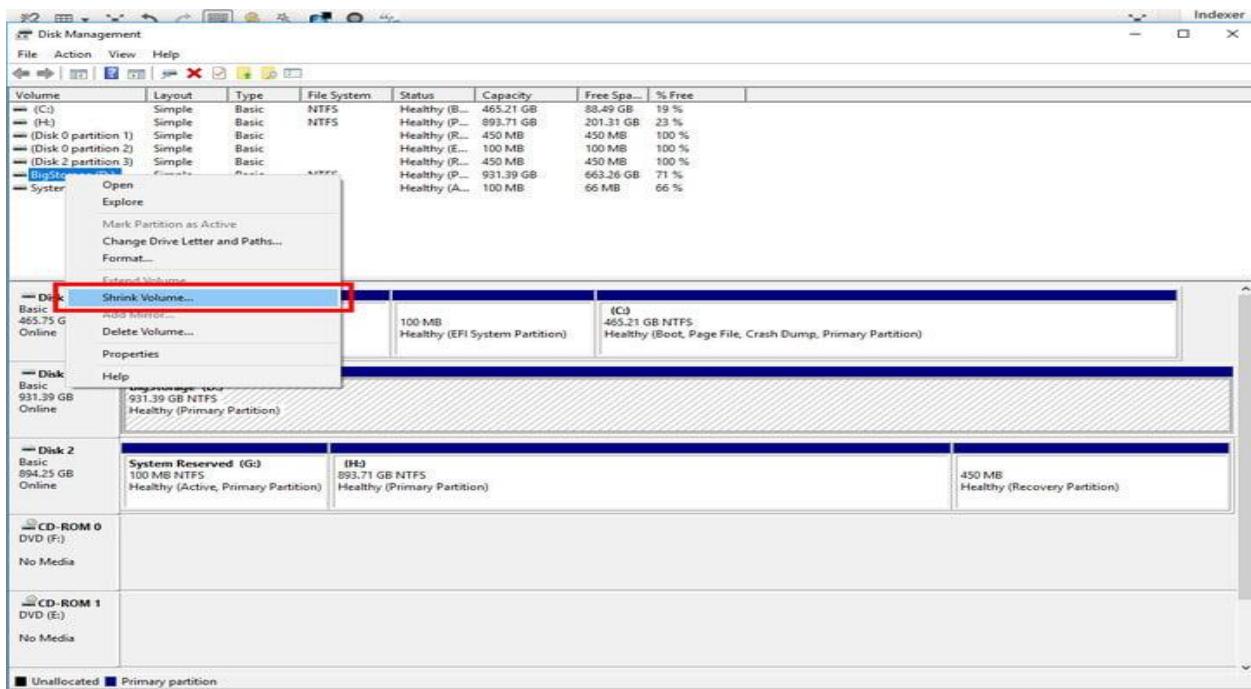
**Aim:**-To discuss how to partition and shrink a hard drive

**Components / tools:-**Computer with windows operating system

**Step 1:** Use the Windows search box to search for Disk Management. Select Create and Format Hard Disk Partitions from the results box. Alternatively, use the Windows Power User *menu* (Windows key + X) and click Disk Management.

