

Field Technician Computing & Peripheral
ELE/Q4601

Participant Handbook

Submitted by

Corona Institute of Technology

1. General Instructions for the Trainees

Dear Participant,

Congratulations and welcome on board to the Additional Skill Acquisition Programme [ASAP], a socio-education transformational programme of the Government of Kerala, to empower the Youth of Kerala to become employable both in India and internationally.

Through this programme, you would gain soft skills in communication and basic IT applications and demand-driven theory skills in the chosen trade aligned with industry requirements. This would enhance opportunities for brighter career and employment prospects.

For gaining maximum benefit of the trainings for development, the following is necessary:

1. Regular attendance to the classes and practical.
2. Active participation in classes and assignments.
3. Following the rules and regulations and maintaining the requisite discipline.
4. Always wear the ASAP Identity card.
5. Please follow healthy habits and care yourself well
6. You are requested kindly switch off fans and light when you leave the class room.
7. Please handle the equipment related to the skill training carefully ensuring maximum and safe utilization of the resources.
8. Mobile phones are not permitted in the class room and skill training centres.
9. Preparations need to be made for the sessions as suggested by SDE and as mentioned in the handbook.
10. Kindly submit the assignments, reports and records on time.
11. Please feel free to contact the Programme Manager of the Skill Development Centre for any clarification or assistance related to the skill training programme.

1. Course Details

1.1. Introduction to the Course

Particulars	Description
Course Title	Field Technician Computing & Peripheral
NOS	
Qualification Pack	ELE/Q4601
Job roles	Customer Support Engineer in Hardware & Networking
Objectives	[please list the major objectives of the course]
Further learning opportunities	[please list of courses which the students may be able to join after successful completion of the present training]
Key competencies	[in conformity with National Occupational Standards (NOS) / and Quality Pack (QP)]
Eligibility criteria for admission	1. Minimum Educational Qualification: 2. Minimum age: 3. Experience [if required]

1.1. Course Duration

Particulars	Duration (hrs)
Institution-based training:	
1. Theory Sessions	49
2. Practical Sessions	158
Industry-based training:	

3. Internship	150
Total	357

2. Course-specific instructions for trainees

- Please be punctual and attentive to all the sessions.
- Observe precautions of Electrical safety during lab sessions
- Handle the lab equipment with care
- Feel free to ask your questions any time during lab or theory sessions
- There will a feedback form at the end of each modules, Use it to express your sincere view of the progress of the session. We ensure complete confidentiality of your opinions.

Preparations for training

- Gain familiarity with the job roles related to the course and its scope.
- Make the necessary preparations for effective learning.

During the training

- Give equal importance to technical and non-technical aspects of training.
- Practice communication skills.
- Read job card or Standard Operating Procedures [SOP] before starting the tasks.
- Follow safety precautions meticulously.

Post training

- Update and enrich knowledge by continuing learning or studying reference material and interaction with professionals

Module information

Module : 1 : Introduction	Unit : 1: Introduction	Session 1 : Get in touch
Module : 1 : Introduction	Unit : 1: Introduction	Session 2 : Binary System
Module : 1 : Introduction	Unit : 1: Introduction	Session 3 : PC Architecture
Module : 2 : Logics	Unit : 1: PC Architecture	Session 1 : Introduction
Module : 2 : Logics	Unit : 1: PC Architecture	Session 2 : Parts of M/B
Module : 2 : Logics	Unit : 1: PC Architecture	Session 3 : MP architecture
Module : 2 : Logics	Unit : 1: PC Architecture	Session 4 : Memory Area
Module : 2 : Logics	Unit : 1: PC Architecture	Session 5 : Slot Area
Module : 2 : Logics	Unit : 1: PC Architecture	Session 5 : Slot Area
Module : 2 : Logics	Unit : 1: PC Architecture	Session 6: Peripheral
Module : 2 : Logics	Unit : 2: Component Id	Session 1: Motherboard
Module : 2 : Logics	Unit : 2: Component Id	Session 2: Add-on Cards
Module : 2 : Logics	Unit : 2: Component Id	Session 3: Peripheral
Module : 2 : Logics	Unit : 3: Computer Assembling	Session 1: Planning
Module : 2 : Logics	Unit : 3: Computer Assembling	Session 2: Precautions
Module : 2 : Logics	Unit : 3: Computer Assembling	Session 3: Test and QC
Module :2 : Logics	Unit : 3: Computer Assembling	Session 4: Dummy Assembling
Module :2 : Logics	Unit : 3: Computer Assembling	Session 5: Live Assembling
Module :2 : Logics	Unit : 3: Computer Assembling	Session 6: Basic TS
Module :2 : Logics U	nit : 4: BIOS, Test & QC	Session 1: BIOS Setup
Module :2 : Logics	Unit : 4: BIOS, Test & QC	Session 2: Testing & QC
Module :2 : Logics	Unit : 4: BIOS, Test & QC	Session 3: QA Softwares
Module :3 : Storage	Unit : 1: Storage Mgmt.	Session 1: Storage Basics
Module :3 : Storage	Unit : 1: Storage Mgmt.	Session 2: Storage Advanced
Module :3 : Storage	Unit : 1: Storage Mgmt.	Session 3: Optical Media
Module :3 : Storage	Unit : 1: Storage Mgmt.	Session 4: HDD Installation
Module :3 : Storage	Unit : 1: Storage Mgmt.	Session 5: HDD configuration

Module :3 : Storage	Unit : 1: Storage Mgmt.	Session 6 : Optical Drive Config
Module :4 : Operating Systems	Unit : 1: OS Management .	Session 1: OS concepts
Module :4 : Operating Systems	Unit : 1: OS Management .	Session 2: XP Install
Module :4 : Operating Systems	Unit : 1: OS Management .	Session 3: XP Install
Module :4 : Operating Systems	Unit : 2: XP Admin .	Session 1: Basic Tasks
Module :4 : Operating Systems	Unit : 2: XP Admin	.Session 2: Advanced Tasks 1
Module :4 : Operating Systems	Unit : 2: XP Admin .	Session 3: Advanced Tasks 2
Module :4 : Operating Systems	Unit : 2: XP Admin .	Session 4: CLI Mgmt.
Module :4 : Operating Systems	Unit : 2: XP Admin .	Session 5: Application SW.
Module :4 : Operating Systems	Unit : 2: XP Admin .	Session 6 Securing XP
Module :4 : Operating Systems	Unit : 3: Windows 7 .	Session 1: Install
Module :4 : Operating Systems	Unit : 3: Windows 7 .	Session 2: Upgrade
Module :4 : Operating Systems	Unit : 3: Windows 7 .	Session 3: What's New
Module :4 : Operating Systems	Unit : 3: Windows 7 .	Session 4: 7 Admin
Module :4 : Operating Systems	Unit : 3: Windows 7 .	Session 5: 7 Admin
Module :4 : Operating Systems	Unit : 3: Windows 7 .	Session 6: 7 Repair
Module :4 : Operating Systems	Unit : 4 : Windows 8&10 .	Session 1: Win8Install

Module :4 : Operating Systems	Unit : 4 : Windows 8&10 .	Session 2: Win8Admin
Module :4 : Operating Systems	Unit : 4 :Windows 8&10 .	Session 3:Win8.1 install
Module :4 : Operating Systems	Unit : 4 :Windows 8&10 .	Session 4:Win8.1 Admin
Module :4 : Operating Systems	Unit : 4 :Windows 8&10 .	Session 5:Win10install
Module :4 : Operating Systems	Unit : 4 :Windows 8&10 .	Session 6:Win10Admin
Module :4 : Operating Systems	Unit : 5 :Linux .	Session 1:Basic Concepts
Module :4 : Operating Systems	Unit : 5 :Linux	.Session 2:Linux File System
Module :4 : Operating Systems	Unit : 5 :Linux	.Session 3:Linux Run Levels
Module :4 : Operating Systems	Unit : 5 :Linux .	Session 4:Installaing RedHat
Module :4 : Operating Systems	Unit : 5 :Linux .	Session 5:Installaing Ubundu
Module :4 : Operating Systems	Unit : 5 :Linux .	Session 6:Basic GUI mgmt
Module :4 : Operating Systems	Unit : 5 :Linux .	Session 7:Basic CLI mgmt
Module :4 : Operating Systems	Unit : 5 :Linux .	Session 8:Advanced CLI mgmt
Module :4 : Operating Systems	Unit : 5 :Linux .	Session 9:Linux Admin & TS
Module :4 : Operating Systems	Unit : 5 :Linux .	Session 10:Linux Admin & TS
Module :4 : Operating Systems	Unit : 5 :Linux .	Session 11:Linux Admin & TS
Module :4 : Operating Systems	Unit : 5 :Linux .	Session 12:Linux Admin & TS
Module :5 : Laptop	Unit : 1 :Laptop Service .	Session 1: Basics
Module :5 : Laptop	Unit : 1 :Laptop Service .	Session 2: Parts ID
Module :5 : Laptop	Unit : 1 :Laptop Service .	Session 3: Parts ID
Module :5 : Laptop	Unit : 2 :Laptop Lab .	Session 1: Disassembly

Module :5 : Laptop	Unit : 2 :Laptop Lab .	Session 2: Disassembly
Module :5 : Laptop	Unit : 2 :Laptop Lab .	Session 3: Disassembly
Module :5 : Laptop	Unit : 2 :Laptop Lab	.Session 3: Troubleshooting
Module :5 : Laptop	Unit : 2 :Laptop Lab .	Session 4: Troubleshooting
Module :5 : Laptop	Unit : 2 :Laptop Lab .	Session 5: Troubleshooting
Module :5 : Laptop	Unit : 2 :Laptop Lab .	Session 6: Troubleshooting
Module :5 : AdvTopics	Unit : 3 :latest Trends .	Session 1: Adv Microprocessor
Module :5 : AdvTopics	Unit : 3 :latest Trends .	Session 2: Motherboard
Module :5 : AdvTopics	Unit : 3 :latest Trends .	Session 3: Tablets
Module :5 : AdvTopics	Unit : 4:Device Config .	Session 1: Printer Theory
Module :5 : AdvTopics	Unit : 4:Device Config .	Session 2: Printer Lab
Module :5 : AdvTopics	Unit : 4:Device Config .	Session 3: Scanner Lab
Module :5 : AdvTopics	Unit : 4:Device Config .	Session 4: Live CD
Module :5 : AdvTopics	Unit : 4:Device Config .	Session 5: DeepFreeze
Module :5 : AdvTopics	Unit : 4:Device Config .	Session 5: Password Recovery
Module :5 : AdvTopics	Unit : 4:Device Config .	Session 6: Data Recovery
Module :5 : AdvTopics	Unit : 4:Device Config .	Session 7: Adv Disk Mgmt
Module :5 : AdvTopics	Unit : 4:Device Config	.Session 8: Adv Disk Mgmt
Module :5 : AdvTopics	Unit : 4:Device Config .	Session 9: Ghost & other tools
Module :5 : AdvTopics	Unit : 4:Device Config	.Session 10: Oracle Virtual Box
Module :5 : AdvTopics	Unit : 4:Device Config .	Session 11: Vmware WS
Module :5 : AdvTopics	Unit : 4:Device Config .	Session 11: Boot CD creation
Module :5 : AdvTopics	Unit : 4:Device Config .	Session 12: Multiboot Scenarios
Module :6 : Networking	Unit : 1:Introduction .	Session 1: what is Networking
Module :6 : Networking	Unit : 1:Introduction .	Session 2: Types of Networking
Module :6 : Networking	Unit : 1:Introduction .	Session 3: Types of Networking
Module :6 : Networking	Unit : 1:Introduction .	Session 4: ISO/OSI Ref Model -1
Module :6 : Networking	Unit : 1:Introduction .	Session 5: ISO/OSI Ref Model -2
Module :6 : Networking	Unit : 2:IP addressing .	Session 1: IP Mgmt Basics
Module :6 : Networking	Unit : 2:IP addressing .	Session 2: IP classes
Module :6 : Networking	Unit : 2:IP addressing .	Session 3: IP Allocation
Module :6 : Networking	Unit : 3:Network Cable Plant	.Session 1: Cable Types
Module :6 : Networking	Unit : 3:Network Cable Plant	.Session 2: Cabling tools
Module :6 : Networking	Unit : 3:Network Cable Plant	Session 3:Cabling Crimping
Module :6 : Networking	Unit : 3:Network Cable Plant	Session 4:Lan Card Test
Module :6 : Networking	Unit : 3:Network Cable Plant	Session 5: Switches
Module :6 : Networking	Unit : 3:Network Cable Plant	Session 6: Switch Config
Module :6 : Networking	Unit : 4: Workgroup Network	Session 1:Windows XP
Module :6 : Networking	Unit : 4: Workgroup Network	Session 2:Resource Mgmt
Module :6 : Networking	Unit : 4: Workgroup Network	Session 3: Collaboration

Module :6 :Networking	Unit : 4: Workgroup Network	Session 3: Collaboration
Module :6 :Networking	Unit : 5: Domain Model	Session 1: Domain Concepts
Module :6 :Networking	Unit : 5: Domain Model	Session 2: Windows ADS
Module :6 :Networking	Unit : 5: Domain Model	Session 3: DNS , FTP, DHCP
Module :6 :Networking	Unit : 5: Domain Model	Session 4: 2003 Server Install
Module :6 :Networking	Unit : 5: Domain Model	Session 5: 2003 ADS config
Module :6 :Networking	Unit : 5: Domain Model	Session 6: Client Connectivity
Module :6 :Networking	Unit : 5: Domain Model	Session 7: windows 2012
Module :6 :Networking	Unit : 5: Domain Model	Session 8: windows 2012
Module :6 :Networking	Unit : 5: Domain Model	Session 9: ADS config , telnet
Module :6 :Networking	Unit : 5: Domain Model	Session 10: Windows 7 Client
Module :6 :Networking	Unit : 5: Domain Model	Session 11: DHCP Configuration
Module :6 :Networking	Unit : 5: Domain Model	Session 12: Role Management
Module :6 Module:6:Networking Concepts	Unit : 6: Administration	Session 1: User
Module :6 :Networking	Unit : 6: Administration	Session 2: Group Concepts
Module :6 :Networking	Unit : 6: Administration	Session 3: Admin Roles
Module :6 :Networking	Unit : 6: Administration	Session 4: User Creation
Module :6 :Networking	Unit : 6: Administration	Session 5: Folder Management
Module :6 :Networking	Unit : 6: Administration	Session 6: Group Creation
Module :6 :Networking	Unit : 6: Administration	Session 7: Telnet Configuration
Module :6 :Networking	Unit : 6: Administration	Session 8: IIS installation
Module :6 :Networking	Unit : 6: Administration	Session 9: Terminal Server
Module :6 :Networking	Unit : 6: Administration	Session 10: Hyper V service
Module :6 :Networking	Unit : 6: Administration	Session 11: Hyper V service
Module :6 :Networking	Unit : 6: Administration	Session 12: Hyper V service
Module :7 :System TS	Unit : 1: Hardware	Session 1- 3
Module :7 :System TS	Unit : 1: Hardware	Session 3-53
Module :8 :System TS	Unit : 2: Networking	Session 1-23
Module :9 :CSE Orientation	Unit : 1: Making of CSE	Session 1 - 3

Module 1 – Introduction

Objectives

Network with your fellow students , Know about types of Computer system
Evolution of computing environment , A detailed discussion on the course curriculum , job opportunities , and scope of the whole training session

Pre-requisite knowledge required

We expect you have basic communication skills in English and basic computing skills and above all a strong passion towards learning new skills and technologies

Unit: No 1 / introduction

Learning outcomes

Student will get a clear view about the scope of the course and general idea of the IT industry

5.1. Session Plan

Session M1/U1/**S1 -S3** Get in Touch

Learning outcomes of the session:

Introduce you to the fascinating world of IT infra structure management in general and computer hardware in particular . brush up the computing skills you acquired over your years of academic study and give you a high level overview of the technology you are going to learn . You will also learn about Binary number system and general PC architecture .

Session Notes

How do you define your Computer

When it come to defining something , we will normally find that even the obvious things become complicated. It is true regarding the computer also. For your elementary classes on computer the definition of computer is simple and straightforward. But when it come to judiciary and other law enforcing agents , the definition of any object hold much importance because any loopholes in the definition will be critical.



So we can have a thought about how a judicial system is going to define a computer .It is not that you are going to have a session on Cyber law , But we thought about starting our session with a complex definition so that you will get a hint of what is waiting for you in this handbook as of the IT act on year 2000, Indian judiciary has a complex definition of computer system closing all the loopholes and avoiding any chances of misinterpretation of such complex electronic equipment.

Definition of a Computer under section 2(1) (i) of IT Act 2000

” any electronic , magnetic , optical or other high speed data processing device or system which performs logical , arithmetic , and memory functions by manipulations of Electronic , magnetic or optical impulse and include all input , output , processing , storage , computer software , or communication facilities which are connected or related to the computer in a computer system or computer network”

Thank god you don't have to remember it for your examination , but now you know one of the complex definitions of a computer system

The first three sessions of this course constitute a 3 hour introduction in to the fascinating world of IT infrastructure and give you some general ideas about computing . Please be interactive and be part of the discussion. you don't have any specific assignments or notes at end of this session



Session Notes

Blank sheet with a table that enables you to jot down their points from the session.

coronainstitute.com

coronainstitute.com

Module 2 – Logics

Objectives

Through a series of theory and practical hands on session , students will get a thorough knowledge about building a Desktop system and its test and quality control procedures

Pre-requisite knowledge required

We expect you have basic communication skills in English and basic computing skills and above all a strong passion towards learning new skills and technologies

Unit: No 1-4

Learning outcomes

What makes the difference between Hardware and software ? What is Logics ? What is peripherals ?The advantages of the main board , add-on card philosophy Upgradeability , customizability and serviceability .Functional components of a motherboard What is microprocessor ?Memory Management ,Base memory , extended memory and expanded memory .Memory manager software IRQ ,DMA Purpose and types of expansion slots .North bridge and south bridge , Different types of motherboard according to microprocessor Identify motherboards according to chipsets and other functions. Berg , edge connectors. Onboard functions , and add-on functions. Identify different slots Identify different types of memory technologies, Assembling an elementary system. Steps involved in assembling process. Minimum display subsystems, Minimum booting sub system, Multimedia sub systems,Basic troubleshooting skills the role of BIOS in a computer ,BIOS setting in different types of machines , both old and new . What is burn-in test .What is the significance of Quality control Diagnostic software ,AMIDIAG or QAPlus Detailed hands on testing and QC of difference parts of computer system

Session Notes M2/U1/S1-S6 M2/U2/S1-S3 M2/U3/S1-S6 M2/U4-S1-S3

Computer Hardware

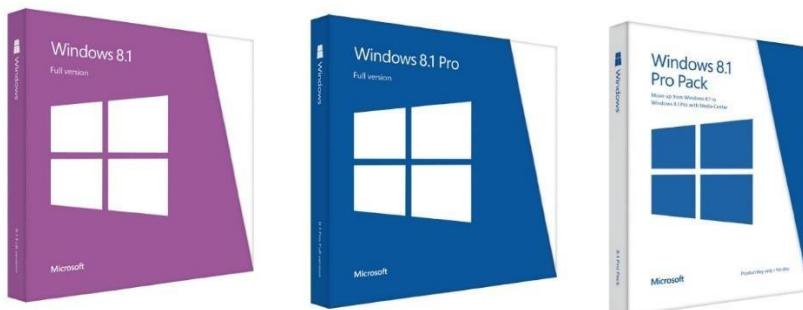
Logics

- What is the difference between Hardware and software ?

Hardware is best described as a device, such as a [hard drive](#), that is physically connected to the computer or something that can be physically touched. A CD-ROM, computer display monitor, printer, and video card are all examples of computer hardware. Without any hardware, a computer would not function, and software would have nothing to run on. Hardware and software interact with one another: software tells hardware which tasks it needs to perform .



Software is a general term used to describe a collection of [computer programs](#), procedures, and documentation that perform some [task](#) on a computer system. Practical computer systems divide software systems into three major classes: [system software](#), programming software, and [application software](#), although the distinction is arbitrary and often blurred. Software is an ordered sequence of instructions for changing the state of the computer hardware in a particular sequence. Software is typically programmed with a user-friendly interface that allows humans to interact more efficiently with a computer system.

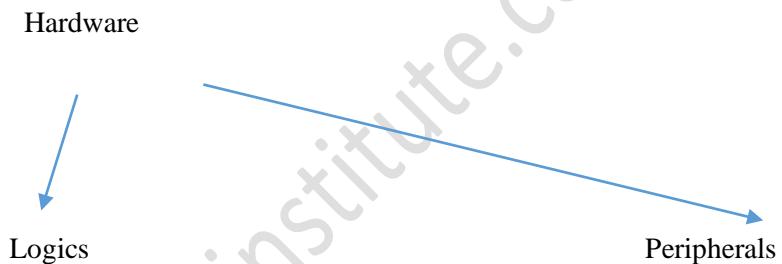


Comparison chart

	Hardware	Software
Definition	Devices that are required to store and execute (or run) the software.	Collection of instructions that enables a user to interact with the computer. Software is a program that enables a computer to perform a specific task, as opposed to the physical components of the system (hardware).
Types	Input,storage,processing,control, and output devices.	System software, Programming software, and Application software.
Examples	CD-ROM, monitor, printer, video card, scanners , label makers, routers , and modems.	Quickbooks, Adobe Acrobat, Winoms-Cs, Internet Explorer , Microsoft Word , Microsoft Excel
Function	Hardware serve as the delivery system for software solutions. The hardware of a computer is infrequently changed, in comparison with software and data, which are “soft” in the sense that they are readily created, modified, or erased on the computer	To perform the specific task you need to complete. Software is generally not needed to for the hardware to perform its basic level tasks such as turning on and responding to input.
Inter dependency	Hardware starts functioning once software is loaded.	To deliver its set of instructions, Software is installed on hardware.
Failure	Hardware failure is random. Hardware does have increasing failure at the last stage.	Software failure is systematic. Software does not have an increasing failure rate.

Durability	Hardware wears out over time.	Software does not wear out over time. However, bugs are discovered in software as time passes.
Nature	Hardware is physical in nature.	Software is logical in nature.

Since the computer is a complex combination of hardware and software , we have to discuss both in our training session . This session begins with a detailed discussion about the hardware . The hardware parts inside your system is divided in to Logics and peripherals . So what is logics ? and what is peripherals ?



The digital electronic circuits inside your system is called logics and rest of the area is called peripherals . So the motherboard and other add on cards falls in to the definition of logics and the components like hard disk , optical drive , power supply and the like falls under the category of peripherals . here the term peripheral simply means anything which is not logics and not to be confused with the term – Peripheral devices which we normally used to mention about the external components like printer , scanner etc .

And the logics is further subdivided in to Mainboard logics and add on card logics



Even though the technology advancements with the IC fabrication and semi conductor technology made it possible to integrate all the functional parts of the computer in to a single circuit board , we will

continue the philosophy of the motherboard and add on card concept because of the reasons mentioned below

□ Upgradeability , customizability and serviceability

Let us start with the Term **Customizability** :

When we purchase a computer , in the case of a single board computer , we don't have that much option left to customize the system according to our specific requirements . If we are following a motherboard , add on card philosophy , we can customize the system according to our specific requirements and save the cost on the components which we don't need at this moment .

On a later stage , if we need any of the functionalities which is not part of the computer , we can add it in the form of an add on card . This concept is called **upgradability**

When anything goes wrong with our system , in the case of a single board architecture , we have to discard the entire motherboard and results in a huge loss in terms of money . in the case of a add on card architecture , we can just add an add on card which contain the functionality which is missing and make the system up again at fraction of the cost . This can be treated as **Serviceability**

What are the Different Motherboard Components and Their Functions

The computer Motherboard or shortly MOBO is one of the most important part of the Personal computer (PC).It is a hardware of the computer installed inside the system unit(CPU).This MOBO hardware act as the main board or the central or core assembly of the computer system unit. In other words inside of the CPU case there are a lot of other hardware's connected to the MOBO, namely

: Hard Disk Drive (HDD), CD/DVD ROM, USB Card reader, FDD Drive, processor, RAM, LAN card, Wireless LAN card, USB expansion board, VGA Card, and the Power Supply Unit (PSU).These are all types of hardware's inside the system unit of the Personal Computer.

Computer motherboard designed to take advantage of the most demand application of a program. Just like the movie games as high innovative applications of computer programming. As the form factor of motherboard as a series of versions of the MOBO from AT, ATX, BTX, LPX, and NLPX. Compatible words being broadcast, that's why it is the MOBO will synchronize the speed of processor, RAM, and Video Card (VGA). Unlike only if the MOBO is built-in through the Input/output ports.

So, let's talk about the Motherboard parts and function to enable you to familiarize the parts and function. This is the most practical approach of the technician



1. I/O ports- This is located in the rear panel of the CPU, this use to connect the outside hardware or peripherals of the computer.

- **PS/2 ports**- These are used to connect the mouse (green color) and the keyboard (purple color)
- **DB 25 female connector (printer port)**-This is use to connect the impact printer, one of that the DOT MATRIX printer, ex. the Epson LX 300 +
- **DB 9 male connector (Serial or com1 port)**-This use to connect a serial device of the computer, such as the serial mouse and external modem.
- **VGA port (built-in)**- This is use to interface the DB cord of the monitor screen or to connect the monitor screen of the computer. The fastest video card versions are based on the standard of the VGA slots, ex: the AGP and PCI'e card.
- **USB 2.0 × 2 ports**- These are the ports of the USB devices of the computer. Attached externally of the system unit, one of that are the USB flash drives. As of now the versions or speed of the USB are the 1.0 and 2.0 compatible.
- **LAN port**- This called as Local Area Network of the computer. This is use to connect the numbers of node or workstations (PC) to form a local area network of the computer with in their area. Using type of communication media such as the network switch and router.
- **Audio Port**- This is use to connect the speaker, mike, and MIDI (Musical Instrument Digital Interface) device of the computer.

2. ATX Power connector(4 pin)- This is use to connect the 4 pin of the power supply unit(PSU). This is separate of the 20 or 24 pin of ATX power supply to provide DC voltage of computer processor.

3. Processor's ZIF Socket- Part of MOBO use to hold the processor or CPU chip (Zero Insertion Force).The compatibility of the socket depends of the computer processor type. Such as the AM2 socket of the AMD and the socket 775 of the Intel company.

4. Memory slot (DIMM) - This is called as Dual Inline Memory Module, this is the slot of computer memory or what we called RAM. The memory slot depends of the type of the memory. Such as the PC 133 SDRAM and PC 400 SDRAM-DDR 1.

5. ATX Power connector (24 or 28 pin) - A group of connector of the MOBO. This is separate of the 4 pin power assignments. It provides a DC power output to the system board (SB) from the output of the Power Supply Unit.

6. Name of the Vendor- this is the manufacturer name. This is important to know the manufacturer or vendor. So you can download through the internet site the driver software of the MOBO.

7. CMOS/BIOS BATTERY- In this part, the CMOS/BIOS battery is hold, so that it can provide 3 volts direct current/voltage to the CMOS IC. To preserve the BIOS settings of the computer. Such as the time module, hardware information and settings/parameter, etc.

- **CMOS**-Complementary Metal Oxide Semiconductor
- **BIOS** - Basic Input/output system. Is a set of a program stored in CMOS IC, use to preserve the BIOS configuration of the computer
- **CMOS BATTERY PART NUMBER**- lithium dry cell CR 2032 3 volts.

8. IDE connector (Intergrated Drive Electronics)- This connector is use to connect the IDE cable of the HDD(Hard Disk Drive) or CD/DVD ROM to the Mother Board IDE.

9. Front panel connectors(F-Panel)- This is use to connect the Power LED,HDD LED, Power Switch, and Reset switch of the computer system unit(CPU).

10. SATA connector-This is Serial Advance Technology Attachment. The new standard of the IDE connection array of the computer HDD (SATA HDD) to the motherboard system.

11. CMOS/BIOS jumper- This is use to disable the BIOS default setup. Such as to disabled the supervisor password of the BIOS.

- How to disable password before the BIOS setup
- Turn off CPU
- Change jumper to clear
- Remove the CMOS battery
- Reinsert the BIOS battery

- Change jumper to normal
- Power up computer
- Press “del” or “F2” to enter BIOS setup.

12. USB connector (header) - This is used to connect the USB port of the front panel USB 2.0 x 2 port.

13. FDD connector- The connector of the FDD cable through the system board. Normally there are 34 pins out of it to connect the 3.5" 1.44mb Floppy Disk Drive.

14. PCI slots- a part of the computer motherboard used to connect the I/O cards of the computer. Such as LAN card, WIFI card, USB expansion card, and sound card.

15. Motherboard Version number- here you can get the version of the motherboard driver software. So that you can download it exactly to the manufacturer website.

16. CMOS/BIOS IC- This is the type of BIOS IC being used by the computer MOBO. A set of a program being installed in this IC to preserve the BIOS configuration settings of the computer. Such as the speed of the CPU chip and RAM, etc.

17. AMR slot- This is the AUDIO Modem Riser. Used to demodulate and modulate the analog audio of the computer.

18. PCI express slot- A part of the computer that holds the computer video card (VGA), the PCI'e card. The latest and the fastest card being installed and most compatible with 3d and 4g gaming of the computer. The old video card type is the AGP or Accelerated Graphic Ports and the standard of the PCI'e.

19. North Bridge IC- Is a popular name as being north of the PCI buses or the PCI slots of the MOBO. The true name of the north bridge is MCI or Memory Controller Hub. Assigned to manage and control the computer memory before the processing of the CPU chip.

20. South Bridge IC- Is a popular name as being south of the PCI buses or PCI slots. The true name of the south bridge is I/O Controller HUB (ICH). It is a type of microchip task to control all the Input and output devices of the computer. Such as the keyboard and mouse. And the monitor screen of the computer that commonly found at the rear back of the CPU or system unit.

Even though we can classify the system with all the complicated terms mentioned above , we can divide the motherboard into four functional areas . That makes our discussion easier . They are

1. Microprocessor Area
2. Slots Area
3. Memory Area
4. Peripheral Area



Motherboard Functional Parts : Microprocessor Area

Let us start with Microprocessor Area : It can be defined as the area where we are placing the Microprocessor . So let us define what is a Microprocessor .

A **microprocessor** is an **electronic component** that is used by a **computer** to do its work. It is a **central processing unit** on a single integrated chip containing millions of very small components including **transistors**, **resistors**, and **diodes** that work together. Microprocessors help to do everything from **writing** to searching the **Web**. Everything a computer does is described by lots of precise instructions, and microprocessors carry out these instructions at incredible speed—many millions of times a second.

Any discussion about the full family of Microprocessors offered by intel and AMD will span several pages of this book . Please check the links for the details about Intel and AMD Microprocessors .

<http://download.intel.com/pressroom/kits/IntelProcessorHistory.pdf>

https://en.wikipedia.org/wiki/List_of_AMD_microprocessors

Motherboard Functional Parts : Memory Area

- What is primary and secondary memory

Definition - What does Primary Memory mean?

Primary memory is computer memory that a processor or computer accesses first or directly. It allows a processor to access running execution applications and services that are temporarily stored in a specific memory location.

Primary memory is also known as primary storage or main memory.

primary memory is a computer system's volatile storage mechanism. It may be random access memory (RAM), cache memory and data buses but is primarily associated with RAM. As soon as a computer starts, primary memory stores all running applications, including the base operating system (OS), user interface and any user installed and running software utility. A program/application that is opened in primary memory interacts with the system processor to perform all application specific tasks.

Primary memory is considered faster than secondary memory.

Definition - What does Secondary Memory mean?

Secondary memory is computer memory that is non-volatile and persistent in nature and is not directly accessed by a computer/processor. It allows a user to store data that may be instantly and easily retrieved, transported and used by applications and services.

Secondary memory is also known as secondary storage.

Secondary memory consists of all permanent or persistent storage devices, such as readonly memory (ROM), flash drives, hard disk drives (HDD), magnetic tapes and other types of internal/external storage media. In computing operations, secondary memory is accessed only by the primary or main memory and later transported to the processor.

Secondary memory is slower than primary memory but can store and retain data, even if the computer is not connected to electrical power. It also has substantial storage capacities, ranging from some MBs to several TBs of storage space within single memory.

Primary memory is further sub divided in to RAM and ROM .

There is one major difference between a ROM and a RAM chip. A ROM chip is nonvolatile storage and does not require a constant source of power to retain information stored on it. When power is lost or turned off, a ROM chip will keep the information stored on it. In

contrast, a RAM chip is volatile and requires a constant source of power to retain information. When power is lost or turned off, a RAM chip will lose the information stored on it.

Other differences between a ROM and a RAM chip include:

A ROM chip is used primarily in the start up process of a computer, whereas a RAM chip is used in the normal operations of a computer after starting up and loading the operating system. Writing data to a ROM chip is a slow process, whereas writing data to a RAM chip is a faster process. A RAM chip can store multiple gigabytes (GB) of data, up to 16 GB or more per chip; A ROM chip typically stores only several megabytes (MB) of data, up to 4 MB or more per chip.

Computer ROM

A good example of ROM in the computer is the computer BIOS, a PROM chip that stores the programming needed to begin the initial computer start up process. Using a non-volatile storage is the only way to begin the start up process for computers and other devices that use a similar start up process. ROM chips are also used in gaming system cartridges, like the original Nintendo, Gameboy, Sega Genesis, and a number of others. The game cartridge stores the game programming on a ROM chip that is read by the game console when the cartridge is inserted into the console.

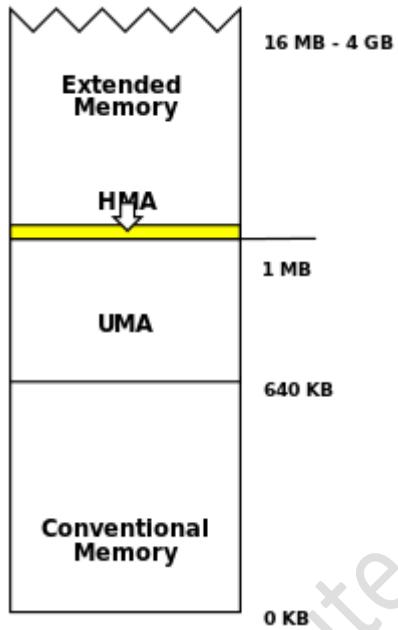


Computer RAM

RAM chips are also used in computers, as well as other devices, to store information and run programs on the computer because RAM is one of the fastest memory in your computer. For example, the Internet browser you are using to read this page has been loaded into memory and is running from memory. However, as mentioned earlier, any information stored in the RAM chip is lost if the computer is turned off or loses power.



Memory Architecture of IBM compatible PC's



In [DOS memory management](#), conventional memory, also called base memory, is the first 640 [kilobytes](#) (640×1024 bytes) of the memory on [IBM PC](#) or compatible systems. It is the read-write memory directly addressable by the processor for use by the operating system and application programs. As memory prices rapidly declined, this design decision became a limitation in the use of large memory capacities until the introduction of operating systems and processors that made it irrelevant.

The **640 KB barrier** is an architectural limitation of IBM and IBM PC compatible PCs. The Intel 8088 CPU, used in the original IBM PC, was able to address 1 MB (2^{20} bytes), since the chip offered 20 address lines.

The first memory segment (64 KB) of the conventional memory area is named **low memory**.

In the design of the PC, the memory below 640 KB was for random-access memory on the motherboard or on expansion boards. The 384 KB above was reserved for system use and optional devices. This upper portion of the 8088 address space was used for the ROM BIOS, additional read-only memory, BIOS extensions for fixed disk drives and video adapters, video adapter memory, and other memory-mapped input and output devices.

The design of the original IBM PC placed the Color Graphics Adapter (CGA) memory map and other hardware in the 384 KB upper memory area (UMA). The need for more RAM grew faster than the needs of hardware to utilize the reserved addresses, which resulted in RAM eventually being mapped into these unused upper areas to utilize all available addressable space. This

introduced a reserved "hole" (or several holes) into the set of addresses occupied by hardware that could be used for arbitrary data. Avoiding such a hole was difficult and ugly and not supported by MS-DOS or most programs that could run on it. Later, space between the holes would be used as upper memory blocks (UMBs).

To maintain compatibility with older operating systems and applications, the 640 KB barrier remained part of the PC design even after the 8086/8088 had been replaced with the Intel 286 processor, which could address up to 16 MB of memory in Protected mode. The 1 MB barrier also remained as long as the 286 was running in Real mode, since MS-DOS required Real mode which uses the segment and offset registers in an overlapped manner such that addresses with more than 20 bits are not possible. It is still present in IBM PC compatibles today if they are running in Real mode such as used by MS-DOS. The most modern Windows-based PCs even still have the "hole" in RAM in the area between 640 and 1024 KBs, which however is invisible to application programs thanks to paging and virtual memory.

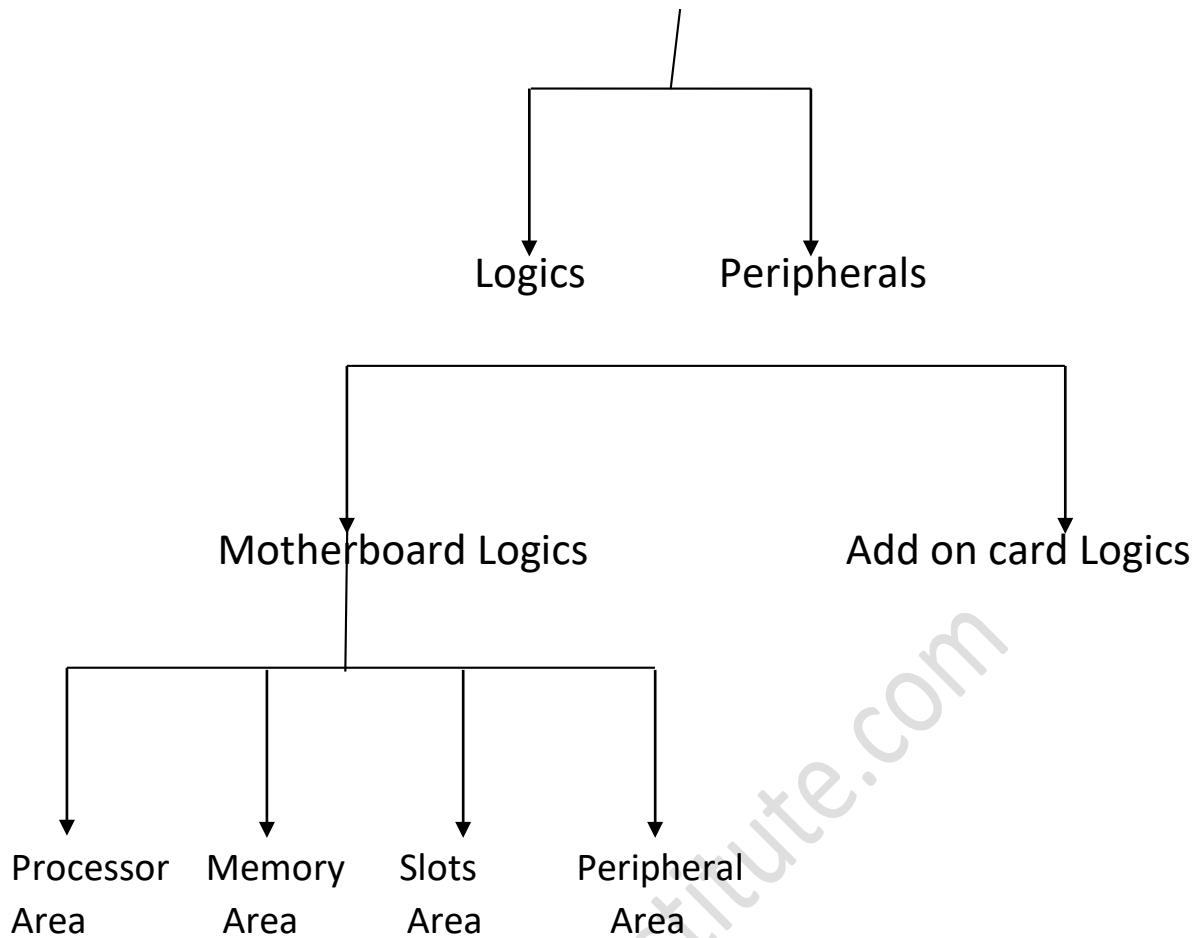
A similar 3 GB barrier exists, which reduces 32-bit addressing from 4 GB to ~3 GB on motherboards that use memory mapped I/O. However, due to applications not assuming that the 3–4 GB range is reserved, there is no need to retain this addressing for compatibility, and thus the barrier is easily removed by using a separate address bus for hardware, and only affects a relatively small number of computers of the 386 era as contemporary Memory Controllers and Buses (e.g. Industry Standard Architecture) could only reach 16 Megabytes. (Some motherboards feature a "Memory Hole at 15 Megabytes" option required for certain VGA video cards that require exclusive access to one particular megabyte for video memory.) Newer Video cards on AGP (PCI memory space) bus can have 256MB memory with 1GB aperture size.

Sessions : M2/U2/S1-S3

Now Enough with the theoretical aspects of the motherboard Architecture . Let us have some real hands on session on the various aspects of motherboard and add on cards .

Component Identification

Hardware

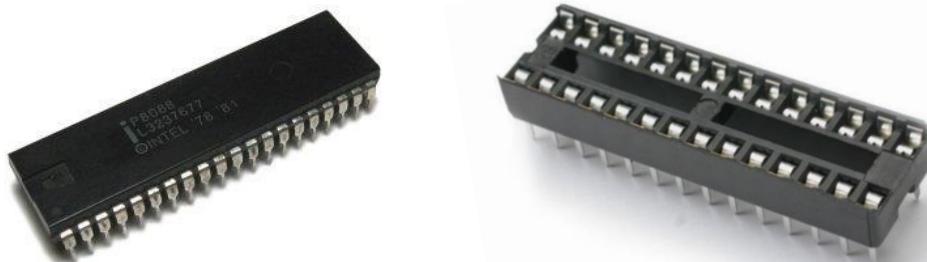


Processor

: Processor
Packages

**DIP (Dual Inline Pin
Package)**

DIP Processor



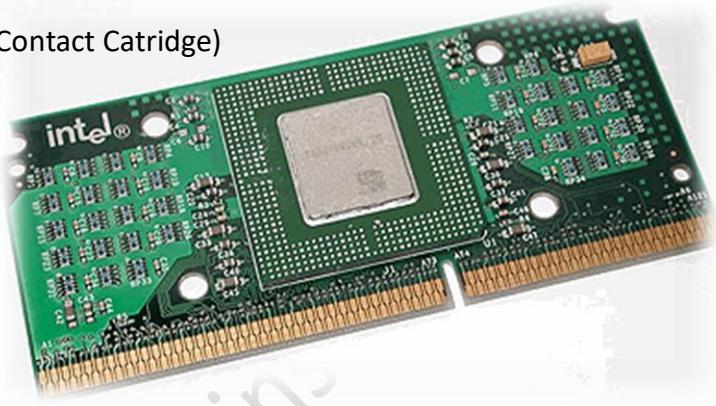
Area

DIP Socket



SMD
Package
LCC
(Plastic
Leadless
Chip
Carrier)

SECC (Single Edge Contact Cartridge)



SECC Slot

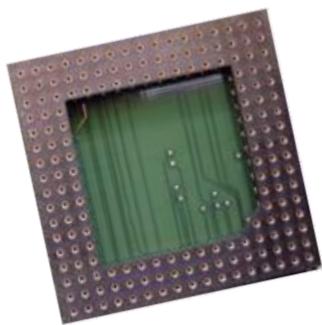


PGA (Pin Grid Array)
Processor

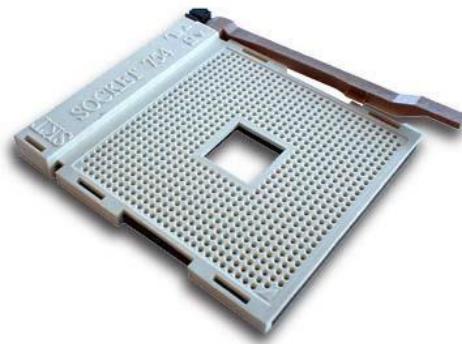


Processor Sockets

LIF (Low Insertion Force)

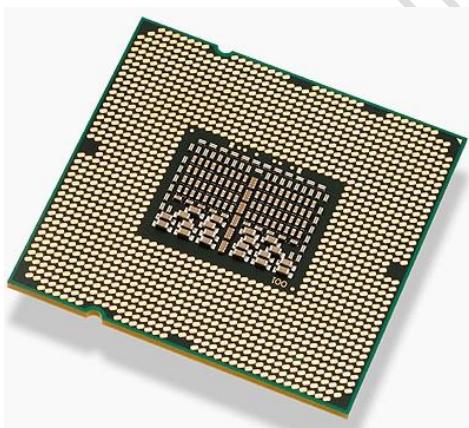


Zero Insertion Force (ZIF)

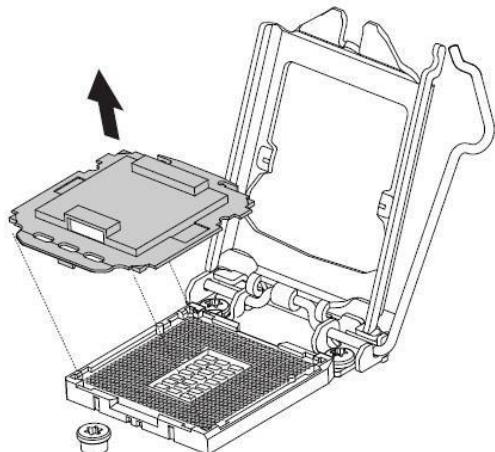


LGA (Land Grid Array)

LGA
LGA



CPU
Socket

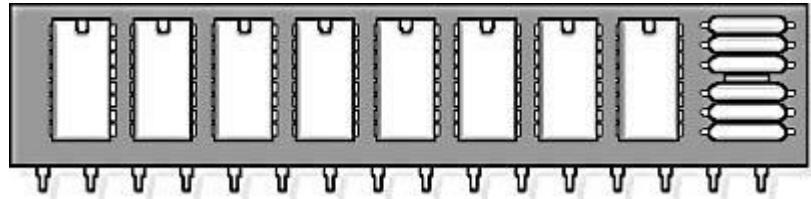


Memory Area

Different Types of Memory

SIPP (Single Inline Pin Package)

A SIPP (single in-line pin package) or SIP (single in-line package) was a short-lived variant of the 30-pin SIMM random-access memory.



It consisted of a small printed circuit board upon which were mounted a number of memory chips. It had 30 pins along one edge which mated with matching holes in the motherboard of the computer.

This type of memory was used in some 80286 and 80386 (80386SX) systems. It was soon replaced by SIMMs using edge connectors, which proved to be more economical and durable.

SIMM (Single Inline Memory Module)

A SIMM, or single in-line memory module, is a type of memory module containing random-access memory used in computers from the early 1980s to the late 1990s. It differs from a dual in-line memory module (DIMM), the most predominant form of memory module today, in that the contacts on a SIMM are redundant on both sides of the module.

The first variant of SIMMs has 30 pins and provides 8 bits of data.

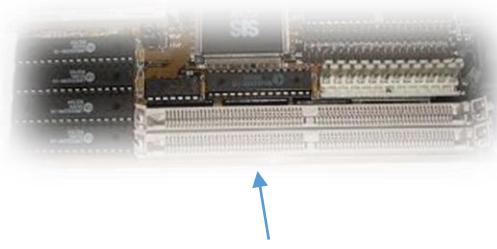
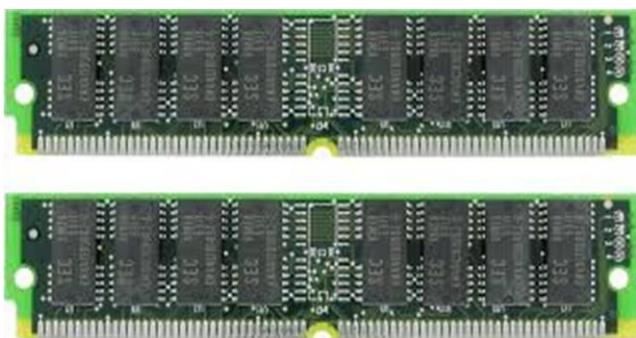


30 Pin SIMM

30 pin SIMM Slot

The second variant of SIMMs has 72 pins and provides **32 bits** of data.

72 pins SIMM



72 pins SIMM Slot

Some series of
that time frame has
take the 30 pin and 72 pin
memory on a single

motherboards at
sockets which can
varients of the
system .

DIMM (Dual Inline Memory Module)

SD RAM (Synchronized Dynamic RAM)

Synchronous dynamic random access memory (SDRAM) is dynamic random access memory (DRAM) that is synchronized with the system bus. Classic DRAM has an asynchronous interface, which means that it responds as quickly as possible to changes in control inputs. SDRAM has a synchronous interface, meaning that it waits for a clock signal before responding

to control inputs and is therefore synchronized with the computer's system bus. The clock is used to drive an internal finite state machine that pipelines incoming commands. The data storage area is divided into several banks, allowing the chip to work on several memory access



commands at a time, interleaved among the separate banks. This allows higher data access rates than with asynchronous DRAM.

SD RAM
DDR (Double Data Rate)

SD-RAM slot

Double data rate synchronous dynamic random-access memory (DDR SDRAM) is a class of memory integrated circuits used in computers. DDR SDRAM, also called DDR1 SDRAM, has been superseded by DDR2 SDRAM, DDR3 SDRAM and DDR4 SDRAM. Compared to single data rate (SDR) SDRAM, the DDR SDRAM interface makes higher transfer rates possible by more strict control of the timing of the electrical data and clock signals.

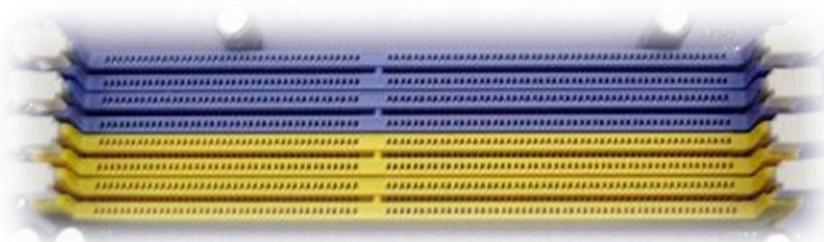
The interface uses double pumping (transferring data on both the rising and falling edges of the clock signal) to lower the clock frequency.