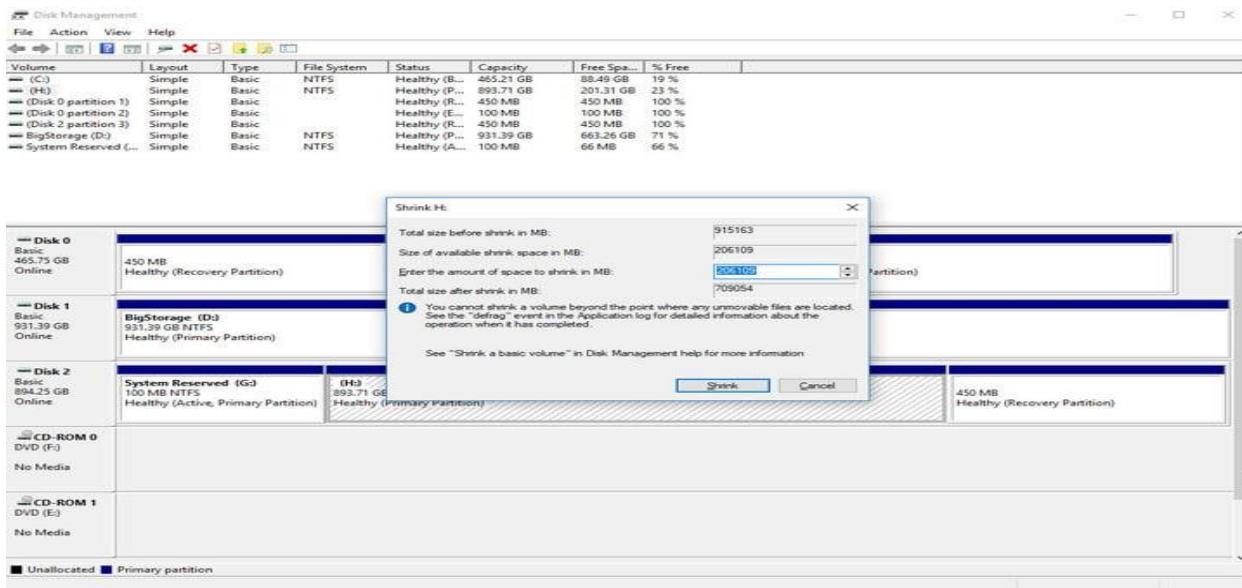


**Step 2:** Select the hard drive you want to partition from the list of drives available. If it is a new drive, skip to step 4. If it is an existing drive with files and your operating system installed on it, you must create some unallocated space before you can partition it. Right-click and select *Shrink Volume* from the resulting drop-down menu.

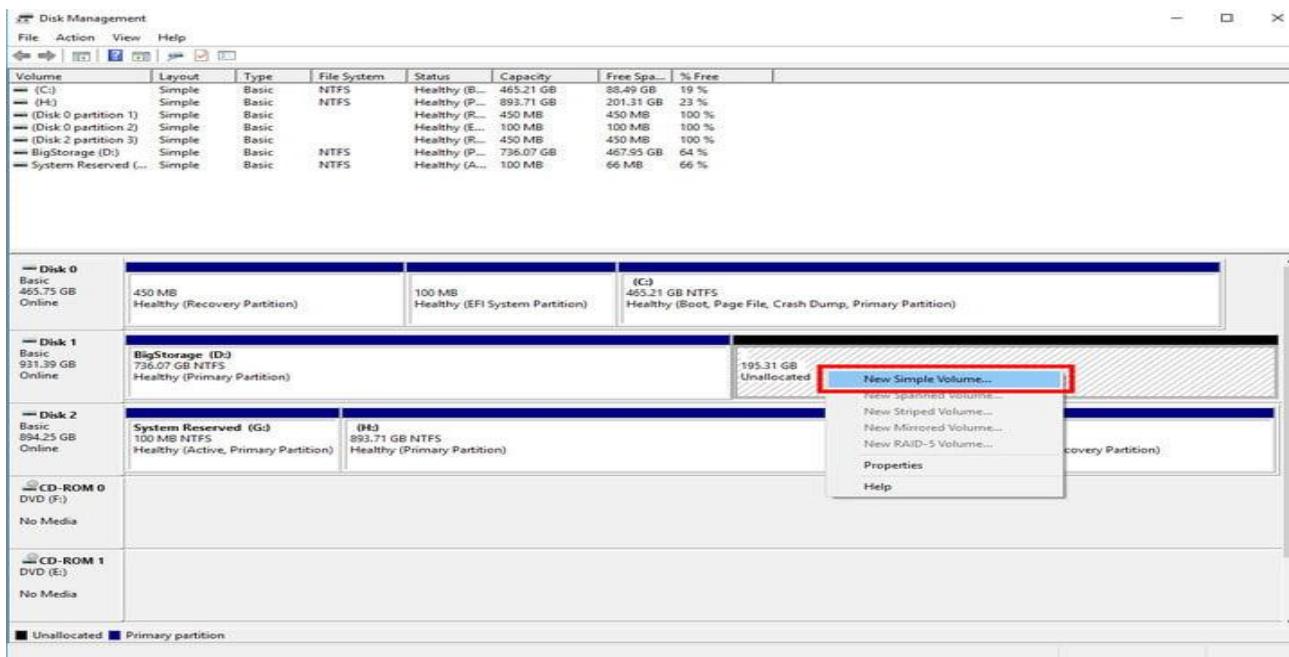


**Step 3:** Your PC will then calculate how much free space you can allocate to the new partition. Once completed, it will ask you how much of it you want to use. If you’re going to use all the free space on the hard drive, click the Shrink button. If you’re going to specify the eventual partition size, input it in megabytes in the respective field before hitting Shrink.