DDR1

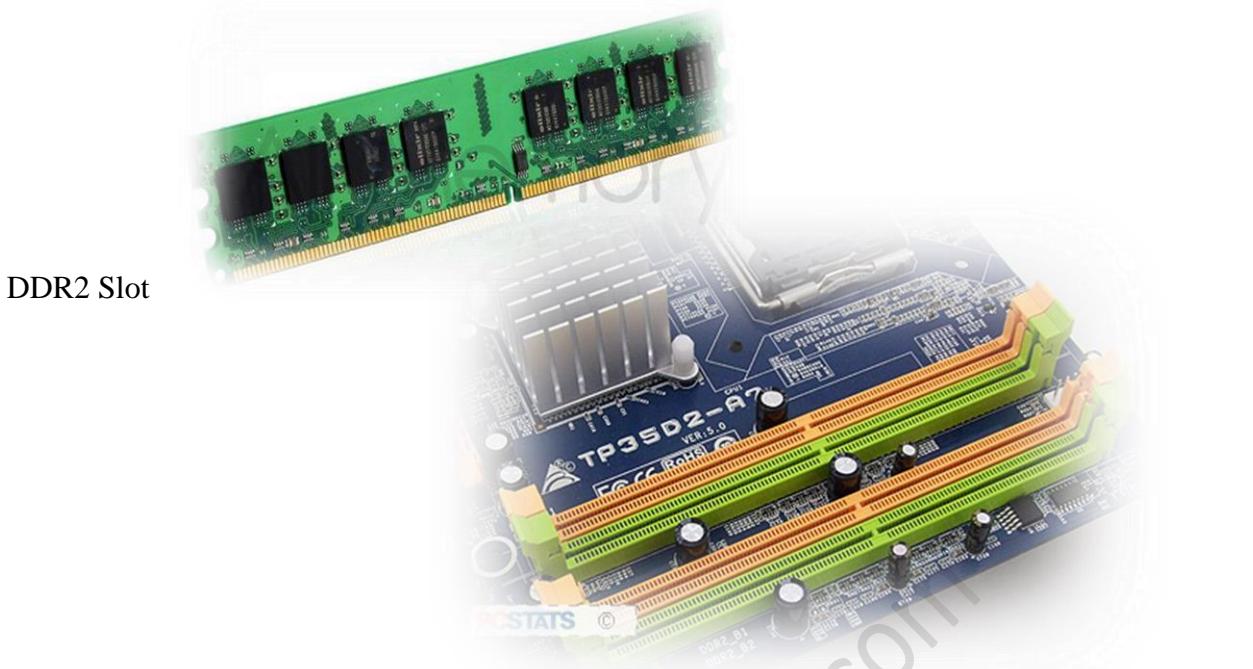


DDR1 Memory

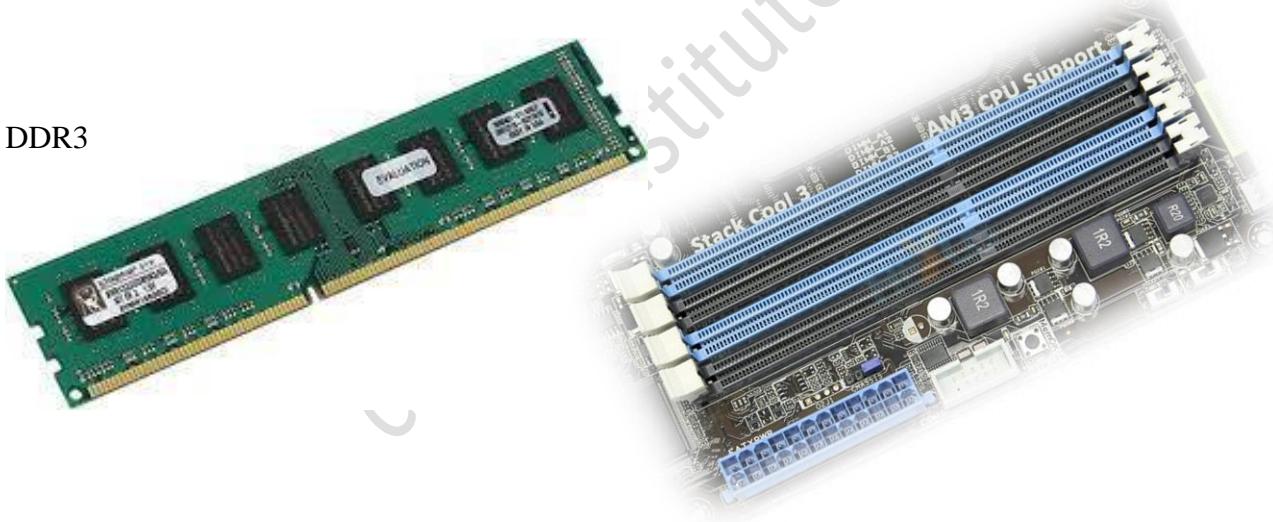
DDR1 Slot



DDR2



DDR3



RIMM (Rambus Inline Memory Module)

Direct Rambus DRAM or DRDRAM (sometimes just called Rambus DRAM or RDRAM) is a type of synchronous dynamic RAM. RDRAM was developed by Rambus inc., in the mid1990s as a replacement for then-prevalent DIMM SDRAM memory architecture.

RDRAM was initially expected to become the standard in PC memory, especially after Intel agreed to license the Rambus technology for use with its future chipsets. Further, RDRAM was expected to become a standard for VRAM. However, RDRAM got embroiled in a standards war with an alternative technology - DDR SDRAM, quickly losing out on grounds of price, and, later on, performance. By around 2003, RDRAM was no longer supported by any mainstream computing architecture.



Slots Area

ISA Slot (Industry Standard Architecture) (8, 16 Bit)

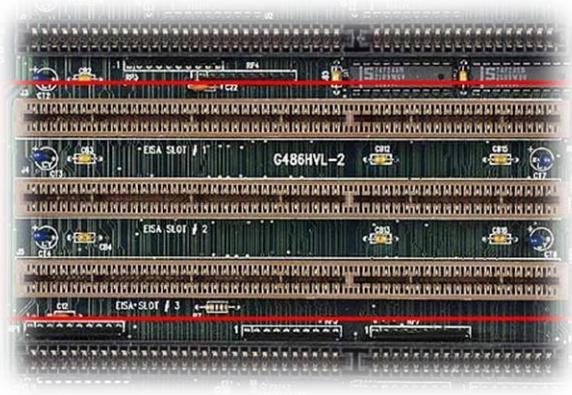
Industry Standard Architecture (ISA) is a [metonym](#) term for the [16-bit](#) internal [bus](#) of IBM PC/AT and similar computers based on the [Intel 80286](#) and its immediate successors during the 1980s. The bus was (largely) backward compatible with the 8-bit bus of the [8088](#) based IBM PC, including the IBM PC/XT as well as IBM PC compatibles. Cards inserted in these Slots are,

Display card Network Card Sound Card



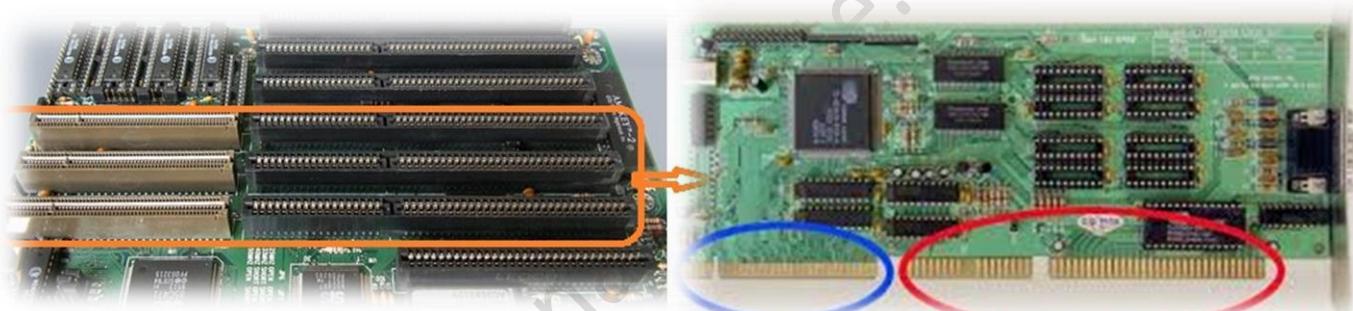
EISA Slot (Extended Industry Standard Architecture) (32 Bit)

The Extended Industry Standard Architecture (in practice almost always shortened to EISA and is a bus standard for [IBM PC compatible computers](#)). It was announced in September 1988 by a [consortium](#) of [PC clone](#) vendors (the "Gang of Nine") as a counter to IBM's use of its [proprietary Micro Channel architecture](#) (MCA) in its [PS/2](#) series. EISA extends the AT bus, which the Gang of Nine [retroactively renamed](#) to the [ISA](#) bus to avoid infringing IBM's trademark on its [PC/AT computer](#), to 32 [bits](#) and allows more than one [CPU](#) to share the bus.



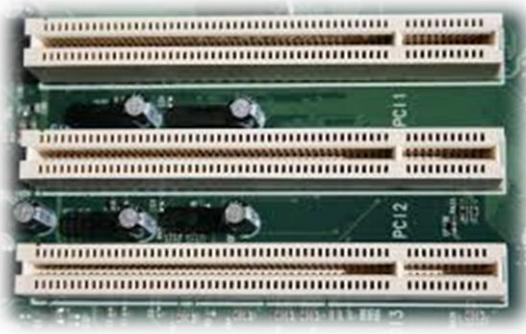
VESA (32 Bit)

The VESA Local Bus (usually abbreviated to VL-Bus or VLB) was mostly used in personal computers. VESA (Video Electronics Standards Association) Local Bus worked alongside the ISA bus; it acted as a high-speed conduit for memory-mapped I/O and DMA, while the ISA bus handled interrupts and port-mapped I/O.



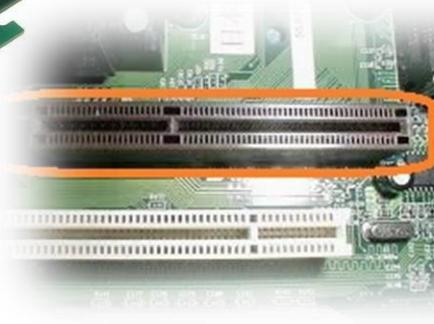
PCI (Peripheral Component Interconnect)

Conventional PCI, often shortened to PCI, is a local computer bus for attaching hardware devices in a computer. PCI is the initialism for Peripheral Component Interconnect and is part of the PCI Local Bus standard. The PCI bus supports the functions found on a processor bus but in a standardized format that is independent of any particular processor's native bus. Devices connected to the PCI bus appear to a bus master to be connected directly to its own bus and are assigned addresses in the processor's address space. It is a parallel bus, synchronous to a single bus clock.



AGP (Accelerated Graphics Port)

The Accelerated Graphics Port (often shortened to AGP) is a high-speed point-to-point channel for attaching a video card to a computer system, primarily to assist in the acceleration of 3D computer graphics. It was originally designed as a successor to PCI-type connections for video cards. Since 2004, AGP has been progressively phased out in favor of



AGP Slot

PCI Express (PCIe); by mid-2008, PCI Express cards dominated the market and only a few AGP models were available.

PCI Express

PCI Express (Peripheral Component Interconnect Express), officially abbreviated as PCIe, is a high-speed serial computer expansion bus standard designed to replace the older PCI, PCI-X, and AGP bus standards. PCIe has numerous improvements over the older standards, including higher maximum system bus throughput, lower I/O pin count and smaller physical footprint, better performance scaling for bus devices, a more detailed error detection and reporting mechanism (Advanced Error Reporting, AER[\[1\]](#)), and native hot-plug functionality. More recent revisions of the PCIe standard provide hardware support for I/O virtualization.



Peripheral Area

D Shape connectors

D Shape Female Connectors

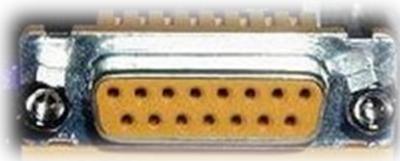
DB – 15 (VGA Port)

A Video Graphics Array (VGA) connector is a three-row 15-pin DE-15 connector. The 15-pin VGA connector is found on many video cards, computer monitors, and high definition television sets



DB – 15 (MIDI Port/ Game Port)

MIDI (Musical Instrument Digital Interface) is a technical standard that describes a protocol, digital interface and connectors and allows a wide variety of electronic musical instruments, [computers](#) and other related devices to connect and communicate with one another.



DB -25 (Parallel Port/ LPT Port)

A parallel port is a type of interface found on computers (personal and otherwise) for connecting peripherals. In [computing](#), a parallel port is a parallel communication physical interface. It is also known as a printer port or Centronics port. It was an industry de facto standard for many years, and was finally standardized as [IEEE 1284](#) in the late 1990s, which defined the Enhanced Parallel Port (EPP) and Extended Capability Port (ECP) bidirectional versions. Today, the parallel port interface is seeing decreasing use because of the rise of Universal Serial Bus (USB) devices, along with network printing using Ethernet.

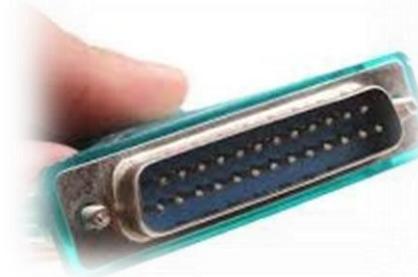


D Shape Male

Connectors

DB - 9 (Serial Port) OR DB -25

A serial port is a serial communication physical interface through which information transfers in or out one bit at a time (in contrast to a parallel port). Throughout most of the history of personal computers, data was transferred through serial ports to devices such as modems, terminals and various peripherals.



DIN Connectors

DIN 5

DIN 5 is used for connecting IBM AT connectors for keyboard and mouse



computer keyboard (later PS/2 are Mini-DIN connectors).

DIN 6 (PS/2)

The PS/2 connector is a 6-pin mini-DIN connector used for connecting some keyboards and mice to a PC compatible computer system. Its name comes from the IBM Personal System/2 series of personal computers, with which it was introduced in 1987.

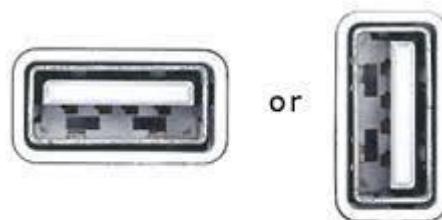
Violet - Keyboard Green - Mouse



USB Port

USB, short for Universal Serial Bus, is an industry standard developed in the mid-1990s that defines the cables, connectors and communications protocols used in a bus for connection, communication, and power supply between computers and electronic devices. It is currently developed by the USB Implementers Forum.

USB was designed to standardize the connection of computer peripherals (including keyboards, pointing devices, digital cameras, printers, portable media players, disk drives and network adapters) to personal computers, both to communicate and to supply electric power. It has become commonplace on other devices, such as smartphones, PDAs and video game consoles. USB has effectively replaced a variety of earlier interfaces, such as serial and parallel ports, as well as separate power chargers for portable devices.



or



Audio Port

It is used for connecting Speakers, Head Phone and MIC

Different Add on Cards

ISA Display Card

LAN cards

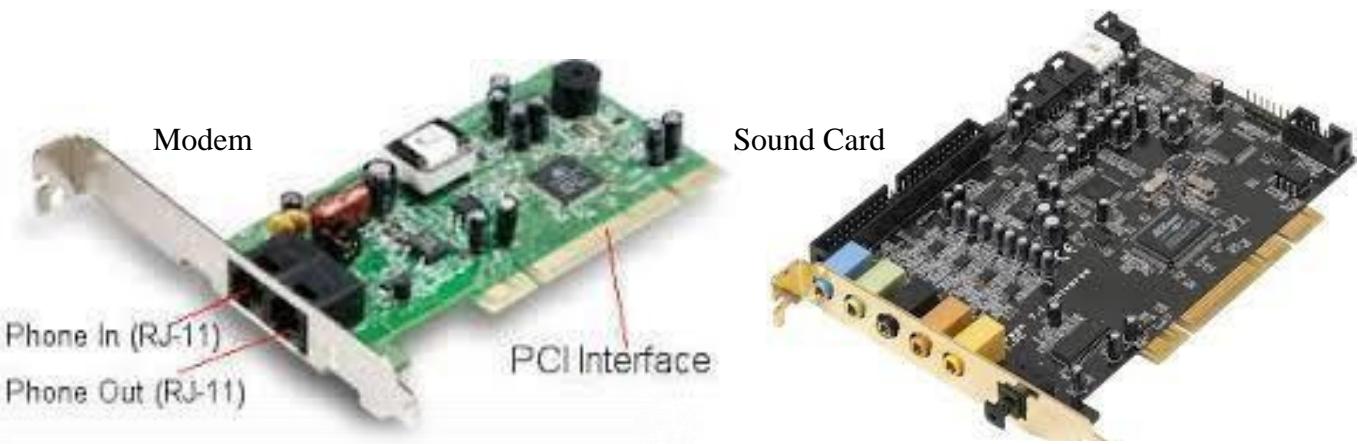


Sound Card



PCI Display Card





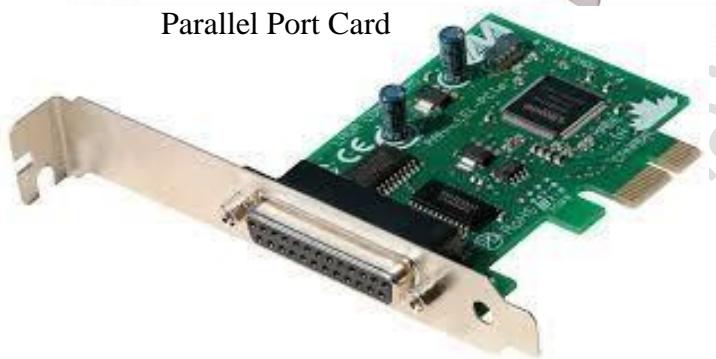
Modem

Sound Card



TV Tuner Card

USB Card



AGP Card



Parallel Port Card



Safe Lab Procedures and Tool Use

This session 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 these guidelines 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.

After completing this chapter, you will meet these objectives:

1. Explain the purpose of safe working conditions and procedures.
2. Identify tools and software used with personal computer components and their purposes.
3. Implement proper tool use

Identify Safety Procedures and Potential Hazards for Users and Technicians

Safety is very important both to the technician and to the equipment. Guidelines help to ensure that proper techniques and precautions are correctly and uniformly implemented.

General Safety Guidelines

Follow general safety guidelines to prevent cuts, burns, electrical shock, and damage to eyesight. General safety guidelines include the following:

- n Manage cables properly to prevent tripping hazards and help protect the cables.
- n Remove your watch or any other jewelry and secure loose clothing before handling equipment.
- n Turn off the power and unplug equipment before performing service.
- n Cover any sharp edges inside the case with tape.
- n Never open a power supply or a monitor.
- n Do not touch areas in a printer that are hot or that use high voltages.
- n Know where the fire extinguisher and first-aid kit are located and how to use them.

Keep food and drinks out of your workspace.

- n Keep your workspace clean and free of clutter.
- n Bend your knees when lifting objects to avoid injury to your back.

Electrical Safety Guidelines

Follow electrical safety guidelines to prevent electrical fires, injuries, and fatalities in the home and the workplace. Power supplies and monitors contain very high voltage. Only experienced technicians should attempt to repair power supplies and monitors. Most users should simply replace them when they stop working, because the cost of hiring a qualified technician typically is higher than the cost of replacement. Do not wear the antistatic wrist strap when repairing power supplies laser printers, or monitors.

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 you make 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.

Electrical devices have certain power requirements. For example, AC adapters are manufactured for specific laptops. Exchanging power cords with a different type of laptop or device may cause damage to both the AC adapter and the laptop.

Fire Safety Guidelines

Follow fire safety guidelines to protect lives, structures, and equipment. To avoid an electrical shock, and to prevent damage to the computer, turn off and unplug the computer before beginning a repair.

Fire can spread rapidly and be very costly. Proper use of a fire extinguisher can prevent a small fire from getting out of control. When working with computer components, always consider the possibility of an accidental fire and know how to react. You should be alert for odors emitting from computers and electronic devices. When electronic components overheat or short out, they will emit a burning odor. If there is a fire, you should follow these safety procedures:

- n Never fight a fire that is out of control or not contained.
- n Always have a planned fire escape route before beginning any work.
- n Get out of the building quickly.
- n Contact emergency services for help.
- n Be sure to locate and read the instructions on the fire extinguishers in your workplace before you have to use them.

Safety training may be available in your organization.

Identify Safety Procedures to Protect Equipment from Damage and Data from Loss

Electrostatic discharge, harsh climates, and poor-quality sources of electricity can cause damage to computer equipment. Follow proper handling guidelines, be aware of environmental issues, and use equipment that stabilizes power to prevent equipment damage and data loss.

Electrostatic Discharge

Static electricity is the buildup of an electric charge resting on a surface. This buildup may jump to a component and cause damage. This is known as electrostatic discharge (ESD).

ESD can be destructive to the electronics in a computer system.

At least 3000 volts of static electricity must build up before a person can feel ESD. For example, static electricity can build up on you as you walk across a carpeted floor. When you touch another person, you both receive a shock. If the discharge causes pain or makes a noise, the charge was probably above 10,000 volts. By comparison, less than 30 volts of static electricity can damage a computer component.

ESD can cause permanent damage to electrical components. Follow these recommendations to help prevent ESD damage:

- n Keep all components in antistatic bags until you are ready to install them
- n Use grounded mats on workbenches.
- n Use grounded floor mats in work areas.
- n Use antistatic wrist straps when working on computers.

Electromagnetic Interference

Electromagnetic interference (EMI) is the intrusion of outside electromagnetic signals in a transmission media, such as copper cabling. In a network environment, EMI distorts the signals so that the receiving devices have difficulty interpreting them.

EMI does not always come from expected sources such as cellular phones. Other types of electric equipment can emit a silent, invisible electromagnetic field that can extend for more than a mile.

There are many sources of EMI:

- n Any source designed to generate electromagnetic energy
- n Man-made sources, like power lines or motors

- n Natural events, such as electrical storms or solar and other radiations from space

Wireless networks are affected by radio frequency interference (RFI). RFI is the interference caused by radio transmitters and other devices transmitting in the same frequency. For example, a cordless telephone can cause problems with a wireless network when both devices use the same frequency.

Power Fluctuation Types

Voltage is the force that moves electrons through a circuit. The movement of electrons is called current. Computer circuits need voltage and current to operate electronic components.

When the voltage in a computer is not accurate or steady, computer components may not operate correctly. Unsteady voltages are called power fluctuations.

The following types of AC power fluctuations can cause data loss or hardware failure:

- n Blackout: Complete loss of AC power. A blown fuse, damaged transformer, or downed power line can cause a blackout.
- n Brownout: Reduced voltage level of AC power that lasts for a period of time. Brownouts occur when the power line voltage drops below 80 percent of the normal voltage level. Overloading electrical circuits can cause a brownout.
- n Noise: Interference from generators and lightning. Noise results in unclean power, which can cause errors in a computer system.
- n Spike: Sudden increase in voltage that lasts for a very short period and exceeds 100 percent of the normal voltage on a line. Spikes can be caused by lightning strikes, but can also occur when the electrical system comes back on after a blackout.
- n Power surge: Dramatic increase in voltage above the normal flow of electrical current. A power surge lasts for a few nanoseconds, or one-billionth of a second

Identify Hardware Tools and Their Purpose

A toolkit should contain all of the tools necessary to complete hardware repairs. As you gain experience, you will learn which tools to have available for different types of jobs. Hardware tools are grouped into these four categories:

- n ESD tools
- n Hand tools
- n Cleaning tools
- n Diagnostic tools

ESD Tools

There are two ESD tools: the antistatic wrist strap and the antistatic mat. Both tools are designed to protect the PC from ESD. The antistatic wrist strap protects computer equipment when clipped to the computer chassis. The antistatic mat protects computer equipment by preventing static electricity from accumulating on the hardware or on the technician.

Hand Tools

Most tools used in the computer assembly process are small hand tools. They are available individually or as part of a computer repair toolkit. Toolkits range widely in size, quality, and price. Common hand tools include the following:

- n Flat-head screwdriver: Used to tighten or loosen slotted screws
- n Phillips-head screwdriver: Used to tighten or loosen cross-headed screws
- n Torx screwdriver: Used to tighten or loosen screws that have a star-like depression on the top, a feature that is mainly found on laptops
- n Hex driver: Used to tighten or loosen nuts in the same way that a screwdriver tightens or loosens screws (sometimes called a nut driver)
- n Needle-nose pliers: Used to hold small parts
- n Wire cutters: Used to strip and cut wires
- n Tweezers: Used to manipulate small parts
- n Part retriever: Used to retrieve parts from locations that are too small for your hand to fit
- n Flashlight: Used to light up areas that you cannot see well

Cleaning Tools

Having the appropriate cleaning tools is essential when maintaining or repairing computers.

Using these tools ensures that computer components are not damaged during cleaning.

Cleaning tools include the following:

Soft cloth: Used to clean different computer components without scratching or leaving debris

Compressed air: Used to blow away dust and debris from different computer parts without touching the components

Cable ties: Used to bundle cables neatly inside and outside of a computer

Parts organizer: Used to hold screws, jumpers, fasteners, and other small parts and prevent them from getting mixed together

Diagnostic Tools

Diagnostic tools include the following:

Digital multimeter: Used to test the integrity of circuits and the quality of electricity in computer components

Loopback adapter: Used to test the basic functionality of computer ports

Assembling the System

Shopping for Parts

The most difficult and time-consuming part of the PC-building process happens long before you start looking for the screwdriver. You can't even start thinking about assembling the individual components until you buy them—and that means doing a lot of investigating into the options (of which there are thousands) and, believe it or not, some serious soulsearching.

The first, and most important, thing to consider is: What do you want your PC to do? Are you looking for a really inexpensive system to put in the kids' room? Do you want a squat, console-like desktop that will fit right next to the TV that you can use for streaming media, or maybe as a Steam Machine? Is a dedicated work PC for your home office the goal? Or do you want the biggest, baddest build that can play the hottest new games without breaking a sweat?

We can't answer this question for you. But once you've reached a decision, you'll have a better idea of what you need to buy and how much money you'll have to spend. And then you can get on to the actual shopping.

The nuances of what components do, and how to best get them to serve your needs, is beyond the scope of this story. But the descriptions below of their functions and what you need to look for when shopping should give you a solid idea of where to start in collecting all the parts you'll need for your PC.

Processor

Start with the central processing unit (CPU), or processor, the "brain" of the computer that, well, processes all the instructions it receives from the software you run and the other components you have installed. Because of the considerable difference it will make in how well you run every program on your PC, paying particular attention to its capabilities is crucial. Here's what to look for:



Number of cores. Back when every CPU only contained one processing unit, or core, clock speed was the easiest way to measure performance. But practically every processor today is a multicore CPU, and the more cores a chip has, the more it can accomplish at once (if it's supported by the software). Most common are two- (dual-) and four- (quad-)core CPUs, though six- and eight-core CPUs are becoming more visible on the market.

Number of threads. Most processors today, particularly from Intel, can simultaneously operate two processing threads per core (Intel calls this technology hyperthreading), effectively

doubling your core count. Because not every processor supports this, check that yours does if you expect to be running a lot of multithreaded applications.

Clock speed (operating frequency). This is the frequency at which each core in a CPU runs, or the number of cycles it is able to execute per second. The higher the number, the faster CPU will generally be per core. These days, clock speed is measured in gigahertz (GHz), or billions of cycles per second.

Cache (L2 or L3). A processor uses memory installed in the chip itself to store and speed up operations before utilizing external system RAM. This on-board memory is stored in one or more caches, which are identified L2 or L3. More powerful processors will be equipped with larger caches.

Socket type. CPUs come in different sizes, are identified by the kind of socket they plug into. (For example, Intel's most powerful current chips use the third revision of the LGA 2011 socket.) You'll need this information to determine what motherboard to buy (see the next section). Manufacturing technology. Every year or two, processors get thinner and more power efficient. Knowing a chip's manufacturing technology (measured in nanometers, or nm) will give you some insight into its capabilities, but is not strictly necessary.

Cooler. Most processors come with a fan rated for their specific speed and estimated heat output; unless you're planning to overclock your computer or otherwise run it at particularly traumatic paces, you probably don't need to buy another one. (And for that reason, we're not going to dwell on the question here.)

But if you do decide to buy a separate one, or if you choose a high-end CPU that doesn't come with its own fan, make sure that the cooler you get is designed for the family of processor you have or are planning to buy.



Motherboard

If the CPU is a computer's brain, the motherboard is its nervous system. Most of your other components will plug into the motherboard, so the one that you use for your build needs to be exactly what you need now, and what you expect to need from it in the future. Here's what to look for:

Socket type. A motherboard's socket type must, must, must match that of the CPU you plan to use in it.

Form factor.

Motherboards come in a range of sizes, or form factors, from the tiny Mini ITX to the enormous Extended ATX. For most full-size desktop builds you'll probably want either regular ATX or the

somewhat smaller Micro ATX. The form factor you get will dramatically affect both the number of other components you're able to install and what kind of case you're able to install them in (see that section below for more details).

Memory. Be on the lookout for several different attributes of how your motherboard deals with memory. You need to know the memory type and standard, which are usually listed together. For example, if your motherboard supports DDR4 2133 memory, buy that. (Many motherboard manufacturers certify certain brands of memory for use with their boards; look up the motherboard on the Web to find out what's officially supported.) The number of memory slots tells you how many individual modules, or DIMMs, you can buy; you'll also be informed of the maximum memory supported, or the total amount of all the individual DIMMs taken together (such as 32 or 64GB). You may also see motherboards labeled as tri- or quad-channel, which signifies that you can expect a noticeable performance benefit if you fill the correct number of RAM slots. Note: Many times a motherboard will be listed as supporting a number of memory types with the designation "O.C." after them—this refers to memory that is overclocked. If you don't plan on overclocking your memory (which we don't recommend, unless you're an expert or fearless tweaker), you may safely ignore these numbers.

Expansion slots.

The most common motherboard form factors, ATX and Micro ATX, will have between four and seven PCI Express (PCIe) slots, for adding expansion cards. These may use either the current top-end standard, PCIe 3.0, or the older (and slower) 2.0, with designations based on the size of the slots and the number of PCIe lanes they use. The longest slots are x16, though some that look identical may run at x8 or x4; in addition, there are visibly smaller x1 slots. On a Mini ITX motherboard, however, you should only expect one x16 slot.

Storage.

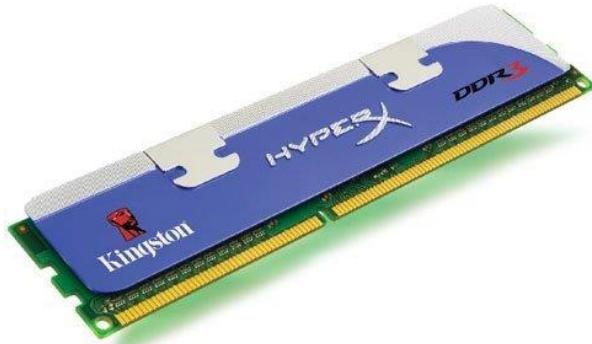
SATA remains the most common interface for connecting internal storage devices to your motherboard. The newest version of the standard, SATA 3, supports data transfer rates of up to 6Gbps. You may also find some other interfaces; M.2, in which a flash-based storage module plugs directly into a thin slot on your motherboard, is becoming increasingly popular, for example. Regardless, you'll want to have enough of the right kind of ports for whatever storage you want to buy. (Learn more about that in the Storage section, below.) **Onboard technologies.** Just about every motherboard will feature onboard stereo sound and Ethernet, most will include integrated Wi-Fi and/or Bluetooth, and many will also include ports for taking advantage of processors' integrated video capabilities. (You won't find the last on motherboards for higher-end processors, which are designed for use with discrete video cards, and you may ignore these ports on lower-end or midrange motherboards if you plan on installing a standalone video card.) It's worth checking the specs so that you don't forego something you really want.

Video card support.

Think you may want to concoct an ultra-powerful gaming machine with more than one graphics card? Even if you have enough slots to hold multiple cards, you're out of luck if your motherboard isn't designed for use with either Nvidia's SLI technology or AMD's CrossFireX, so verify that first.

Memory

Your computer's random-access memory, or RAM, is where data is stored while the processor is waiting to crunch the numbers. More is pretty much always better, within the boundaries of your budget and your system (if yours is 32-bit, it's limited to about 4GB; 64-bit PCs can handle up to 192GB, which is much more than any consumer desktop motherboard can currently hold), though if you use simple applications and aren't an avid multi tasker, you can get away with less. The nice thing about building your own PC: If it turns out you need more, memory is one of the easiest things to add. Here's what to look for:



Type. Memory will only be useful to you if the motherboard supports it; read that section for more information. Each new standard offers some additional speed and features, but not in all situations, so don't feel as if DDR4 RAM, rather than DDR3, is an automatic must for you if you're building from scratch. Just remember that RAM is not backward-compatible, so DDR4 will not work in a DDR3 slot. The higher the number in a memory's standard, such as DDR4 2666, the faster it generally is. Faster memory designed for the same slot type will work in a slower slot, but save yourself some money and don't leave any performance on the table you don't have to.

Capacity. DIMMs for each memory type come in a variety of capacities, so you can buy what you need and can afford. It's best to buy at least one chip for each memory channel (three for triple-channel, four for quad-channel), and memory often comes in "kits" to make that easier; and we don't recommend mixing and matching capacities within any one build. If you see a capacity listed as something like "8GB (2 x 4GB)," this means the total amount of RAM is divided up between a number of chips (in this case, two DIMMs of 4GB each, for a total of 8GB).

Memory timings. Most memory specs include a series of four numbers, separated by hyphens, that provide an at-a-glance way to tell how speedy the memory is. The first number, CAS latency (the amount of time between when the memory controller requests data and when it's available) is the most significant, and may be listed by itself. The lower the numbers, the faster you can expect the memory to be.

Other specs. Error Checking and Correction (ECC) memory is intended for high-performance systems such as workstations and servers; you will need a motherboard that specifically supports this type of memory if you want to use it (and most ordinary users won't need to). Voltage numbers give you specific information about how the memory uses power, with higher voltages typically meaning speedier RAM—but this is something only over clockers will really need to know.

Video Card

Though integrated graphics systems are more commonplace today than ever, even the best versions in the latest processors can't deliver what you can get from even a lower-end discrete video card. If you're into gaming of any sort, a video card is a must, but any programs that are designed to take advantage of graphics hardware acceleration, from Windows to Photoshop and beyond, can benefit from offloading video processing to a dedicated subsystem. Unless you're blasting out a tight-budget build, there's no good reason to forego a video card. Here's what to look for:

Processing cores. Like your CPU, your graphics processing unit (or GPU) has contains multiple processing cores exclusively for churning out graphics. The more of them your video card has, the better a performer it's likely to be (and the more it's likely to cost). AMD calls its versions "stream processors" and Nvidia has named its own "CUDA cores"—note that although you can't directly compare the two types, the numbers of cores are good indicators of relative power within each company's chipset families.

Clock rates. As with your CPU, this is the speed at which the graphics processing unit, or GPU, runs. It's not unusual to see cards with fewer processing cores and faster clock speeds, or vice versa, so try to find the best blend for the amount of money you have to spend. **Memory.** Video memory (VRAM) serves a function for video cards that's similar to what ordinary RAM does for the rest of your computer: It stores the data until it's needed for processing. This matters less if you're playing at lower resolutions, where there aren't as many pixels and other visual effects to be wrangled, but, as a rule of thumb—as with RAM—more tends to be better. (You'll see 4GB or more on the highest-end video cards.) Also pay attention to the memory clock speed, which can also function into performance. **Ports.** A video card isn't worth much if it's not hooked up to at least one monitor. Look at the list of its ports to determine whether your card outputs to DVI, HDMI, and DisplayPort; if you'll be using your computer with a monitor you already own, you'll want to know ahead of time whether you'll need to buy an adapter. Another good idea is verifying how many monitors the card can drive at once: It may not be the same as the card's number of output ports.

Power requirements. Video cards are among the most power-hungry PC components you can buy, so know what you need to get from your power supply. Usually there will be a minimum value you should respect, and you'll also be told the specific number of PCIe power connectors (six- or eight-pin) you'll need in order to get the card to work, as well as the number of amps needed from the power supply



Storage

Even if you love smartphones and tablets, you have to admit that storage is one of their biggest weaknesses: You seldom get that much, and you're pretty much stuck with whatever you buy.

When you're building your own PC, that's not a problem—it's easy to add or change more pretty much anytime you want.

But even if you don't have to worry too much about capacity, you need to make a few other crucial decisions. Here's what to look for:



[Hard drive or SSD?](#) The average price of solid-state drives (SSDs), which store data on flash memory, has dropped a lot in recent years, making them a better choice than ever to add to your computer if speed in booting up and accessing files is what you crave. But by and large, they're still punishingly expensive on a cost-per-gigabyte basis compared with traditional, slower mechanical hard drives: It's not hard to track down a 3TB hard drive that costs \$100 or less, whereas consumer-oriented SSDs top out at about 1TB—and those will run you \$350 at an absolute minimum. Because of this, the classic advice is still the best: Pair a lowercapacity solid-state drive (256GB or so is a good compromise), for installing Windows and your most important programs, with one or more spinning hard drives for housing all your data. Another option may be a hybrid drive, which stores most of your data on an inexpensive hard drive but uses a tiny amount of flash memory for things you use most frequently; this can save you a lot of money, but because of how the underlying technology functions, the performance will not always match what you get from a true hard drive–SSD pairing.

Interface. Serial ATA (SATA) connections are still common, especially for hard drives, and your motherboard will undoubtedly have plenty. But for major speed advantages, you can also buy newer SSDs on PCIe cards that install directly into your motherboard's expansion slots and use that much faster bus. Other interfaces, such as mSATA and M.2 are less common, but you may want to take a page from space-saving smaller systems and consider M.2 (which plugs directly into a motherboard port) for use as a boot drive. Just be certain your motherboard supports whatever standard you intended to use.

Form factor. This refers to the size of the drive, with hard drives coming in 3.5- or 2.5-inch varieties, and SSDs coming in 2.5- or 1.8-inch models. For desktop computers, form factor doesn't always matter much, though you'll need to have the right kind of space in your case for whatever drive you choose.

Hard drive specs. A couple of extra details may appear on hard drive listings that you won't see when researching SSDs. Most consumer hard drives spin at either 7,200 or 10,000rpm, with the speedier drives costing more and using more energy. You can also select the amount of cache memory your hard drive uses (up to 128MB) to boost performance. This information is useful for detail-oriented purists, but is of limited use if you don't plan to use your hard drive as your boot drive (which, as mentioned above, we don't recommend). Is optical optional? Now that most software is purchased and delivered digitally, an optical drive may not be a necessity for you, particularly if you don't plan to install a lot of older programs. If you don't want an optical drive, you'll need another strategy for installing the operating system; use another computer to create an installation USB key, for example. If you do want a drive, it may be worth it to splurge a bit on a Blu-ray burner so you can watch high-definition movies you may have hanging around.

Power Supplies

You can buy the best components to be found on the Web, and they'll be useless if you can't actually turn your computer on once you've finished building it. A



power supply unit (or PSU) may be the most unappreciated of components, but without it, nothing else will work, so don't forget to give it the thought it deserves. Here's what to look for: Maximum power. This is the highest amount of power the PSU is capable of directing to your components. The less complicated or intense the build, the lower a number you can get away with—for most people, 500 to 750 watts will be fine. But if you're using high-end parts, particularly energy-sucking video cards (or more than one), your power needs could raise to 1,000 watts or even more. Checking your components' power usage or thermal design power (TDP) is vital—get a power supply that's too weak, and your computer may not even turn on. Voltage rails. Simply put, voltage rails are like individual power circuits within your PSU, with each of the major varieties (+3.3V, +5V, and +12V) powering different kinds of components. In most cases, the most important one to pay attention to is the +12V rail, as that's what will be driving your video cards; one of these capable of supplying 34 to 40 amps should be enough for the most powerful cards you can currently buy, and is likely to be more reliable than using multiple +12V rails for the same job.

Form factor. Like other components we've covered here, power supplies come in a variety of form factors that determine the kinds of hardware you can use with them, and under what circumstances. The most common for mainstream motherboards right now is the ATX12V, but you may also see others (such as EPS12V), and you may need to buy a smaller power supply if you're building a system too miniature to fit a full-size ATX power supply, say.

Connectors. Power supplies come in two varieties: one in which all the cables are preattached, and another (called modular) that lets you connect only the cables you need. In either case, your PSU still has to have the right connectors, whether six- and eight-pin for video cards, SATA for newer hard drives and SSDs, or Molex for older drives and other devices. The good news is

that if you don't have all the connectors you need, adapters aren't too tough to find. Still, it's easiest to verify that you have what you need ahead of time; the PCIe connectors for the video card are most likely to trip you up, so find out what your card needs so your PSU can supply power in the proper way.

Case

Yes, you'll need a case to house all the other components you buy, and that's what we'll focus on here. But remember that it's also the outward expression of your computer's personality—and your own. How big should it be? What shape? What color? Do you want a window? Make these decisions, too, so your final computer will look every bit as good as it runs. But as far as the necessary specs, here's what to look for:

Form factor. Though a case can basically be as big or as small as you want it to be, what matters more is which form factor of motherboard it's designed for. One intended for ATX motherboards will have room for the board and the proper number of expansion slots; a Micro ATX motherboard is smaller and will have fewer slots, though the case itself may not necessarily be smaller; and smaller form factors still, such as Mini ITX, may require other adjustments to your component choices (less storage, for example, or maybe a smaller power supply). Many larger ATX cases can also be used with motherboards of other form factors; as long as yours is supported, you should be fine.

Front-panel ports and controls. You'll definitely want to access all of your computer's features, and its front-panel ports are the way to do that. Every case will have Power and Reset buttons and an activity light, and most will also have headphone and microphone jacks and USB ports; some may even have fan or lighting controls. Just remember that you'll need to connect any front-panel ports to the motherboard, so cross-comparing those specs ahead of time is a good idea.

Drive bays. You'll need someplace to store your hard drives and SSDs, and any other devices you may be using. Generally speaking, cases may have one or more 5.25-inch external bays for optical drives other enthusiast gadgets, and multiple bays for 3.5- or 2.5-inch hard drives and SSDs. (Some cases also have externally accessible 3.5-inch bays for easily swapping hard drives in and out.) The smallest cases, though, can have very few of these, so pay attention, or risk not being able to perform necessary upgrades later.

Fans and filters. Cooling is one of a case's most important functions. Your case will probably come with one or more intake or exhaust fans, and have room for adding more (in several sizes, from 80mm on up) if you want them. Removable filters, which capture dust to keep your PC's interior tidy and are easy to clean, are also common on higher-end cases.



Putting It All Together

Once you've decided on and purchased your parts, it's time to do the really exciting/fun/scary thing: assembling them all. Believe it or not, this is less difficult than it may sound, especially now that tool-free cases are de rigueur and you won't need your Phillips screwdriver for installing much more than the power supply and the motherboard.

But doing things in the proper order will help out a lot.

What follows is the basic procedure we used while building a higher-end system for testing hardware here in PC Labs. It illustrates most of the points you'll encounter in your building, though the details will differ a bit depending on the components you buy. The basic techniques, however, seldom vary much from build to build.

1. Get Prepared

Just as a chef wouldn't fire up the stove without the mise en place ready to go, neither should you. Unpack all your components, remove the packing material from them, and arrange them cleanly on a large, flat surface. The floor will absolutely work if that's all you have, but try to avoid doing it on a carpet—static electricity remains a major danger for electronics, and frying your system before you even get to use it is one shock you don't want. (If you're concerned, you can use an antistatic wrist strap or ground yourself by touching some bare metal, such as the frame of your empty computer case, before you start working with anything else.) Also, open up the main side panel of your case, because that's where your build will begin.

2. Install the Power Supply

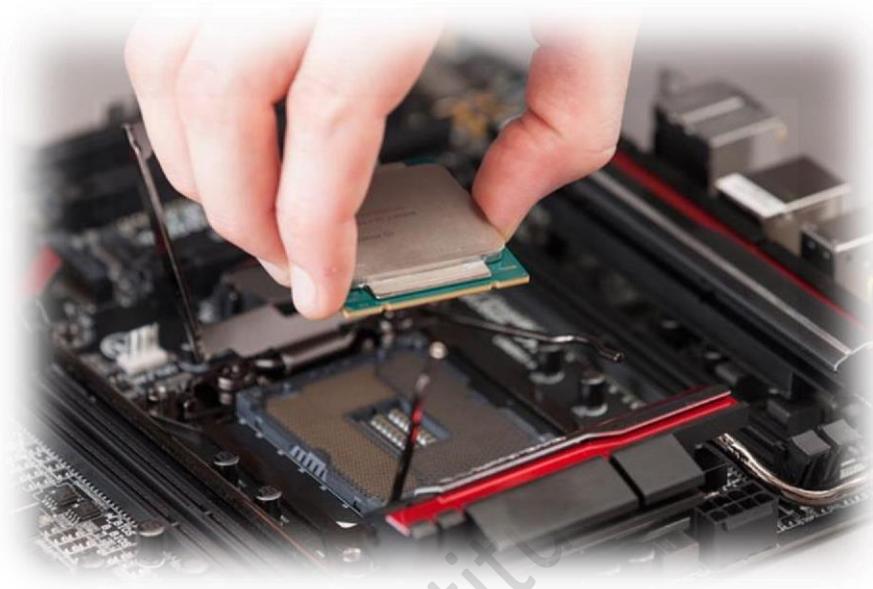
You won't need the power supply until much later in the build process, but you're better off installing it first because once the other components are in place, it becomes a lot more difficult to put the supply where it needs to go. Position the PSU in the bay with the fan pointing downward (many cases will have a vent there) and the screw holes lining up with the holes on the back of the case. Secure the power supply with the provided screws, then drape the cables over the side of the case to keep them out of the way while you work on everything else.

4. Install the Processor

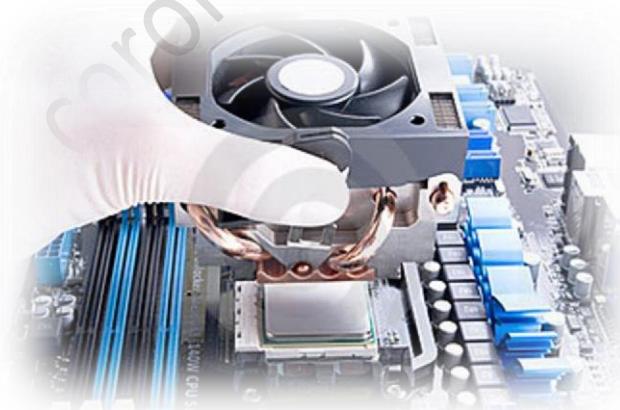
Most of the time, it's going to be easiest to install some components on the motherboard before you put the motherboard in the case—you'll have a lot more room to work that way.

The processor definitely qualifies for this treatment. Begin by opening the socket. If you're using an AMD CPU, just lift the lever to release the locking mechanism; you'll also need to do this for Intel chips, but notice that a metal cover will also secure the chip in place, and that needs to be lifted as well. (On higher-end Intel chips using the LGA 2011 socket, two levers hold down the socket cover, and you'll need to lift those one at a time.) Once the socket is opened, use the arrows printed on the socket and chip to align the CPU correctly,

then lower it gently into the socket. (With AMD processors, the pins are on the CPU, so they'll need to all go down into the proper holes and the chip sits flat before proceeding.) Once the chip is in place, secure the socket again by reversing the procedure you used to open it.



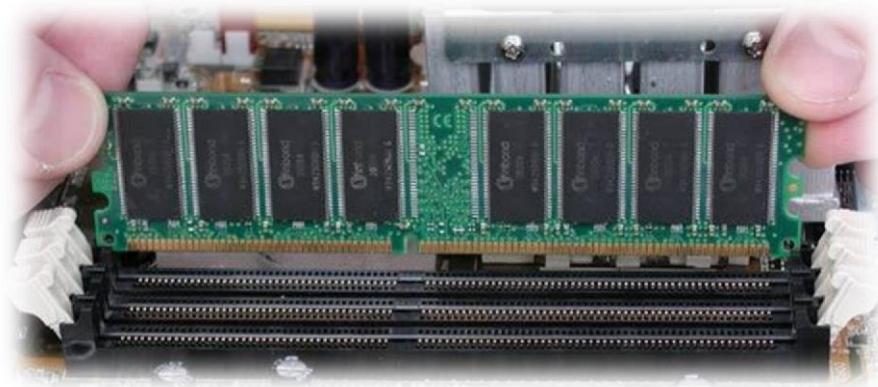
5. Install the CPU Cooler



Some fans and coolers may come with the necessary thermal compound already applied. If yours doesn't, squeeze a small dab onto the center of the top of the processor; you can spread it around evenly with something like a business card if you want, but this isn't strictly necessary. With most stock coolers, you just align the support posts for the cooler around the socket and secure them in place; each cooler is slightly different in this regard, so refer to its instructions for exact directions on doing this with the model you have. If you're using a liquid cooler (such as the one shown in this paragraph) or another aftermarket cooler, you may need to install

mounting hardware on the underside of the motherboard or configure a universal support mechanism for use with your specific motherboard and processor—either is another good reason to install the cooler while the motherboard is still outside the case.

5. Install the RAM



The RAM bays are opened with the little clips at either end (some motherboards use only one set of clips, but most have two)—just push them down. Align the notch in the memory connector to the raised "key" in the RAM bay (you could do damage to the DIMM if it's not oriented correctly), then push the DIMM firmly into place. When it's correct, the clips should rotate back up and lock the memory in. Repeat with your other chips. Note: If you're using multiple-channel memory, the DIMMs should be installed in the proper channels if you want the according speed boost. It's pretty easy if, say, you have a quad-channel board and only four memory bays, but it might be more confusing in other situations, though the bays are often color-coded to clear things up. Consult your motherboard's manual if you're not sure.

6. Place the I/O Plate



Each motherboard comes with a specially designed I/O plate that labels each of its ports and helps close off the back of the computer from dust and other intrusions; you don't absolutely

need it, but it's a really good thing to have. Align the plate right-side up (you may want to compare it to the back of the motherboard, just to be safe), place it inside the wide space at the rear of the case, and push on it—hard—until it locks into place on all four edges.

7. Mount the Motherboard



Although some cases come with preinstalled motherboard risers, which prevent the board from directly touching the metal of the case, most don't. To find out where the risers should go if you're not sure, place the motherboard in the case and see which holes in it correspond with which holes in the case, then screw the risers that came with your case into those holes. (Some cases have the holes needed for the various form factors marked so you won't have to either do this or guess.) Once the risers are in, tighten each of them as much as you can. Guide the motherboard gently into the case, pushing its rear-panel ports through the correct openings in the I/O plate, and then laying the motherboard on top of the risers so you can see them through the screw holes. Insert and screw in half way all the screws; once they're in, and you've verified that the motherboard's position is correct, go back and screw them all in the rest of the way. Be careful not to overtighten the screws.

8. Install the Video Card

The video card plugs into the longest (x16) PCIe slot on the motherboard, the first in the series of slots. Open that slot on the case, either by unscrewing the cover blocking it or utilizing your case's tool-free mechanism. Line up the card's backplate with the slot and the gold connectors (avoid touching them) with the slot itself. Then push the card down until it clicks. Secure the card in its position using whatever method your case employs. Note: If you're using an extra-wide video card or multiple video cards, you'll need to open more than one slot.

9. Install Your Drives



Because every case is different, it's tough to provide a single blanket explanation for how to install the specific drives for your build. Most 5.25-inch drives, if you're using them, will either screw in place or use a simple tool-free system on one or both sides of the drive cage. It's not uncommon for 3.5-inch drives to install using caddies or trays, though they may also screw into a smaller cage below the 5.25-inch one (almost always at the top of the drive well). And many of those same trays will also have space for 2.5-inch drives, though some of these drives come with adapters that let them work easily in 3.5-inch bays, or other slots (such as on the floor of the case or beneath the motherboard tray) may be provided for installing them. Other drive form factors, such as mSATA or M.2, install into special slots on the motherboard itself; and still other drives can be placed in PCIe slots. The manuals for your motherboard and any unusual drives will have the information you need about this.

10. Connect Your Cables

With all your hardware installed, it's time to start linking everything together. Run data cables from your drives that need them to the appropriate ports on the motherboard. (SATA ports are often located along the edge of the motherboard.) Ensure that everything that needs power gets it: Connect the appropriate cables from the power supply to the motherboard (you'll probably need two for this: one terminating in a 24-pin plug, another in a four- or eight-pin plug), to your video card (one or more of the six- or eight-pin cables, probably labeled PCIe), and to your drives (the connectors are thin and black). For bonus points, route your interior cables through the holes in the inside of the case and around the back of the motherboard if you can; most non-budget cases today are designed to facilitate this. Yes, the inside of your

computer will look better (nice if you have a window), but you'll also be improving airflow, and thus the way your computer deals with heat.

11. Connect Your Wires



The final step in making it possible to interact with all the various parts of your computer—and seeing that they operate correctly—is connecting all the wires. Connect the power wires from your CPU cooler and any case fans to the proper pins on the motherboard; sets are clearly marked for "CPU Fan," "Chassis Fan," or "Aux Fan." Then connect the wires from the front panel to the appropriate headers: USB will be common here (note that the 2.0 and 3.0 standards' headers look different), as will the headphone and microphone jacks (which will connect via the same audio header), but you may have other esoteric ones to deal with as well. Last, but not least, link the bevy of tiny front-panel wires linked to your activity lights and Power and Reset buttons to the pins on the motherboard. These are almost always labeled on the board itself, but they can be hard to see, and it can be difficult to know which of the two-pin connectors goes where. Again, consult your motherboard manual if you have any questions as to what goes where—you won't do any permanent damage if you screw this up, but your buttons might not work and your lights might not flash correctly, and that can sometimes be even more annoying.

12. Start Using Your PC

That's it. You'll still need to install Windows and software, and tweak the BIOS or UEFI settings to your liking, so there's a fair amount of work yet to be performed. But remember that this doesn't have to be the end of the process. Want more speed? Swap out the processor for a faster one. Tackle more demanding projects by upping the RAM. Make your games more exciting by replacing your video card with the latest and greatest model. Add another hard drive or two or three. The choice is yours, and you can change your mind at any time—and upgrading individual parts (aside from the motherboard) is invariably easier than starting from scratch. In any event,

rest easy knowing that you're doing it all on a PC you built especially for you, and that will always reflect your needs and desires in a way no tablet or laptop easily can.



After you turn on your PC for the first time , if everything goes well you will get display on the screen . But if you have any issues in your system , you may be greeted with a set of error beeps from the buzzer on the motherboard . Please find a quick reference of the same

Sample Beep Codes

Beep Code	Meaning	Cause
1 beep	Passed POST	Successfully passed POST
2 beeps	Memory parity error	Bad memory
3 beeps	Base 64K memory failure	Bad memory
4 beeps	Timer not operational	Bad motherboard
5 beeps	Processor error	Bad processor
6 beeps	8042 gate A20 failure	Bad CPU or motherboard
7 beeps	Processor exception	Bad processor
8 beeps	Video memory error	Bad video card or memory

9 beeps	ROM checksum error	Bad BIOS
10 beeps	CMOS checksum error	Bad motherboard
11 beeps	Cache memory bad	Bad CPU or motherboard

Module M2/U4/S1-S3

BIOS configuration

- What is BIOS , the role of BIOS in a computer

Short for Basic Input/Output System, the BIOS (pronounced bye-oss) is a ROM chip located on all motherboards that allows you to access and set up your computer system at the most basic level. In the picture below, is an example of what a BIOS chip may look like on your computer motherboard. In this example, this is a picture of an early AMIBIOS, a type of BIOS manufactured by the AMI. Another good example of a BIOS manufacturer is Phoenix.



The BIOS includes instructions on how to load basic computer hardware and includes a test referred to as a POST (Power On Self Test) that helps verify the computer meets requirements

to boot up properly. If the computer does not pass the POST, you will receive a combination of beeps indicating what is malfunctioning within the computer.

The four main functions of a PC BIOS

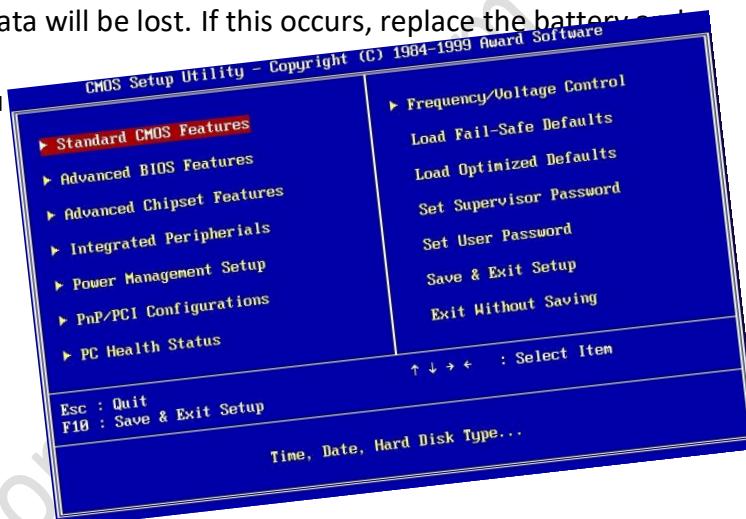
POST - Test the computer hardware and make sure no errors exist before loading the operating system. Additional information on the POST can be found on our POST and Beep Codes page.

Bootstrap Loader - Locate the operating system. If a capable operating system is located, the BIOS will pass control to it.

BIOS drivers - Low level drivers that give the computer basic operational control over your computer's hardware.

BIOS or CMOS Setup - Configuration program that allows you to configure hardware settings including system settings such as computer passwords, time, and date.

The BIOS contains a setup program used to configure settings for hardware devices. The configuration data is saved to a special memory chip called a complementary metal-oxide semiconductor (CMOS). CMOS is maintained by the battery in the computer. If this battery dies, all BIOS setup configuration data will be lost. If this occurs, replace the battery and reconfigure the BIOS settings. To enter the BIOS setup program, you must press the proper key or key sequence during POST. Most computers use the Delete key. Your computer might use another key or combination of keys. The detailed lab session will give you real hands on skills on configuring various kind of settings on your BIOS setup .



Test & QC

After you build your system, it is time to do a thorough testing of the system with Test and QC procedures. It is essential to ensure that the system will work without failure in extreme working conditions at the customer site for a long time.

Modern-day PCs are more reliable than ever before, but that doesn't mean they're infallible. Equipment failures still happen, however rarely, and even the beefiest of computer components aren't worth their weight in silicon if they aren't dependable. Thankfully, the hot and heavy world of stress testing can help to identify critical faults before your PC craps out in the middle of a critical operation.

Whenever you buy or build a PC, swap out a major component, or overclock a piece of hardware, it's a good idea to stress-test (or "burn in") the fresh gear,

Why stress-test? Simple: To ensure the reliability and stability of your system. Even if a computer boots up and performs well under normal usage, fickle hardware can cause woes when you step up to heftier tasks, such as gaming or video editing. Stress-testing software

places your components under an intense workload to simulate a worse-case scenario; if a component crashes, hangs, or otherwise fails a dedicated stress test, there's a good chance that it won't be reliable under a heavy everyday load. It's best to uncover unstable components sooner rather than later, while they're still under warranty.

Running stress tests can also let you know if you need additional cooling in your computer. If a graphics card or overclocked CPU consistently overheats and shuts down during a stress test, it's time to dump the stock cooler, add a few case fans, and possibly even consider liquid cooling.

All that said, the actual process of stress testing isn't terribly complicated, though it can be time-consuming. Ladies and gentlemen, it's time to start your engines.

Session Notes

Blank sheet with a table that enables you to jot down their points from the session.



coronainstitute.com

Feedback of Trainee for Module 2

[This will enable the SDE to get a feedback on the unit]

Dear Participant,

Please provide your frank feedback for enhancing the trainings/

Sl. No.	Parameters	Rating		
		Good	Satisfactory	Poor
1.	Preparation of SDE for taking sessions			
2.	Response of SDE to queries			
3.	Interaction of SDE with students			
4.	Use of teaching – learning material			
5.	Communication skills of SDE			
6.	Punctuality of SDE			
7.	Other specific parameters, if any			

Suggestions:

Module 3 – Storage

Objectives

Through a series of theory and practical hands on session , students will get a through knowledge about storage systems

Unit: No 1-4

Learning outcomes

What is a secondary storage

What are magnetic and optical data storage systems

Principle of operation of a Magnetic data storage

Principle of operation of an optical data storage

Disk Management with Fdisk ,DM , partition magic and other industry tools

Session Notes M3/U1/S1-S9

Module M3/U1/S1-S9

Storage Management

Hard Disk Drives

For most applications, you are going to need some type of mass storage device. The primary device used for mass storage is the hard disk. This read/write device allows for relatively fast access to large amounts of data. Without a hard disk drive, a PC would have no way to permanently store significant amounts of information.

Hard disks differ by technology, interface, speed, and capacity, however they read and write data in basically the same fashion. Most hard disks are capable of 5000 rotations per minute. Data is written onto the platters or read from them by read/write heads , which can access both sides of the platters. The more platters in a hard drive, the larger the capacity. The read/write heads move back and forth across the platters with the aid of the head actuator.

Information is recorded in a circular fashion in what are called tracks. Tracks are like the lanes on a racetrack. Tracks are divided into sectors. A cylinder is a vertical stack of sectors. Finally, clusters are formed from several sectors on the same track. This is the minimum unit that DOS uses to store information.

Hard Disk Installation

The process for installing an internal hard disk is nearly identical to that for installing an internal floppy disk drive, after the installation of the hard disk controller.

Make sure that the system is turned off and remove the system enclosure. Check disk termination.

The disk drive controller (or controller/data) cable must be terminated at the hard disk. For multiple drives connected in a daisy-chained configuration, the last drive in the daisy chain will be terminated. This typically only is a concern with SCSI drives.

Mount the hard disk in the enclosure. Older enclosures require you to mount the drive directly to the enclosure. Newer enclosures use slide rails for this purpose. For smaller drives (3 ½" and below) it may be necessary to use an adapter frame in order to fit the drive in the expansion bay.

Connect the power and drive cables. While drive cables are often keyed, this is not always true. Use care to ensure that cables are properly oriented.

Multiple SCSI and IDE drives will be internally connected to a single daisy- chain cable. If you are having a SATA drive , it is connected individually to the SATA connectors .

Microsoft way of Hard disk management with FDISK and Format

Even if the command line operating systems for the customer is a thing of the past , most of your IT infra management skills still need command prompt skills . Fdisk is such a great tool to understand the basic concepts of Hard disk partitioning and still a great tool for troubleshooting some of the hard disk related issues .

Before you install your operating system, you must first create a primary partition on the hard disk (disk 1) on your computer, and then format a file system on that partition. The Fdisk tool is an MS-DOS-based tool that you can use to prepare (partition) a hard disk. You can use the Fdisk tool to create, change, delete, or display current partitions on the hard disk, and then each allocated space on the hard disk (primary partition, extended partition, or logical drive) is assigned a drive letter. Disk 1 may contain one extended partition, and a second hard disk may contain a primary or extended partition. An extended partition may contain one or more logical MS-DOS drives.

After you use the Fdisk tool to partition your hard disk, use the Format tool to format those partitions with a file system. The file system File Allocation Table (FAT) allows the hard disk to accept, store, and retrieve data. Windows 95 OEM Service Release 2 (OSR2), Windows 98, Windows 98 Second Edition, Windows Millennium Edition (Me), and Windows 2000 support the FAT16 and FAT32 file systems. When you run the Fdisk tool on a hard disk that is larger than 512 megabytes (MB), you are prompted to choose one of the following file systems: FAT16: This file system has a maximum of 2 gigabytes (GB) for each allocated space or drive letter. For example, if you use the FAT16 file system and have a 6-GB hard disk, you can have three drive letters (C, D, and E), each with 2 GB of allocated space.

FAT32: This file system supports drives that are up to 2 terabytes in size and stores files on smaller sections of the hard disk than the FAT16 file system does. This results in more free space on the hard disk. The FAT32 file system does not support drives that are smaller than 512 MB.

When you run the fdisk and format commands, the Master Boot Record (MBR) and file allocation tables are created. The MBR and file allocation tables store the necessary disk geometry that allows hard disk to accept, store, and retrieve data.

Important Considerations Before You Use the Fdisk and Format Tools
Consider the following questions before you use the Fdisk and Format tools:

Is the hard disk new? If not, view the second question.

Is this hard disk the only hard disk on your computer (master) or is this hard disk a second hard disk (slave)?

Have you prepared the hard disk by following the manufacturer's instructions? It is important to set the jumpers and cabling according to the role of the hard disk (master or slave).

Have you checked your basic input/output system (BIOS) to verify that it supports the hard disk or the second hard disk? If not, check the documentation that came with your motherboard, or

contact the manufacturer. Typically, the BIOS has an auto detect hard disk setting that configures the drive, but you should verify this before you continue.

What type of file system do you want to use? You can use either the FAT16 or the FAT32 file systems.

Does the hard disk already contain data?

Have you backed up all of your important data? If not, back up your data before you proceed.

When you run the fdisk command to create, delete, or change a partition, all of the data on that partition is permanently deleted. Note that you can view current partition information without deleting your data.

Does the hard disk have a drive overlay or a disk management program? If your computer uses drive overlay software to enable large hard disk support, do not use the Fdisk tool until you have checked with the software manufacturer.

How to Partition and Format a Master Hard Disk

IMPORTANT: If you use the following steps on a hard disk that is not empty, all of the data on that hard disk is permanently deleted.

How to Partition a Master Hard Disk

To partition a master hard disk, run the fdisk command:

Insert the Startup disk in the floppy disk drive, restart your computer, and then use one of the following methods, depending on your operating system. For a Windows 98, Windows 98 Second Edition, or Windows Me Startup disk:

When the Microsoft Windows 98 Startup menu is displayed, select the Start computer without CD-ROM support menu option, and then press ENTER.

At a command prompt, type fdisk, and then press ENTER. View step 2.

For a Windows 95 Startup disk:

At a command prompt, type fdisk, and then press ENTER.

View step 2.

If your hard disk is larger than 512 MB, you receive the following message:

Your computer has a disk larger than 512 MB. This version of Windows includes improved support for large disks, resulting in more efficient use of disk space on large drives, and allowing disks over 2 GB to be formatted as a single drive.

IMPORTANT: If you enable large disk support and create any new drives on this disk, you will not be able to access the new drive(s) using other operating systems, including some versions of Windows 95 and Windows NT, as well as earlier versions of Windows and MSDOS. In addition, disk utilities that were not designated explicitly for the FAT32 file system will not be able to work with this disk. If you need to access this disk with other operating systems or older disk utilities, do not enable large drive support.

Do you wish to enable large disk support?

If you want to use the FAT32 file system, press Y and then press ENTER. If you want to use the FAT16 file system, press N, and then press ENTER. For additional information about the FAT32 and FAT16 file systems, After you press ENTER, the following Fdisk Options menu is displayed:

1. 1. Create DOS partition or Logical DOS Drive
2. 2. Set active partition
3. 3. Delete partition or Logical DOS Drive
4. 4. Display partition information
5. 5. Change current fixed disk drive

Note that option 5 is available only if you have two physical hard disks in the computer.

6. Press 1 to select the **Create DOS partition or Logical DOS Drive** menu option, and then press ENTER.
7. Press 1 to select the **Create Primary DOS Partition** menu option, and then press ENTER.
8. After you press ENTER, you receive the following message:

Do you wish to use the maximum available size for primary DOS partition?

After you receive this message, use one of the following methods, depending on the file system that you selected.

For a FAT32 File System

- a. If you press Y for the FAT32 file system (in step 2) and you want all of the space on the hard disk to be assigned to drive C, press Y, and then press ENTER.
- b. Press ESC, and then press ESC to quit the Fdisk tool and return to a command prompt. c. View step 7.

For a FAT16 File System

If you press N for the FAT16 file system (in step 2), you can accept the default 2 GB size for the partition size, or you can customize the size of the partition.

To accept the default partition size:

- d. If you want the first 2 GB on the hard disk to be assigned to drive C, press Y, and then press ENTER.
- e. Press ESC to return to the **Options** menu, and then view step d in the following "To customize the partition size" section.

To customize the partition size:

- f. If you want to customize the size of the partitions (drive letters) on the hard disk, press N, and then press ENTER.
- g. A dialog box is displayed in which you can type the size that you want for the primary partition in MB or percent of disk space. Note that for computers that are running either Windows 98 or Windows Me, Microsoft recommends that you make the primary partition at least 500 MB in size. Type the size of the partition that you want to create, and then press ENTER.
- h. Press ESC to return to the **Options** menu.
- i. To assign drive letters to the additional space on the hard disk, press 1, and then press ENTER.
- j. Press 2 to select the **Create Extended DOS Partition** menu option, and then press ENTER.
- k. You receive a dialog box that displays the maximum space that is available for the extended partition. You can adjust the size of the partition or use the default size. Note that the default maximum space is recommended, but you can divide the space between multiple drive letters. Type the amount of space that you want, press ENTER, and then press ESC.
- l. The **Create Logical DOS Drive(s) in the Extended DOS Partition** menu is displayed. This is the menu that you can use to assign the remaining hard disk space to the additional drive letters. Type the amount of space that you want to assign to the next drive letter in the **Enter logical drive size in Mbytes or percent of disk space (%)** box, and then press ENTER.
- m. A table that lists the drive letter that you created and the amount of space on that drive is displayed. If there is free space on the hard disk, it is displayed near the bottom of the table. Repeat steps e through g until you receive the following message:

All available space in the Extended DOS Partition is assigned to local drives.

- n. After you receive this message, press ESC to return to the **Options** menu.
- o. To activate the partition from which you plan to boot (usually drive C), press 2 to select the **Set active partition** menu option, and then press ENTER.
- p. When you receive the following message, press 1, and then press ENTER:

Enter the number of the partition you want to make active.

- q. Press ESC, and then press ESC to quit the Fdisk tool and return to a command prompt, and then view the following "How to Format a Hard Disk" section in this article.

How to Format a Hard Disk

After you create the partitions, you must format the partitions:

1. Restart your computer with the Startup disk in the floppy disk drive.

NOTE: If you are using a Windows 95 Startup disk, a command prompt is displayed and you can skip to step 2. If you are using a Windows 98, Windows 98 Second Edition, or Windows Me Startup disk, select the **Start computer without CD-ROM support** menu option when the Windows 98 Startup menu is displayed.

2. When a command prompt is displayed, type format c: /s, and then press ENTER. This command transfers the system files and should only be used when you format drive C (or your "active" drive). For all other partitions, typeformat *drive*: (where *drive* is the letter of the partition that you want to format).

NOTE: If you receive a "Bad command" or "Bad file name" error message, you may need to extract the Format.com tool to your boot disk. To do this, type the following command at a command prompt, and then press ENTER:

extract ebd.cab format.com

After the Format.com tool is extracted to your boot disk, type format c: /s t a command prompt to format your active partition, or type format *drive*: if you want to format a partition that is not your active partition.

3. When you successfully run the Format.com tool, you receive the following message:

WARNING, ALL DATA ON NON-REMOVABLE DISK DRIVE C: WILL BE LOST! Proceed with Format?

4. Press Y, and then press ENTER to format drive C.

5. After the format procedure is finished, you receive the following message:

Volume label (11 characters, ENTER for none)?

NOTE: This is an optional feature that you can use to type a name for the drive. You can either type an 11-character name for the drive, or you can leave it blank by pressing ENTER.

Session Notes

Blank sheet with a table that enables you to jot down their points from the session.



coronainstitute.com

Feedback of Trainee for Module 4

[This will enable the SDE to get a feedback on the unit]

Dear Participant,

Please provide your frank feedback for enhancing the trainings

Sl. No.	Parameters	Rating		
		Good	Satisfactory	Poor
1.	Preparation of SDE for taking sessions			
2.	Response of SDE to queries			
3.	Interaction of SDE with students			
4.	Use of teaching – learning material			
5.	Communication skills of SDE			
6.	Punctuality of SDE			
7.	Other specific parameters, if any			

Suggestions:

Module 4 – Operating Systems

Objectives

Through a series of theory and practical hands on session on various operating systems in the IT industry

Unit: No 1-5

Learning outcomes

Difference between GUI and CUI .Historical timeline of Microsoft windows family

Features of windows XP Minimum requirement of windows XP

Easy installation method of windows XP .Installing windows XP from a command prompt

Boot up management Display and sound configuration .Safe and VGA mode .System restore
Backup and restore . Office suits installation .General purpose Application software

File compression and expansion tools . Registry edit , Install , configure and manage Windows 7 . Learn the new features of windows 7 comparing to XP . Troubleshoot common issues with windows 7 environment, What's New with 8 , 8.1 and 10 and the advanced features of 8 , 8.1 and 10 , Installing different distros of Linux, CUI management, Process Management, and administration.

Session Notes M4/U1/S1-S9 U2/S1-S6 ,U3/S1-S6,U4/S1-S1,U5/S1-S12

Module M4/U1/S1-S3

Fundamental Operating Systems

The operating system (OS) controls almost all functions on a computer. In this chapter, you will learn about the components, functions, and terminology related to the Windows 2000, Windows XP, Windows Vista, and Windows 7 operating systems. After completing this session , you will meet these objectives:

1. Explain the purpose of an operating system.
2. Describe and compare operating systems to include purpose, limitations, and compatibilities.
3. Determine the operating system based on customer needs.
4. Install an operating system.
5. Navigate a graphical user interface (GUI).
6. Identify and apply common preventive maintenance techniques for operating systems.
7. Troubleshoot operating systems

Regardless of the size and complexity of the computer and the operating system, all operating systems perform the same four basic functions. Operating systems control hardware access, manage files and folders, provide a user interface, and manage applications.

Control Hardware Access

The operating system manages the interaction between applications and the hardware. To access and communicate with the hardware, the operating system installs a device driver for each hardware component. A device driver is a small program written by the hardware manufacturer and supplied with the hardware component. When the hardware device is installed, the device driver is also installed, allowing the OS to communicate with the hardware component. The process of assigning system resources and installing drivers can be performed with Plug and Play (PnP). The PnP process was introduced in Windows 95 to simplify the installation of new hardware. All modern operating systems are PnP-compatible. With PnP, the operating system automatically detects the PnP-compatible hardware and installs the driver for that component. The operating system then configures the device and updates the Registry, which is a database that contains all the information about the computer.

File and Folder Management

The operating system creates a file structure on the hard disk drive to allow data to be stored. A file is a block of related data that is given a single name and treated as a single unit. Program and data files are grouped together in a directory. The files and directories are organized for easy retrieval and use. Directories can be kept inside other directories. These nested directories are referred to as subdirectories. Directories are called folders in Windows operating systems, and subdirectories are called subfolders.

User Interface

The operating system enables the user to interact with software and hardware. There are two types of user interfaces:

Command-line interface (CLI): The user types commands at a prompt

Graphical user interface (GUI): The user interacts with menus and icons, Most operating systems, such as Windows 2000, Windows XP, Windows Vista, and Windows 7, include both a GUI and a CLI.

Application Management

The operating system locates an application and loads it into the RAM of the computer. Applications are software programs, such as word processors, databases, spreadsheets, games, and many other applications. The operating system ensures that each application has adequate system resources.

An application programming interface (API) is a set of guidelines used by programmers to ensure that the application they are developing is compatible with an operating system.

Here are two examples of APIs:

Open Graphics Library (OpenGL): Cross-platform standard specification for multimedia graphics

DirectX: Collection of APIs related to multimedia tasks for Microsoft Windows

Explain Operating System Concepts

To understand the capabilities of an operating system, it is important to understand some basic terms. The following terms are often used when comparing operating systems:

Multiuser: Two or more users can work with programs and share peripheral devices, such as printers, at the same time.

Multitasking: The computer is capable of operating multiple applications at the same time.

Multiprocessing: The computer can have two or more central processing units (CPU) that programs share.

Multithreading: A program can be broken into smaller parts that can be loaded as needed by the operating system. Multithreading allows individual programs to be multitasked.

Almost all modern operating systems are multiuser and multitasking, and they support multiprocessing and multithreading.

Modes of Operation

All modern CPUs can run in different modes of operation. The mode of operation refers to the capability of the CPU and the operating environment. The mode of operation determines how the CPU manages applications and memory. Table 5-1 shows an example of the logical memory allocation. The four common modes of operation are real mode, protected mode, virtual real mode, and compatible mode.

Real Mode

A CPU that operates in real mode can execute only one program at a time, and can address only 1 MB of system memory. Although all modern processors have real mode available, it is used only by DOS and DOS applications in old operating systems and by 16-bit operating environments, such as Windows 3.x.

Protected Mode

A CPU that operates in protected mode has access to all of the memory in the computer, including virtual memory. Virtual memory is hard disk space that is used to emulate RAM. Operating systems that use protected mode can manage multiple programs simultaneously. Protected mode provides 32-bit access to memory, drivers, and transfers between input and output (I/O) devices. Protected mode is used by 32-bit operating systems, such as Windows

2000 and Windows XP. In protected mode, applications are protected from using the memory reserved for another application that is currently running.

Virtual Real Mode

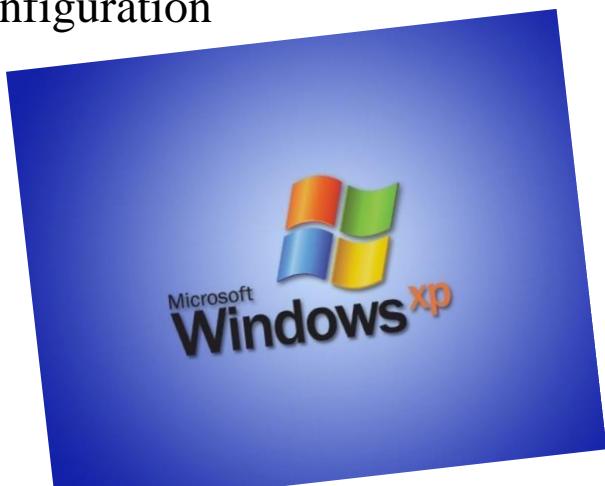
A CPU that operates in virtual real mode allows a real-mode application to run within a protected-mode operating system. This can be demonstrated when a DOS application runs in a 32-bit operating system, such as Windows XP. Table 5-2 is a chart of some common DOS commands that can still be used in modern operating systems, such as Windows XP

32 Bit versus 64-Bit

There are three main differences between 32-bit and 64-bit operating systems. A 32-bit operating system, such as Windows XP Professional, is capable of addressing only 4 GB of RAM, while a 64-bit operating system can address more than 128 GB of RAM. Memory management is also different between these two types of operating systems, resulting in enhanced performance of 64-bit programs. A 64-bit operating system, such as Windows Vista 64-bit, has additional security features such as Kernel Patch Protection (KPP) and mandatory driver signing. With KPP, third-party drivers cannot modify the kernel. With mandatory driver signing, unsigned drivers cannot be used.

Windows XP - Installation and configuration

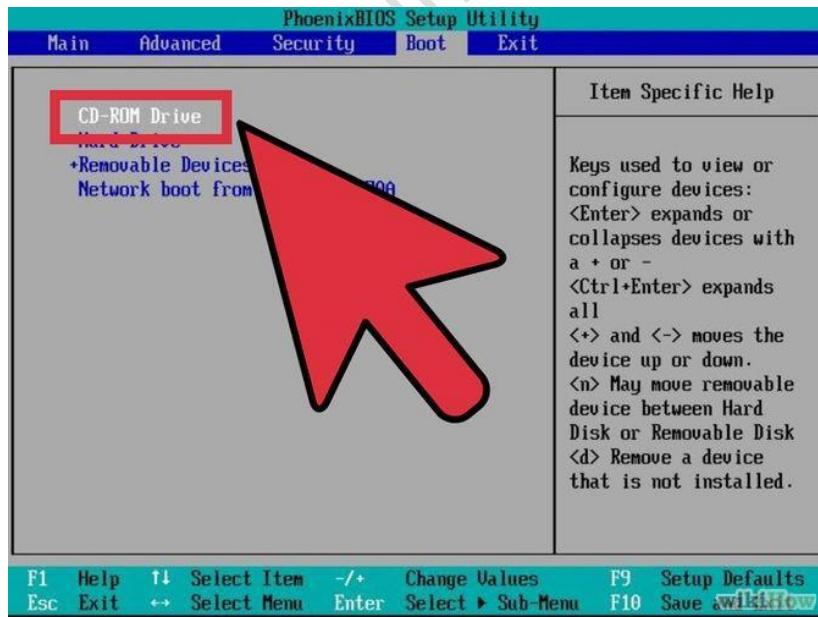
Windows XP is an operating system introduced in 2001 from Microsoft's Windows family of operating systems, the previous version of Windows being Windows Me. The "XP" in Windows XP stands for eXPerience. Microsoft called the XP release its most important product since Windows 95. Along with a redesigned look and feel to the user interface, the new operating system was built on the Windows 2000 kernel, giving users a more stable and reliable environment than previous versions of Windows.



Installation Steps

Start your computer from the Windows XP CD. To do this, insert the Windows XP CD into your CD drive or DVD drive, and then restart your computer.

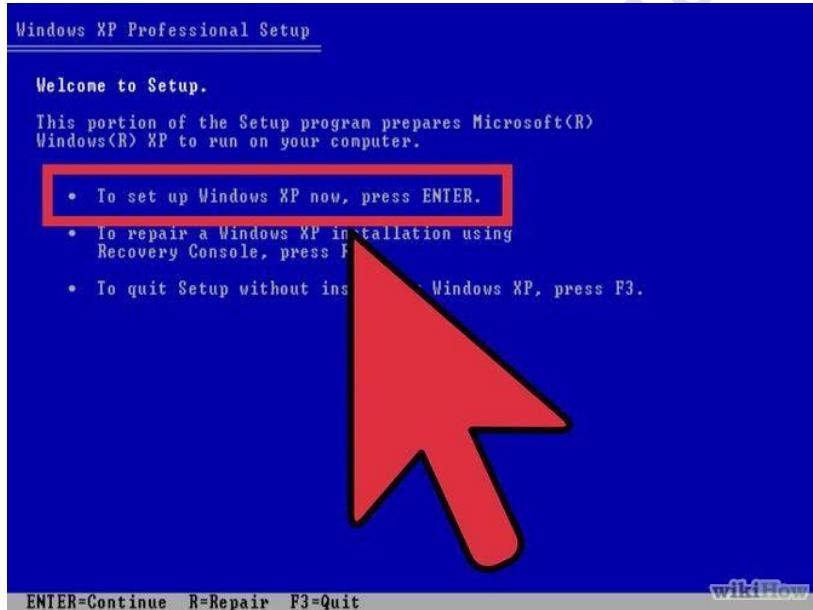
Note To boot from your Windows XP CD, the BIOS settings on your computer must be configured to do this.



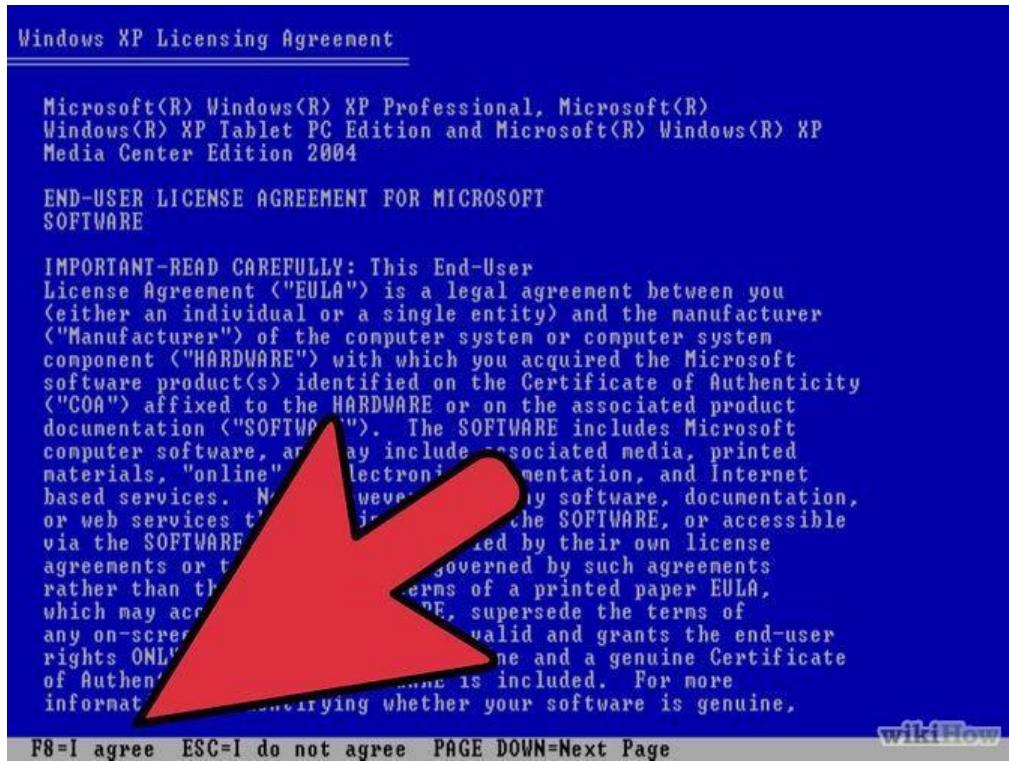
1. When you see the "Press any key to boot from CD" message, press any key to start the computer from the Windows XP CD.



Press ENTER to begin installation. Once the loading is complete, you will be taken to the Welcome screen. You are given several options, but if you are installing or reinstalling Windows XP, you'll want to press ENTER to start the installation configuration.

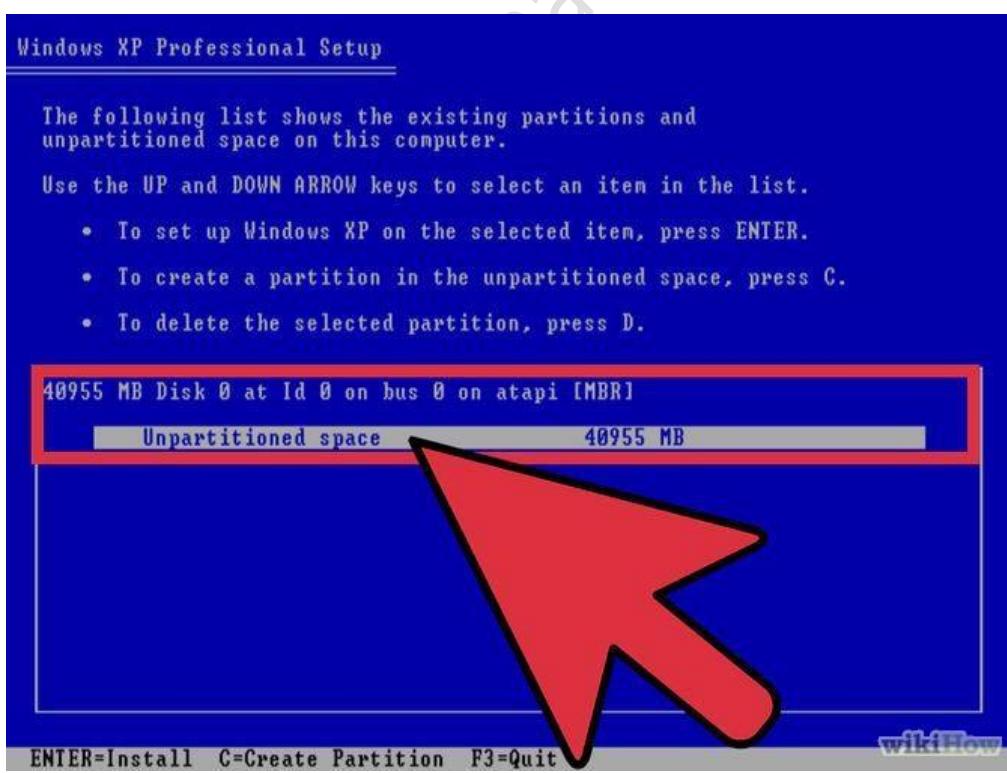


2. Read the Microsoft Software License Terms, and then press F8.



Select the partition you want to install on. You will see a list of available partitions on your installed hard drives. If you are installing Windows XP on a new hard drive, you should see only one entry labeled "Unpartitioned space." If you have a previous version of Windows or Linux installed on your computer, you will potentially have multiple partitions.

Installing Windows XP will erase all of the data on the partition that you choose. Select a



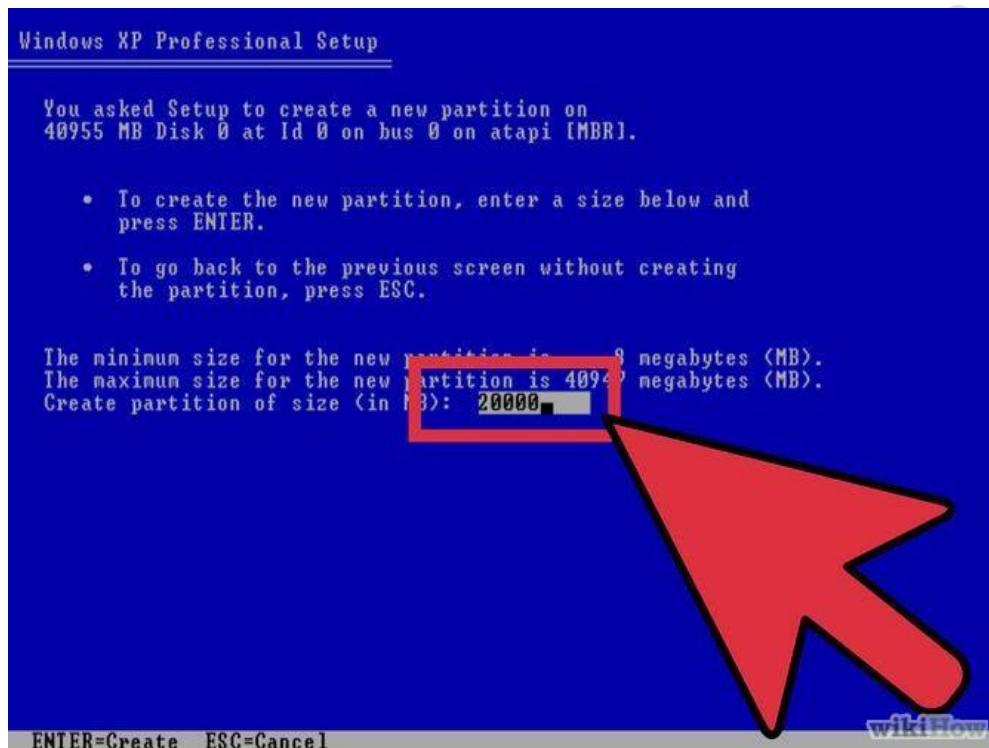
partition
that is
empty or that
contains data
that you do not
care to lose.
You can delete
your partitions
with the "D"
key. This will
return them to
"Partitioned
space". Any
data on the
partition will be
lost when it is
deleted.

Create a new
partition. Select

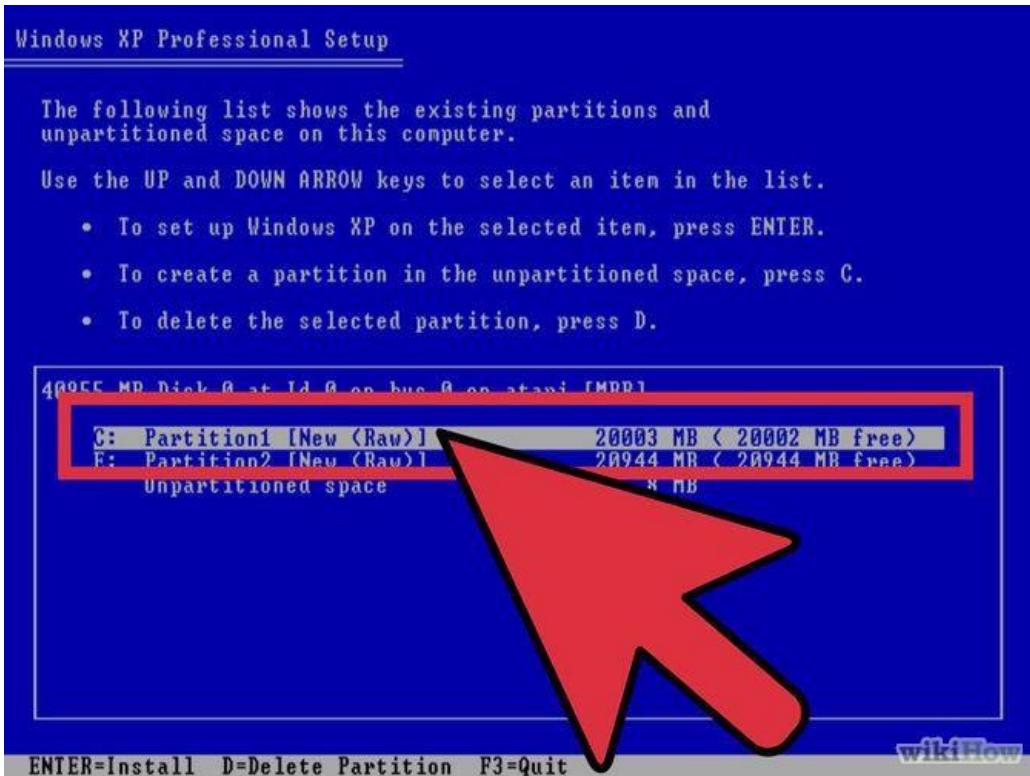
the Unpartitioned space and press "C". This will open a new screen where you can set the partition's size from the available space. Enter the size in megabytes (MB) for the new partition and then press ENTER.

- By default, the partition will be set to the maximum amount of available space. Unless you plan on creating multiple partitions, you can usually leave this at its default.
- Windows XP requires at least 1.5 gigabytes (1536 MB) for its installation files, but you will want more than this for programs, documents, downloads, and other files. 5 gigabytes (5120 MB) is a good baseline amount for Windows XP, with more if you plan on installing a lot of programs.
- You can create multiple partitions on a single drive. This can allow you to separate your programs from your movies and music, or to install another operating system. Windows XP can only be installed on one discrete partition.

□
□



3. **Select your new partition.** Once you've created your installation partition, you will be returned to the partition selection screen. Select your new partition, usually labeled "C: Partition 1 [Raw]" and press ENTER.



4. **ENTER=Install D=Delete Partition F3=Quit**

5.

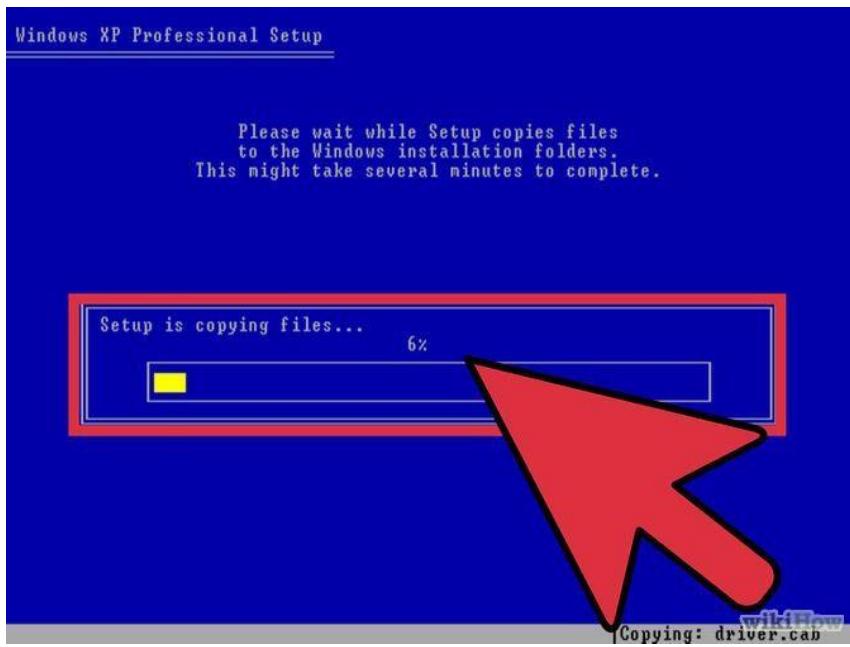
6.

7. Select "Format the Partition using the NTFS File System" and press ENTER. NTFS is the preferred method, supporting a larger amount of disk space per partition than FAT, and including security features at the file system level. NTFS also includes system level compression. There are almost no situations anymore where choosing FAT would be preferable.

- If your partition size is larger than 32 GB, you will not be given the option to choose FAT.
- It is highly recommended to avoid Quick Format, as this skips an important process that checks the hard drive for errors or bad sectors. This scan is what consumes the majority of the time taken when performing a full format. If there are errors on a disk at the physical level, it's best to catch them now rather than later.



8. **Wait for the format to complete.** The system will now format the partition. The length of time this process requires depends on the speed and size of the drive. In general, the larger the partition, the longer the process will take



9. Allow the computer to boot normally. You will see the message asking you to press a key to boot from CD. Ignore it and allow the computer to continue booting from the hard drive. You will see the Windows logo as the Setup program loads.

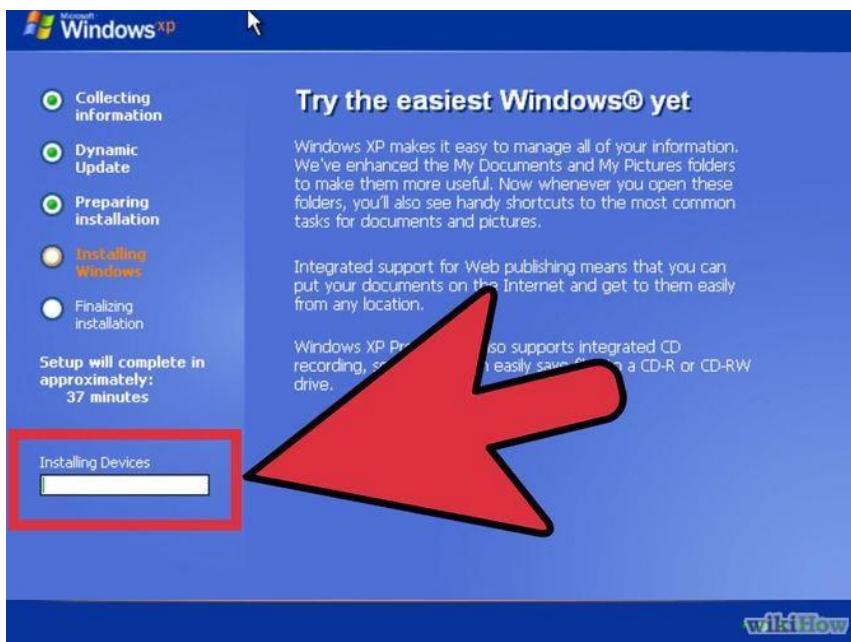


10. Wait for the installation to proceed. After the Windows logo goes away, you will see a list of steps remaining on the left side of the screen, and tips for using windows on the right.

The time remaining for the installation will be displayed below the list of steps remaining.

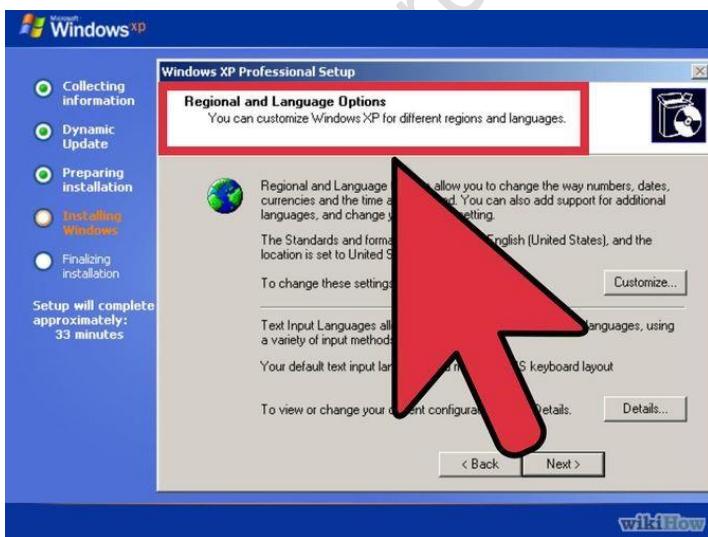
- It is normal for the screen to flicker, turn on and off, or resize during this process.

□



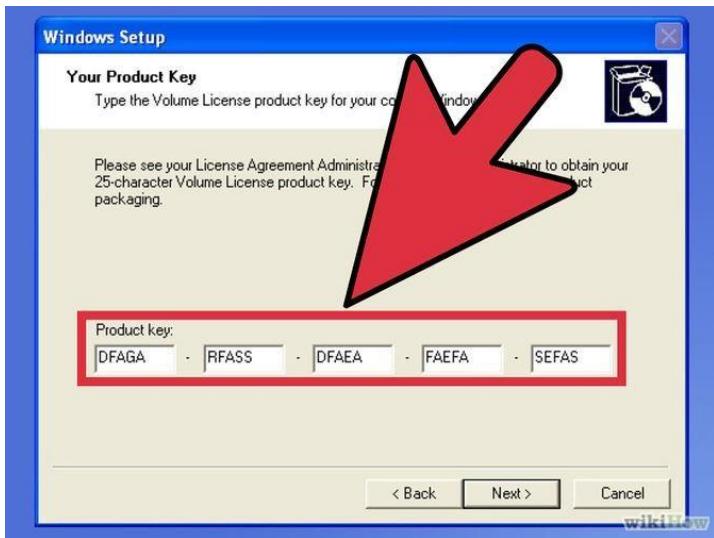
11. Choose your language and region settings. During the installation process a dialog window will appear, asking you to choose your Regional settings. Select appropriate settings native to your area. Click the Next button when that is completed.