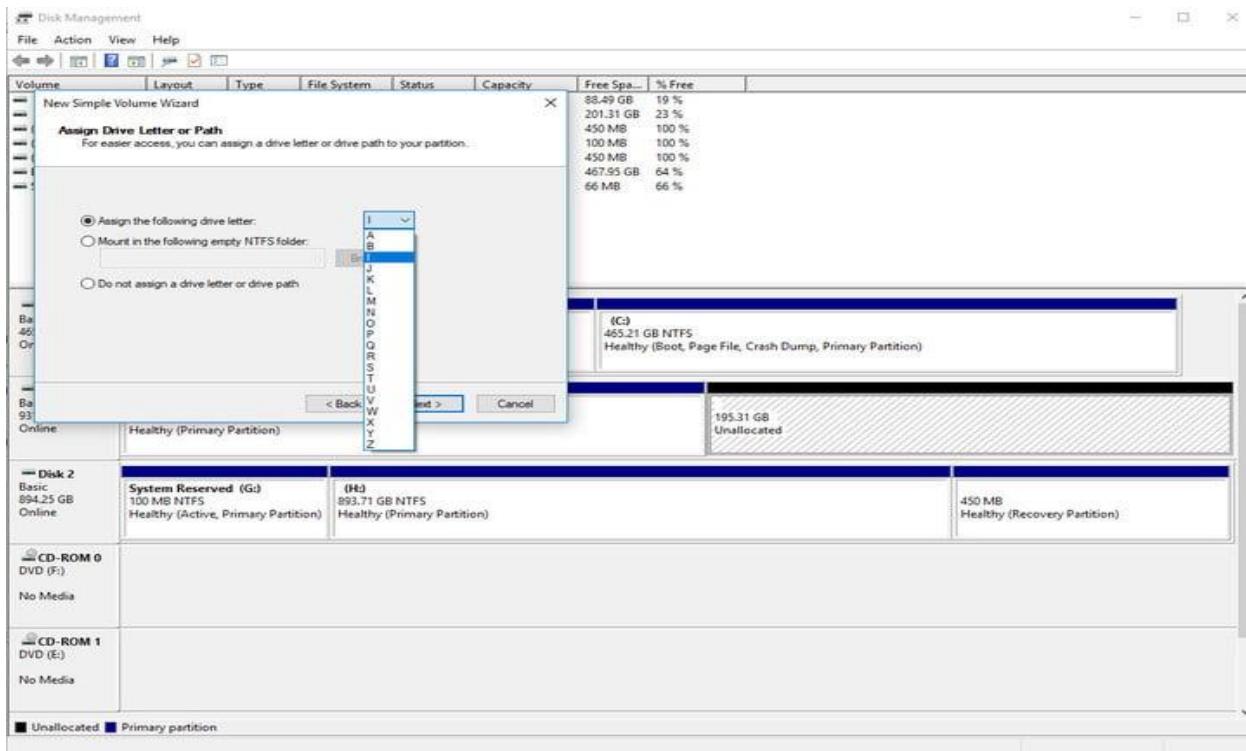
The process can take a minute depending on the speed of your drive — when complete, you’ll have new unallocated space shown next to the corresponding physical drive in the bottom half of the Disk Management screen.



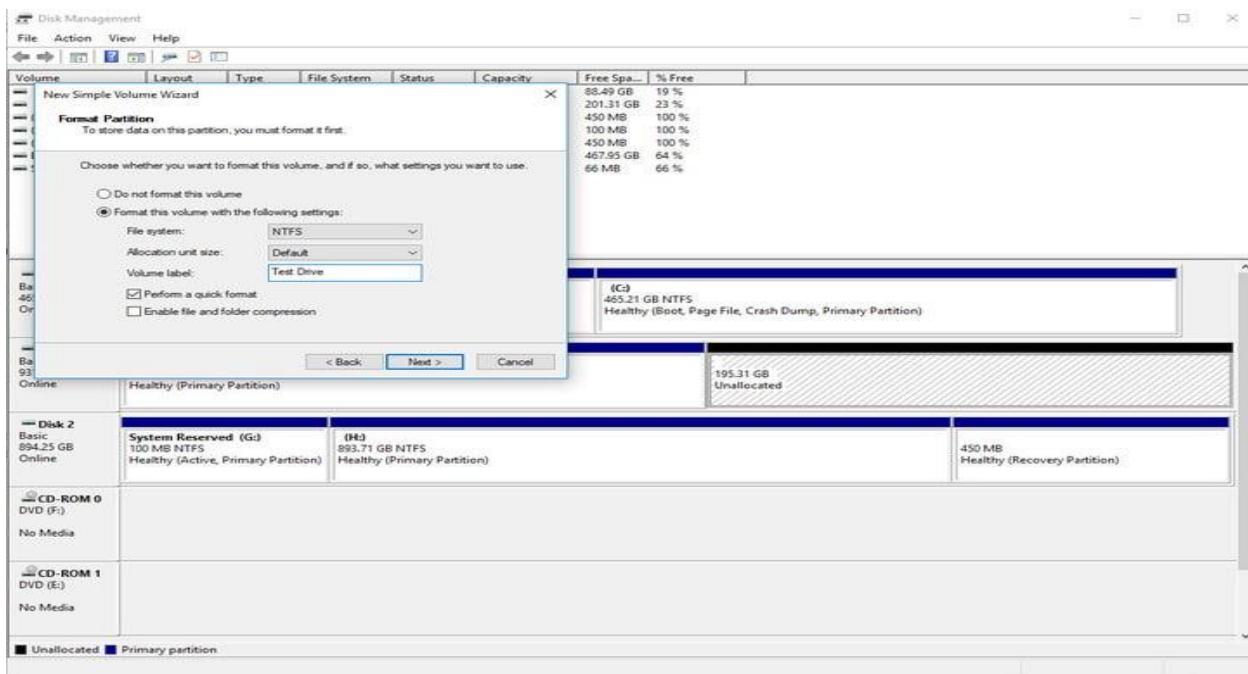
**Step 4:** Right-click the unallocated space and select *New Simple Volume* from the resulting menu.