- Enter your full name if you want. This will be set as the “owner” of Windows, and will be attached to certain things, such as Document creation.

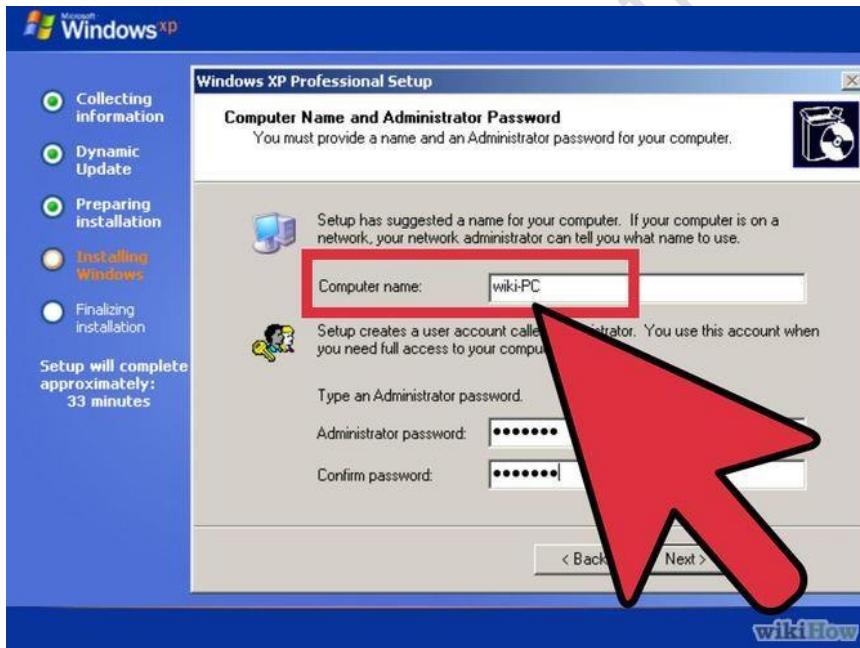


12. Enter your Product Key. You will not be able to complete the installation process without a valid Product Key. Click "Next" to continue.

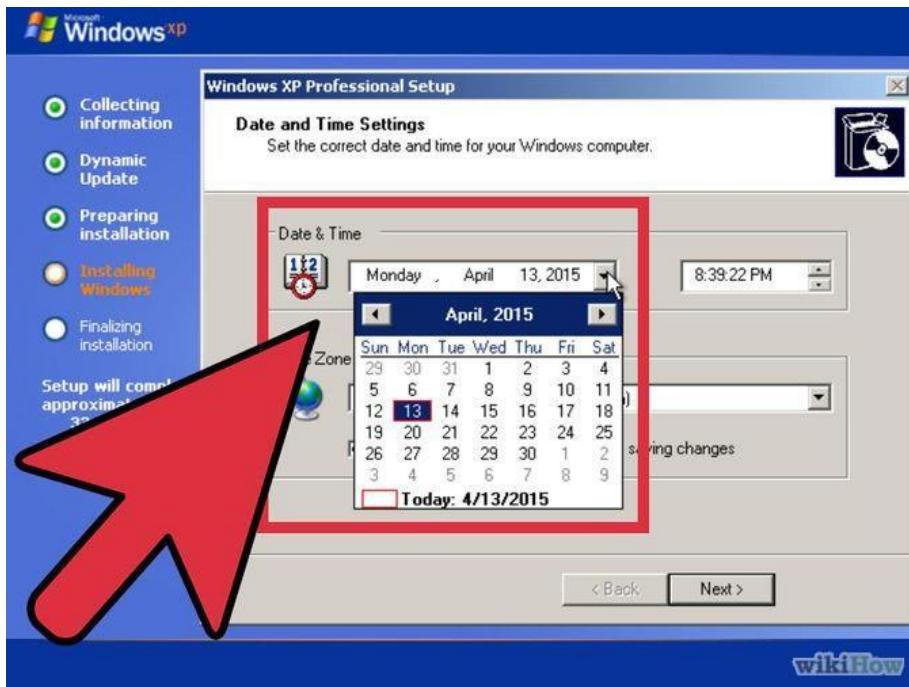
- Some versions of Windows will not ask for the Product Key until installation is complete.



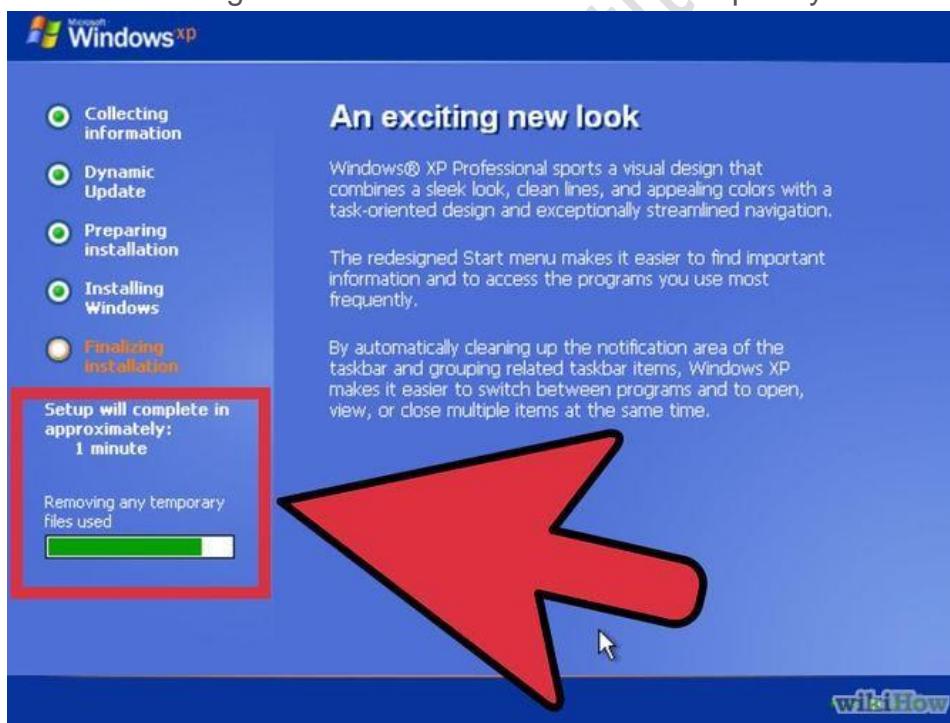
- 13. Set your computer's name.** This will be the name that represents the computer on a network. Windows sets a default name, but you can change it if you would like. You can also set a password for the Administrator account. This is optional, but recommended for public computers.



- 14. Select your time zone.** Ensure that the date/time are correct. Click "Next" to continue.



- 15.** Wait for the installation to finalize. This will only take a few minutes, and the computer will reboot when it is finished installing. Once the computer reboots, you will be taken to the Windows XP desktop. At this point, installation is complete, though there are a few things left to do before Windows is completely usable.



- 16.** Complete the installation by giving User Name and Click continue

Windows XP - Command Prompt – Installation

To start Windows XP at a command prompt, follow these steps:

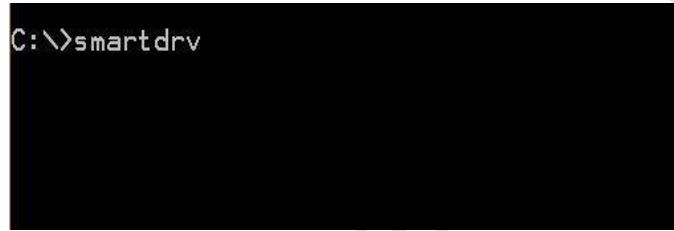
Create a partition on the hard disk and format it with the FAT or FAT32 file system Use FDISK or Disk Manager (DM) to create FAT16/ FAT 32 Partitions.

Copy XCOPY, EDIT, SMARTDRV into C :\> drive.

Install CDROM in DOS.

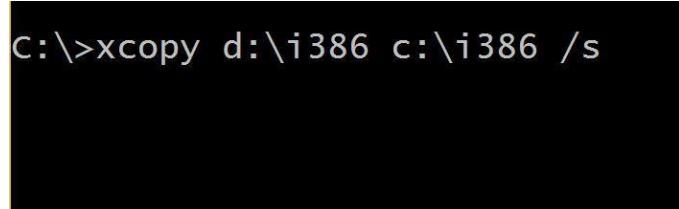
Insert the Windows XP CD-ROM in the CD-ROM or DVD-ROM drive.

Start SMARTDrive if it is not already started.To start, type smartdrv, in C: \> and then press ENTER . (If you do not use SMARTDrive, the Windows XP Setup program may copy files to the hard disk slowly.)



At the command prompt, type drive:, and then press ENTER (where drive is the drive that contains the Windows XP CD-ROM - eg: D:\> is CDROM).

Type the following command, for copying installation files of Windows XP to C: \> drive. C:\>
XCOPY D:\I385 C:\I386 /S and press Enter (/S is used for copying sub directory also)



After copying all files, go to C: \> drive . C:\> cd
i386 and press enter.

C:\i386>winnt press enter

```
c:\i386>winnt
```

The Windows XP Setup program starts.

Type the path of the Windows XP installation files, and then press ENTER. For example, type d:\i386.

The Windows Setup program copies files to the hard disk. When the files are copied, you receive the following message:

The MS-DOS based part of The Setup Program Is complete.

The Setup program will now restart your computer. After your computer restarts, the Windows XP Setup program will continue. If there is a floppy disk in drive A:, remove it now.

Press ENTER to restart your computer and continue Windows XP Setup.

Remove any floppy disks from the computer, and then press ENTER. The computer restarts, and the Windows XP Setup program resumes.

Press ENTER to continue.

Follow the steps to select and format a partition where you want to install Windows XP. If your hard disk contains only one partition, do not delete it from the list of existing partitions. The Windows XP Setup program has copied the installation files to this partition.

Setup copies the files that the Windows XP Setup program requires, and then the computer restarts. If you chose to format the drive by using the NTFS file system, Windows checks the drive for errors, and then it restarts. Windows XP Setup resumes in Graphical User Interface (GUI) mode.

Follow the steps in the Windows Setup Wizard to complete the installation of Windows XP.

Module M4/U2/S1-S6

Managing Windows XP – Basics to Advanced Administration

Start Windows XP

Now you are going to do the practical work with Windows XP. If you have not done so already, turn on your pc now.

All programs have to be started; Windows XP is no exception, but it happens automatically. When you turn on power to the pc, it boots, the pc gets ready, and the operating system and its various programs are read in.



Microsoft has done much to optimize the start-up, so ordinarily Windows XP will be ready run in 30 seconds after you turn on power. That is a substantial improvement – especially when compared to Windows 2000 and NT, which could demonstrate a very slow start-up. After start-up You usually have to click on a user name, since other users may use the same pc (see the description on page 61). To select a user is really called "log on". See Figure 5. Once you have logged on, you will get to Windows XP itself. This picture may look slightly different from pc to pc.

Graphics user interface

Windows XP is first of all characterized by a smart graphics user interface that you need to get acquainted with. The user interface is built basically on the same model we know from Windows 2000 og 98/Me, but the appearance has changed quite a bit. There are many features that you need to know; here are some of the most important:

The Start button, which covers a wide range of Menus. It is in the bottom left of the screen and gives access to all the pc's programs.



The task bar



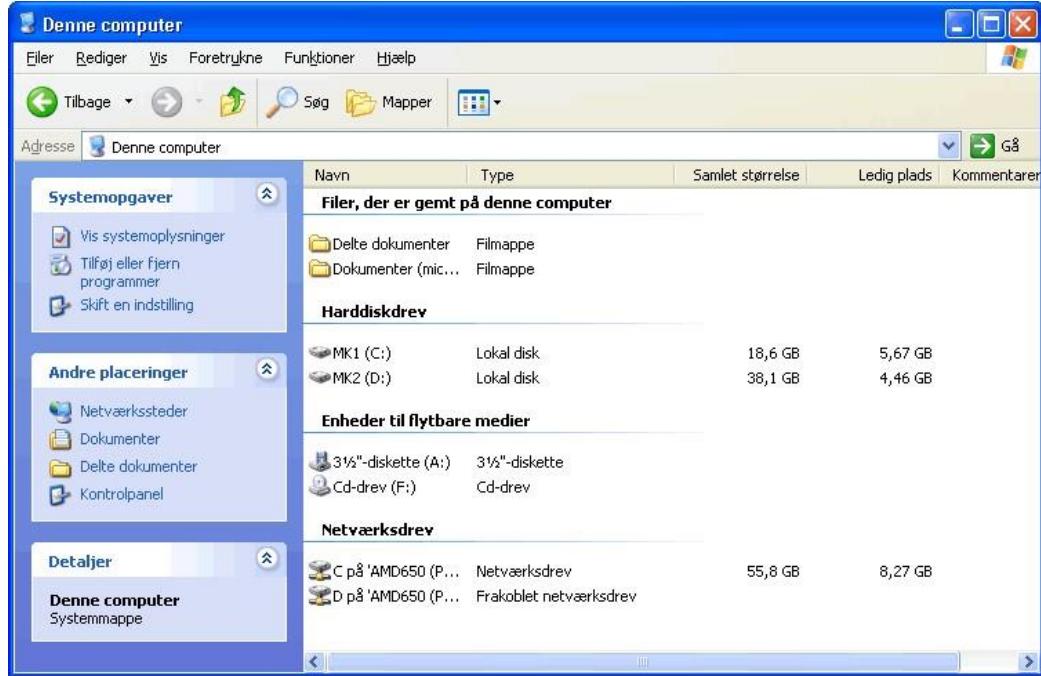
The task bar is the daily "cockpit", from where you control your work. You can modify the task bar in many ways,

Desk top. That is the large area you see when Windows XP starts. Compared with earlier Windows editions there are much fewer default icons on the desk top, which can be modified in different ways



Hyperlinks. The Windows XP user interface makes extensive use of hyperlinks (previously referred to as shortcuts). Hyperlinks appear as small icons, and they can be placed in many places on the Windows XP user interface. Hyperlinks are known from web, where you can open various home pages by clicking on them. In the same way Windows XP gives you very easy access to files, home pages, programs and other objects.

Windows Explorer and My Computer. Windows Explorer is really your tool to work with files, folders, programs, hyperlinks, Control panel and much more. The starting point for work with Windows Explorer is often My Computer. That is a system folder that shows and gives access to most of the pc's resources .



"This computer" is a very important folder, which opens access to the pc's drives, folders and files. The control panel is the entry to the pc's various settings such as controlling hardware units through the so-called drivers



Windows XP gives additional users the option of their individual "log-on".

The Start button

First we will look at the Start button, which most people are familiar with.

The only change in Windows XP is that the button compared to older versions is that it is now green and got a rounded appearance .

..



The start button is your main entry to the pc. A single click on that opens the Start menu, which I will describe here. You can also activate it with the Windows key – I use that often:



The Windows key activates the Start menu directly.

You can actually operate the Start button in yet other ways. Try to press Control+Escape.

Hold the Control key and press the Escape key simultaneously, then the Start menu opens.

The Start menu

The Start menu has a rather new look in Windows XP, but the structure is about the same as before. You find:

- A number of hyperlinks to various programs and functions.
- An item that opens the sub menu All programs.
- Two buttons in the bottom of the menu, which can be used to change user (Log off) and to close the computer respectively.



The Start menu, which opens when you press the Start button. The menu is divided in two lists.

The left program list

In the left half of the menu you see a list with hyperlinks to selected programs. This list actually consists of two sections. On top are hyperlinks to important programs (Internet and E-mail in Figure 8). Here you can add and remove hyperlinks. If I right click on the Internet hyperlink, I could choose the menu item "Delete from this list":

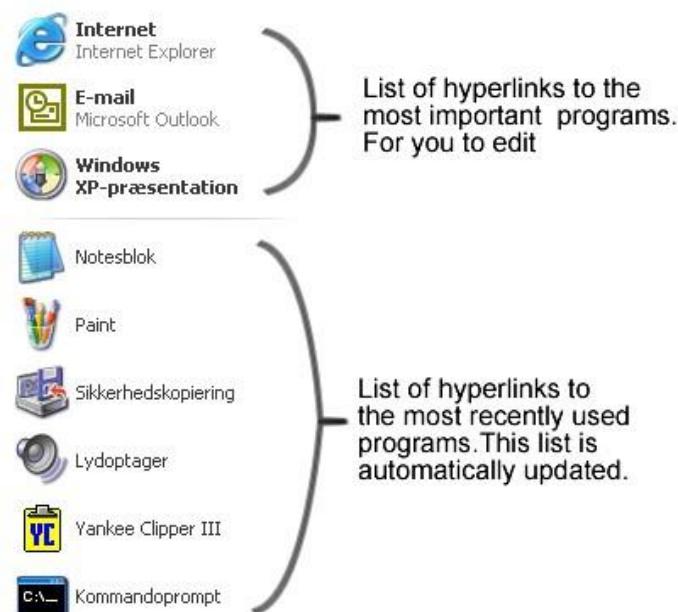


The bottom section in the left program list is automatically updated with hyperlinks to the most recently used programs. Here we are talking about programs, which you open with the menus

Start à All programs. They are automatically emphasized with a hyperlink in the left list, when you have used them.

In Figure you see six hyperlinks (Noteblock, Paint etc.). Those are hyperlinks that are installed in my list, beyond my control. That happened because I have used or installed the listed programs.

I can remove these hyperlinks from the list if I do not want to see them, but I don't have to worry about that. If I don't use them, they will automatically be replaced with hyperlinks to the programs I use:

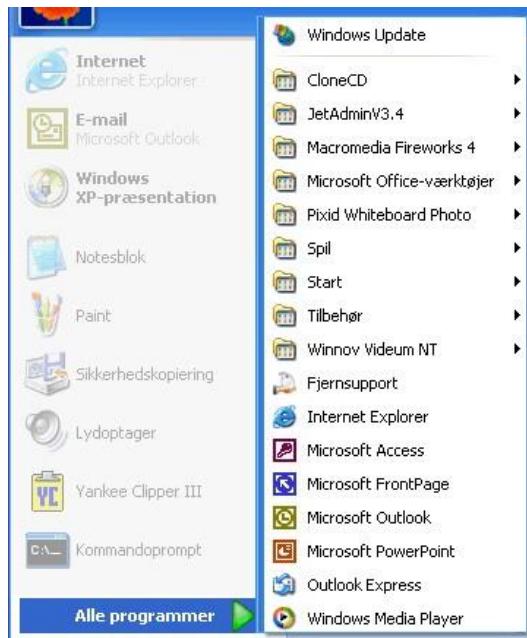


. The left list in the Start menu consists of two sections with each their own function. The six hyperlinks in the bottom of the left list are thus "dynamic"; they change with your work. The right list in the Start menu has 9-11 fixed hyperlinks, which can activate a number of central Windows functions.

The start menu thus contains a number of hyperlinks. But the most important is probably the access to the pc's programs. You find that in the menu item All programs, which can be opened by pressing letter a. You can see that by the underlining of the first letter:



That menu item opens access to a list of various programs. Some of those are installed with Windows XP, you have installed others yourself. Here is my list:



. The list with All programs is seen to the right.

If you examine the list, you can find two types of menu items:

☒ Hyperlinks, which give direct access to specified programs such as Windows Update,

remote support, Internet Explorer etc. ☒ Access to sub menus, which are associated with specific program groups. They are

recognized by the small arrow to the far right. In Figure 9 you thus see the program groups CloneCD, JetAdminV3.4 and Macromedia Fireworks 4.

Some of the sub menus are installed by Windows XP. Those are Play, Start and Accessories. The others belong to program packages that I have installed on the pc.

Try for yourself

Some of the menu items have a built-in help text, which activates when the mouse cursor rests upon them. Try to place the cursor on the top item, Windows Update. Then the help text appears in a yellow box:

User Management

In Windows XP, there are three types of user accounts.

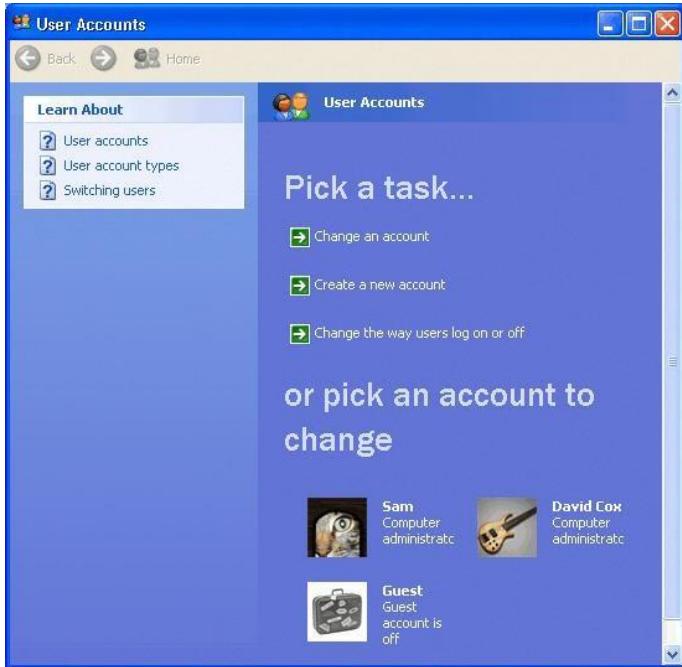
Administrator account. The administrator can do everything with the computer and can go anywhere he or she desires—essentially giving that person control over the entire computer, including other accounts. The administrator account can never be disabled or deleted.

Standard account. Users with standard accounts can install programs and hardware, change pictures and related personal data, and create, change, or remove passwords.

Guest account. A guest account doesn't require a password, can't add or remove programs from the computer, and is disabled by default. This account type is ideal for kids and students.

User Creation – Method 1

To easily manage user accounts, click the User Accounts icon in the Control Panel.



To create a new account:

Click Create a New Account in the User Accounts window.

A User Accounts window appears. Enter the name of the new account, then click Next.

The next window asks you to pick an account type. Choose Computer Administrator or Limited by clicking the appropriate radio button.

If you're not sure, click each one and read the list of actions that can be performed by the account type.

When finished, click the Create Account button.

The new account now appears in the User Account window.

Changing an account

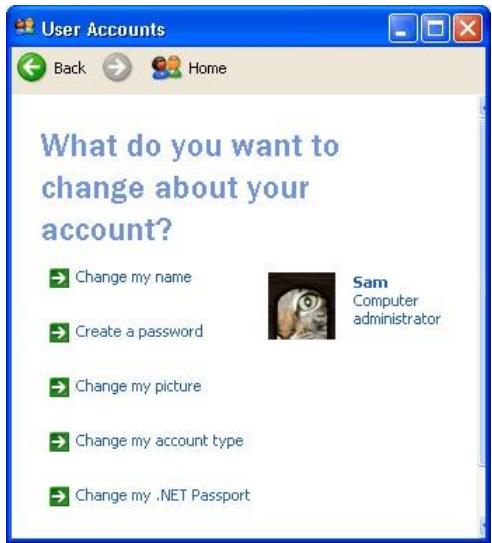
Any account can be easily edited or changed from the User Accounts window.

To change an existing user account:

Click Change an Account in the User Accounts window.

A window appears asking you which account you want to change.

The next window (figure below) allows you to change the name on the account, the picture, and the account type; create a password; and delete the account. Make necessary changes. Use the Back button to return to the original list to make any additional changes.



Changing user log on and log off procedures You can also select the way users log on and log off.

To change log on and log off options:

Click Change the way users log on and off in the User Accounts window.

You'll see two check boxes that allow you to enable the Welcome screen and Fast User Switching. Fast User Switching allows you to switch to another user account without closing any programs.



My Computer - Right Click – Manage



Click Local Users and Groups

Right Click on Users, Click New User

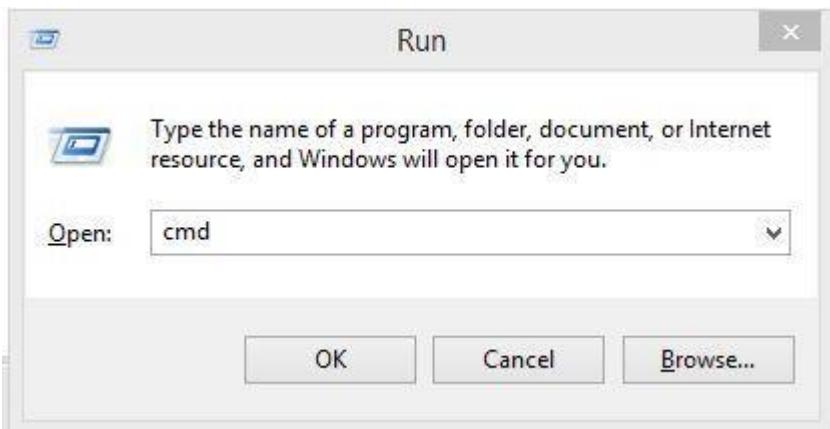


Type User Name, Password and click Create

User Creation – Method 3

Using Command Prompt

In Run menu type cmd



Syntax (For Create User)

Net user <user name> <password> /add



An e.g.: is shown below (where abc is Username, 123 is password)

A screenshot of a Windows Command Prompt window titled "C:\Windows\system32\cmd.exe". The command line shows "C:\Users\User>net user abc 123 /add". The window is mostly black, indicating no output was displayed.

Syntax (For Delete User)

Net user <user name> /del



Syntax (For Change Password of an

Net user <user name> <password>



existing user)

Disk Management

Disk Management is used to Create and Delete partitions, Manage Partitions, Change drive letters, Format volumes with the FAT, FAT32, or NTFS file systems.

To open Disk Management,

My Computer → Right Click -> Manage -> Disk Management



To create a new partition or a new logical drive

To create a new partition or logical drive on a basic disk:

In the Disk Management window, complete one of the following procedures, and then continue to step 2:

To create a new partition, right-click unallocated space on the basic disk where you want to create the partition, and then click New Partition.

To create a new logical drive in an extended partition, right-click free space on an extended partition where you want to create the logical drive, and then click New Logical Drive.

In the New Partition Wizard, click Next.

Click the type of partition that you want to create (either Primary partition, Extended partition, or Logical drive), and then click Next.

Specify the size of the partition in the Partition size in MB box, and then click Next. Decide whether to manually assign a drive letter, let the system automatically enumerate the drive, or do not assign a drive letter to the new partition or logical drive, and then click Next.

Specify the formatting options you want to use by using one of the following procedures: If you do not want to format the partition, click Do not format this partition, and then click Next.

If you want to format the partition, click Format this partition with the following settings, and then complete the following procedure in the Format dialog box:

Type a name for the volume in the Volume label box. This is an optional step. Click the file system that you want to use in the File system box.

You can change the disk allocation unit size, and then specify whether to perform a quick format, or enable file and folder compression on NTFS volumes.

Click Next.

Confirm that the options that selected are correct, and then click Finish.

The new partition or logical drive is created and appears in the appropriate basic disk in the Disk Management window. If you chose to format the volume in step 6, the format process now starts.

To format a basic volume

To format a partition, logical drive or basic volume:

In the Disk Management window, right-click the partition or logical drive that you want to format (or reformat), and then click Format.

In the Format dialog box, type a name for the volume in the Volume label box. This is an optional step.

Click the file system that you want to use in the File system box. If you want, you can also change the disk allocation unit size, specify whether you want to perform a quick format, or enable file and folder compression on NTFS volumes.

Click OK.

Click OK when you are prompted to format the volume. The format process starts.

To delete a partition or a logical drive To
delete a partition or logical drive:

In the Disk Management window, right-click the partition or logical drive that you want to delete, and then click Delete Partition or Delete Logical Drive.

Click Yes when you are prompted to delete the partition or logical drive. The partition or logical drive is deleted.

Important

When you delete a partition or a logical drive, all the data on that partition or logical drive, and the partition or the logical drive, are deleted.

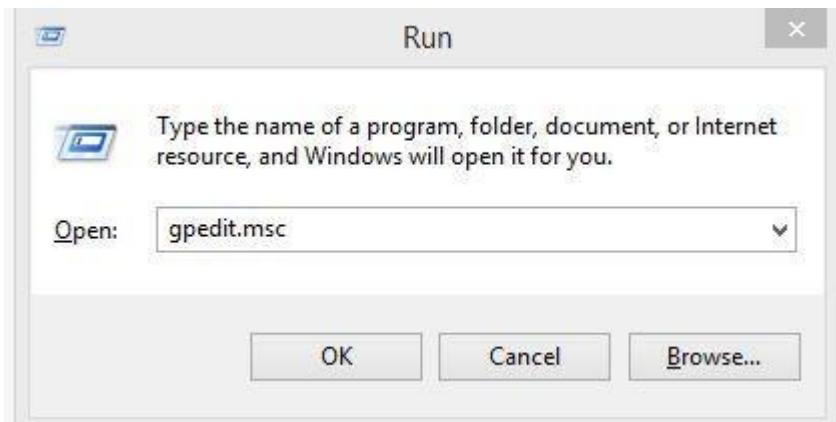
You cannot delete the system partition, boot partition, or a partition that contains the active paging (swap) file.

You cannot delete an extended partition unless the extended partition is empty. All logical drives in the extended partition must be deleted before you can delete the extended partition.

gpedit.msc (Group Policy Management)

Group Policy is a feature of the Microsoft Windows NT family of operating systems that controls the working environment of user accounts and computer accounts. A version of Group Policy called Local Group Policy ("LGPO" or "LocalGPO") also allows Group Policy Object management on standalone and non-domain computers

To open the Local Group Policy Editor from the command line
Click Start , type gpedit.msc in the Start Search box, and then press ENTER .



Run Level commands

msconfig - Configuration to edit startup files

MSConfig (officially called System Configuration in [Windows Vista](#), [Windows 7](#) and [Windows 8](#) or Microsoft System Configuration Utility in previous [operating systems](#)) is a [system utility](#) to [troubleshoot](#) the [Microsoft Windows startup](#) process. It can disable or re-enable software, [device drivers](#) and [Windows services](#) that run at startup, or change boot parameters.

dxdiag - DirectX Diagnostic Utility

DxDiag ("[DirectX](#) Diagnostics") is a diagnostics tool used to test DirectX functionality and troubleshoot video- or sound-related hardware problems. DirectX Diagnostic can save text files with the scan results. These files are often posted in tech [forums](#) or attached to support emails in order to give support personnel a better idea of the PC the requester is using in case the error is due to a hardware failure or incompatibility.

Module M4/U3/S1-S6

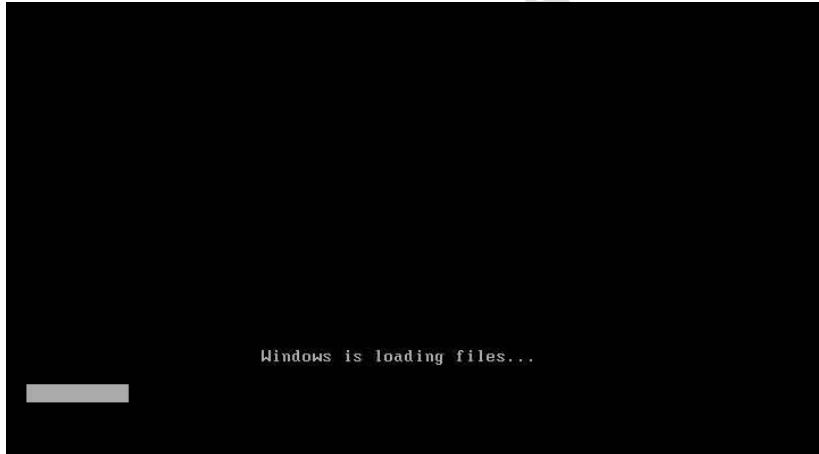
Windows 7

Windows 7 Installation – Steps

Boot from CD/DVD by setting 1st boot device as CD/DVD in BIOS.

After you have placed the disc into the disc drive, start your computer. When the computer starts, press a key if you are asked if you would like to boot from the disc by pressing any key.

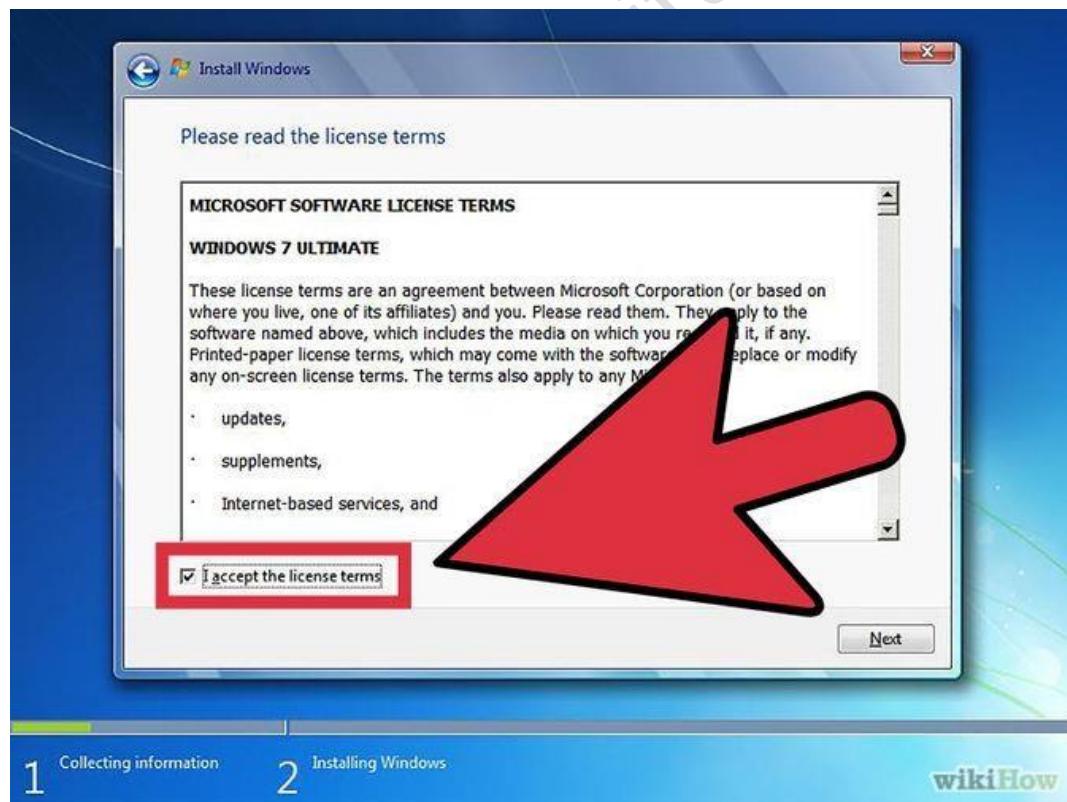
After you choose to start from the disc, Windows Setup will begin loading.



Once Windows Setup loads, you'll be presented with a window. Select your preferred language, keyboard type, and time/currency format, then click Next.



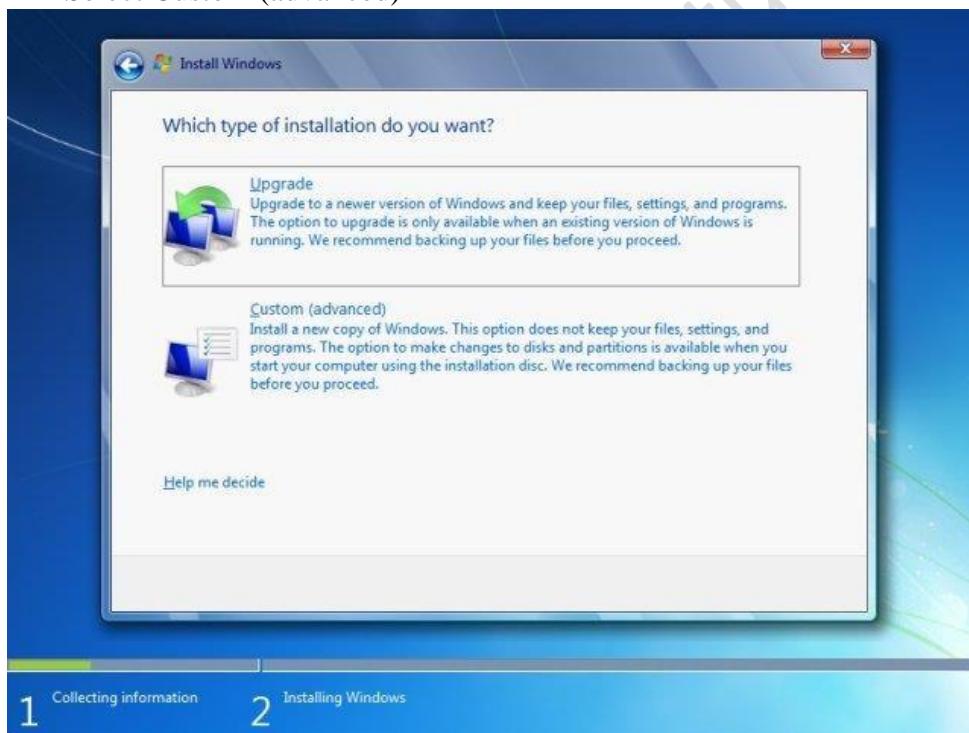
Accept the License Terms. Read over the Microsoft Software License Terms, check I accept the license terms, and click Next.



Click on Install Now

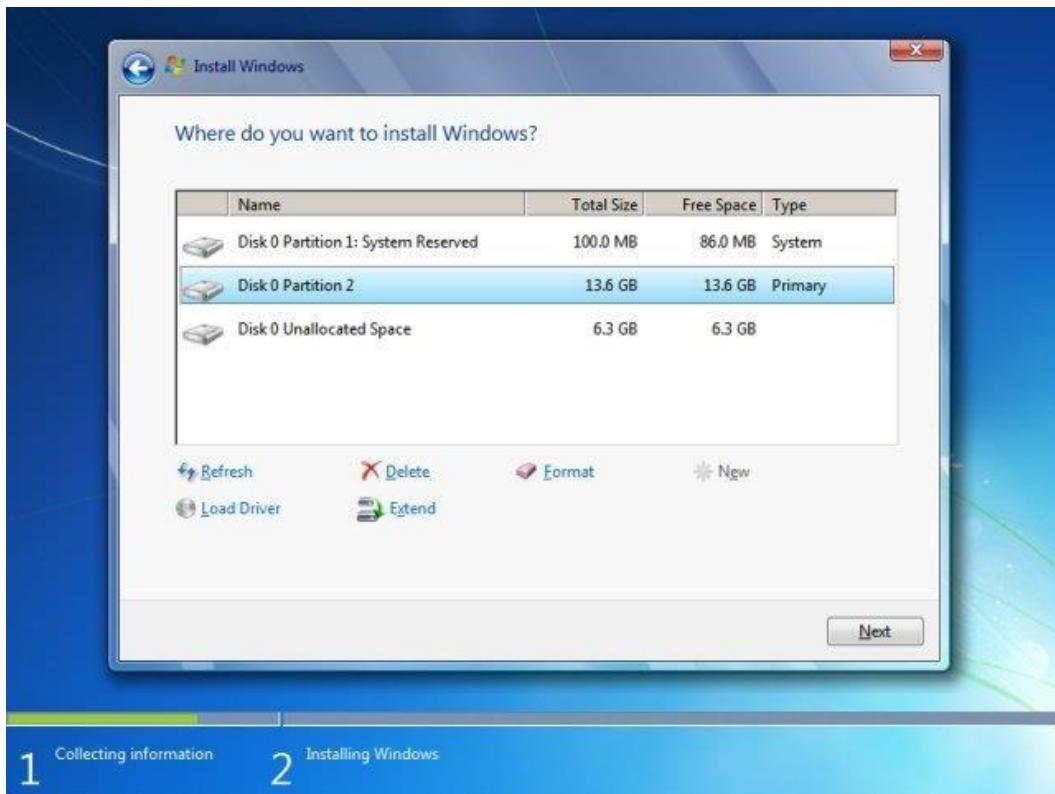


Select Custom (advanced)

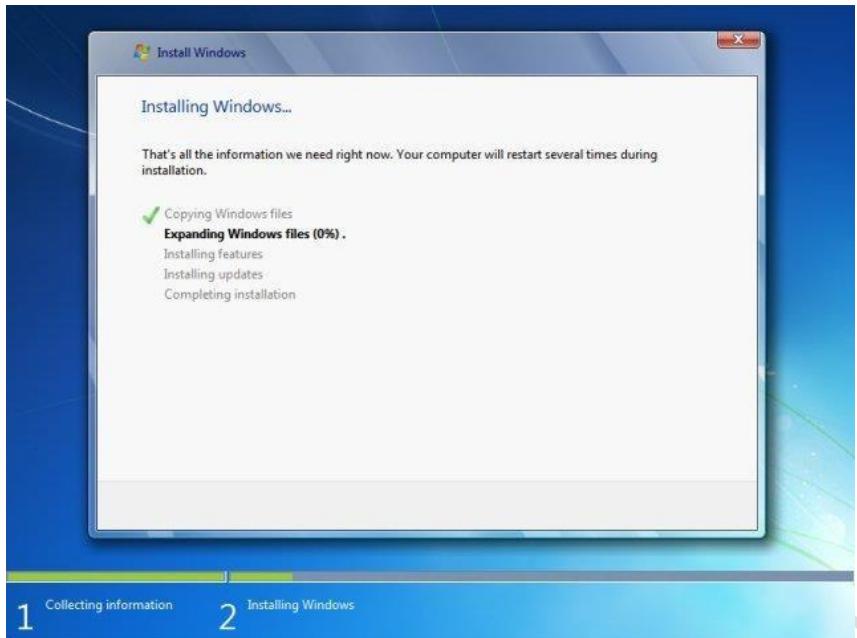


Select unpartitioned space and Click New. Create a partition with 20 / 25 GB (Size minimum 15 GB)

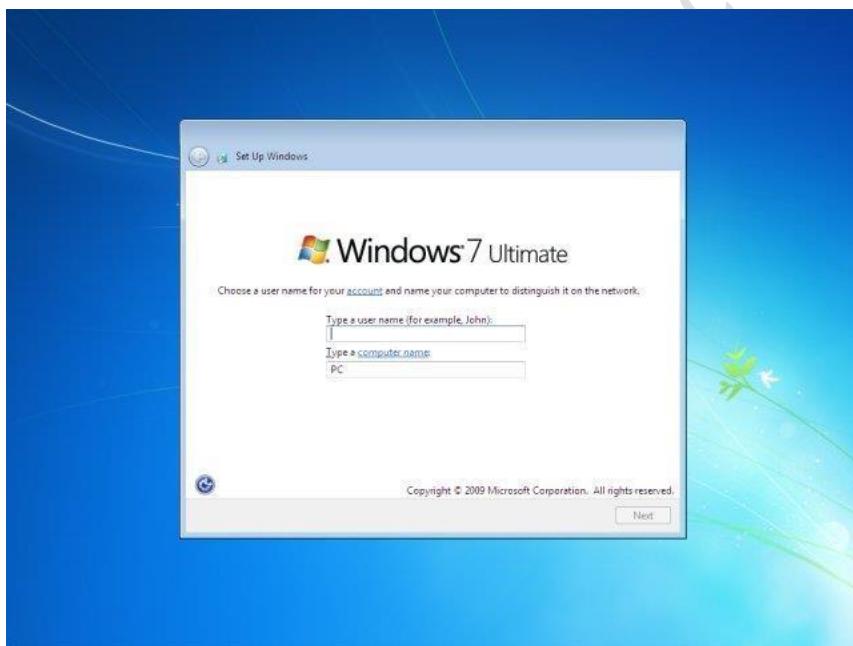
Click on Next



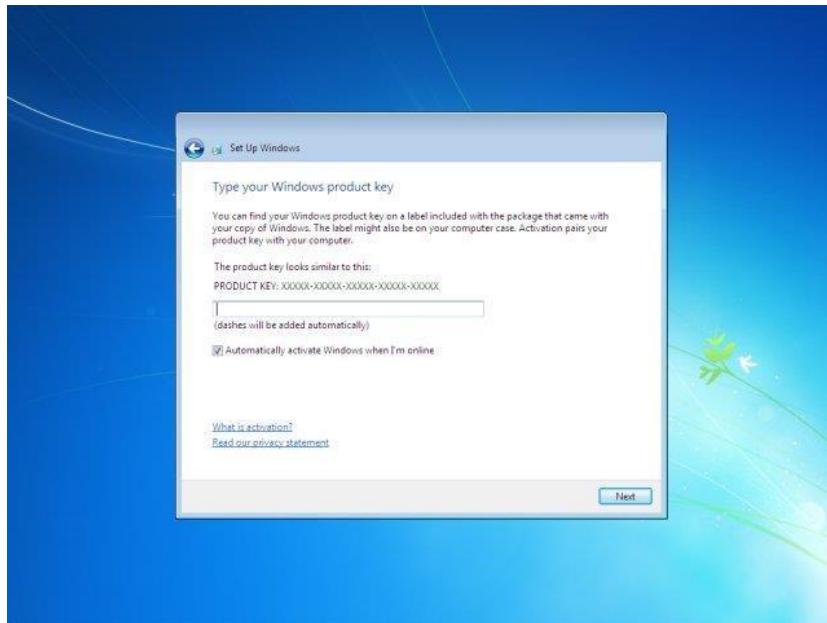
Installation starts.



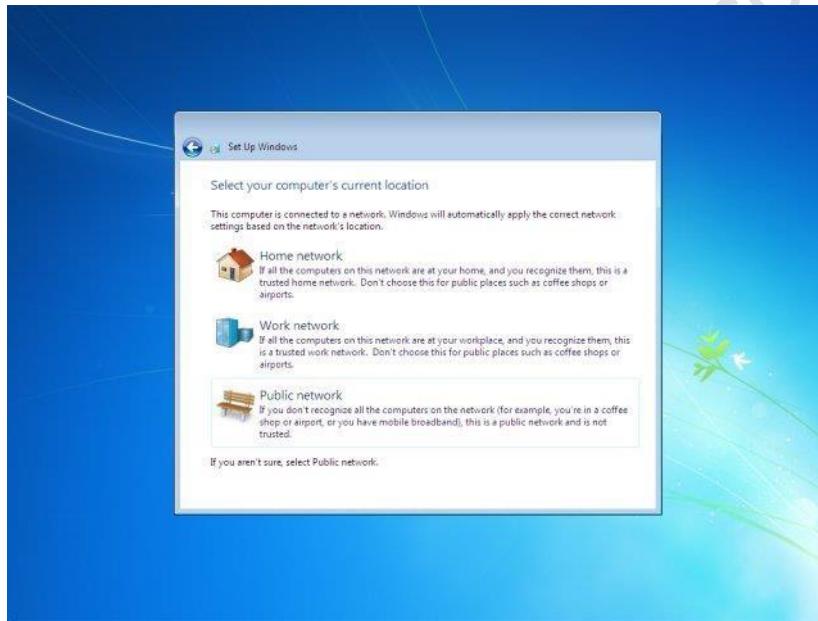
After it give User Name, click Next



Give the product key.



Select the Network



Upon finishing the process , you will reach the desktop . Since you have basic skills with working with windows environment , you can start exploring what is new with the windows 7 on your lab sessions .

Let us look in to some of the advanced features of Windows 7 comparing to windows XP .

System Requirements

Minimum hardware requirements for Windows 7

Component	Operating system architecture	
	32-bit	64-bit
Processor	1 GHz IA-32 processor	1 GHz x86-64 processor
Memory (RAM)	1 GB	2 GB
Graphics card	DirectX 9 graphics processor with WDDM driver model 1.0	
Free hard drive space	16 GB	20 GB
Optical drive	DVD-ROM drive (Only to install from DVD-ROM media)	

Editions

Microsoft currently has six different versions of the Windows 7 operating system:

- Windows 7 Starter
- Windows 7 Home Basic
- Windows 7 Home Premium
- Windows 7 Professional
- Windows 7 Enterprise
- Windows 7 Ultimate

Windows 7 is available in six different editions, of which the Home Premium, Professional, and Ultimate were available at retail in most countries, and as pre-loaded software on new computers. Home Premium and Professional were aimed at home users and small businesses respectively, while Ultimate was aimed at enthusiasts. Each edition of Windows 7 includes all of the capabilities and features of the edition below it, and add additional features oriented towards their market segments; for example, Professional adds additional networking and security features such as Encrypting File System and the ability to join a domain. Ultimate contained a superset of the features from Home

Premium and Professional, along with other advanced features oriented towards power users, such as BitLocker drive encryption; unlike Windows Vista, there were no "Ultimate Extras" add-

ons created for Windows 7 Ultimate. Retail copies were available in "upgrade" and higher-cost "full" version licenses; "upgrade" licenses require an existing version of Windows to install, while "full" licenses can be installed on computers with no existing operating system. The remaining three editions were not available at retail, of which two were available exclusively through OEM channels as pre-loaded software. The Starter edition is a stripped-down version of Windows 7 meant for low-cost devices such as netbooks. In comparison to Home Premium, Starter has reduced multimedia functionality, does not allow users to change their desktop wallpaper or theme, disables the "Aero Glass" theme, and does not have support for multiple monitors. Home Basic was sold only in emerging markets, and was positioned in between Home Premium and Starter. The highest edition, Enterprise, is functionally similar to Ultimate, but is only sold through volume licensing via Microsoft's Software Assurance program. All editions aside from Starter support both IA32 and x86-64 architectures; Starter only supports 32-bit systems. Retail copies of Windows 7 are distributed on two DVDs: one for the IA-32 version and the other for x86-64. OEM copies include one DVD, depending on the processor architecture licensed. The installation media for consumer versions of Windows 7 are identical; the product key and corresponding license determines the edition that is installed. The Windows Anytime Upgrade service can be used to purchase an upgrade that unlocks the functionality of a higher edition, such as going from Starter to Home Premium, and Home Premium to Ultimate. Most copies of Windows 7 only contained one license; in certain markets, a "Family Pack" version of Windows 7 Home Premium was also released for a limited time, which allowed upgrades on up to three computers. In certain regions, copies of Windows 7 were only sold in, and could only be activated in a designated region.

Features

Among Windows 7's new features are advances in touch and handwriting recognition, support for virtual hard disks, improved performance on multicore processors, improved boot performance, DirectAccess, and kernel improvements. Windows 7 adds support for systems using multiple heterogeneous graphics cards from different vendors (Heterogeneous Multi-adapter),¹ a new version of Windows Media Center, a Gadget for Windows Media Center, improved media features, XPS Essentials

Pack and Windows PowerShell being included, and a redesigned Calculator with multiline capabilities including Programmer and Statistics modes along with unit conversion for length, weight, temperature, and several others. Many new items have been added to the Control Panel, including ClearType Text Tuner Display Color Calibration Wizard, [Gadgets](#), Recovery, Troubleshooting, Workspaces Center, Location and Other Sensors, Credential Manager, Biometric Devices, System Icons, and Display. Windows Security Center has been renamed to Windows Action Center (Windows Health Center and Windows Solution Center in earlier builds), which encompasses both security and maintenance of the computer. ReadyBoost on 32-bit editions now supports up to 256 gigabytes of extra allocation. Windows 7 also supports images in RAW image format through the addition of Windows Imaging Component-enabled image decoders, which enables raw image thumbnails, previewing and metadata display in Windows Explorer, plus full-size viewing and slideshows in Windows Photo Viewer and Windows Media Center.