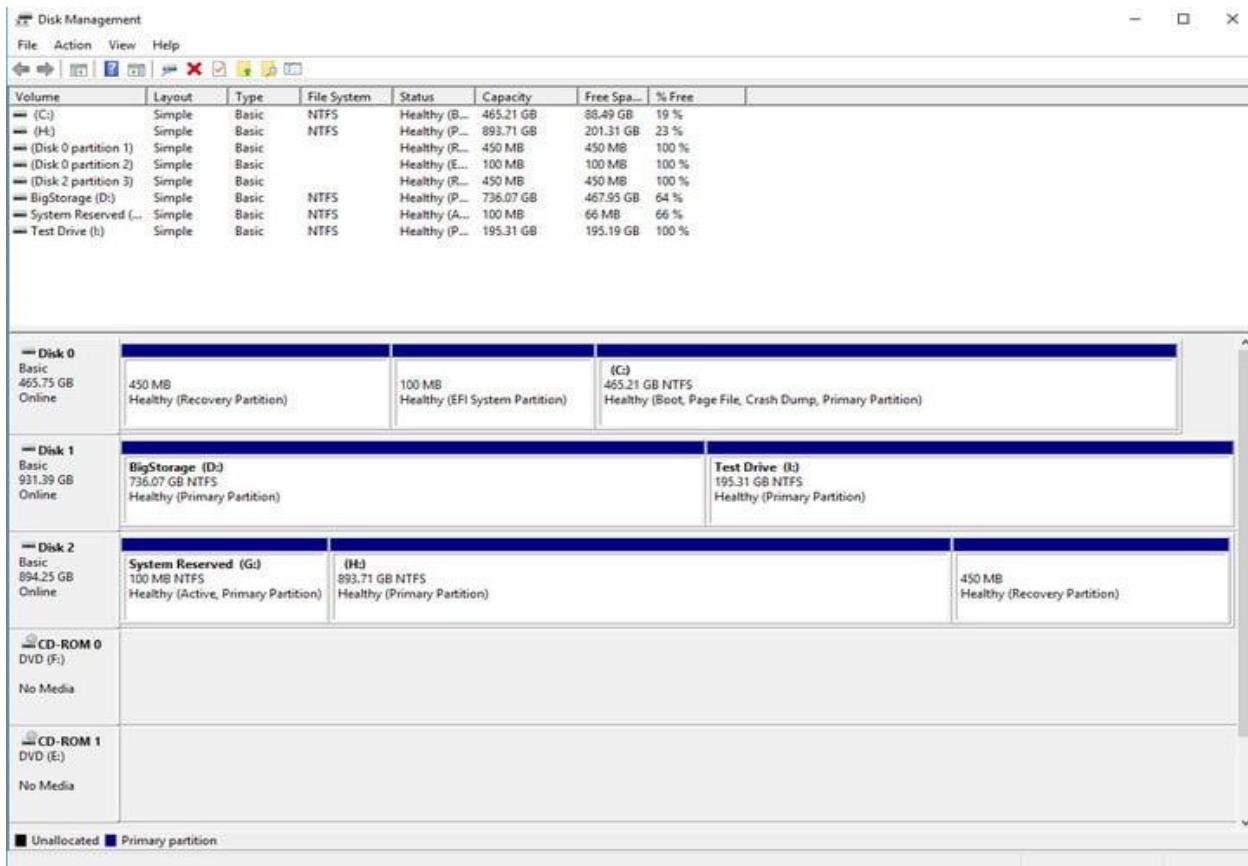
**Step 5:** Follow the on-screen instructions and select the size of the volume (the default will use all unallocated space) and the drive letter.



**Step 6:** It's wise to format new and old drives when creating a new partition. When given the option, select to do so. For File System, choose *NTFS*. The *ExFAT* option is often used for portable devices. You can also add a volume label (a name) should you desire. You can leave the allocation unit size at default. Select *Quick Format* if you are short on time — it rarely requires a full format.



**Step 7:** Continue to click through the *Next* buttons and, finally, hit *Finish* to create the volume. Your hard drive will now have a new partition with its very own designation. You'll be able to see it and all the information about it on the Disk Management page.



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