The default taskbar of Windows 7.



The taskbar has seen the biggest visual changes, where the old Quick Launch toolbar has been replaced with the ability to pin applications to taskbar. Buttons for pinned applications are integrated with the task buttons. These buttons also enable Jump Lists to allow easy access to common tasks. The revamped taskbar also allows the reordering of taskbar buttons. To the far right of the system clock is a small rectangular button that serves as the Show desktop icon. By default, hovering over this button makes all visible windows transparent for a quick look at the desktop. In touch-enabled displays such as touch screens, tablet PCs, etc., this button is slightly (8 pixels) wider in order to accommodate being pressed by a finger. Clicking this button minimizes all windows, and clicking it a second time restores them.

Window management in Windows 7 has several new features: Snap maximizes a window when it is dragged to the top of the screen. Dragging windows to the left or right edges of the screen allows users to snap software windows to either side of the screen, such that the windows vertically take up half the screen. When a user moves windows that were snapped or maximized using Snap, the system restores their previous state. Snap functions can also be triggered with keyboard shortcuts. Shake hides all inactive windows when the active window's title bar is dragged back and forth rapidly (metaphorically shaken). Desktop

Themes

Support for themes has been extended in Windows 7. In addition to setting the colors of the window chrome, desktop background, desktop icons, mouse pointers and sound schemes, themes in Windows 7 include desktop slideshow settings. A new control panel interface, accessible through the "Personalize" context menu item on the desktop. Desktop Slideshow Windows 7 includes a desktop slideshow that changes the desktop background in a designated amount of time with a smooth fading transition. This feature supports predownloaded sets of wallpapers and also supports photo RSS feed.

Gadgets

Windows Vista introduced Gadgets and a sidebar which provides the ability to anchor Gadgets to the side of the user's desktop. In Windows 7, the sidebar has been removed, while gadgets can still be placed on the desktop. Gadgets snap to certain positions on the desktop and from each other; dragging with the Shift key held down prevents gadgets from automatically snapping into position. Windows 7 adds a Windows Media Center gadget to the default collection while removing the Contacts and Notes gadgets.

Gadgets can be brought to the foreground on top of active applications by pressing Win+G.

Updates

Service Pack 1

Windows 7 Service Pack 1 (SP1) was announced on 18 March 2010. A beta was released on 12 July 2010. The final version was released to the public on 22 February 2011. At the time of release, it was not made mandatory. It was available via Windows Update, direct download, or by ordering the Windows 7 SP1 DVD. The service pack is on a much smaller scale than those

released for previous versions of Windows, particularly Windows Vista. Windows 7 Service Pack 1 adds support for Advanced Vector Extensions (AVX), a 256-bit instruction set extension for processors, and improves IKEv2 by adding additional identification fields such as E-mail ID to it.

Aero features

Windows 7 uses a group of features called Windows Aero. Aero is a visual desktop experience that combines translucent windows, appealing color, and graphics effects with convenient functionality. Aero includes Snap, Peek, Shake, and Flip. Watch the video to learn how the Aero features work on the desktop.

Snap

Snap allows you to resize open windows to make reviewing and comparing easier. The images below show two windows before and after using the Snap feature.





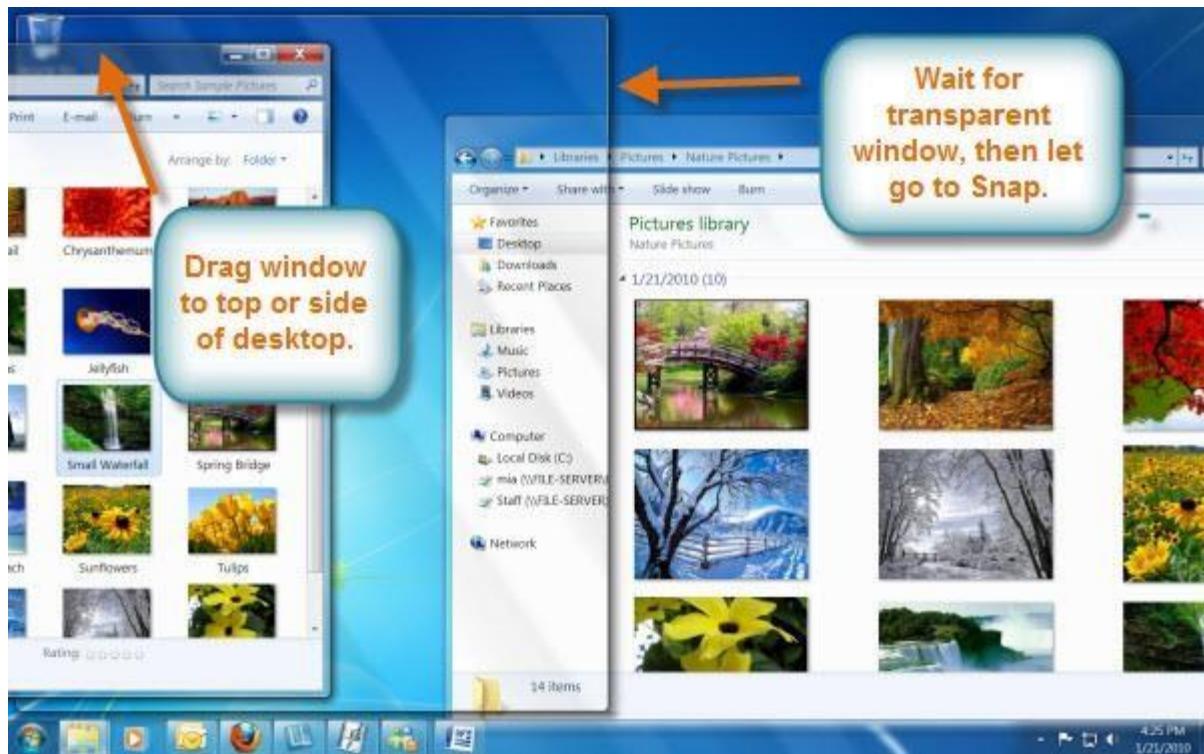
Place the mouse at the top of the window, drag to the left or right of the screen, wait for the transparent window to appear, and let go.

Your window should Snap into place.

To return to the full view, Snap the window to the top of the screen.

Peek

You can view your open windows on the taskbar by using Peek. Simply scroll the mouse over the taskbar icons, and a thumbnail preview of the open windows will appear.



Hover the mouse over the windows in Peek, and the full window will appear on your screen. Click the Peek preview to open the window, or click the X to close the window from the Peek view.



Shake

When your desktop is cluttered with open windows, you can use Shake to select a single window and close the rest.

Click on the top of the window you want to focus on and shake your mouse, and the rest of the windows will disappear.

Simply shake the window again, and the closed windows will reappear.



Flip

Flip and Flip 3D are two ways you can see previews of all your open windows at once. Flip will display previews in a row, and Flip 3D will display them as a stack.



Press and hold the Alt key, then press Tab to open the Flip view of your open windows. While still pressing the Alt key, you can flip through open windows by pressing the Tab key. Stop on the window you want to open, and it will appear on the full screen.



Press and hold the Windows key, then press Tab for a 3D version of Flip. Use the Tab key or Arrow keys to flip through your open windows.

Taskbar features

Microsoft has improved the taskbar by making it easier to view and access files and windows.

The taskbar view

When multiple windows are open in a program, the icon will look "stacked" on the taskbar.



**Taskbar icons are stacked when there is more
than one window open.**

Aero Peek will show you a thumbnail of each window when you hover the mouse over the icon on the taskbar.



If you wish, you can change the order of the icons by clicking and dragging the icon to whatever space you desire on the taskbar.

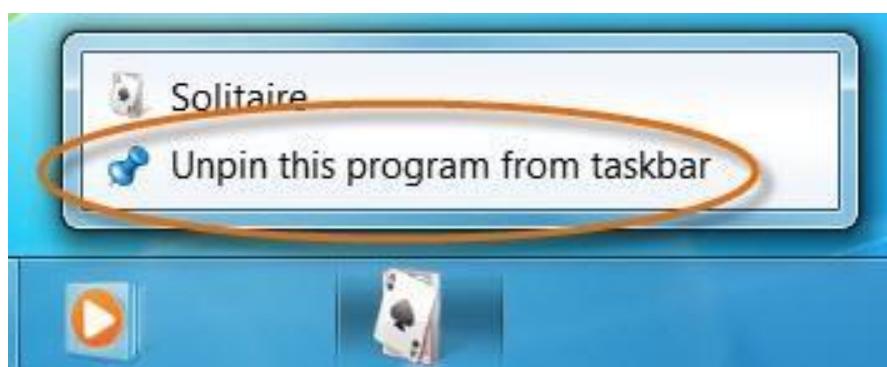
Pin a program to the taskbar

You can Pin programs to the taskbar and access them with a single click of the mouse. To

Pin a program, drag it to the taskbar and release.

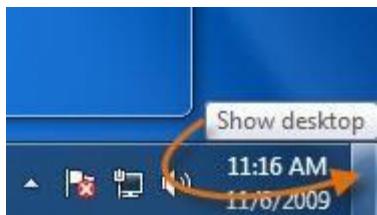


To Unpin a program, simply right-click on the icon and select Unpin.



Show desktop

To Peek at the desktop without closing windows: Hover the mouse over the Show desktop button.



The windows will become transparent, allowing you to see the desktop.



Click the Show desktop button to close the windows.

Click again, and the windows will return.

Gadgets

Gadgets are programs that run on your desktop so you can see information at a glance. Gadgets can give you information about the weather, date and time, news, traffic, and more.

To add gadgets to your desktop:

Right-click your desktop and select Gadgets.



Select and drag the gadgets you desire, and place them anywhere you want on the desktop.

Windows 7: Security features

The Windows 7 operating system from Microsoft simplifies computer security, making it easier for you to reduce the risk of damage caused by viruses, spyware and other malware. Windows 7 also features an improved backup solution to help keep your information safe, and its improved parental controls help you protect your family.

The Action Center: security information at your fingertips

The new Windows 7 Action Center in the Control Panel helps you make sure that your firewall is on, your antivirus software is up to date, and your computer is set to install updates automatically.

Protect your data from theft, hackers, and accidental loss

BitLocker Drive Encryption encrypts your Windows hard disk to help keep documents, passwords, and other important data safe. Once you turn on BitLocker, any file that you save on that drive is encrypted automatically.



Windows Firewall can also help protect your computer from hackers and malicious software.

With Windows 7, the built-in firewall is more flexible and easier to use than before.

The Microsoft backup system is also improved for Windows 7. Backup and Restore creates copies of your most important files, so you're always prepared for the worst.

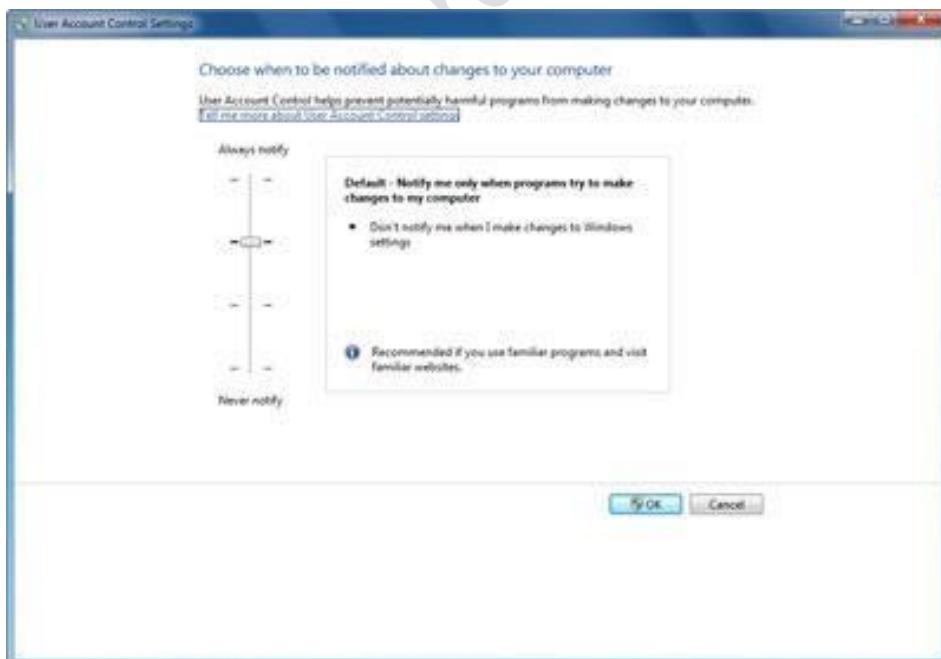
Defend your computer against viruses, spyware, and other malware

Microsoft Security Essentials is a free download for Windows 7 that helps protect your computer from viruses, spyware, worms, Trojans, and other malware. For more information, see Help protect your PC with Microsoft Security Essentials.

Windows 7 also includes Windows Defender, software that helps protect your computer from pop-up ads, slow performance, and security threats caused by spyware and other unwanted software. For more information, see Using Windows Defender.

Reduce risk by enhancing security and control

Windows 7 makes it easier and less intrusive to run your computer as a standard user instead of as an administrator. Windows Vista introduced User Account Control, a feature that warned you when a program wanted to make a change on your computer. Windows 7 improves on this feature, which means you'll get the same level of protection, but with fewer messages than before.



User Management

In Windows 7, there are two types of accounts:

Standard: Standard accounts are the basic accounts you use for normal, everyday tasks. As a Standard user, you can do just about anything you would need to do, such as running software or personalizing your desktop. Also, Parental Controls can be placed on Standard accounts.

Administrator: Administrator accounts are special accounts that are used for making certain changes to system settings or managing other people's accounts. They have full access to every setting on the computer. Every computer will have at least one Administrator account.

As you can see, Administrator accounts are more powerful. But for the same reason, Standard accounts are safer, so they are generally better for everyday use. In fact, you can make Administrator-level changes while logged into a Standard account; you will just need to provide an Administrator password when making the changes.

To go to your user accounts:

Go to the Control Panel from the Start Menu.

Click Add or remove user accounts.



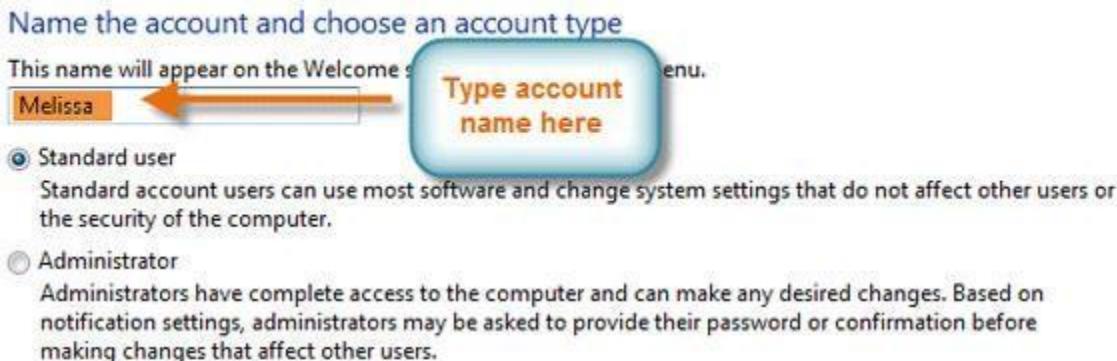
The Manage Accounts pane will appear. You will see all of the user accounts here, and you can add more accounts or manage existing ones.



To create a new account:

From the Manage Accounts pane, click Create a new account.

Type an account name.



Why is a standard account recommended?

Create Account

Cancel

Select Standard user or Administrator.

Click Create Account.

To create a password:

From the Manage Accounts pane, click the account name or picture.

Choose the account you would like to change



Click Create a password.

Make changes to Will Jr's account

[Change the account name](#)

Create a password



[Change the picture](#)

[Set up Parental Controls](#)

[Change the account type](#)

[Delete the account](#)

[Manage another account](#)

Type a password in the New password field, and retype it in the Confirm new password field.

You are creating a password for Will Jr.

If you do this, Will Jr will lose all EFS-encrypted files, personal certificates and stored passwords for Web sites or network resources.

To avoid losing data in the future, ask Will Jr to make a password reset floppy disk.

New password

Confirm new password

If the password contains capital letters, they must be typed the same way every time.

[How to create a strong password](#)

Type a password hint

The password hint will be visible to everyone who uses this computer.

[What is a password hint?](#)

If you want, you can type a password hint to help you remember your password.

Click Create password.

To go back to the Manage Accounts pane, click Manage another account.

To change your account picture:

You can also change the picture for any account. This picture appears next to the account name and helps you easily identify the account.

From the Manage Accounts pane, click the account name or picture.

Click Change the picture.

Make changes to Will Jr's account

[Change the account name](#)

[Change the password](#)

[Remove the password](#)

Change the picture



[Set up Parental Controls](#)

[Change the account type](#)

[Delete the account](#)

[Manage another account](#)

Select a picture, or click Browse for more pictures to select one of your own.

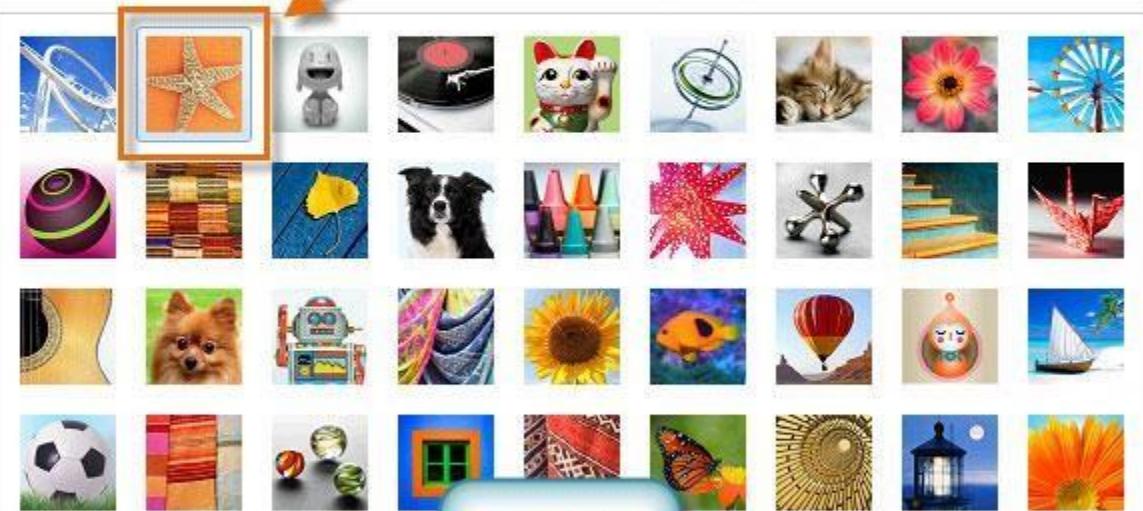
Choose a new picture for Will Jr's account



Will Jr
Standard user
Password protected

Select your favorite picture

The picture you choose will appear on the Welcome screen and on the Start menu.



[Browse for more pictures...](#)

Or use one of your own

Change Picture

Cancel

Click Change Picture.

Parental Controls

Windows 7 offers various Parental Controls to help you control the types of content your children can access. You can place parental controls on any Standard account, and each account can have different settings. If you have more than one child, each child can have access to

different types of content, and you can always change the Parental Controls settings as your children get older.

Before you set up Parental Controls

You'll need to create an account for your child, if you haven't already. It should be a Standard account; you cannot apply Parental Controls to an Administrator account. When you're setting up Parental Controls, it doesn't matter which account you're logged in to, but if you're logged in to a Standard account you'll need to provide an Administrator password before making any changes.

To set up Parental Controls

Go to the Control Panel from the Start Menu.

Click Set up parental controls for any user.



Click on any Standard Account.

Choose a user and set up Parental Controls

[What can I do with Parental Controls?](#)

Users



Dad

Computer administrator
Password protected



Will Jr

Standard user
Password protected

If you want to apply Parental Controls to someone who isn't in this list,
create a new user account for them to use.

Click On to turn Parental Controls on.

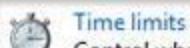
Set up how Will Jr will use the computer

Parental Controls:

On, enforce current settings

Off

Windows Settings



Time limits

Control when Will Jr uses the computer



Games

Control games by rating, content, or title



Allow and block specific programs

Allow and block any programs on your computer

Click to turn Parental Controls on



Will Jr
Standard user
Password protected

Time Limits:

On

Game Ratings:

Up to EVERYONE

Program Limits:

On

Change Parental Controls here

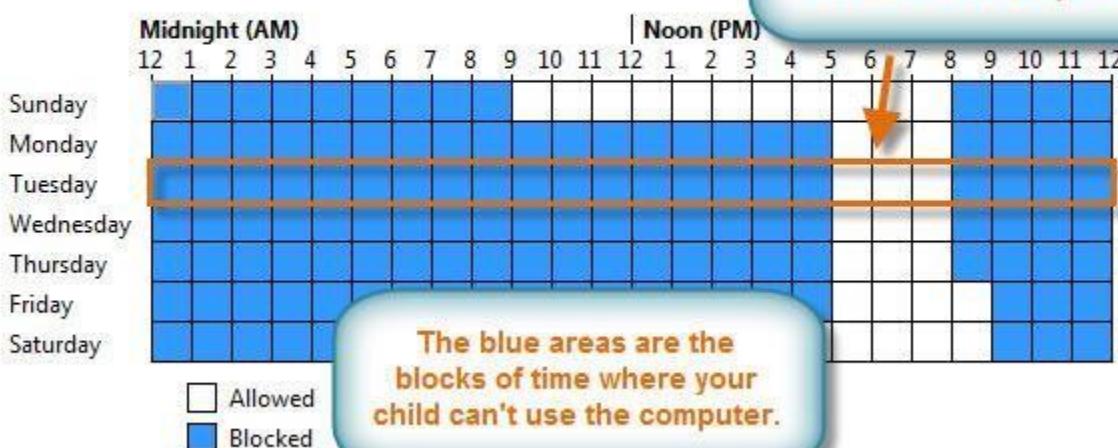
Now you can click Time limits, Games, or Allow and block specific programs to set the Parental Controls. We'll explore each of these on the next page.

Time limits

The time limits settings allow you to control when your children can use the computer. Click and drag from any box to allow or block a section of time. If you want, you can set different time limits on different days. For example, you may want to allow more computer use on weekends.

Control when Will Jr will use the computer

Click and drag the hours you want to block or allow.



Games

The Games settings allow you to select which game ratings to allow, and you can also allow or block specific games. First, you'll have to click Yes to allow your children to play games, then you can change your Games settings.

Control which types of games Will Jr can play

Can Will Jr play games?

Yes

No

Click "Yes" to
allow your child
to play games

Block (or allow) games by rating and content types

[Set game ratings](#)

Maximum allowed rating: EVERYONE, including unrated games

Game descriptors blocked: Animated Blood, Blood, Blood and Gore, Cartoon Violence

Block (or allow) any game on your computer by name

[Block or Allow specific games](#)

Always blocked: None

Always allowed: None

Here, we have selected "Everyone" as the highest rating allowed. This means your children can play games rated "Everyone" OR "Early Childhood."

Control which types of games Will Jr can play

If a game has no rating, can Will Jr play it?

- Allow games with no rating
- Block games with no rating

Select the highest
rating that you
want to allow



Which ratings are ok for Will Jr to play?

The Entertainment Software Rating Board defines these ratings.

	EARLY CHILDHOOD Titles rated EC - Early Childhood have content that may be suitable for ages 3 and older. Titles in this category contain no material that parents would find inappropriate.
	EVERYONE Titles rated E - Everyone have content that may be suitable for persons ages 6 and older. Titles in this category may contain minimal violence, some comic mischief, and/or mild language.
	EVERYONE 10+ Titles rated E10+ - Everyone 10 and older have content that may be suitable for ages 10 and older. Titles in this category may contain more cartoon, fantasy or mild violence, mild language, and/or minimal suggestive themes.
	TEEN Titles rated T - Teen have content that may be suitable for persons ages 13 and older. Titles in this category may contain violent content, mild or strong language, and/or strong language.

To allow or block specific programs:

Allow and block specific programs controls which nongame programs your children can use. By default, your children can use all nongame programs. But there may be some programs you

don't want your children to use, like a financial or email program. Here's how to block specific programs:

Click Will Jr can only use the programs I allow.

Click Check All.

Uncheck the programs you want to block.

Which programs can Will Jr use?

Will Jr can use all programs

Will Jr can only use the programs I allow

1) Click here

Check the programs that can be used:

File	Description	Product Name
<input checked="" type="checkbox"/> MSPUB.EXE	Microsoft Office Publisher	<Unknown>
<input checked="" type="checkbox"/> MSQRY32.EXE	Microsoft Query	<Unknown>
<input checked="" type="checkbox"/> MSTORDB.EXE		<Unknown>
<input checked="" type="checkbox"/> MSTORE.EXE		<Unknown>
<input checked="" type="checkbox"/> OIS.EXE		<Unknown>
<input checked="" type="checkbox"/> ORGWIZ.EXE		<Unknown>
<input type="checkbox"/> OUTLOOK.EXE		<Unknown>
<input checked="" type="checkbox"/> POWERPNT.EXE	Microsoft Office PowerPoint	<Unknown>
<input checked="" type="checkbox"/> PPTVIEW.EXE	Microsoft Office PowerPoint	<Unknown>
<input checked="" type="checkbox"/> PROJIMPT.EXE	Project Import Wizard comm...	<Unknown>
<input checked="" type="checkbox"/> REGFORM.EXE	Microsoft Office Infopath Form I...	<Unknown>
<input checked="" type="checkbox"/> SCANOST.EXE	Microsoft Office Outlook OST Int...	<Unknown>
<input checked="" type="checkbox"/> SCANPST.EXE	Microsoft Personal Folders Scan/...	<Unknown>
<input checked="" type="checkbox"/> SELFCERT.EXE	Create a self-signed digital certific...	<Unknown>

Add a program to this list:

Browse...

Check All

Uncheck All

1) Click here

3) Uncheck the
programs you don't
want your child to use

2) Click "Check All"

Conclusion

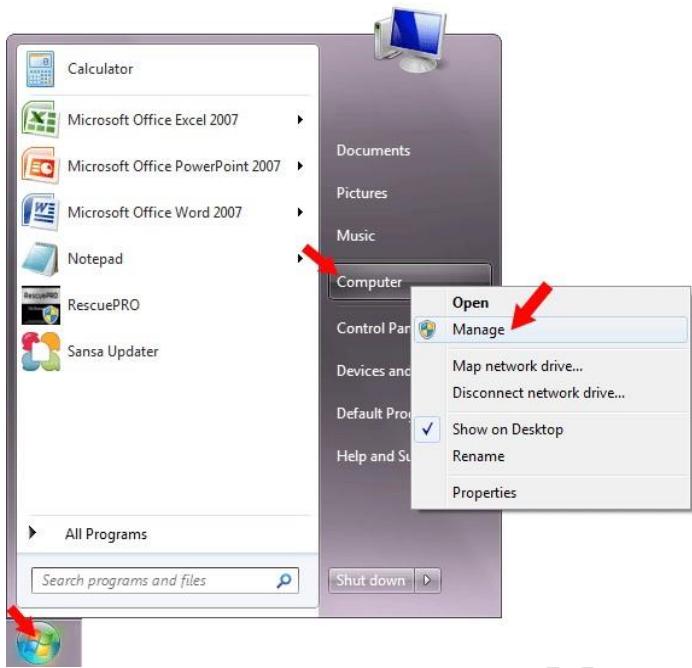


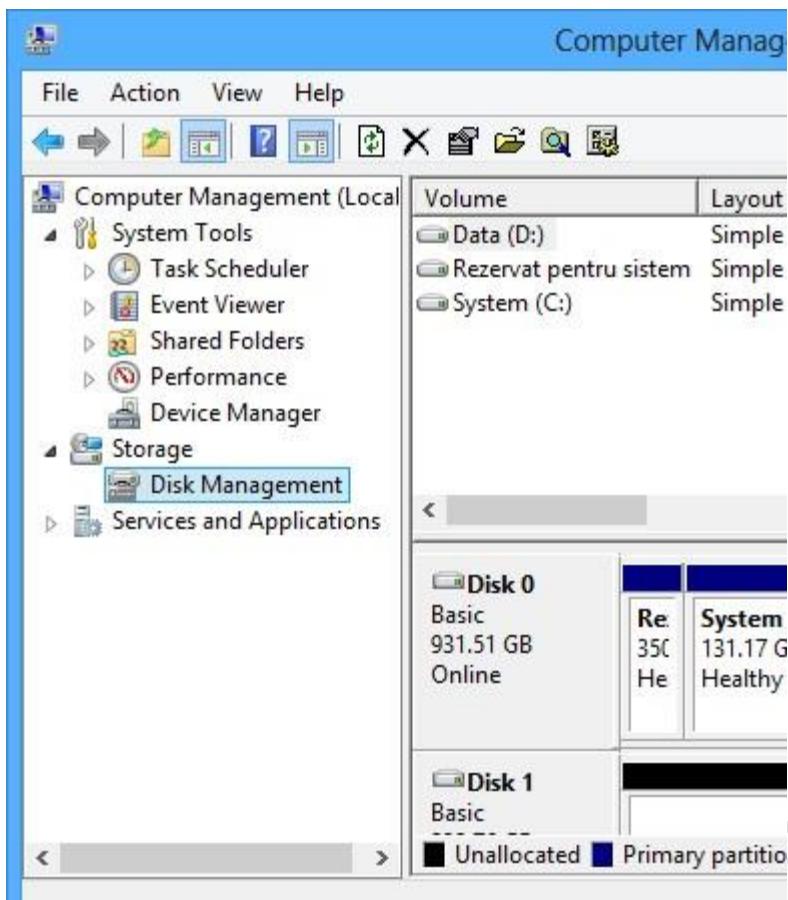
You can now create new accounts whenever you want, and all users will be able to easily access their own files and customize the appearance of Windows 7 while they're logged in to their respective accounts.

If you're using Parental Controls, take the time to familiarize yourself with the different controls offered. Windows 7 gives you a lot of flexibility when using Parental Controls, so you can apply them with as much or as little detail as you want.

Disk Management

Computer > Right Click > Manage – Select Disk Management





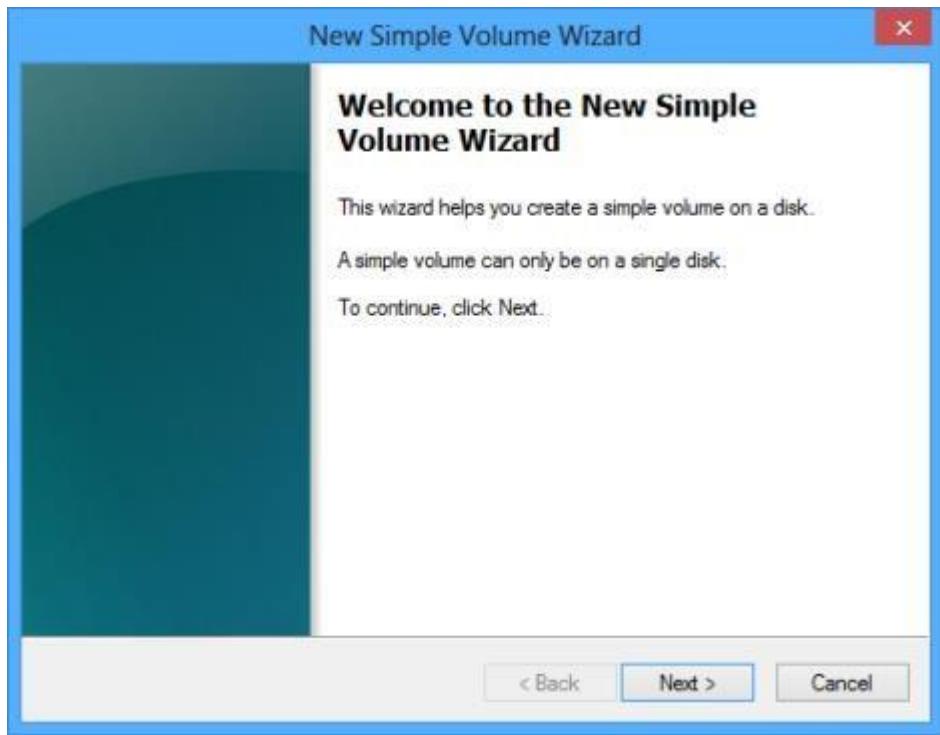
Create a Disk Partition with Disk Management

If you do have "free" space on your hard drives, you can use it to create new partitions. The actual logic behind using Primary, Extended, and Logical partitions is outside the scope of this tutorial.

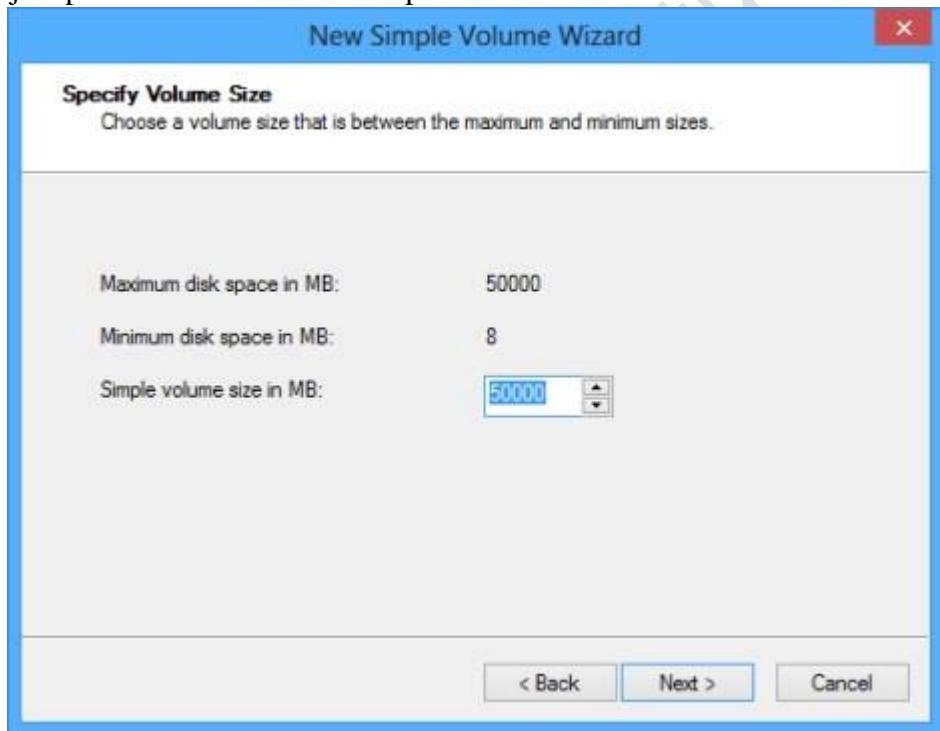
You'll see unpartitioned space highlighted and labeled as Unallocated or "Free space".

Disk 0 Basic 931.51 GB Online	Rezervat per 350 MB NTFS Healthy (Syste	System (C:) 131.17 GB NTFS Healthy (Boot, Page File, Crash	Data (D:) 800.00 GB NTFS Healthy (Primary Partition)
Disk 1 Basic 232.76 GB Online	Backup (E:) 48.83 GB NTFS Healthy (Primary Partit	New Volume (F:) 135.10 GB NTFS Healthy (Primary Partition	48.83 GB Unallocated

To create a partition here, right-click or tap and hold the free space and select "New Simple Volume" to bring up the "New Simple Volume Wizard.". Click or tap Next.



The wizard will ask you for the size of the partition, which you can specify as you wish, using all or just part of the total available space.



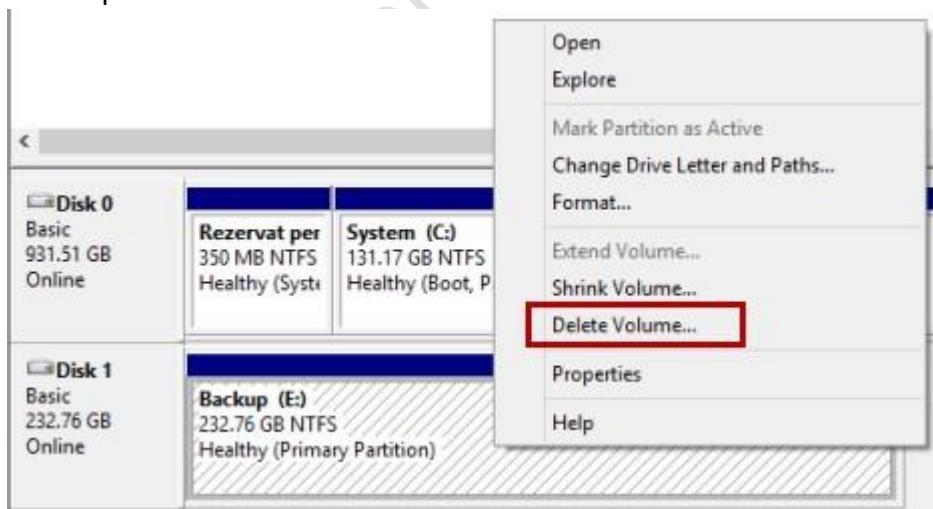
Now you can choose to assign a drive letter, mount in an empty NTFS folder or even not assigning any drive letter or path for your new partition. Select the option of your choosing and click or tap Next.



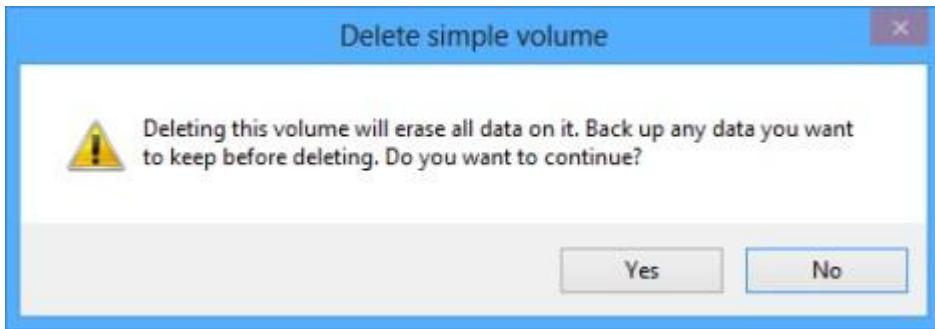
You'll be asked for information on how the partition should be formatted. Keep in mind that if you wish to use this partition, it needs to be formatted. In most cases, you'll want to use NTFS. This is the default and preferred file system since Windows NT, providing increased performance, security and fault tolerance when compared to FAT16/FAT32.

Delete a Disk Partition with Disk Management

In some cases you'll want to remove a partition from your hard drive, either to make space to extend an existing partition, or redo the partition, but with a different size or file system. To remove a partition, right-click or tap and hold the partition you're trying to remove and then click or tap "Delete Volume".



You'll be prompted to confirm your choice, to make you aware that if you remove the partition all data on it will be erased. Therefore, please make sure you've backed up any critical data on that partition prior to clicking or tapping Yes.

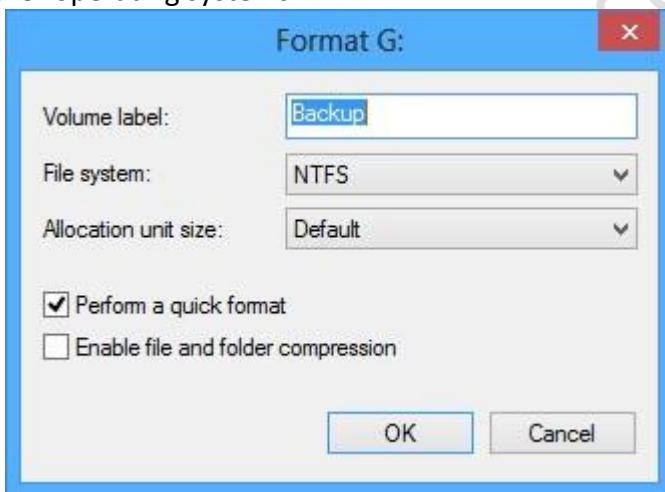


You'll now see the deleted partition showing as "Free space" or Unallocated in the Disk Management utility.

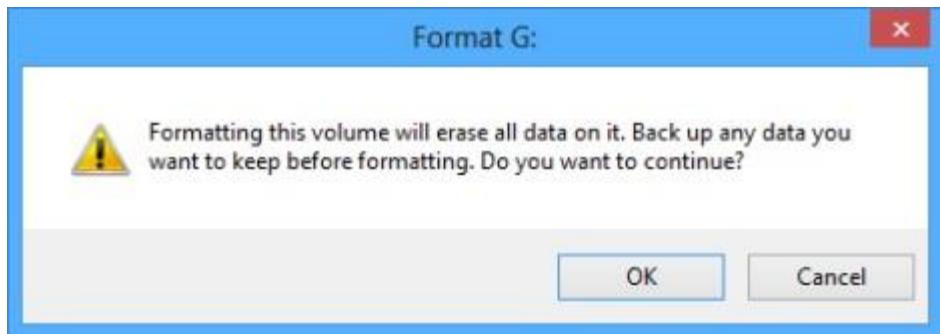
Format a Partition with Disk Management

You can format a partition that is already created, keeping in mind that doing so will remove all data on the partition. In this example, I re-created the "G:" partition but didn't select the option to have it formatted.

Right-click or tap and hold the partition and select Format. Set the label and file system type, keeping the allocation unit size at the default (4 Kb). As mentioned earlier, the volume label will show up next to the drive letter when viewing the partition in File Explorer or Windows Explorer, and is required if you're planning on sharing this partition with other operating systems.



Click or tap OK, and confirm the warning about data being erased.



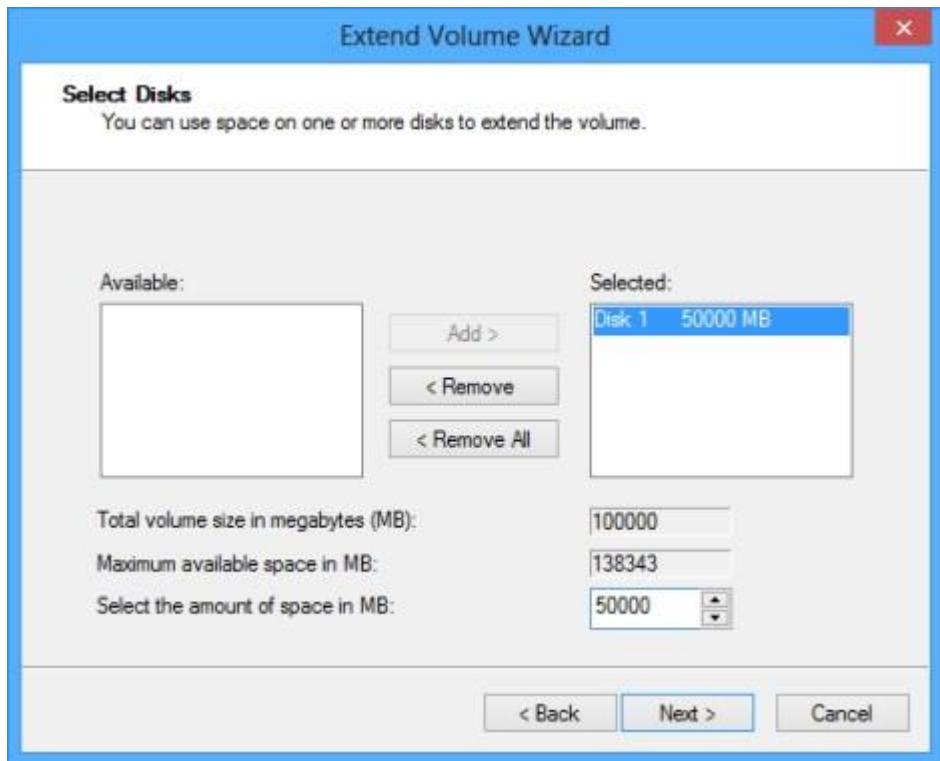
The partition will begin formatting. This process will generally take only a few seconds, but will depend on the size of the partition and the speed of your computer.

Resize a Partition - Extending & Shrinking

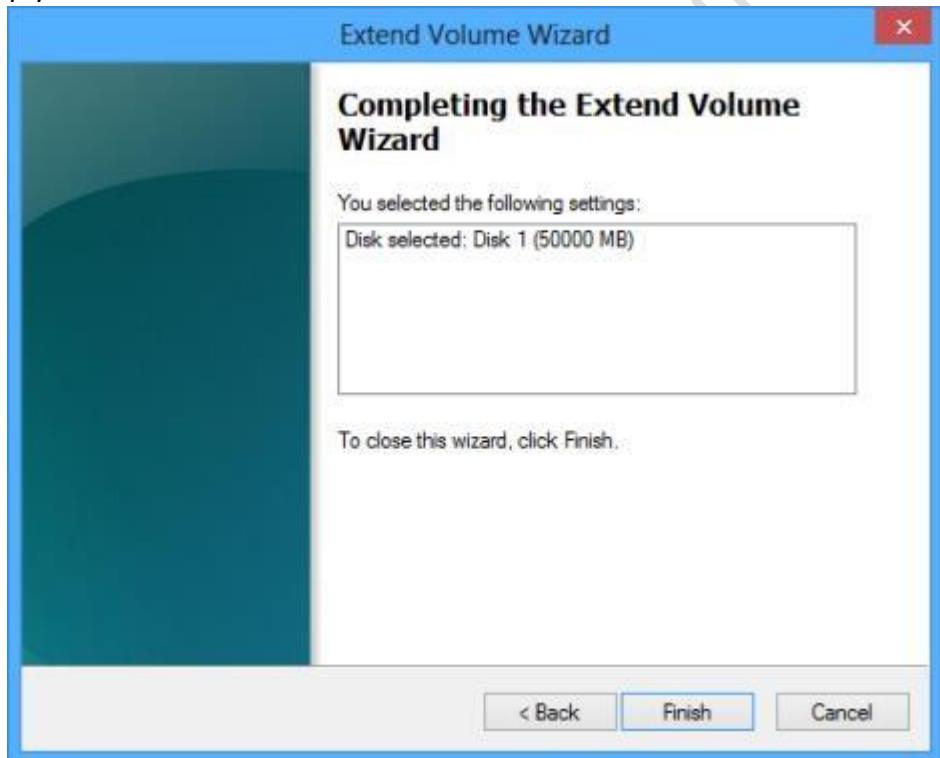
You can shrink or expand NTFS and FAT16/FAT32 partitions, as long as there is awfree (unpartitioned) space immediately before or after the partition you're trying to modify. Expanding a partition does not require formatting. To do this, right-click or tap and hold the partition and select "Extend Volume". This will open the "Extend Volume Wizard". In this example, I want to expand the size of my Stuff partition.



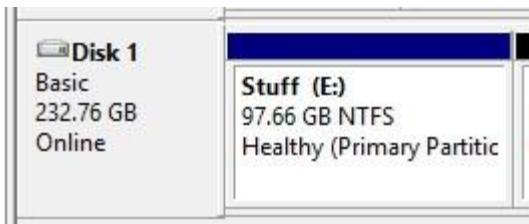
Click next, and the wizard will show you how much space is available for adding to the current partition. In this example, there is about 135GB of space next to the partition, but I only want to use 50GB of this to make the total size of the partition about 100GB.



Click or tap Next to see a brief summary of the change and then click or tap again Finish to apply them.

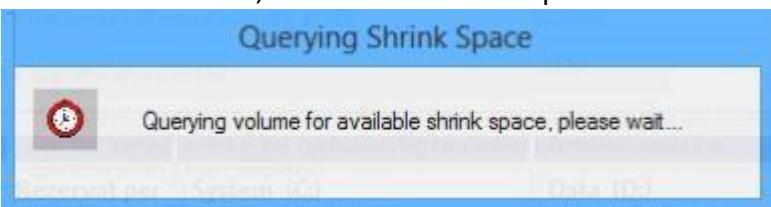


You'll be brought back to the Disk Management utility, where you'll see that the size of the Stuff partition is now about 100GB.

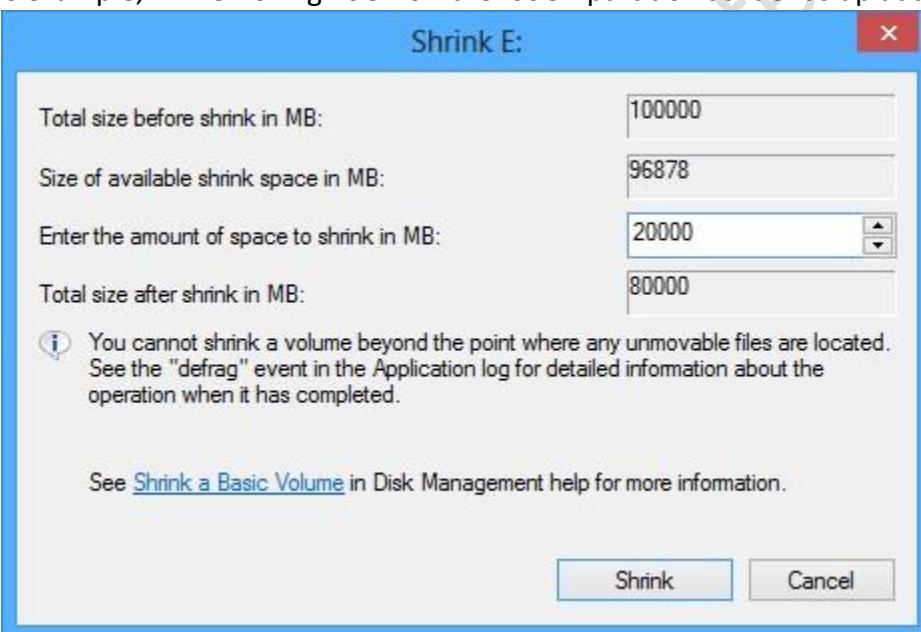


In many cases, you can also shrink a partition. On partitions that store Windows operating systems, there may be certain files on the disk that can prevent you from shrinking a volume. This problem has existed since Windows Vista, and may require that you take certain steps to prepare the partition to be shrunk.

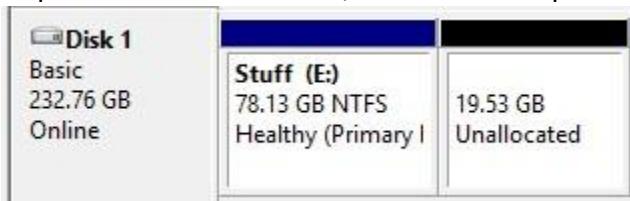
Right-click or tap and hold the partition and select "Shrink volume". The below box may come up for several minutes while Windows examines the hard drive to determine whether the volume can be shrunk, and how much disk space can be shaved off.



Once this is complete, the wizard will ask how much space you want to take off the partition. In this example, I'm removing 20GB off the 100GB partition so it ends up at about 80GB.

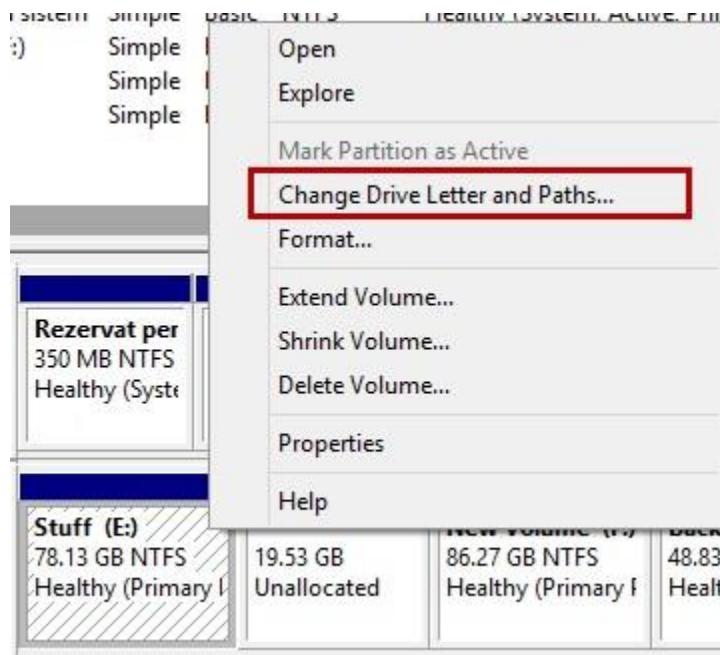


Click Shrink, and you'll be brought back to the Disk Management utility where you will see that your partition is now smaller, and the extra space has been made available.

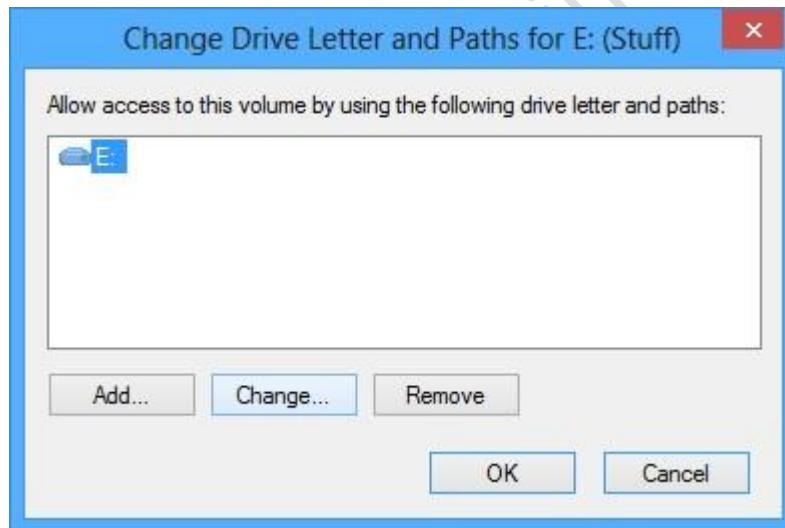


Changing a Drive Letter and Label with Disk Management

In this example, there is a partition "E:" and labeled as Stuff. I want to change the drive letter to "X:" instead and name it Test. To change the drive letter associated with the partition, right-click or tap and hold the partition and click "Change Drive Letter and Paths".



A new window will pop up, listing the drive letter of the partition you are trying to change.



Click or tap Change. In the next window, select the new drive letter you wish to represent the partition and click or tap OK.



You may be prompted to acknowledge the change you are about to make. If you wish to proceed, click or tap Yes.



You'll now see the partition listed in the Disk Management utility with a different drive letter.



Module M4/U4/S1-S6

Windows 8 / Windows 8.1

Windows 8 is a personal computer operating system developed by Microsoft as part of the Windows NT family of operating systems. The operating system was released to manufacturing on 1 August 2012, and was released for general availability on 26 October 2012.

While previous versions of Windows mainly ran on Desktop and Laptop computers, Windows 8 is also designed to run on Tablets. Because of this, the interface has been simplified so it will work with touch screens.

Windows 8 introduced major changes to the operating system's platform and user interface to improve its user experience on tablets, where Windows was now competing with mobile operating systems, including Android and [iOS](#). In particular, these changes included a touch-optimized Windows shell based on Microsoft's "Metro" design language, the Start screen (which displays programs and dynamically updated content on a grid of tiles), a new platform for developing apps with an emphasis on touch screen input, integration with online services (including the ability to sync apps and settings between devices), and Windows Store, an online store for downloading and purchasing new software. Windows 8 added support for USB 3.0, Advanced Format hard drives, near field communications, and cloud computing.

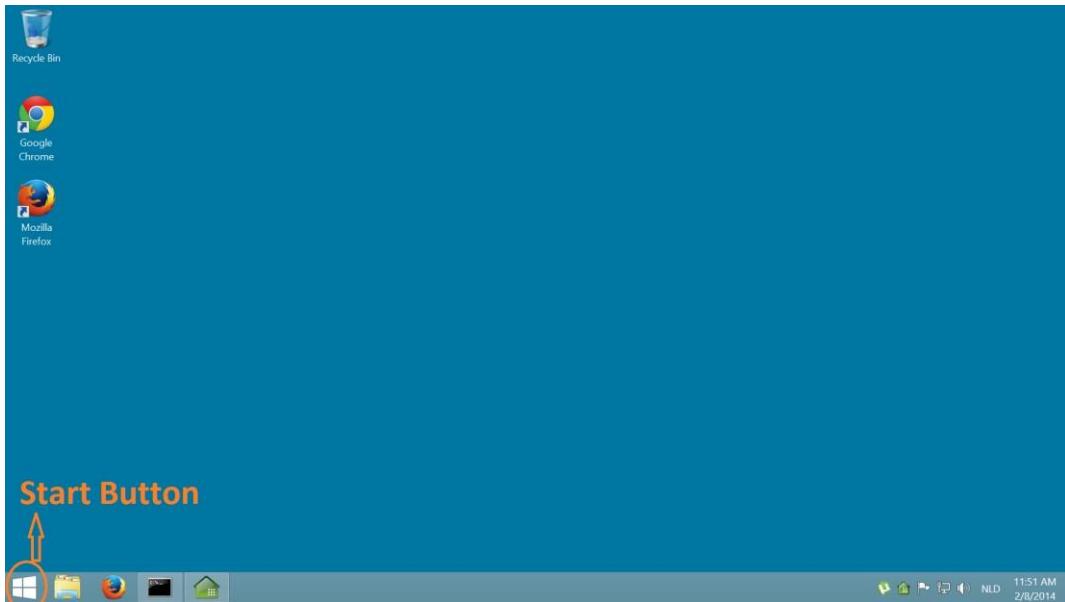
Additional security features were introduced, such as built-in antivirus software, integration with Microsoft SmartScreenphishing filtering service and support for UEFI Secure Boot on supported devices with UEFI firmware, to prevent malware from infecting the boot process. On 17 October 2013, Microsoft released Windows 8.1. It addresses some aspects of Windows 8 that were criticized by reviewers and early adopters and incorporates additional improvements to various aspects of the operating system.

There are many new features and changes in Windows 8, both small and large. These changes include a redesigned interface, online features, and improved security.

Windows 8 Desktop



Windows 8.1 Desktop



Minimum Hardware Requirements – Windows 8/ 8.1

Component	Minimum	Recommended
Processor	1 GHz clock rate IA-32 or x64 architecture Support for PAE , NX and SSE2	x64 architecture Second Level Address Translation (SLAT) support for Hyper-V
Memory (RAM)	IA-32 edition: 1 GB x64 edition: 2 GB	4 GB
Graphics Card	DirectX 9 graphics device WDDM 1.0 or higher driver	DirectX 10 graphics device
Display screen	N/A	1024×768 pixels
Input device	Keyboard and mouse	multi-touch display screen
Hard disk space	IA-32 edition: 16 GB x64 edition: 20 GB	N/A

Windows 8 Editions

Windows 8

Some tablets and desktop computers aimed at home shoppers will come with Windows 8. More powerful than Windows RT, Windows 8 includes the Start screen and its apps, as well as a fully-functional desktop. It doesn't include the Microsoft Office apps tossed in with Windows RT; you can either buy the Office apps separately, or buy the full version of Microsoft Office to run on the desktop.

Windows 8 Pro

Aimed at small businesses and home enthusiasts who want everything, Windows 8 Pro includes everything found in Windows 8, as well as advanced features like the Remote Desktop, encryption, virtual hard drives, and other feature rarely used by home users.

Windows 8 Enterprise

Sold only by license to large businesses, Windows 8 Enterprise offers extra networking features to help technicians run large networks. Windows 8 Enterprise is mostly Windows 8 Pro with a few technical programs, but Microsoft's licensing program gives businesses a bulk buy discount.

Windows RT

Designed to compete with the iPad and other popular tablets, Windows RT relies on the Start screen and its family of apps. Windows RT comes pre-installed on tablets or laptops; you can't buy it separately, and you can't move it from one device to another.

Windows 8.1 Editions

Windows 8.1 — the version you probably want — works great unless you specifically need one of the features in Windows 8.1 Pro. A big bonus for many of you: This version makes all the myriad Windows languages — 96 of them, from Afrikaans to Yoruba — available to anyone with a normal, everyday copy of Windows, at no extra cost.

Windows 8.1 Pro includes everything in Windows 8.1 plus the ability to attach the computer to a corporate domain network; the Encrypting File System and BitLocker for scrambling your hard drive's data; Hyper-V for running virtual machines; and the software necessary for your computer to act as a Remote Desktop host — the “puppet” in an RD session. You also need Windows 8.1 Pro if you want to run Windows Media Center, which is an extra-cost add-on. An added bonus: If you want to buy Windows on Microsoft hardware, the Microsoft Surface computers come with Windows 8.1 Pro and Windows RT (but not Windows 8.1 itself). Surface computers are capable, junk-free, innovative — and pricey.

Windows 8.1 Enterprise is available only to companies that buy into Microsoft's Software Assurance program — the (expensive) volume licensing plan that buys licenses to every modern Windows version. Enterprise offers a handful of additional features, but they don't matter unless you're going to buy a handful of licenses or more.

Windows RT, quite possibly the worst name Microsoft has ever given any product, isn't really Windows because it won't run old-fashioned Windows programs and it doesn't have a real Windows 7-style desktop. Windows RT is Microsoft's iPad-wannabe, built on a completely new kind of computer, commonly called ARM.

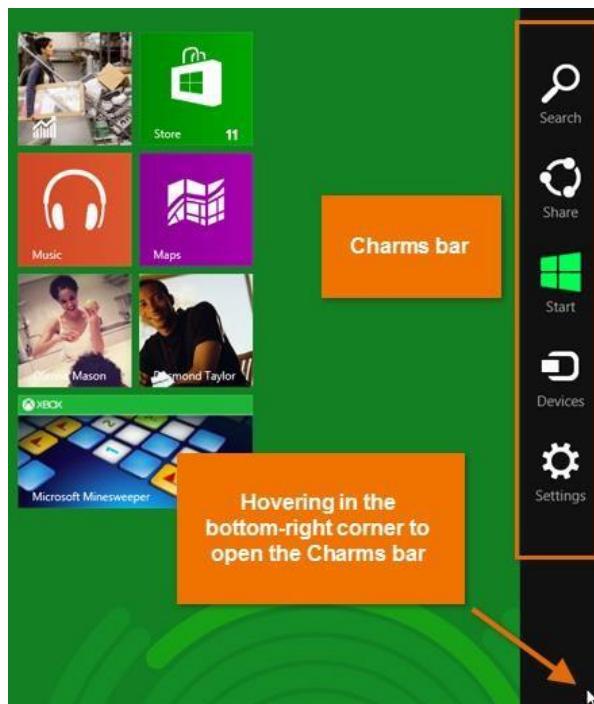
Interface changes

The first thing you'll notice about Windows 8 is that it looks totally different from previous versions of Windows. The all-new interface includes features like the Start screen, live tiles, and hot corners.

Start screen: The main screen you'll use is called the Start screen, and it displays all of your apps as tiles. You can personalize your Start screen by changing the color scheme, choosing a background image, and rearranging your tiles.

Live tiles: Some apps use live tiles, which let you see information without even clicking on the app. For example, the Weather app displays the current weather on its tile, and you can click on it to see more details.





Hot corners: You'll navigate through Windows 8 by using hot corners. To use a hot corner, just hover the mouse in the corner of the screen, and it will open a toolbar or tile that you can click. For example, to switch to another open app, you can hover the mouse in the topleft corner and then click. If you're using a tablet, you'll swipe from the left or right instead of using hot corners.



Charms bar: Many of your computer's settings are now found in a toolbar called the Charms bar. You can access it by hovering in the top-right or bottom-right corner of the screen. If you're using a tablet, you can swipe from the right to open the Charms bar.

Online features in Windows 8

Many people are starting to save their files and other information online (also known as the cloud). One way to do this is with Microsoft's OneDrive service (previously called SkyDrive).

Windows 8 is designed to connect seamlessly to OneDrive, as well as to other online services like Facebook and Twitter.

Sign in with Microsoft account: Instead of creating an account on your computer, you can sign in with your free Microsoft account. This will bring all of your OneDrive files, contacts, and more into your Start screen. You can even sign in to a different computer that has Windows 8, and all of your important files will be there.



Social

networking features: You can connect your Facebook, Twitter, and Flickr accounts to Windows 8, allowing you to see your friends' updates directly from your Start screen or from the built-in People app.

Olenna Mason



Olenna Mason
8/23/2012



Olenna Mason
8/22/2012

I always find the most interesting things



Designbox

Olenna checked in at Designbox.

Designbox is a space for independent designers and firms. Designbox is North Carolina's influential think tank. Designbox is a gallery. Our gallery is dedicated to promoting the expression of creative work. See More

[f](#) [Like](#) [Comment](#)



Olenna Mason
8/22/2012

Donating my maternity clothes!



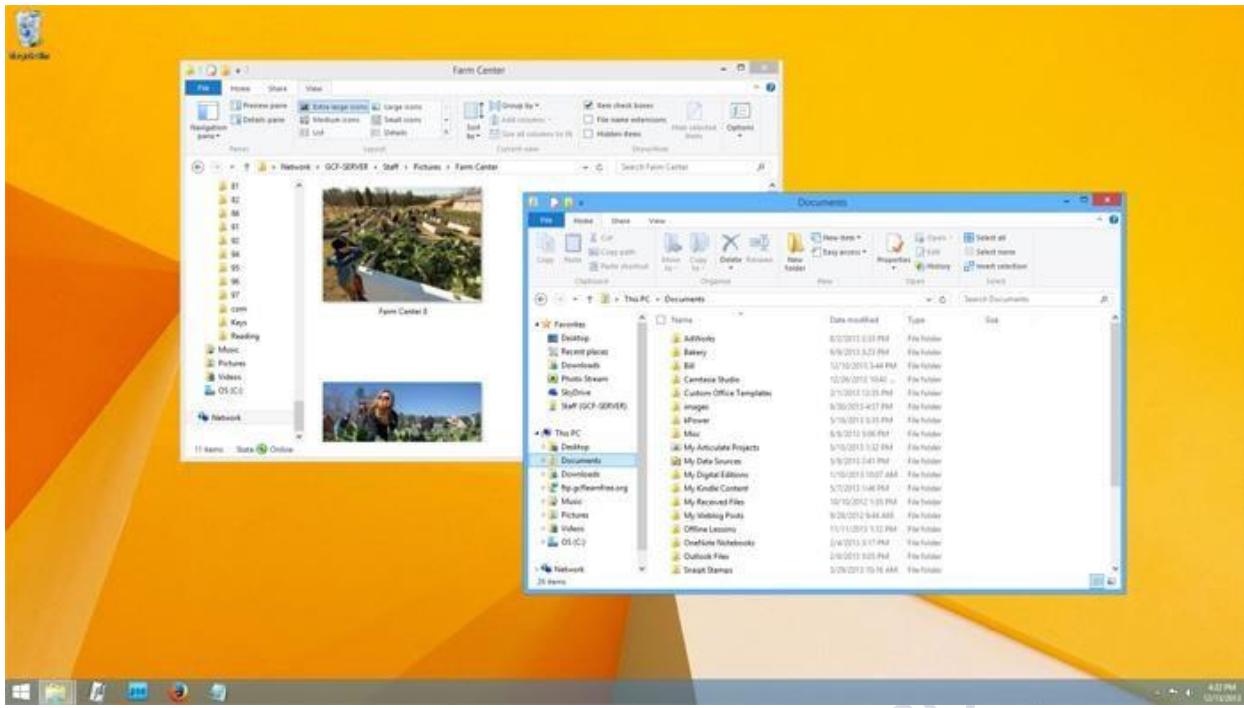
Goodwill

Olenna checked in at Goodwill.

To learn more about Microsoft's online services, check out our [Microsoft Account](#) and [OneDrive and Office Online](#) tutorials.

Other Windows 8 features

Simplified Desktop for increased speed: Microsoft hasn't removed the Desktop, and you can still use it to manage your files or open many of your existing programs. However, it has removed some of the transparency effects that often caused Windows 7 and Vista to run slowly. The new Desktop should run more smoothly on most computers.



Start menu has been replaced: The Start menu was an important feature in earlier versions of Windows, but it has been replaced with the Start screen. You'll use the Start screen to open programs or search your computer. Some people may find it disorienting to use Windows without the Start menu.

Improved security: Windows 8 has a built-in antivirus program called Windows Defender, which can also protect you from other types of malware such as spyware. The builtin Windows Store also helps to keep you and your computer safe by showing you what information each app will have access to. For example, some apps have access to your location, so if you're uncomfortable sharing your location you can decide not to download those apps.

Updating Windows 8 to Windows 8.1

When Windows 8 was released in 2012, many users complained that it was difficult and confusing to use, especially compared to older versions of Windows. Windows 8.1 is an update for Windows 8 that includes a number of improvements and features to address some of these issues. Below are some of the most helpful and notable features:

- Start Button:** Windows 8 removed the Start button from the Desktop. Many users complained about the missing Start button, so Windows 8.1 adds it back to the Desktop.

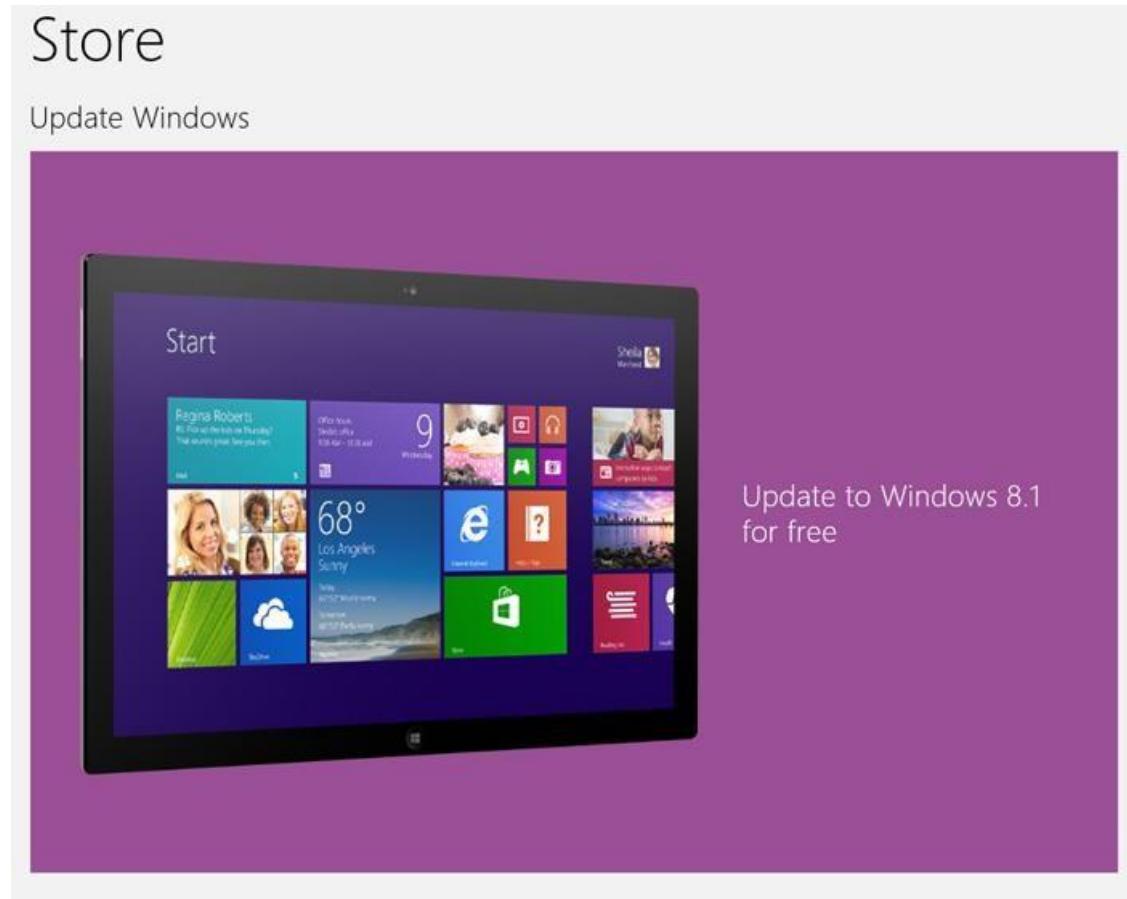
Clicking the Start button on the Desktop will launch the Start screen, which you'll use to open programs and search for files.

Boot to Desktop: Rather than launching the Start screen when you turn on your device, Windows 8.1 now gives you the option to boot directly to the Desktop, much like older versions of Windows. This is especially helpful if you're not interested in using the Start screen very often.

Snap Start Screen Apps: Windows 8 introduced full-screen apps for the Start screen, but it did not allow you to view more than two apps at once. Windows 8.1 allows you to view several

different Start screen apps and snap them to different parts of the screen. Traditional desktop apps still work the way they did in earlier versions of Windows: They'll appear in individual windows that you can move and resize.

If you already have Windows 8, you should now be able to upgrade to Windows 8.1. Your computer may be updated to Windows 8.1 automatically, but you can also update it manually. To do this, open the Windows Store app from the Start screen, then select Update Windows.



User Management

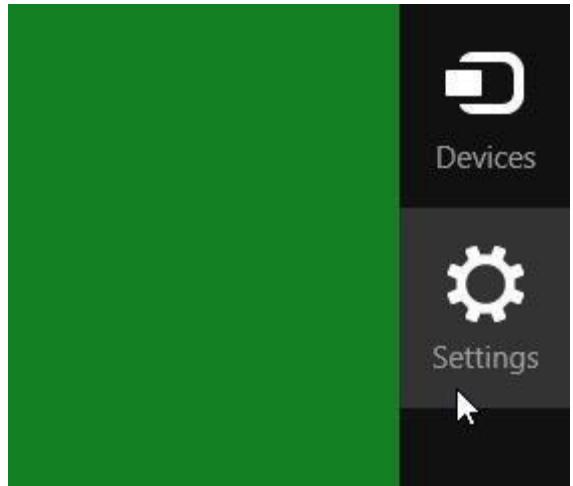
A user account allows you to sign in to Windows 8. By default, your computer already has one user account, which you were required to create when setting up Windows 8. If you plan to share your computer, you can create a separate user account for each member of your home or office.

You can also choose to associate any new user account with a Microsoft account. Signing in with a Microsoft account will bring all of your OneDrive files, contacts, and more into the Start screen. You can even sign in to a different computer that has Windows 8, and all of your important files will be there.

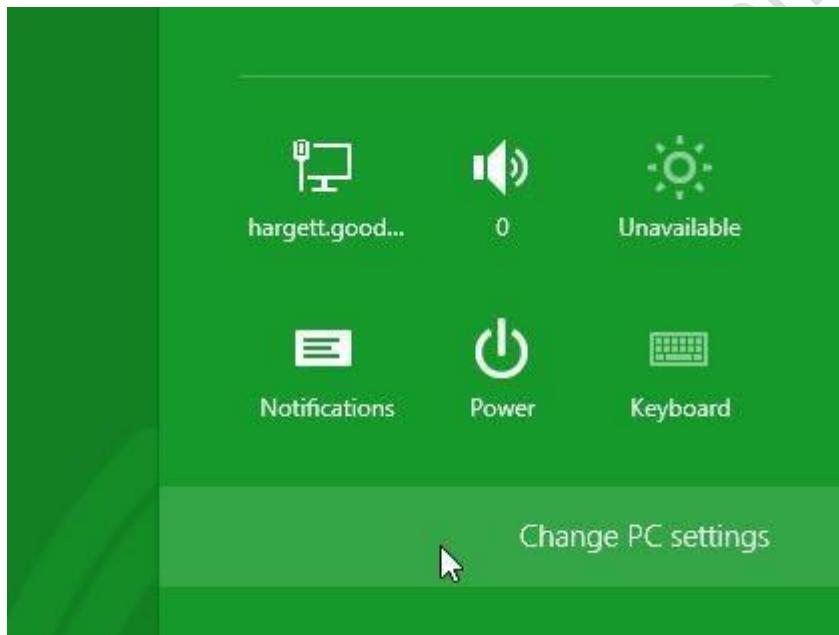
In this lesson, you'll learn how to add, manage, and switch between user accounts. We'll also talk about how to set parental controls for individual users.

To add a new user (with a Microsoft account)

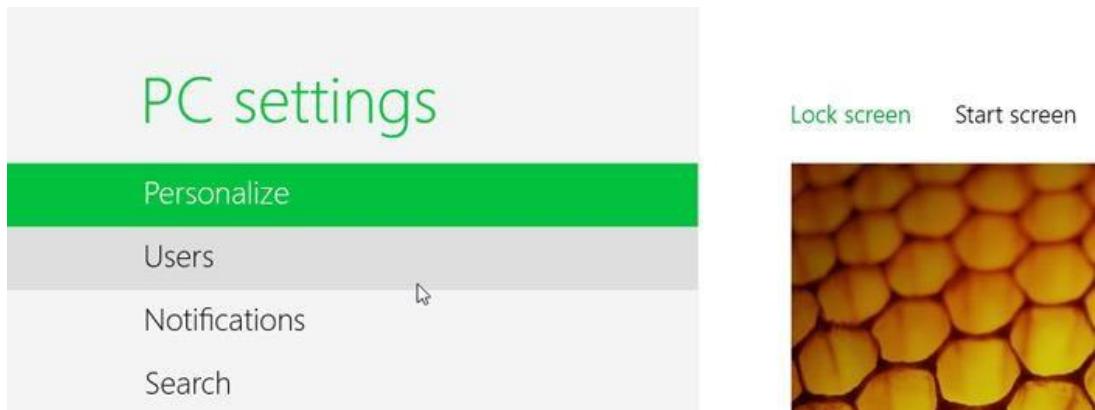
From the Start screen, hover the mouse in the lower-right corner to access the Charms bar, then select



Locate and select Change PC Settings.

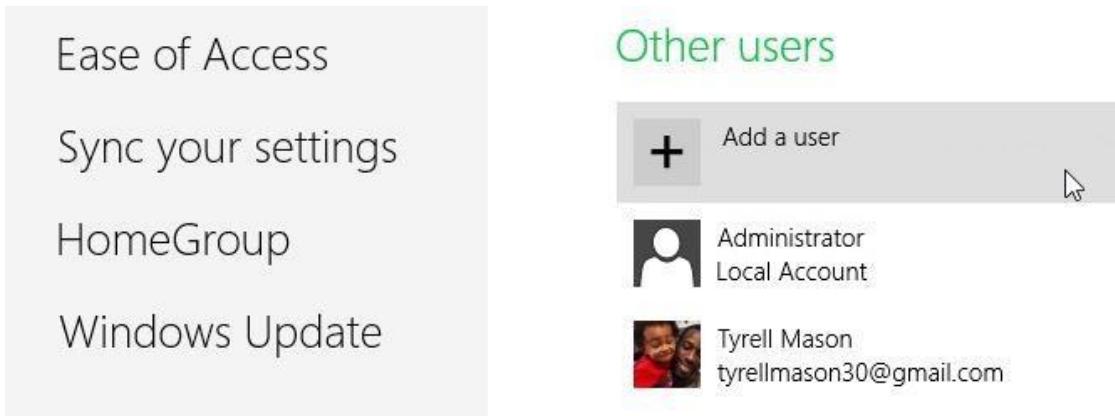


PC Settings will appear. Select Users on the left.

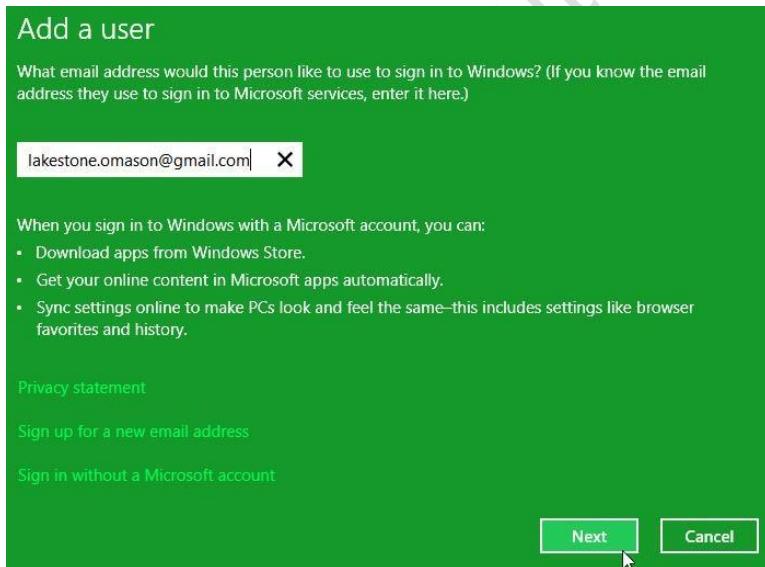


coronainstitute.com

The Users pane will appear on the right. Locate and select Add a user.



Enter the user's Microsoft account username, then click Next to continue.



Add a user

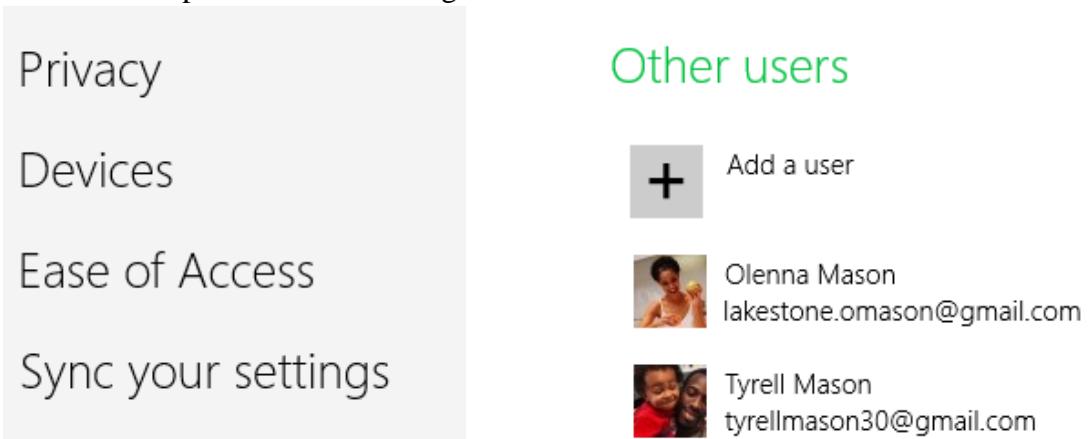
Let this person know they'll need to be connected to the Internet to sign in for the first time.



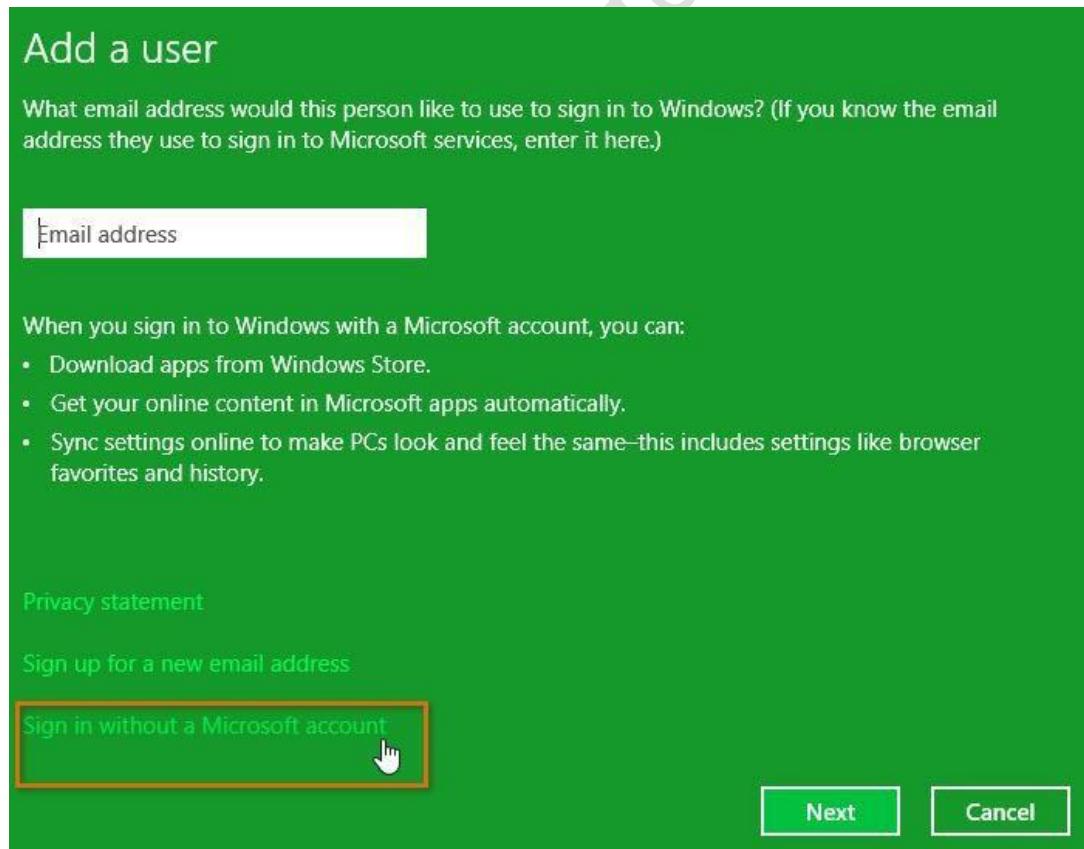
Optional: If the user is a child, check the box to activate Family Safety, which will let you set parental controls. We'll talk more about parental controls later in this lesson. Click Finish.

The user will be added.

To add a new local user (without a Microsoft account):
Navigate to the Users pane from PC Settings. Click Add a user.



Locate and select Sign in without a Microsoft account.



Click Local account to continue.

Add a user

There are two options for signing in:

Microsoft account

Signing in to PCs with your email address lets you:

- Download apps from Windows Store.
- Get your online content in Microsoft apps automatically.
- Sync settings online to make PCs look and feel the same—like your browser history, account picture, and color.

Local account

Signing in with a local account means:

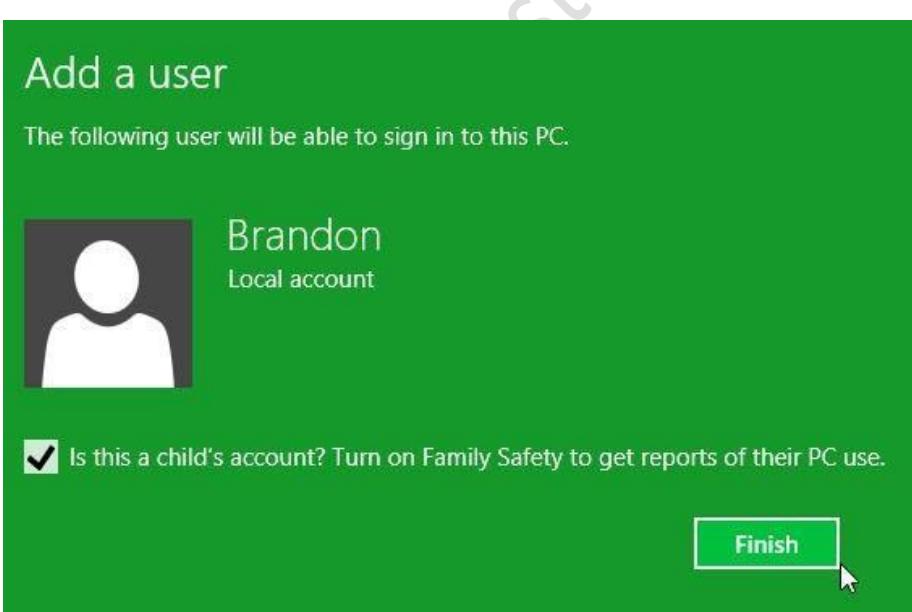
- You have to create a user name and account for each PC you use.
- You'll need a Microsoft account to download apps, but you can set it up later.
- Your settings won't be synced across the PCs that you use.

Microsoft account

Local account

Cancel

Enter an account name, and type the desired password. It's important to choose a strong password - in other words, one that is easy to remember but difficult for someone else to guess. For more information, check out [Password Tips](#) in our Tech Savvy tutorial. Re-enter the password and include a hint, then click Next to continue.



Optional: Check the box to activate Family Safety.

Click Finish.

The user will be added.

Privacy

Devices

Ease of Access

Sync your settings

HomeGroup

Other users



Add a user



Brandon
Local Account



Olenna Mason
lakestone.omason@gmail.com



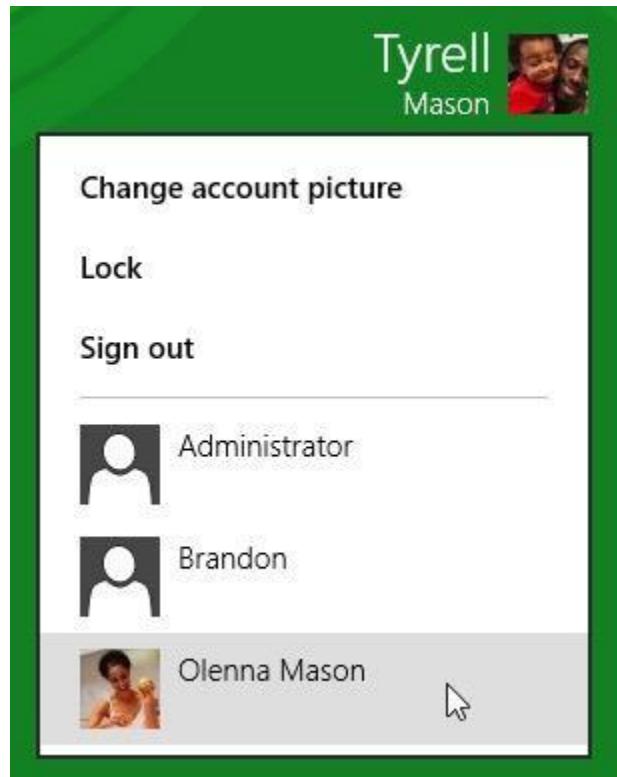
Tyrell Mason
tyrellmason30@gmail.com

coronainstitute.com

Switching users

If you have multiple user accounts on your computer, it's easy to switch between users without signing out or closing your current apps. Switching users will lock the current user, so you won't need to worry about someone else accessing your account.

To switch users, click the current user in the upper-right of the Start screen and then select the desired user from the drop-down menu. The user will then need to enter a password to sign in.

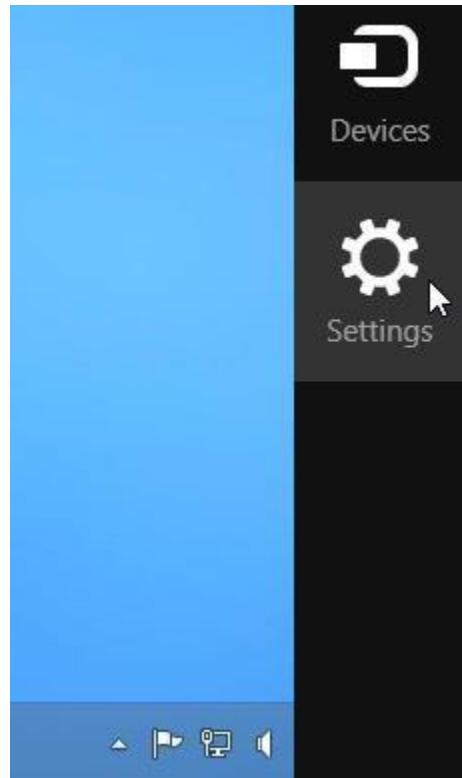


Changing User Account Types

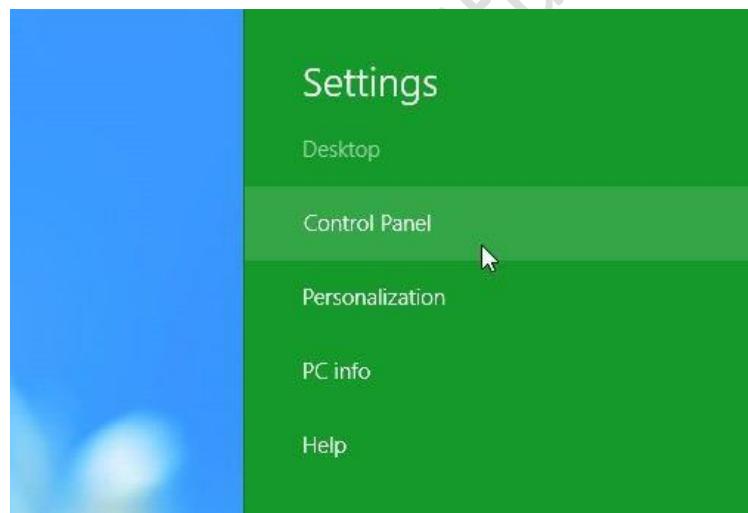
By default, the user account you created when setting up Windows 8 is an Administrator account. An Administrator account allows you to make top-level changes to the computer, like adding new users or modifying specific settings. Any users you add are automatically assigned to a Standard account, which should meet the everyday needs of most users. You will probably only need one Administrator account on a shared computer, but you have the option to promote any user to an Administrator account if you want.

To change the account type:

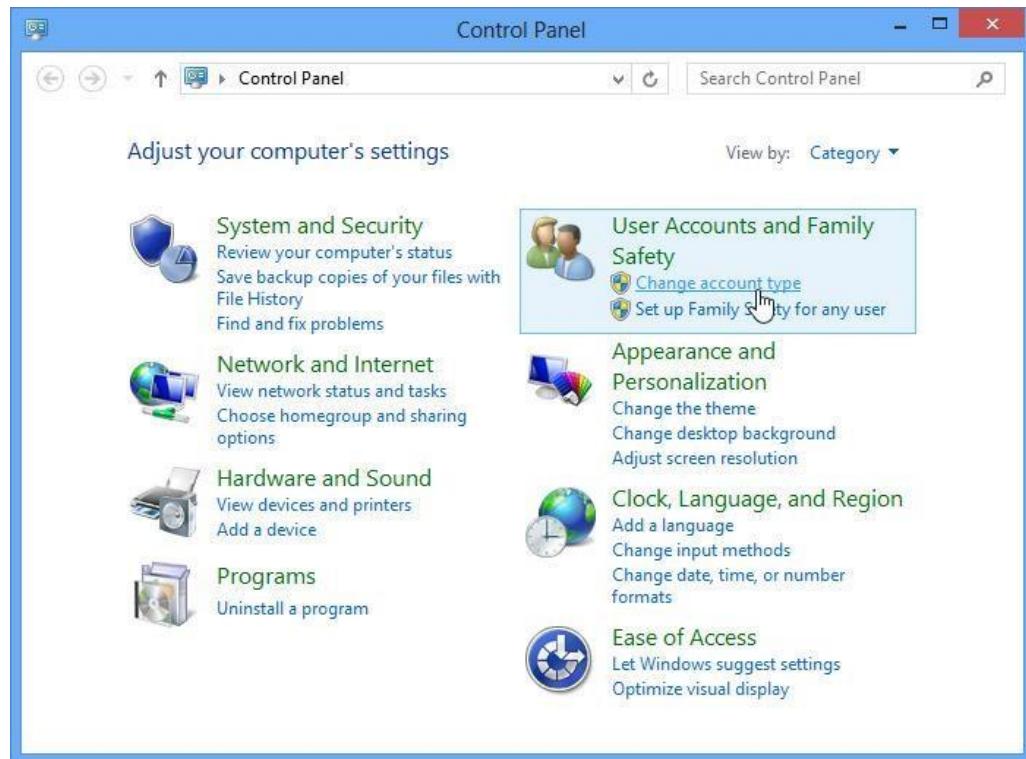
From the Desktop view, hovers the mouse in the lower-right corner to access the Charms bar, then select Settings.



Locate and select Control Panel from the Settings Pane.

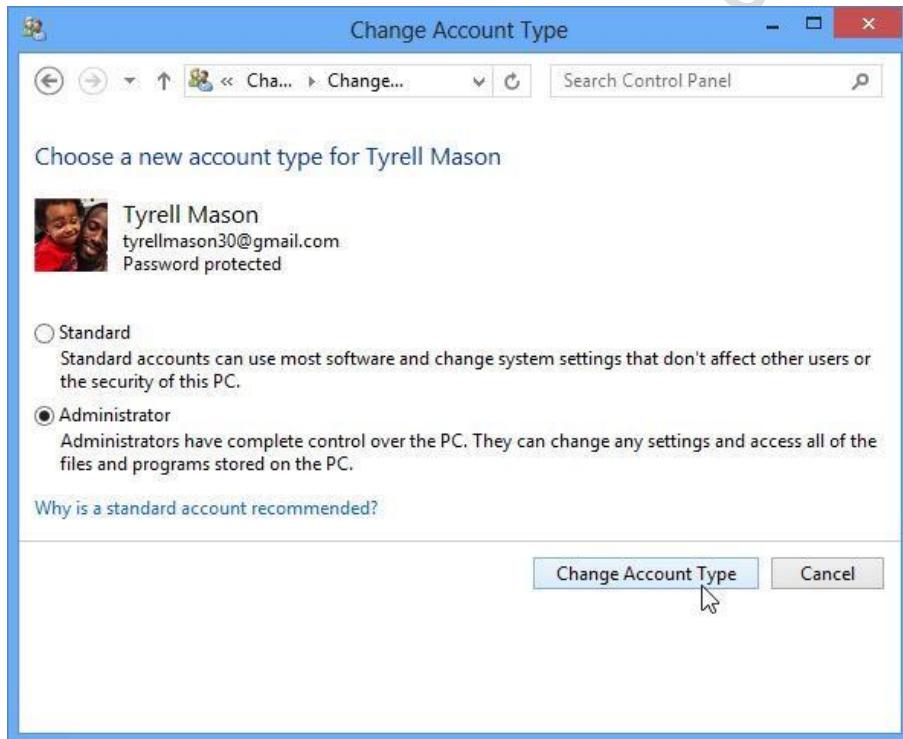
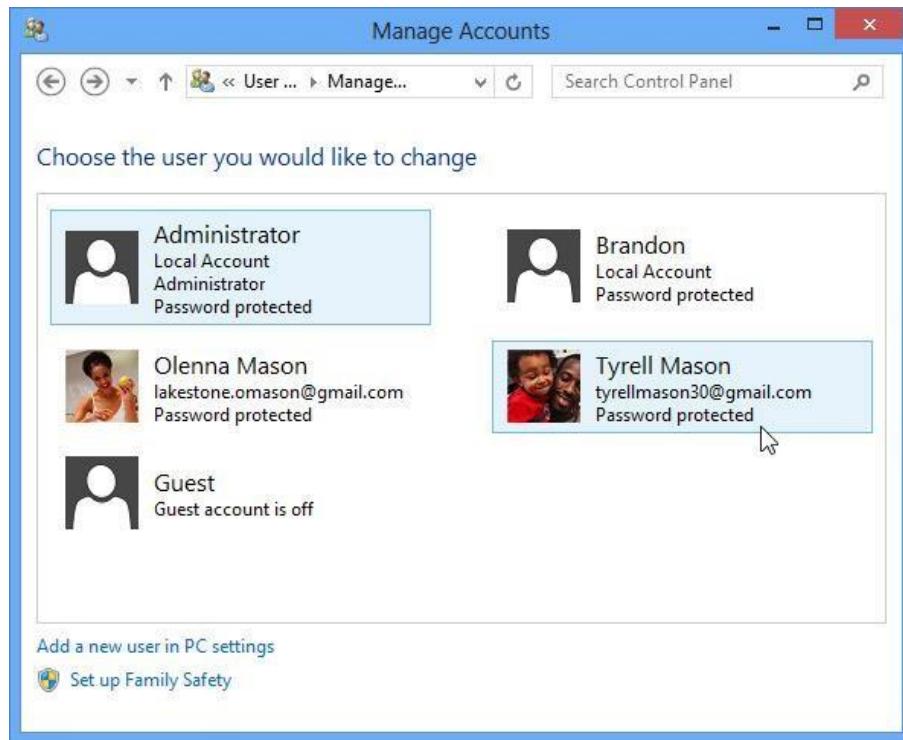


The Control Panel will appear. Select Change account type below the User Accounts and Family Safety group.



The Manage Accounts dialog box will appear. Select the desired user account.

The Change Account Type dialog box will appear. Choose Administrator, and then select Change Account Type. The user will now have administrative privileges.



Parental controls

Windows 8 offers a variety of parental controls that can help you monitor your children's activity and protect them from inappropriate content. For example, you can restrict certain apps and websites or limit the amount of time a user can spend on the computer. You'll need to add an account for each user you wish to monitor.

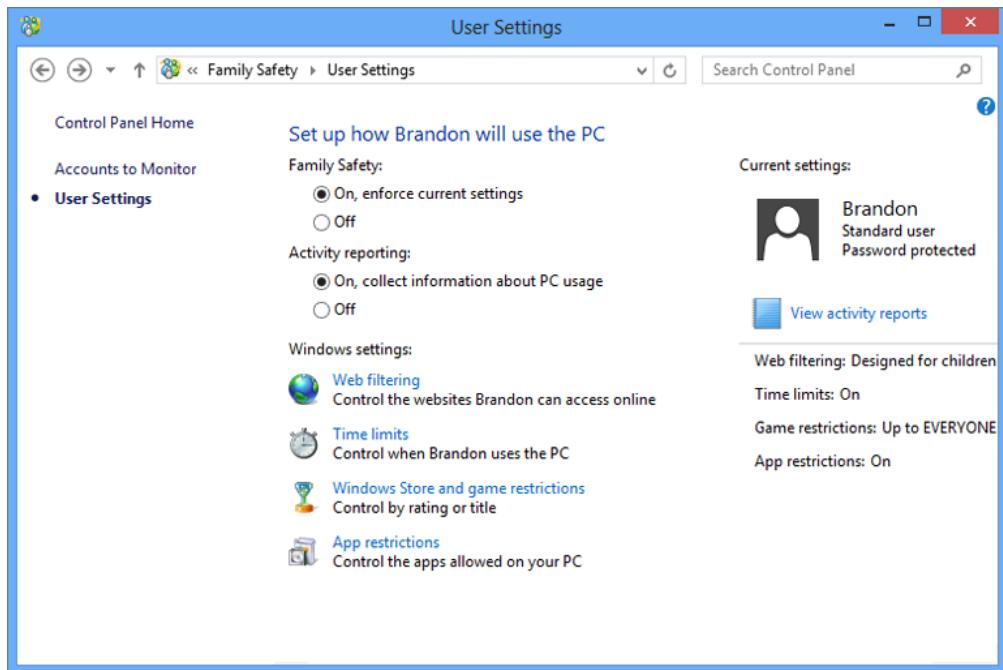
To set parental controls:

From the Control Panel, locate and select Set up Family Safety for any user below the User Accounts and Family Safety group.

The Family Safety dialog box will appear. Select the desired user.



The Family Safety settings pane will appear. Make sure Family Safety is turned On. You'll then be able to set parental controls for the selected user.



Module M4/U1/S1-S3

Linux Fundamentals

All modern operating systems have their roots in 1969 when Dennis Ritchie and Ken Thompson developed the C language and the Unix operating system at AT&T Bell Labs. They shared their source code (yes, there was open source back in the Seventies) with the rest of the world, including the hippies in Berkeley California. By 1975, when AT&T started selling Unix commercially, about half of the source code was written by others. The hippies were not happy that a commercial company sold software that they had written; the resulting (legal) battle ended in there being two versions of Unix: the official AT&T Unix, and the free BSD Unix. Development of BSD descendants like FreeBSD, OpenBSD, NetBSD, DragonFly BSD and PC-BSD is still active today.

In the Eighties many companies started developing their own Unix: IBM created AIX, Sun SunOS (later Solaris), HP HP-UX and about a dozen other companies did the same. The result was a mess of Unix dialects and a dozen different ways to do the same thing. And here is the first real root of Linux, when Richard Stallman aimed to end this era of Unix separation and everybody re-inventing the wheel by starting the GNU project (GNU is Not Unix). His goal was to make an operating system that was freely available to everyone, and where everyone could work together (like in the Seventies). Many of the command line tools that you use today on Linux are GNU tools.

The Nineties started with Linus Torvalds, a Swedish speaking Finnish student, buying a 386 computer and writing a brand new POSIX compliant kernel. He put the source code online, thinking it would never support anything but 386 hardware. Many people embraced the combination of this kernel with the GNU tools, and the rest, as they say, is history.

Linux distributions

A Linux distribution is a collection of (usually open source) software on top of a Linux kernel. A distribution (or short, distro) can bundle server software, system management tools, documentation and many desktop applications in a central secure software repository. A distro aims to provide a common look and feel, secure and easy software management and often a specific operational purpose.

Red Hat

Red Hat is a billion dollar commercial Linux company that puts a lot of effort in developing Linux. They have hundreds of Linux specialists and are known for their excellent support.

They give their products (Red Hat Enterprise Linux and Fedora) away for free. While Red Hat Enterprise Linux (RHEL) is well tested before release and supported for up to seven years after release, Fedora is a distro with faster updates but without support.

Ubuntu

Canonical started sending out free compact discs with Ubuntu Linux in 2004 and quickly became popular for home users (many switching from Microsoft Windows). Canonical wants Ubuntu to be an easy to use graphical Linux desktop without need to ever see a command line. Of course they also want to make a profit by selling support for Ubuntu.

Debian

There is no company behind Debian. Instead there are thousands of well organised developers that elect a Debian Project Leader every two years. Debian is seen as one of the most stable Linux distributions. It is also the basis of every release of Ubuntu. Debian comes in three versions: stable, testing and unstable. Every Debian release is named after a character in the movie Toy Story.

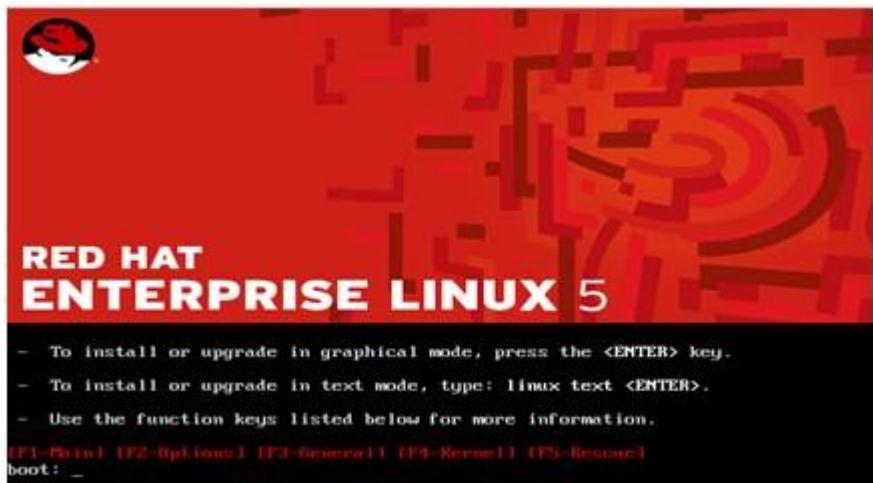
Other Distributions

like CentOS, Oracle Enterprise Linux and Scientific Linux are based on Red Hat Enterprise Linux and share many of the same principles, directories and system administration techniques. Linux Mint, Edubuntu and many other *buntu named distributions are based on Ubuntu and thus share a lot with Debian. There are hundreds of other Linux distributions.

Installing a Linux Distribution :

We are using RedHat Linux as a sample installation . You can try different variants on the Lab session

Step 1 – Insert the Red Hat Linux DVD into the DVD-drive of your computer. As soon as the following screen pops up, press ‘Enter’ to install Red Hat Enterprise Linux (RHEL) through GUI mode.



Step 2– RHEL installer would then prompt you conduct a check as to whether the CD media from which you’re installing is functioning correctly or not. Choose ‘Skip’, press enter and the installation would begin.

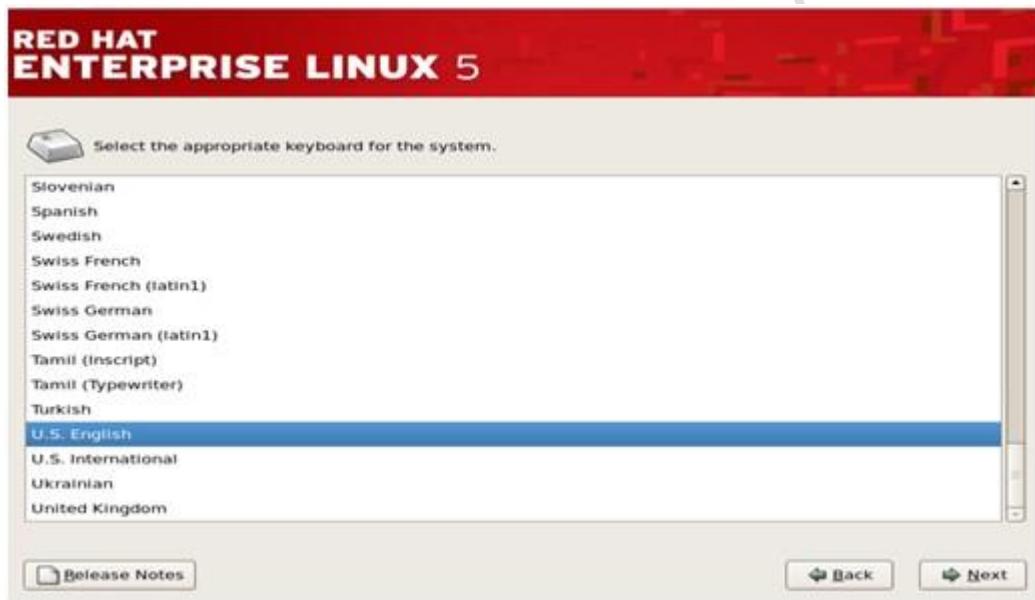


Step 3– Next, we need to select the language- English or any other language as per your preference, and then press ‘Next’ .

RED HAT ENTERPRISE LINUX 5



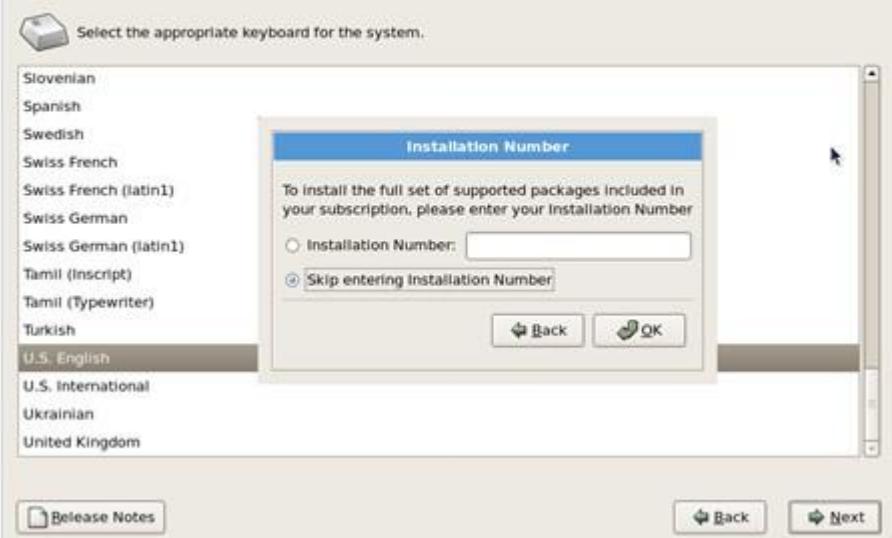
Step 4– In this step, the RHEL installer would ask you about the appropriate type of keyboard for the system. We take the ‘US English’ keyboard, you can pick any other option depending on the type of your keyboard. Then press ‘Next’ to move to the next step.



Step 5– Next, the installer would ask for an ‘installation number’ if you wish to install full set of Red Hat functionalities. Enter the installation number and press ‘OK’ if you have an officially licensed installation number(for corporate clients that buy Red Hat’s backup support and full features).

Others can select ‘Skip entering installation number’ and press ‘OK’ to proceed. RHEL would show a warning message, press ‘Skip’ in it to continue.

RED HAT ENTERPRISE LINUX 5



Step 6– The Red Hat installer would then require you to create partitions in your computer’s hard disk for the installation. You can do it in four ways but the simplest way is to select ‘Use free space on selected drives and create default layout’ as this option will not affect any other OS residing in your system.

Check the ‘review and modify portioning layout’ to create partitions and click next.



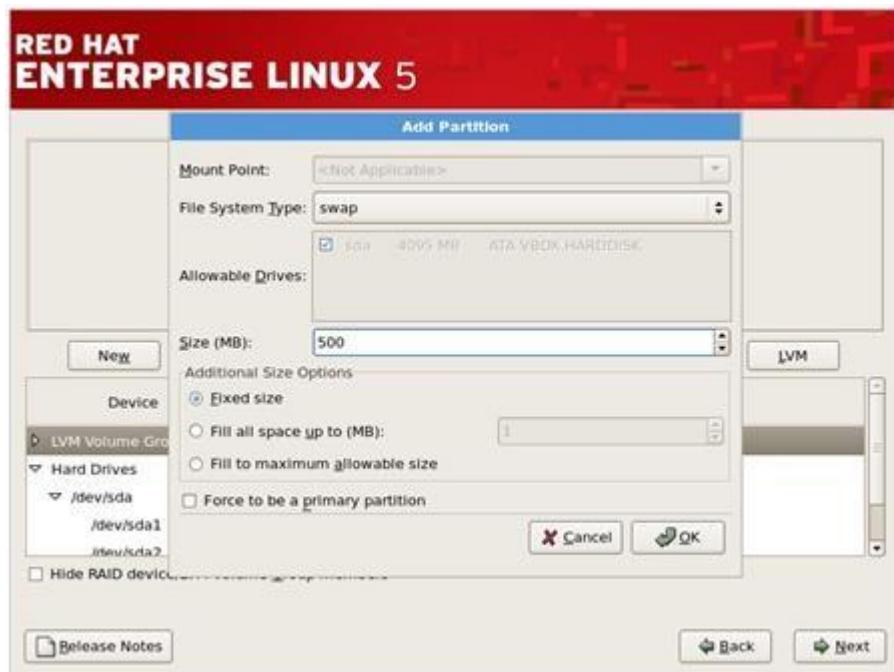
Step 7– In this step you must create the required system partitions and mount points such as ‘/boot’, ‘/home’, ‘swap’ etc which are required for the Linux’s proper functioning. To create different partitions such as /home, /var etc, click on ‘New’ to create the partitions.



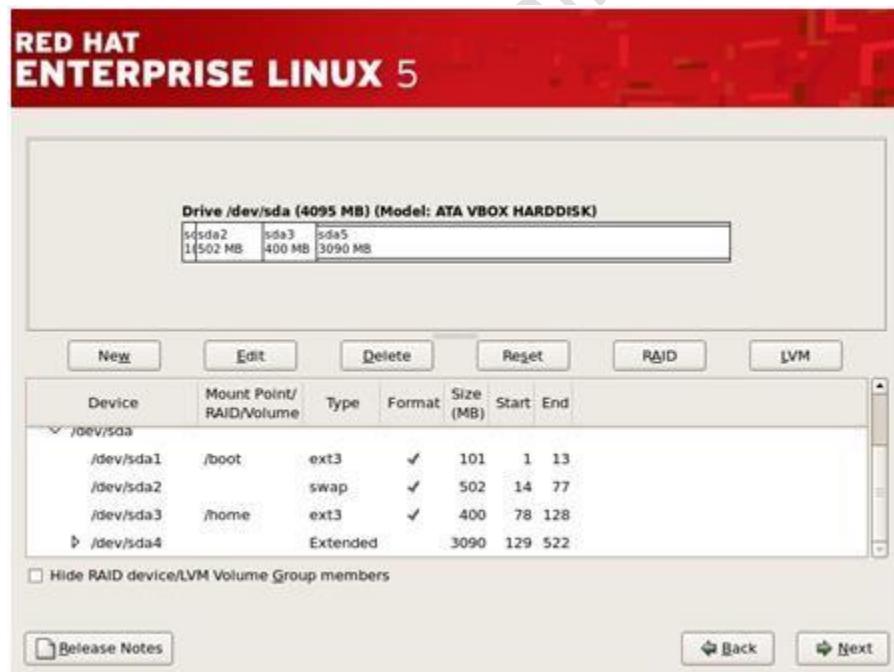
Then, select /home in the mount point and choose 'ext3' as the file system and give the desired size for it and then click 'OK'. Similarly also create /boot and /var.



Also, create a swap partition by clicking on 'New' and then choosing the filesystem as 'swap' and also give the size of Swap partition.(Usually size of swap partition SHOULD BE twice the size of RAM available to the system but you can keep its size less than that too)



Once you have made all the desired partitions and given their mount points, click 'Next' to continue installation.



Step 8– This step pertains to the default OS that will be loaded by the GRUB loader

RED HAT ENTERPRISE LINUX 5

- The GRUB boot loader will be installed on /dev/sda.
 No boot loader will be installed.

You can configure the boot loader to boot other operating systems. It will allow you to select an operating system to boot from the list. To add additional operating systems, which are not automatically detected, click 'Add.' To change the operating system booted by default, select 'Default' by the desired operating system.

Default	Label	Device	Add
<input checked="" type="checkbox"/>	Red Hat Enterprise Linux Server	/dev/VolGroup00/LogVol00	Edit
			Delete

A boot loader password prevents users from changing options passed to the kernel. For greater system security, it is recommended that you set a password.

Use a boot loader password [Change password](#)

Configure advanced boot loader options

[Release Notes](#)

[Back](#)

[Next](#)

(Note- If you have multiple Operating Systems installed, you would see multiple options here and you have to check in front of the OS name that you want to be loaded by default when the system is started.) Click 'Next' to continue.

Step 9– This step pertains to the network settings of the Linux system that you are going to install. You can select the Ethernet devices through which the system would communicate with other devices in the network.

You can also provide the hostname, Gateway address and DNS address to the system during this step. (However it's better to adjust these settings once the system has been fully installed).

RED HAT ENTERPRISE LINUX 5

Network Devices

Active on Boot	Device	IPv4/Netmask	IPv6/Prefix
<input checked="" type="checkbox"/>	eth0	DHCP	Auto

[Edit](#)

Hostname

Set the hostname:

automatically via DHCP

manually

(e.g., host.domain.com)

Miscellaneous Settings

Gateway:

Primary DNS:

Secondary DNS:

[Release Notes](#)

[Back](#)

[Next](#)

Step 10– The next step is to adjust the system clock to your particular time zone. Select your time zone and then click 'Next'.



Step 11 – This is a very important step that deals with the root(super-user) password for the system . Type the password and confirm it and then click next.



Step 12 – The RHEL installer would then prompt you about if you wish to install some extra ‘Software Development’ or ‘Web Server’ features. By default, keep it at ‘Customize later’ and press ‘Next’.

RED HAT ENTERPRISE LINUX 5

The default installation of Red Hat Enterprise Linux Server includes a set of software applicable for general Internet usage. What additional tasks would you like your system to include support for?

Software Development

Web server

You can further customize the software selection now, or after install via the software management application.

Customize later Customize now

 Release Notes

 Back

 Next

Step 13– This next step will initiate the installation of Red Hat Linux, press ‘Next’ to begin the process.



Step 14– Upon the completion of installation you should see the following screen. Press Reboot and you'd be ready to use your newly installed Red Hat Linux OS.



POST INSTALLATION CONFIGURATIONS

1. Accept the Red Hat License agreement and click 'Forward'.



2. The next step is regarding the configuration of the Firewall. You can Enable or Disable the firewall according to your preferences and then click 'Forward'.



3. Next step is about the configuration of another security tool- SE Linux. By default you should keep it 'Disabled' unless you're working with very secure information.



4. You can also choose to configure the Kdump, that stores information about system crashes if your system fails but uses valuable disk space. By default don't enable it.



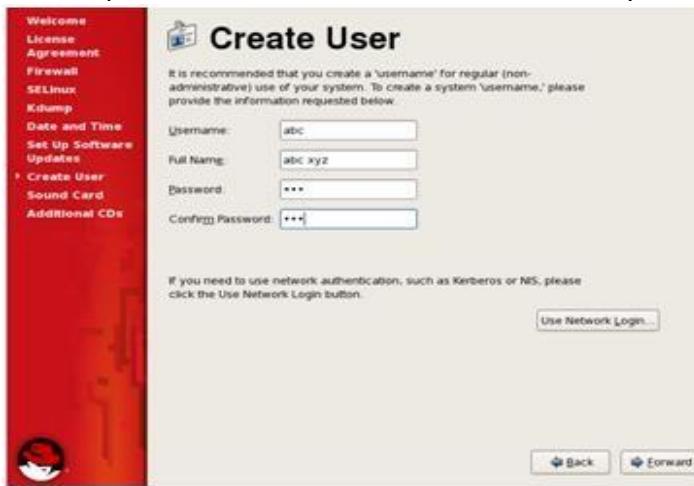
5. Next, adjust the time and date settings, and then click ‘Forward’.



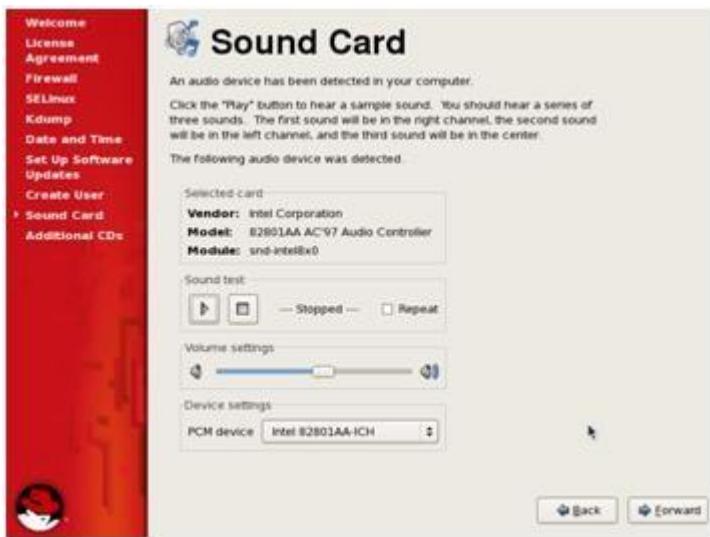
6. The next step is for software updates from Red Hat, at this point you should skip the registration and register at a later time and then click ‘Forward’.



7. This step is to create a non-admin user for the system. Enter the details and click ‘Forward’.



8. This step is about configuration of your Sound Card, choose a sound device and then click ‘Forward’.

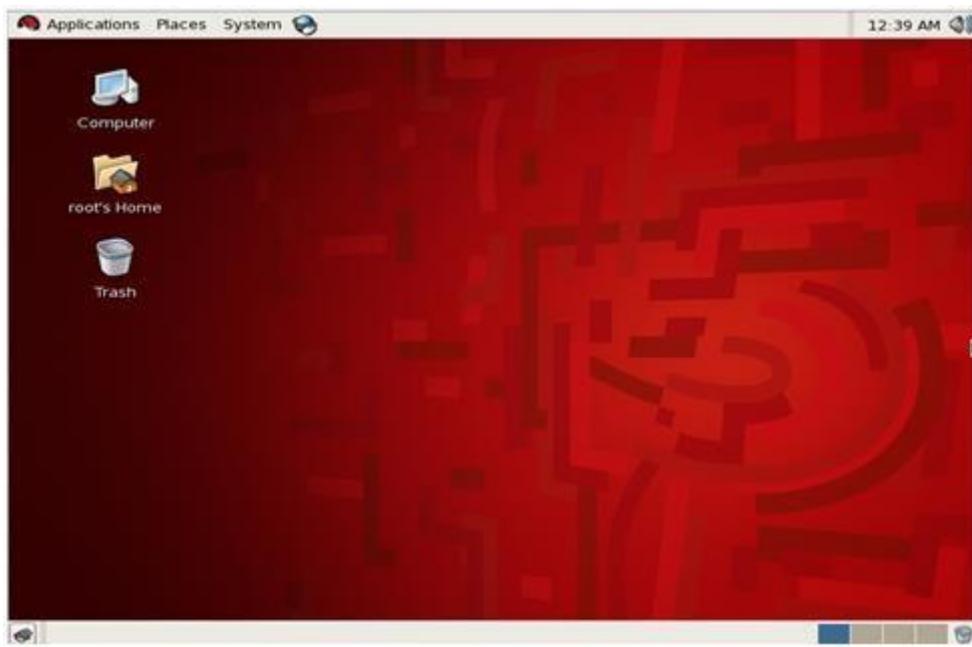


9. Click 'Forward' to complete the configurations and start using your Red Hat Linux OS.



(Note- On clicking 'Finish' the system would require a reboot if you have made changes to the configurations of Firewall or SE Linux.)

Your Red Hat Linux OS is now all installed and configured, ready to be used. Good luck using and exploring various features of Red Hat Linux.



Basic Command Skills in Linux

Even though linus distributions offer graphical shells , the power user still get their work done through command prompt . It is essential that you have a above average literacy of the linux Command line interface to survive in this field . So let us have a look to some basic commands

pwd

The you are here sign can be displayed with the pwd command (Print Working Directory). Go ahead, try it: Open a command line interface (also called a terminal, console or xterm) and type pwd. The tool displays your current directory. Here the **Paul@debian8** is the system name

```
Paul@debian8:~$ pwd  
/home/paul
```

cd

You can change your current directory with the cd command (Change Directory).

```
Paul@debian8$ cd /etc Paul@debian8$ pwd /etc Paul@debian8$ cd /bin  
Paul@debian8$ pwd /bin Paul@debian8$ cd /home/paul/ Paul@debian8$ pwd  
/home/paul
```

cd ~

The cd is also a shortcut to get back into your home directory. Just typing cd without a target directory, will put you in your home directory. Typing cd ~ has the same effect.

```
paul@debian8$ cd /etc  
paul@debian8$ pwd /etc  
paul@debian8$ cd paul@debian8$  
pwd /home/paul paul@debian8$ cd ~  
paul@debian8$ pwd /home/paul
```

cd ..

To go to the parent directory (the one just above your current directory in the directory tree), type cd ...

```
paul@debian8$ pwd /usr/share/games  
paul@debian8$ cd .. paul@debian8$ pwd  
/usr/share
```

To stay in the current directory, type cd . ;-) We will see useful use of the . character representing the current directory later.

cd -

Another useful shortcut with cd is to just type cd - to go to the previous directory.

```
paul@debian8$ pwd /home/paul  
paul@debian8$ cd /etc paul@debian8$  
pwd /etc paul@debian8$ cd - /home/paul  
paul@debian8$ cd - /etc
```

absolute and relative paths

You should be aware of absolute and relative paths in the file tree. When you type a path starting with a slash (/), then the root of the file tree is assumed. If you don't start your path with a slash, then the current directory is the assumed starting point. The screenshot below first shows the current directory /home/paul. From within this directory, you have to type cd /home instead of cd home to go to the /home directory.

```
paul@debian8$ pwd /home/paul paul@debian8$ cd  
home  
bash: cd: home: No such file or directory  
paul@debian8$ cd /home  
paul@debian8$ pwd /home
```

path completion

The tab key can help you in typing a path without errors. Typing cd /et followed by the tab key will expand the command line to cd /etc/. When typing cd /Et followed by the tab key, nothing will happen because you typed the wrong path (upper case E). You will need fewer key strokes when using the tab key, and you will be sure your typed path is correct! Is You can list the contents of a directory with ls.

```
paul@debian8:~$ ls  
allfiles.txt dmesg.txt services stuff summer.txt  
paul@debian8:~$
```

ls -a

A frequently used option with ls is -a to show all files. Showing all files means including the hidden files. When a file name on a Linux file system starts with a dot, it is considered a hidden file and it doesn't show up in regular file listings.

```
paul@debian8:~$ ls allfiles.txt dmesg.txt services stuff summer.txt paul@debian8:~$  
ls -a . allfiles.txt .bash_profile dmesg.txt .lessht stuff .. .bash_history .bashrc services  
.ssh summer.txt paul@debian8:~$
```

mkdir

Walking around the Unix file tree is fun, but it is even more fun to create your own directories with mkdir. You have to give at least one parameter to mkdir, the name of the new directory to be created. Think before you type a leading / .

```
paul@debian8:~$ mkdir mydir paul@debian8:~$ cd
```

```
mydir
```

```
paul@debian8:~/mydir$ ls -al total 8 drwxr-xr-x 2 paul paul 4096 Sep 17 00:07 . drwxr-xr-x 48 paul paul 4096 Sep 17 00:07 ..
```

```
paul@debian8:~/mydir$ mkdir stuff
```

```
paul@debian8:~/mydir$ mkdir otherstuff
```

```
paul@debian8:~/mydir$ ls -l
```

```
total 8
```

```
drwxr-xr-x 2 paul paul 4096 Sep 17 00:08
```

```
otherstuff drwxr-xr-x 2 paul paul 4096 Sep 17 00:08 stuff
```

```
paul@debian8:~/mydir$
```

rmdir

When a directory is empty, you can use rmdir to remove the directory

```
rmdir -p
```

And similar to the mkdir -p option, you can also use rmdir to recursively remove directories.

```
paul@debian8:~$ mkdir -p test42/subdir paul@debian8:~$ rmdir -p test42/subdir
```

```
paul@debian8:~$
```

```
working with files
```

we learn how to recognise, create, remove, copy and move files using commands like file, touch, rm, cp, mv and rename.

all files are case sensitive Files on Linux (or any Unix) are case sensitive. This means that FILE1 is different from file1, and /etc/hosts is different from /etc/Hosts (the latter one does not exist on a typical Linux computer).

everything is a file A directory is a special kind of file, but it is still a (case sensitive!) file. Each terminal window (for example /dev/pts/4), any hard disk or partition (for example /dev/sdb1)

and any process are all represented somewhere in the file system as a file. It will become clear throughout this course that everything on Linux is a file.

file

The **file** utility determines the file type. Linux does not use extensions to determine the file type. The command line does not care whether a file ends in .txt or .pdf. As a system administrator, you should use the file command to determine the file type. Here are some examples on a typical Linux system.

```
paul@laika:~$ file pic33.png
pic33.png: PNG image data, 3840 x 1200, 8-bit/color RGBA, non-interlaced
paul@laika:~$ file /etc/passwd /etc/passwd: ASCII text
paul@laika:~$ file HelloWorld.c HelloWorld.c: ASCII C program text
```

The file command uses a magic file that contains patterns to recognize file types. The magic file is located in /usr/share/file/magic. Type **man 5 magic** for more information. It is interesting to point out file -s for special files like those in /dev and /proc.

```
root@debian6~# file /dev/sda /dev/sda:
block special root@debian6~# file -s
/dev/sda
/dev/sda: x86 boot sector; partition 1: ID=0x83, active, starthead...
root@debian6~# file /proc/cpuinfo /proc/cpuinfo: empty
root@debian6~# file -s /proc/cpuinfo /proc/cpuinfo: ASCII C++
program text
```

touch

One easy way to create an empty file is with touch .

This screenshot starts with an empty directory, creates two files with touch and the lists those files

```
paul@debian7:~$ ls -l total 0
paul@debian7:~$ touch file42
paul@debian7:~$ touch file33
paul@debian7:~$ ls -l
total 0
-rw-r--r-- 1 paul paul 0 Oct 15 08:57 file33
-rw-r--r-- 1 paul paul 0 Oct 15 08:56 file42
paul@debian7:~$
```

rm remove forever When you no longer need a file, use rm to remove it. Unlike some graphical user interfaces, the command line in general does not have a waste bin or trash can to recover files. When you use rm to remove a file, the file is gone. Therefore, be careful when removing files!

```
paul@debian7:~$ ls
BigBattle.txt file33 file42 SinkoDeMayo
paul@debian7:~$ rm BigBattle.txt
```

```
paul@debian7:~$ ls file33 file42
SinkoDeMayo
paul@debian7:~$
```

rm -i To prevent yourself from accidentally removing a file, you can type rm -i. it will ask for a step by step confirmation before removing each and every file .

rm -rf

By default, rm -r will not remove non-empty directories. However rm accepts several options that will allow you to remove any directory. The rm -rf statement is famous because it will erase anything (providing that you have the permissions to do so). When you are logged on as root, be very careful with rm -rf (the f means force and the r means recursive) since being root implies that permissions don't apply to you. You can literally erase your entire file system by accident

```
paul@debian7:~$ mkdir test paul@debian7:~$ rm
test
rm: cannot remove `test': Is a directory
paul@debian7:~$ rm -rf test paul@debian7:~$ ls
test
ls: cannot access test: No such file or directory
paul@debian7:~$
```

cp

To copy a file, use cp with a source and a target argument.

```
paul@debian7:~$ ls file42 SinkoDeMayo
paul@debian7:~$ cp file42 file42.copy paul@debian7:~$ ls
file42 file42.copy SinkoDeMayo
```

copy to another directory If the target is a directory, then the source files are copied to that target directory.

```
paul@debian7:~$ mkdir dir42 paul@debian7:~$ cp
SinkoDeMayo dir42 paul@debian7:~$ ls dir42/
SinkoDeMayo
```

copy multiple files to directory

You can also use cp to copy multiple files into a directory. In this case, the last argument (a.k.a. the target) must be a directory.

```
paul@debian7:~$ cp file42 file42.copy SinkoDeMayo dir42/ paul@debian7:~$ ls
dir42/
file42 file42.copy SinkoDeMayo
```

rename files with mv

```
Use mv to rename a file or to move the file to another directory. paul@debian7:~$ ls  
dir33 dir42 file42 file42.copy SinkoDeMayo paul@debian7:~$  
mv file42 file33  
paul@debian7:~$ ls dir33 dir42 file33 file42.copy SinkoDeMayo paul@debian7:~$
```

When you need to rename only one file then mv is the preferred command to use.

rename directories with mv

The same mv command can be used to rename directories.

head

You can use head to display the first ten lines of a file.

```
paul@debian7:~$ head /etc/passwd
```

The head command can also display the first n lines of a file.

```
paul@debian7:~$ head -4 /etc/passwd tail
```

Similar to head, the tail command will display the last ten lines of a file.

```
paul@debian7:~$ tail /etc/services
```

cat

The cat command is one of the most universal tools, yet all it does is copy standard input to standard output. In combination with the shell this can be very powerful and diverse. Some examples will give a glimpse into the possibilities. The first example is simple, you can use cat to display a file on the screen. If the file is longer than the screen, it will scroll to the end.

```
paul@debian8:~$ cat /etc/resolv.conf domain
```

linux-training.be

search linux-training.be

nameserver 192.168.1.42

create files You can use cat to create flat text files.

Type the cat > winter.txt command as shown in the screenshot below.

Then type one or more lines, finishing each line with the enter key. After the last line, type and hold the Control (Ctrl) key and press d.

Many Linux distributions partially follow the Filesystem Hierarchy Standard. The FHS may help make more Unix/Linux file system trees conform better in the future. The FHS is available online at <http://www.pathname.com/fhs/> where we read: "The filesystem hierarchy standard has been designed to be used by Unix distribution developers, package developers, and system implementers. However, it is primarily intended to be a reference and is not a tutorial on how to manage a Unix filesystem or directory hierarchy."

the root directory /

All Linux systems have a directory structure that starts at the root directory. The root directory is represented by a forward slash, like this: /. Everything that exists on your Linux system can be found below this root directory. Let's take a brief look at the contents of the root directory

```
[paul@RHELv4u3 ~]$ ls /
bin dev home media mnt proc sbin srv tftpboot  usr
boot etc lib misc opt root selinux sys tmp var
```

binary directories

Binaries are files that contain compiled source code (or machine code). Binaries can be executed on the computer. Sometimes binaries are called executable.

/bin The /bin directory contains binaries for use by all users. According to the FHS the /bin directory should contain /bin/cat and /bin/date (among others).

/sbin /sbin contains binaries to configure the operating system. Many of the system binaries require root privilege to perform certain tasks.

/lib Binaries found in /bin and /sbin often use shared libraries located in /lib. Below is a screenshot of the partial contents of /lib.

/lib/modules Typically, the Linux kernel loads kernel modules from /lib/modules/\$kernelversion/. This directory is discussed in detail in the Linux kernel chapter.

/lib32 and **/lib64** We currently are in a transition between 32-bit and 64-bit systems. Therefore, you may encounter directories named /lib32 and /lib64 which clarify the register size used during compilation time of the libraries. A 64-bit computer may have some 32-bit binaries and libraries for compatibility with legacy applications.

/opt The purpose of /opt is to store optional software. In many cases this is software from outside the distribution repository. You may find an empty /opt directory on many systems.

/boot The /boot directory contains all files needed to boot the computer. These files don't change very often. On Linux systems you typically find the /boot/grub directory here.

/boot/grub contains /boot/grub/grub.cfg (older systems may still have /boot/grub/grub.conf) which defines the boot menu that is displayed before the kernel starts

/etc All of the machine-specific configuration files should be located in /etc. Historically /etc stood for etcetera, today people often use the Editable Text Configuration backronym.

/etc/init.d/ A lot of Unix/Linux distributions have an /etc/init.d directory that contains scripts to start and stop daemons. This directory could disappear as Linux migrates to systems that replace the old init way of starting all daemons.

/etc/X11/ The graphical display (aka X Window System or just X) is driven by software from the X.org foundation. The configuration file for your graphical display is /etc/X11/xorg.conf.

/etc/skel/ The skeleton directory /etc/skel is copied to the home directory of a newly created user. It usually contains hidden files like a .bashrc script.



/etc/sysconfig/ This directory, which is not mentioned in the FHS, contains a lot of Red Hat Enterprise Linux configuration files.

/home Users can store personal or project data under /home. It is common (but not mandatory by the fhs) practice to name the users home directory after the user name in the format /home/ \$USERNAME.

/root On many systems /root is the default location for personal data and profile of the root user. If it does not exist by default, then some administrators create it.

/mnt The /mnt directory should be empty and should only be used for temporary mount points.

/tmp Applications and users should use /tmp to store temporary data when needed. Data stored in /tmp may use either disk space or RAM. Both of which are managed by the operating system. Never use /tmp to store data that is important or which you wish to archive.

/dev Device files in /dev appear to be ordinary files, but are not actually located on the hard disk. The /dev directory is populated with files as the kernel is recognizing hardware.

Session Notes

Blank sheet with a table that enables you to jot down their points from the session.

coronainstitute.com

Feedback of Trainee for Module 4

[This will enable the SDE to get a feedback on the unit]

Dear Participant,

Please provide your frank feedback for enhancing the trainings/

Sl. No.	Parameters	Rating		
		Good	Satisfactory	Poor
1.	Preparation of SDE for taking sessions			
2.	Response of SDE to queries			
3.	Interaction of SDE with students			
4.	Use of teaching – learning material			
5.	Communication skills of SDE			
6.	Punctuality of SDE			
7.	Other specific parameters, if any			

Suggestions:

Module 5 – Laptop Service & Adv Topics

Objectives

Through a series of theory and practical hands on gain skills to comfortably work with laptop card level service and learn fundamental troubleshooting aspects

Unit: No 1-4

Learning outcomes

Component identification , disassembly and re assembly of laptop systems, LCD panels
Printer Installation Modem , Live CD Based TS. Deepfreeze, VMware Workstation, Partition
MagicData recovery, Password recovery

Session Notes M5/U1/S1-S3 , U2/S1-S6 U3/S1-S3 , U4/S1-11

Module M5/U1/S1-S3 U2/S1-S6

Laptop Servicing

The laptop revolution is here to stay. And it is time for even an average hardware engineer to update himself with laptop chip level service knowledge .

If you have to feel comfortable with laptop chip level training , make sure you are already comfortable with desktop hardware service. Since you have gone through the assembling and service of the desktop , we can proceed with laptop section .

SYSTEM BOARD / MOTHERBOARD

The system board is the main logic board in any laptop. All internal components are connected



More memory you have installed – better the performance of the laptop.

Learn about different types of memory, compatibility issues and how you can replace or upgrade memory yourself. The memory is a user replaceable part.



to the system board. This is one of the most expensive parts in a laptop.

MEMORY / RAM

HARD DRIVE

The hard drive is the main storage of information in a laptop. All system files, personal files are stored inside the hard drive. Find the difference between SATA and IDE hard drives. Faster hard drive you have installed – faster data access you get. You can upgrade the hard drive yourself.

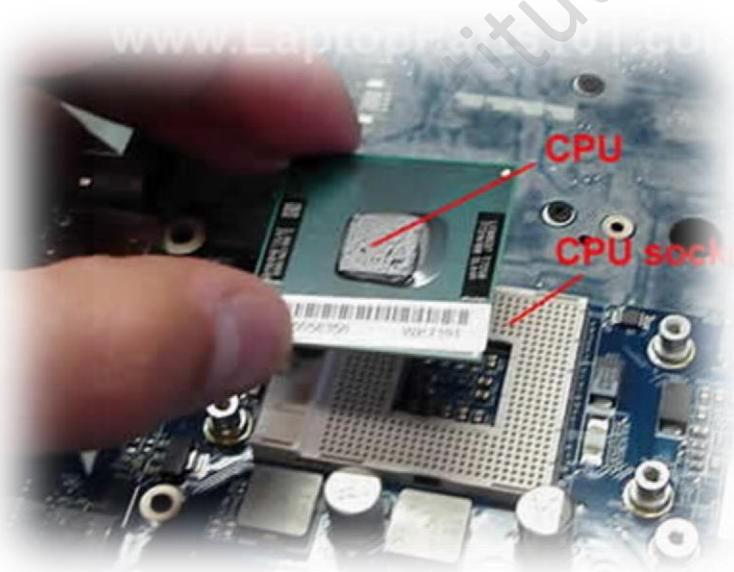


SATA hard drive

IDE hard drive

PROCESSOR / CPU

The processor is the brain of your laptop. Faster CPU means faster data processing.



KEYBOARD

The keyboard is the main input device. Find out how the keyboard is connected to the motherboard and how it can be removed or replaced.



CD/DVD OPTICAL DRIVE

The CD/DVD drive allows you to read/write data from/to a CD or DVD disc. Learn about the difference between drives with regular and SATA connectors.

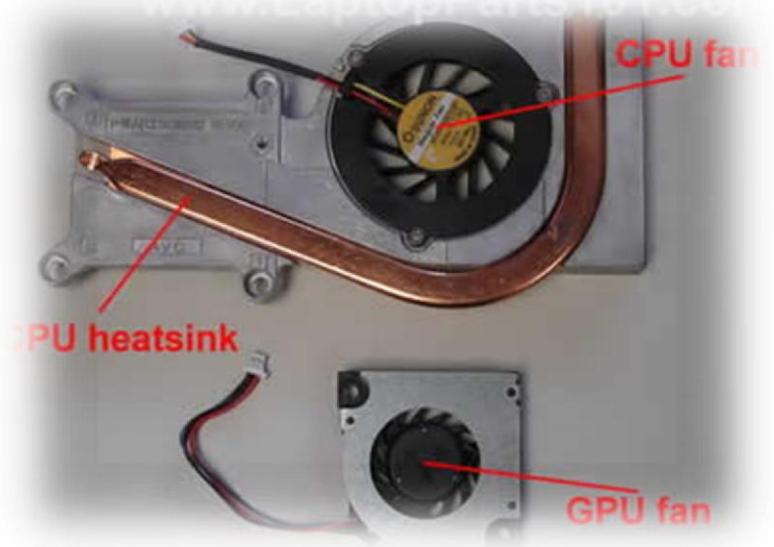


Optical drive with
SATA connector

Optical drive with
regular connector

COOLING FAN

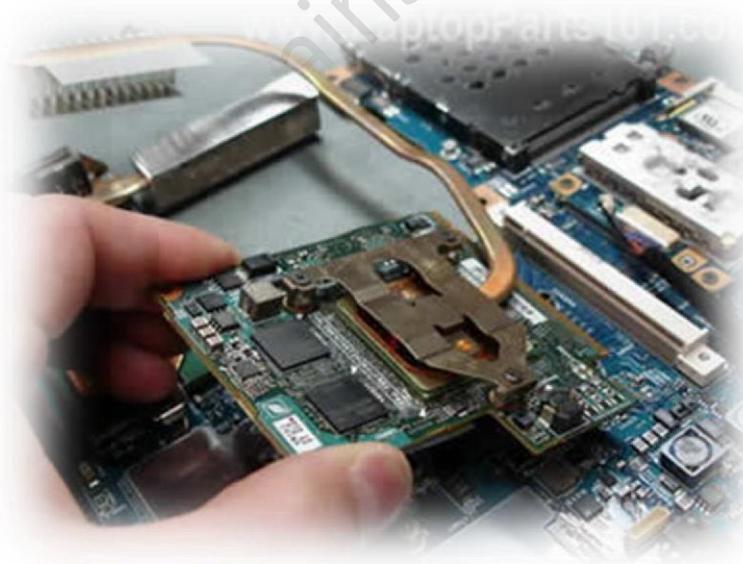
The cooling fan is a part of the cooling module in a laptop. The fan helps to cool down the processor when the laptop is turned on.



VIDEO CARD aka GRAPHICS CARD

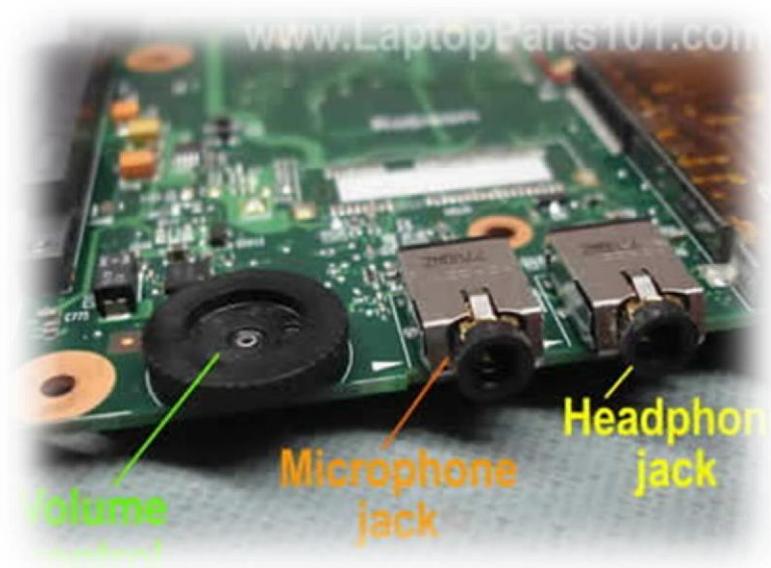
In most modern laptops the video card is integrated into the system board. If the video card fails you have to replace the whole motherboard.

In some laptops the video card is a discrete module and can be removed or replaced separately from the motherboard.



AUDIO BOARD aka SOUND BOARD

In most laptops the audio board is a part of the motherboard. If that's the case, all audio board input/output components such as volume control, microphone jack and headphone jack are soldered directly to the motherboard.



WIRELESS NETWORK CARD

The internal wireless card helps you to connect to the Internet without running a cable. Learn about different types of internal wireless cards and how they are connected to the motherboard.



CMOS BATTERY aka RTC BATTERY

The CMOS battery provides power to the CMOS chip when the laptop is turned off or disconnected from the wall outlet.



LCD SCREEN

The LCD screen is one of the most expensive parts in a laptop computer. The LCD screen mounts inside the display panel.

If you accidentally cracked the screen, it has to be replaced. You cannot repair a cracked screen.



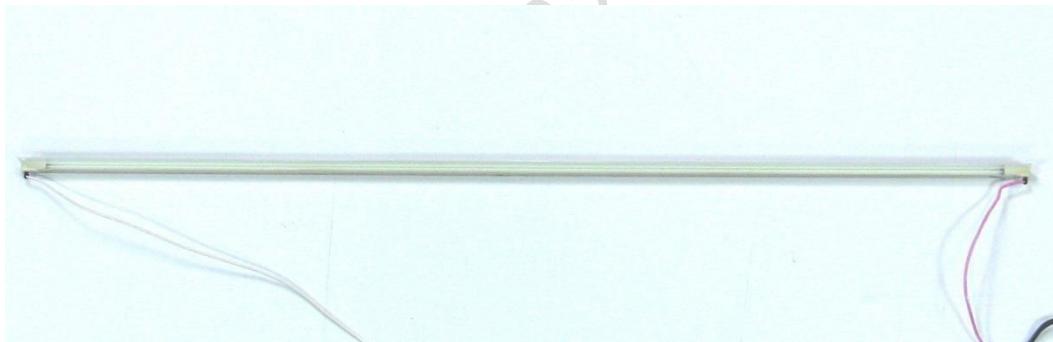
SCREEN INVERTER BOARD aka FL INVERTER

The inverter board is a power supply for the backlight lamp inside the LCD screen. When inverter fails, the LCD screen goes very very dark and you barely can see any image on the screen. In most laptops the inverter board is mounted inside the display panel below the LCD screen.



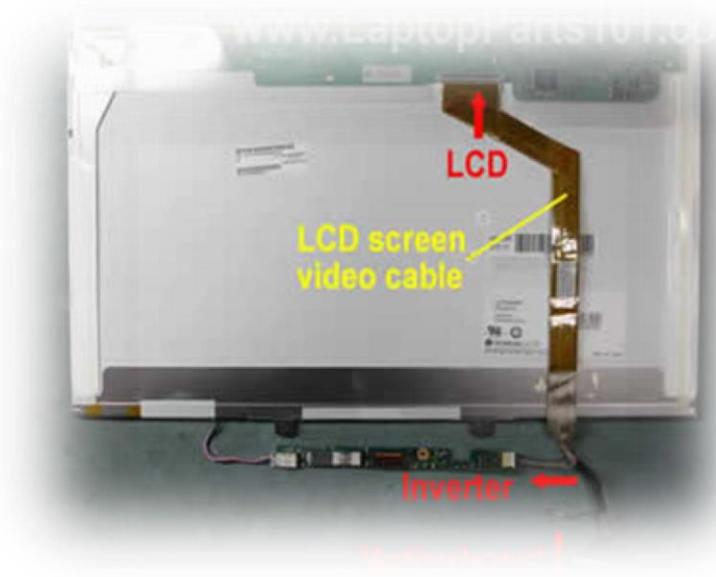
SCREEN BACKLIGHT LAMP aka CCFL TUBE

The backlight lamp is the main source of light in the LCD screen. The backlight lamp is mounted inside the screen. When the backlight lamp fails, you have to replace the whole LCD screen. It's possible to replace just the lamp inside the screen but it's very hard and has to be performed by an experienced technician.



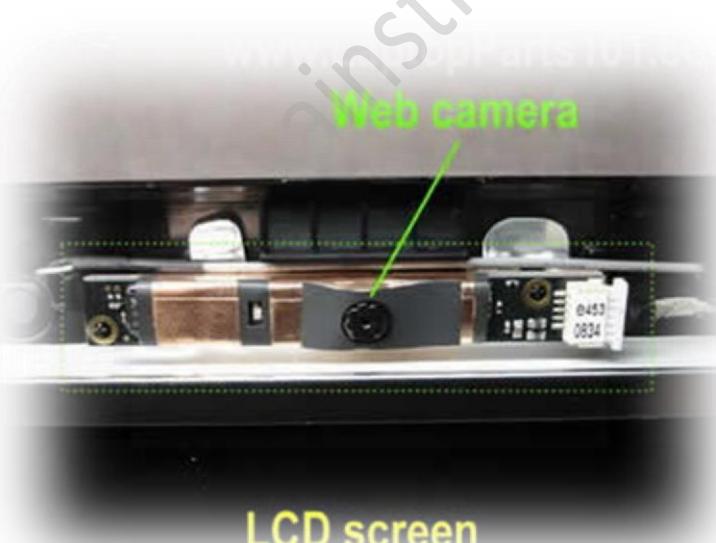
SCREEN CABLE aka VIDEO CABLE

The video cable connects the Laptop screen to motherboard. The video cable carries data signal for the LCD screen and power for the inverter board.



WEB CAMERA

Many modern laptops come with a web camera built into the display panel. The web camera is not a part of the LCD screen. The web cameras are located on a separate board and can be replaced separately from the LCD.



DISPLAY HINGES aka SCREEN HINGES

The display hinges connect two main parts of any laptop – the display panel and base assembly.



AC/DC POWER ADAPTER

The AC/DC power adapter converts high voltage AC power from the mains to low voltage DC power required by the laptop.



MAIN BATTERY

The battery is a secondary source of power for a laptop. The battery gets charged while the laptop is plugged into the mains and keeps the laptop running when it's unplugged from the mains.



Once you get familiarized with the laptop components , We will proceed with a hands on session on taking apart your laptop and reassemble and learn basic troubleshooting tips on the same .

Printer

There are mainly two types of printers. They are, Impact Printers Non-Impact Printers

Impact printers

These printers have a mechanism that touches the paper in order to create an image. It usually forms the print image by pressing an inked ribbon against the paper using a hammer or pins. Following are some examples of impact printers.

eDaisy Wheel Printer, Dot Matrix Printer

Non-impact printers

These printers do not touch the paper when creating an image; and because these printers do not hammer against the paper they are much quieter.

Following are some non-impacted printers.

eg: Inkjet Printer, Laser Printer

Impact printers

Daisy-wheel printers

In order to get the quality of type found on typewriters, a daisy-wheel impact printer can be used. It is called daisy-wheel printer because the print mechanism looks like a daisy; at the end of each "Petal" is a fully formed character which produces solid-line print. A hammer strikes a "petal" containing a character against the ribbon, and the character prints on the paper. Its speed is slow typically 25-55 characters per second.



Dot-Matrix Printers

The dot-matrix printer uses print heads containing from 9 to 24 pins. These pins produce patterns of dots on the paper to form the individual characters. The 24 pin dot-matrix printer produces more dots than a 9 pin dot-matrix printer, which results in much better quality and clearer characters. The general rule is: the more pins, the clearer the letters on the paper. The pins strike the ribbon individually as the print mechanism moves across the entire print line in both directions, i.e., from left to right, then right to left, and so on. The user can produce a color output with a dot-matrix printer (the user will change the black ribbon with a ribbon that has

color stripes). Dot-matrix printers are inexpensive and typically print at speeds of 100-600 characters per second.

Working

All dot matrix printers create characters on paper by striking an inked ribbon with a hard surface. Unlike typewriters, which use a similar mechanism, dot matrix printers do not have fixed character shapes or fonts. Instead, each individual character is formed by the arrangement of a series of pins. This allows dot matrix printers to be used for basic graphical printing and multiple fonts as well as basic text printing -- but it gives the printout a characteristic "dotted" appearance. Dot matrix printouts often produce lower-quality text that can be difficult to read. In addition, dot matrix printers generally are noisier than inkjet or laser models.

Advantages of Impact Printer

Dot matrix printers, like any impact printer, can print on multi-part stationery or make carbon-copies.

Impact printers have one of the lowest printing costs per page.

As the ink is running out, the printout gradually fades rather than suddenly stopping partway through a job.

They are able to use continuous paper rather than requiring individual sheets, making them useful for data logging.

They are good, reliable workhorses ideal for use in situations where low printing cost is more important than quality

Disadvantages of Impact Printer

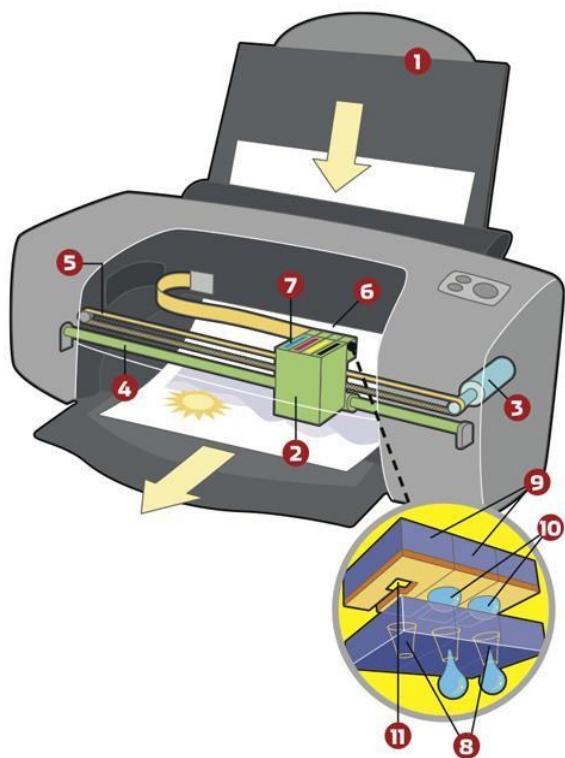
Impact printers create noise when the pins or typeface strike the ribbon to the paper.

Sound-damping enclosures may have to be used in quiet environments. They can only print lower-resolution graphics, with limited color performance, limited quality.

Lower speeds compared to non-impact printers.

Non Impact Printer

Inkjet Printer



Working

A typical inkjet receives control info from your printer driver/PC, or may process the printout in its onboard electronics. Either way, rollers advance a page from your paper tray (1) under a sliding print head/ cartridge assembly (2). Then, the print head stepper motor (3) kicks in, drawing the assembly on a sliding rod (4) to its starting position, usually via a belt (5).

The print head (6) proper is an incredible piece of miniaturization, in some cases fabricated via an etching process similar to semiconductor manufacture. On some printers, the head and ink cartridge (7) are one unit. The head's microscopic nozzles (8) anywhere from dozens to literally thousands—are outlets for incredibly tiny ink chambers (9), which are fed by the cartridge's reservoirs. Microscopic droplets (10), measured in millionths of a millionth of a liter (no, that's not a typo), fire through the nozzles.

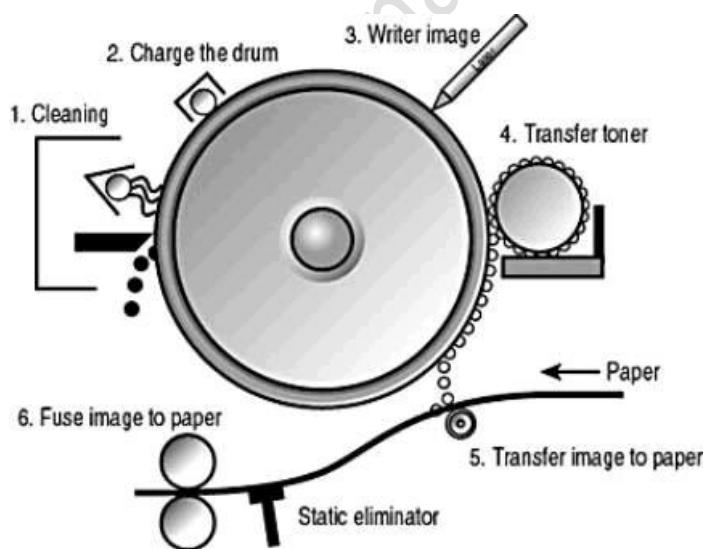
Pumps simply don't come that small. Instead, most inkjets use "thermal" technology in which a tiny resistor (11) in an ink chamber is pulsed, as needed, with intense current, superheating the ink and vaporizing part of the droplet. The result: Terrific pressure blasts it out the nozzle and onto your page. Capillary action then draws new ink into the chamber. Your text and images are built up, line by line, as the printhead assembly tracks across the page.

A given chamber can repeat the heating/ firing/ cooling cycle thousands of times per second.

Laser Printer



Working



A laser beam (typically, an Aluminium Gallium Arsenide (AlGaAs) semiconductor laser) projects an image of the page to be printed onto an electrically-charged, selenium-coated, rotating, cylindrical drum (or, more commonly in subsequent versions, organic photoconductors). Photoconductivity allows the charged electrons to fall away from the areas exposed to light.

Powdered ink (toner) particles are then electrostatically attracted to the charged areas of the drum that have not been laser-beamed. The drum then transfers the image onto paper (which is passed through the machine) by direct contact. Finally the paper is passed onto a finisher, which uses intense heat to instantly fuse the toner/ image onto the paper.

Scanner

A Scanner is an Input device, that optically scans images, printed text, [handwriting](#), or an object, and converts it to a [digital image](#).

There are 4 types of scanners. They are,

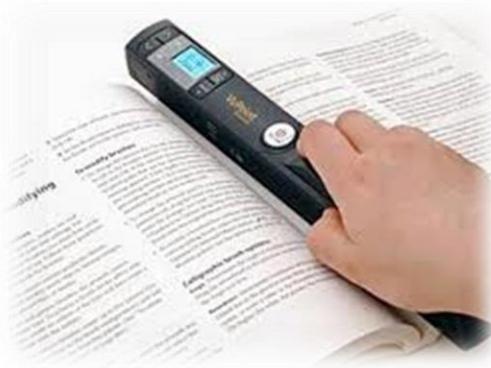
- **Flatbed scanners**, also called desktop scanners, are the most versatile and commonly used scanners. In fact, this article will focus on the technology as it relates to flatbed scanners.



- **Sheet-fed scanners** are similar to flatbed scanners except the document is moved and the scan head is immobile. A sheet-fed scanner looks a lot like a small portable printer.



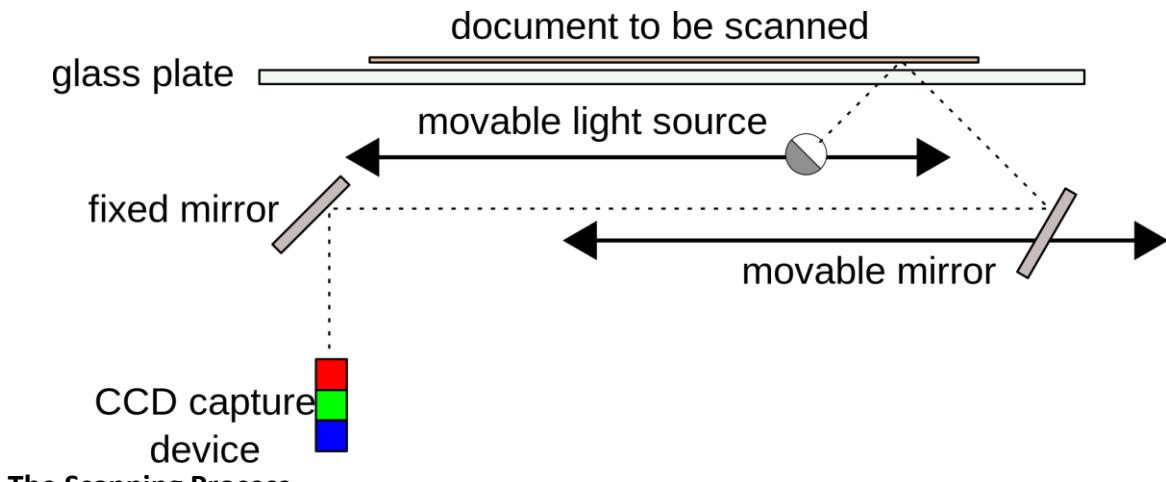
- **Handheld scanners** use the same basic technology as a flatbed scanner, but rely on the user to move them instead of a motorized belt. This type of scanner typically does not provide good image quality. However, it can be useful for quickly capturing text.



Working

The core component of the scanner is the **CCD array**. [CCD](#) is the most common technology for image capture in scanners. CCD is a collection of tiny light-sensitive [diodes](#), which convert photons (light) into electrons (electrical charge). These diodes are called **photosites**. In a nutshell, each photosite is sensitive to light -- the brighter the light that hits a single photosite, the greater the electrical charge that will accumulate at that site.

The image of the document that you scan reaches the CCD array through a series of mirrors, filters and lenses. The exact configuration of these components will depend on the model of scanner, but the basics are pretty much the same.



The Scanning Process

Here are the steps that a scanner goes through when it scans a document:

- The document is placed on the **glass plate** and the **cover** is closed. The inside of the cover in most scanners is flat white, although a few are black. The cover provides a uniform background that the scanner software can use as a reference point for determining the size of the document being scanned. Most flatbed scanners allow the cover to be removed for scanning a bulky object, such as a page in a thick book.
- A **lamp** is used to illuminate the document. The lamp in newer scanners is either a cold cathode fluorescent lamp (CCFL) or a xenon lamp, while older scanners may have a standard fluorescent lamp.
- The entire mechanism (mirrors, lens, filter and CCD array) make up the **scan head**. The scan head is moved slowly across the document by a **belt** that is attached to a stepper motor. The scan head is attached to a **stabilizer bar** to ensure that there is no wobble or deviation in the **pass**. Pass means that the scan head has completed a single complete scan of the document.
- The image of the document is reflected by an angled **mirror** to another mirror. In some scanners, there are only two mirrors while others use a three mirror approach. Each mirror is slightly curved to focus the image it reflects onto a smaller surface.
- The last mirror reflects the image onto a **lens**. The lens focuses the image through a **filter** on the CCD array.

The filter and lens arrangement vary based on the scanner. Some scanners use a **three pass** scanning method. Each pass uses a different color filter (red, green or blue) between the lens and

CCD array. After the three passes are completed, the scanner software assembles the three filtered images into a single full-color image.

Most scanners today use the **single pass** method. The lens splits the image into three smaller versions of the original. Each smaller version passes through a color filter (either red, green or blue) onto a discrete section of the CCD array. The scanner combines the data from the three parts of the CCD array into a single full-color image.

Another imaging array technology that has become popular in inexpensive flatbed scanners is **contact image sensor (CIS)**. CIS replaces the CCD array, mirrors, filters, lamp and lens with rows of red, green and blue **light emitting diodes (LEDs)**. The image sensor mechanism, consisting of 300 to 600 sensors spanning the width of the scan area, is placed very close to the glass plate that the document rests upon. When the image is scanned, the LEDs combine to provide white light. The illuminated image is then captured by the row of sensors. CIS scanners are cheaper, lighter and thinner, but do not provide the same level of quality and resolution found in most CCD scanners.

Oracle VM Virtual Box

Virtual Box is a powerful x86 and AMD64/Intel64 virtualization product for enterprise as well as home use. Not only is Virtual Box an extremely feature rich, high performance product for enterprise customers, it is also the only professional solution that is freely available as Open Source Software under the terms of the GNU General Public License (GPL) version 2. See "About Virtual Box" for an introduction.

Presently, Virtual Box runs on Windows, Linux, Macintosh, and Solaris hosts and supports a large number of guest operating systems including but not limited to Windows (NT 4.0, 2000, XP, Server 2003, Vista, Windows 7, Windows 8), DOS/Windows 3.x, Linux (2.4, 2.6 and 3.x), Solaris and Open Solaris, OS/2, and Open BSD.

Virtual Box is being actively developed with frequent releases and has an ever growing list of features, supported guest operating systems and platforms it runs on. Virtual Box is a community effort backed by a dedicated company: everyone is encouraged to contribute while Oracle ensures the product always meets professional quality criteria.

Configure virtual box

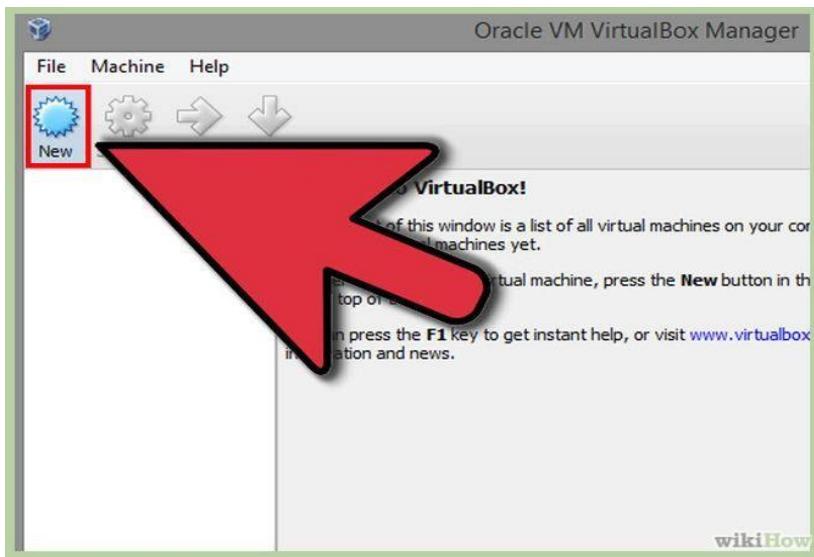
Install Virtual box

Install the Virtual Box program. If you are using Windows, double-click the setup file and follow the prompts to install. If you are using a Mac, open the DMG file that you downloaded and drag the Virtual Box file to your Applications folder.

During the Windows installation, keep all of the options set to their default

Creating Virtual Machine

1. start the program. Virtual Box allows you to manage your various virtual machines, and easily create new ones. You can run Virtual Box directly from the installation program, or you can start it from the desktop icon.
2. Gather your installation disc(s). When creating a virtual machine, you will need to install the operating system just like you would on a regular computer. This means that you will need the installation discs for the operating system you want to install on the virtual machine.
If you download the ISO file for the installation disc, you can burn it to a blank DVD, or install it directly from the ISO file.

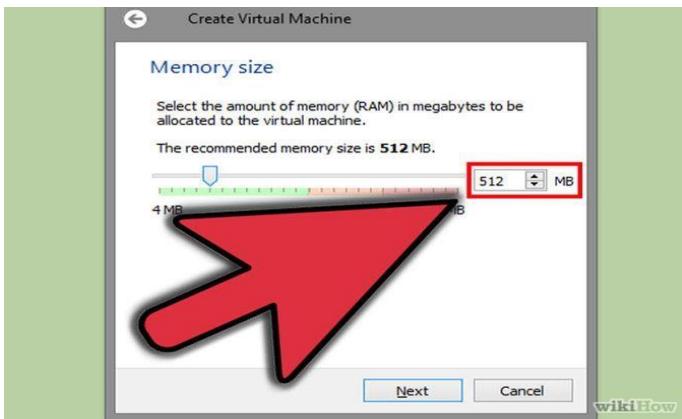


Click the "New" button. This will open the wizard that will guide you through the process to create your first virtual machine.

3. Identify the operating system. On the first screen of the wizard, you will be asked to give the new virtual machine a name as well as choose what operating system you will be installing. Choose the type of operating system from the Type menu, and then choose which version you are installing from the Version menu.
4. Set the amount of RAM. You will need to designate how much of your computer's RAM will be allocated to your virtual machine. Virtual Box will automatically choose the recommended minimum amount for the operating system you selected, but you can increase or decrease this if you'd like.

You can only go as high as the amount of RAM physically installed in your system.

It is not recommended that you set it to the max amount, as there won't be any left for your regular operating system to use when the virtual machine is running.

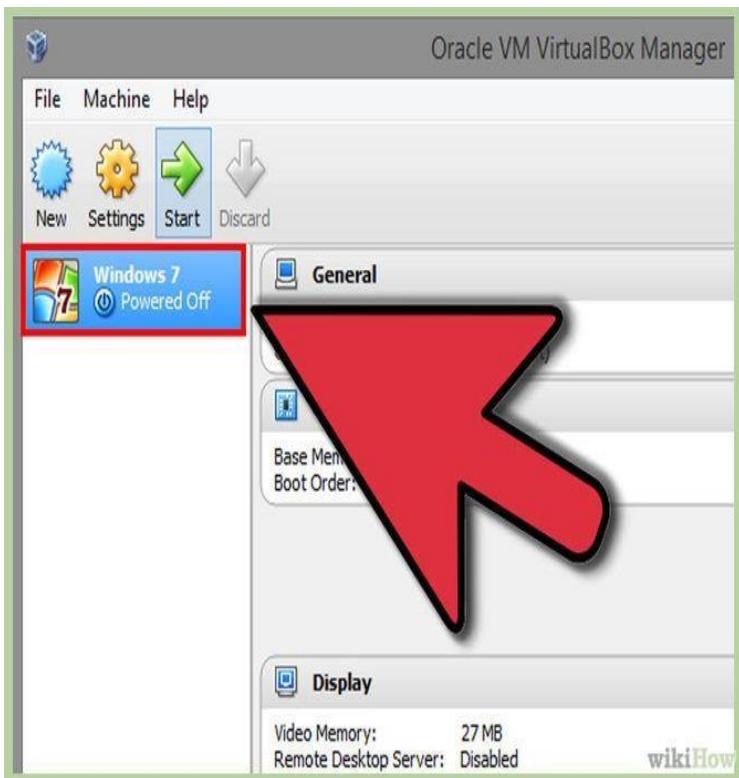


4. Create a virtual hard drive. Your virtual machine will need a virtual hard drive in order to install the operating system and any programs. This virtual hard drive is carved out of the free space available on your computer. Virtual Box will set a recommended size based on the operating system, but you can set it to whatever you'd like.
- . Make sure that the virtual hard drive has at least enough space to install the operating system. Check the specifications for your operating system to see how much space you should allocate at minimum.
- Remember that any programs you install will also take up space on your virtual hard drive, so plan accordingly

5. Start the operating system installation. Once the virtual machine has been configured, the wizard will close and you will be taken back to the Virtual Box main window. Doubleclick your new machine in the left menu to start it up for the first time

6. Install the operating system. After selecting the installation media, the operating system installation will begin. Installation proceeds the same way it would as if you were installing the operating system on a regular computer

Using Virtual machine



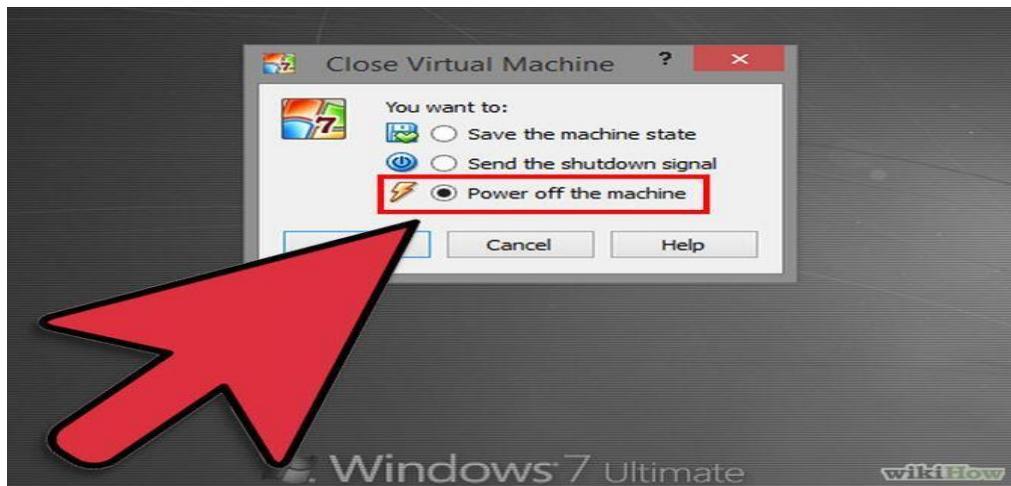
1. Boot up your virtual machine. Once the operating system is installed, your virtual machine is ready to go. Simply double-click the machine in the left menu of the VirtualBox main page to start the virtual machine. The virtual computer will boot and load into the operating system that you installed.

Your virtual machine will run in a window. Whenever the virtual machine window has focus, any keystrokes or mouse clicks will affect the virtual machine and not your physical computer. You can create a desktop shortcut for your virtual machine by right-clicking on the machine in the Virtua IBox window and selecting "Create Shortcut on Desktop".

2. Shut down your virtual machine. You have a couple of different options when closing your virtual machine, and each will affect the machine slightly differently. When you click the "X" in the upper-right corner of the window, you will be presented with several options: Save the machine state - This will save the virtual machine in exactly the state that it's in when you close it. Any programs you are running will be saved in their current state, and everything will be restored when you start the machine again.

Send the shutdown signal - This will send a power-down signal to the virtual machine, and it will shut down as if the power button was pressed on a physical computer.

Power off the machine - This will power down the machine as if power was cut to the computer. Nothing will be saved.



3. Take snapshots of your virtual machine. Virtual Box allows you to copy your virtual machine's exact state, allowing you to return to that state at any time. This is incredibly useful for testing software or other configurations.[\[1\]](#)

You can take a snapshot by clicking the Machine menu and selecting "Take snapshot". The snapshot will be added to the list of your virtual machines on the left side of the Virtual Box menu.

You can restore a snapshot by right-clicking the snapshot and selecting "Restore". Any changes to your virtual hard drive since the time the snapshot was created will be lost when the snapshot is restored.



VMware Workstation



VMware Workstation is a hypervisor that runs on x86-64 computers; it enables users to set up one or more virtual machines (VMs) on a single physical machine, and use them simultaneously along with the actual machine. Each virtual machine can execute its own operating system, including versions of Microsoft Windows, Linux, BSD, and MS-DOS. VMware Workstation is developed and sold by VMware, Inc., a division of EMC Corporation.

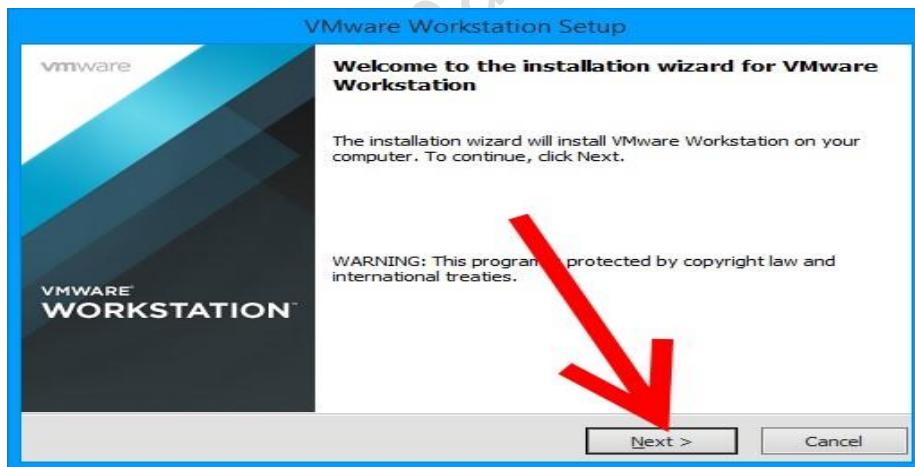
VMware Workstation supports bridging existing host network adapters and sharing physical disk drives and USB devices with a virtual machine. In addition, it can simulate disk drives. It can mount an existing ISO image file into a virtual optical disc drives or that the virtual machine sees it as a real one. Likewise, virtual hard disk drives are made via .vmdk files.

VMware Workstation can save the state of a virtual machine (a "snapshot") at any instant. These snapshots can later be restored, effectively returning the virtual machine to the saved state

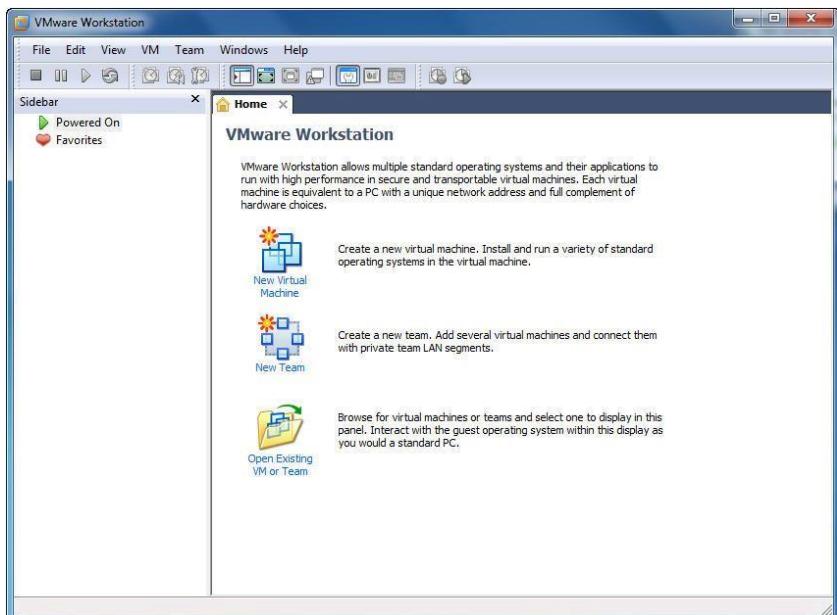
Configure VMware workstation

Install Workstation

1.double click the installation file



2. in installation setup click next >accept the license agreement >next >select the type (typical/custom)>next >enter the license key >next >finish Create Virtual Machine Launch VMware Workstation. Click New Virtual Machine.



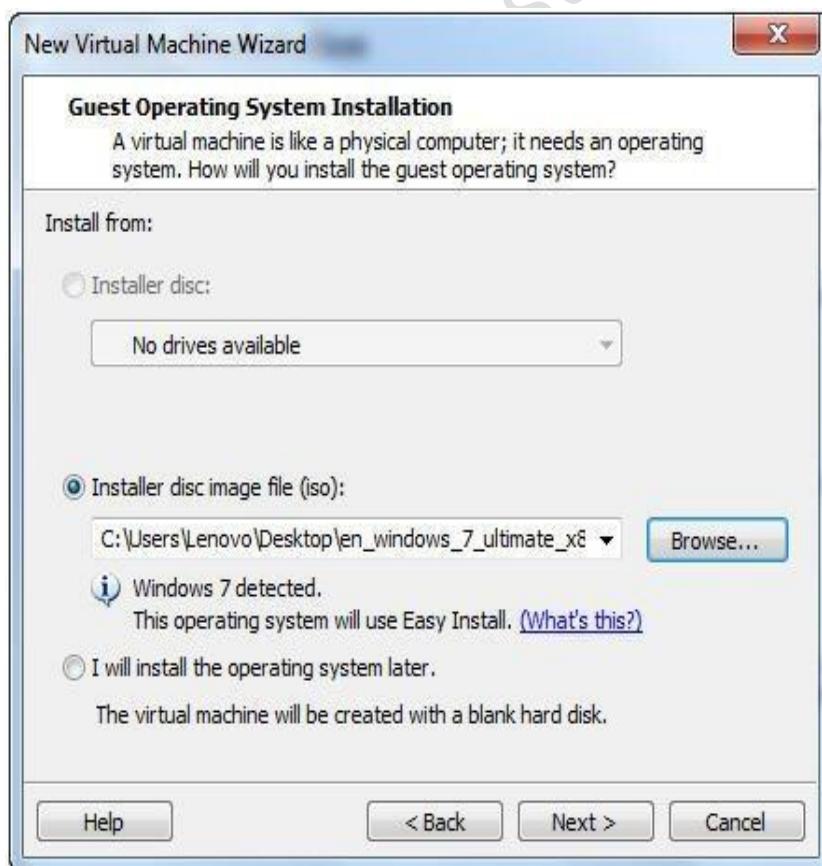
Select the type of virtual machine you want to create and click Next:

Click Next.

Select your guest operating system (OS), then click Next. You can install the OS using:

An installer disc (CD/DVD)

An installer disc image file (ISO)



Click Next.

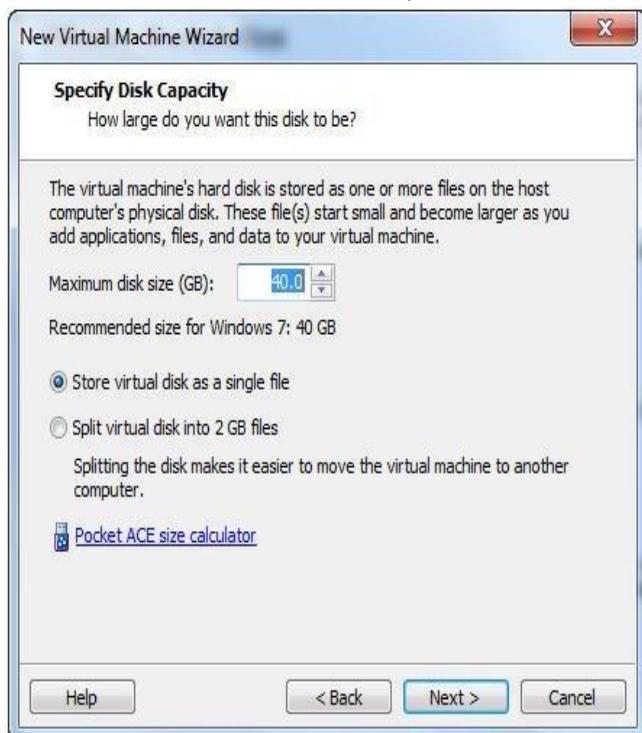
Enter your Product Key.

Create a user name and password.

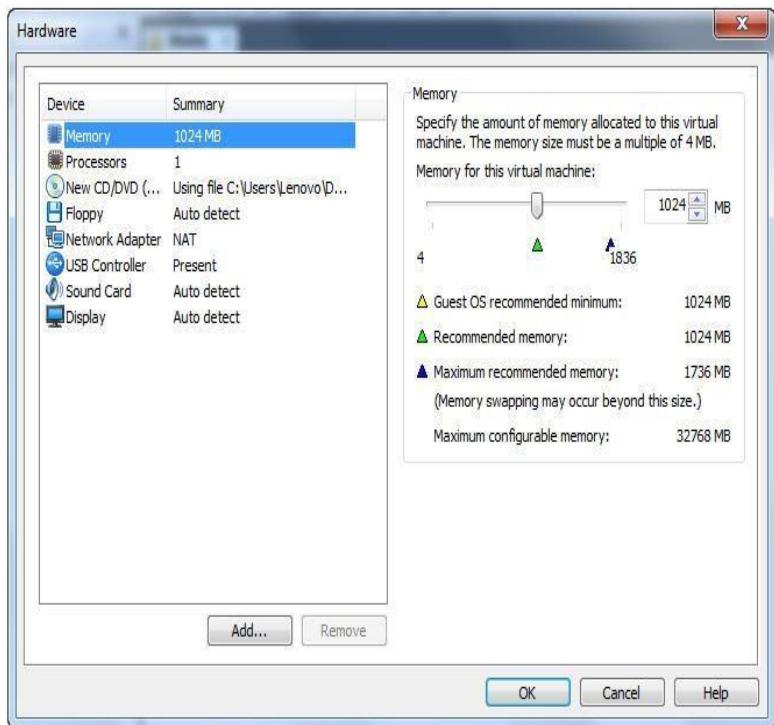
Click Next.

Enter a virtual machine name and specify a location for virtual machine files to be saved, click Next.

Establish the virtual machine's disk size, select whether to store the virtual disk as a single file or split the virtual disk into 2GB files, click Next.



Verify the other configuration settings for your virtual machine:



Click Finish.

When the virtual machine is powered on, the VMware Tools installation starts. You are prompted to restart your virtual machine once the Tools installation completes.

Deep Freeze

Deep Freeze, by Faronics, is an application available for the Microsoft Windows, Mac OS X, and SUSE Linux operating systems which allows system administrators to protect the core operating system and configuration files on a workstation or server by restoring a computer back to its original configuration each time the computer restarts.

Operation

Deep Freeze is a kernel-level driver that protects hard drive integrity by redirecting information being written to the hard drive or partition, leaving the original data intact. This redirected information is no longer referenced once the computer is restarted, thus restoring the system to its original state at the disk sector level. This allows users to make 'virtual' changes to the system, giving them the appearance that they can modify core files or even delete them, and even make the system unusable to themselves, but upon reboot the originally configured 'frozen' state of the operating system is restored.

To make changes, a system administrator must 'thaw' the protected partition by disabling Deep Freeze, make any needed changes, and then 'freeze' it again by re-enabling Deep Freeze. These changes become part of the protected partition and will be maintained after restarts. 'Freezing' and 'thawing' can be done at the workstation level or remotely via either the

Faronics Core management platform or the Deep Freeze Enterprise Console. Users of the Enterprise version can also create virtual partitions called ThawSpaces (of up to 1 TB on an NTFS-formatted drive) to retain data on "frozen" hard drives after restarts. Deep Freeze can also protect a computer from harmful malware, since it automatically deletes (or rather, no longer "sees") downloaded files when the computer is restarted. The advantage of using an application such as Deep Freeze antivirus / antimalware is that it uses very few system resources, and thus does not slow computer performance greatly. The disadvantage is that it does not provide real-time protection, therefore an infected computer would have to be restarted in order to remove malware.

Limitations and security

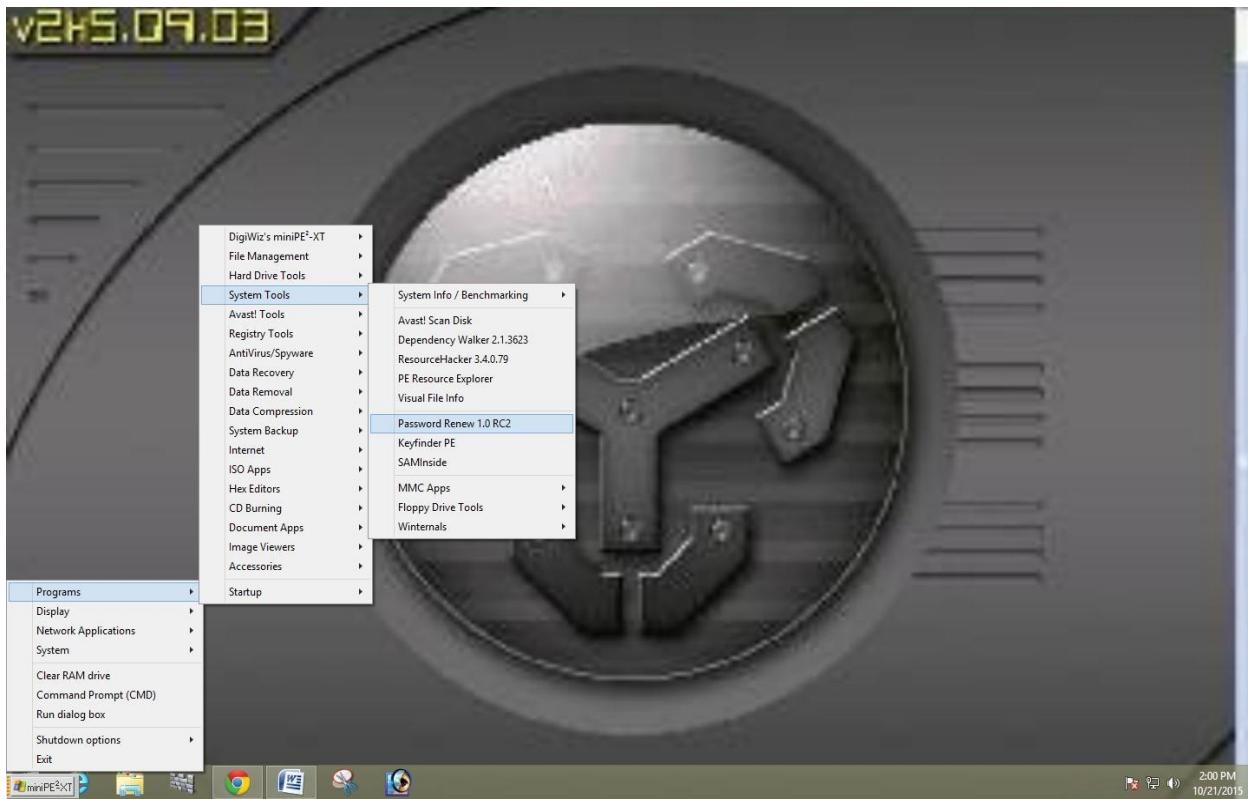
Deep Freeze only protects workstations in a "fresh-booted" state. That is, Deep Freeze prevents permanent tampering with protected hard drives/partitions across reboots, but user activity between restarts is not limited by the program. For example, Deep Freeze does not prevent application installation; a user can install a modified version of a Web browser (but seemingly harmless to the unknowing user) designed to secretly send users' passwords to a server connected to the Internet. As a workaround, Deep Freeze can be configured to restart after user logout, shutdown after a chosen period of inactivity, or restart/shutdown at a scheduled time in an attempt to ensure that no such installations are retained (as rebooting the system returns the system to its original, unmodified state).

Deep Freeze cannot protect the operating system and hard drive upon which it is installed if the computer is booted from another medium (such as another bootable partition or internal hard drive, an external hard drive, a USB device, optical media, or network server). In such cases, a user would have real access to the contents of the (supposedly) frozen system. On a Windows-based computer, this scenario may be prevented by configuring the CMOS (nonvolatile BIOS memory) on the workstation to boot only to the hard drive to be protected, then password protecting the CMOS. This is a normal precaution for most public access computers. A further precaution would be to lock the PC case shut with a physical lock or tiedown cable system to prevent access to motherboard jumpers.

Deep Freeze can protect hard drive partitions of larger than 2 TB capacity (using NTFS).

Password Recovery - Using Live CD

1. Boot from Mini PE CD.
2. Select Programs -> System Tools -> Password Renew



3. Select the windows installed directory (eg: C:\Windows)
4. Select the user, type new password, confirm new password.
5. Click "Install"
6. Message came as password renew for NT is successfully done.

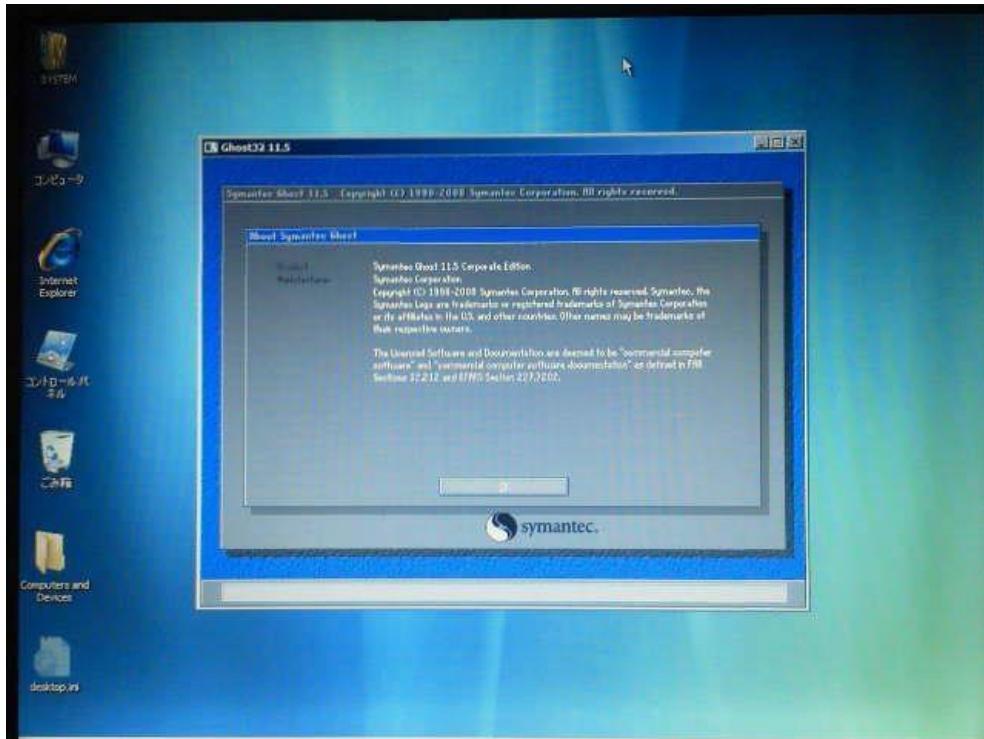
Norton Ghost

Ghost is a disk cloning and backup tool originally developed by Murray Haszard in 1995 for Binary Research. The technology was acquired in 1998 by Symantec.

The backup and recovery functionality has been replaced by Symantec System Recovery (SSR), although the Ghost imaging technology is still actively developed and is available as part of Symantec Ghost Solution Suite.

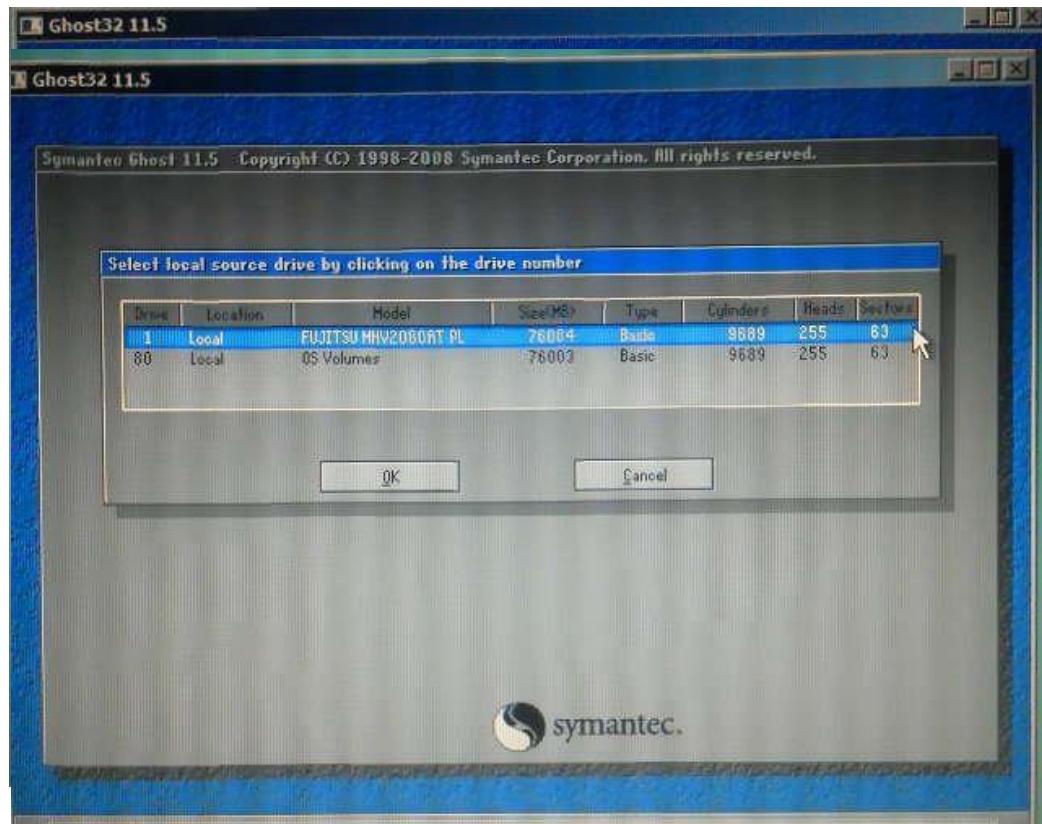
To Create Partition Image

1. Open Ghost programme.

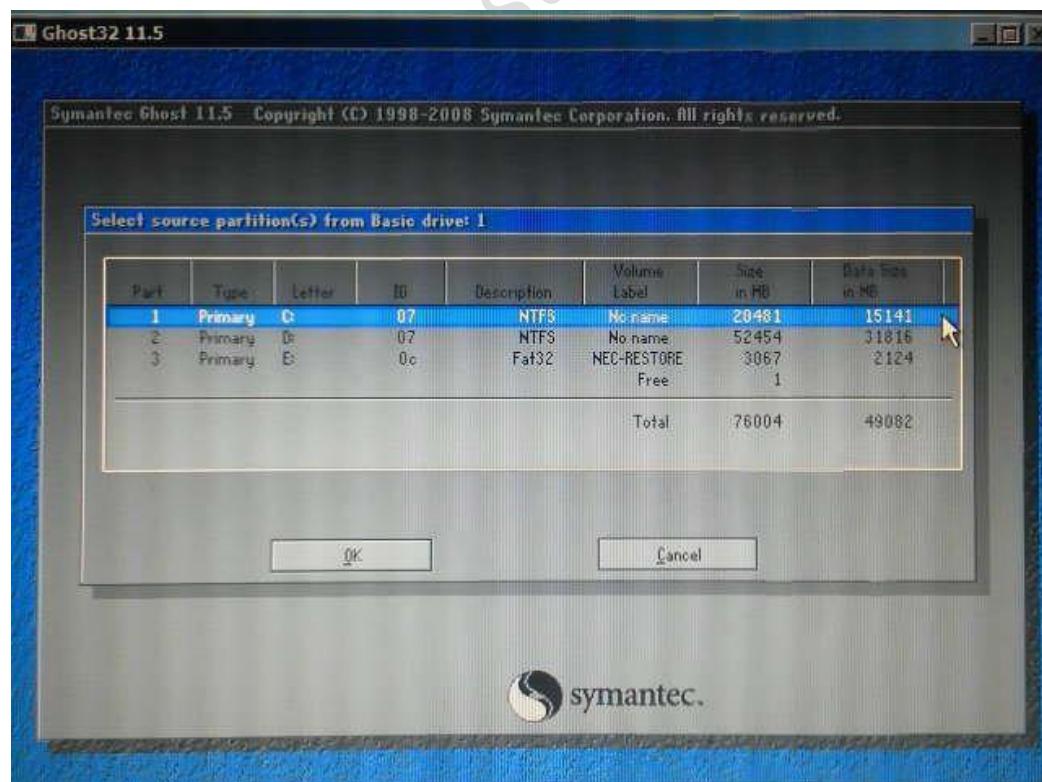


2. Local → Partition → To Image

3. Select Source disk



4. Select source partition(s) from basic drive:1 – Click OK

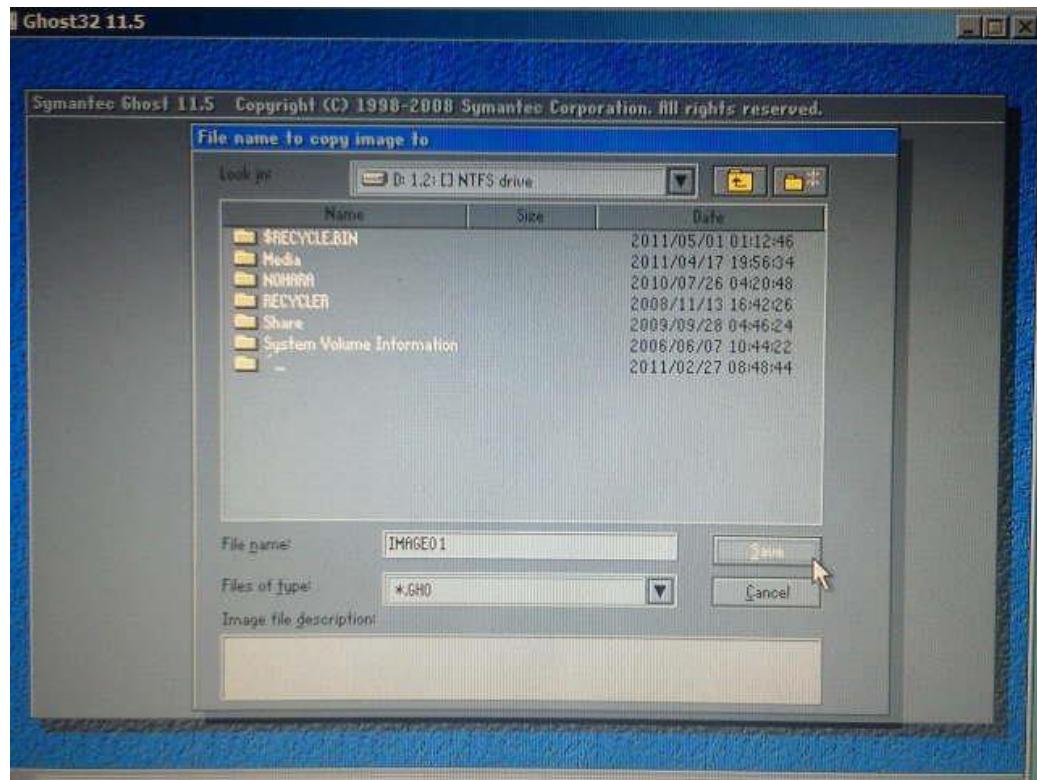


- 5.

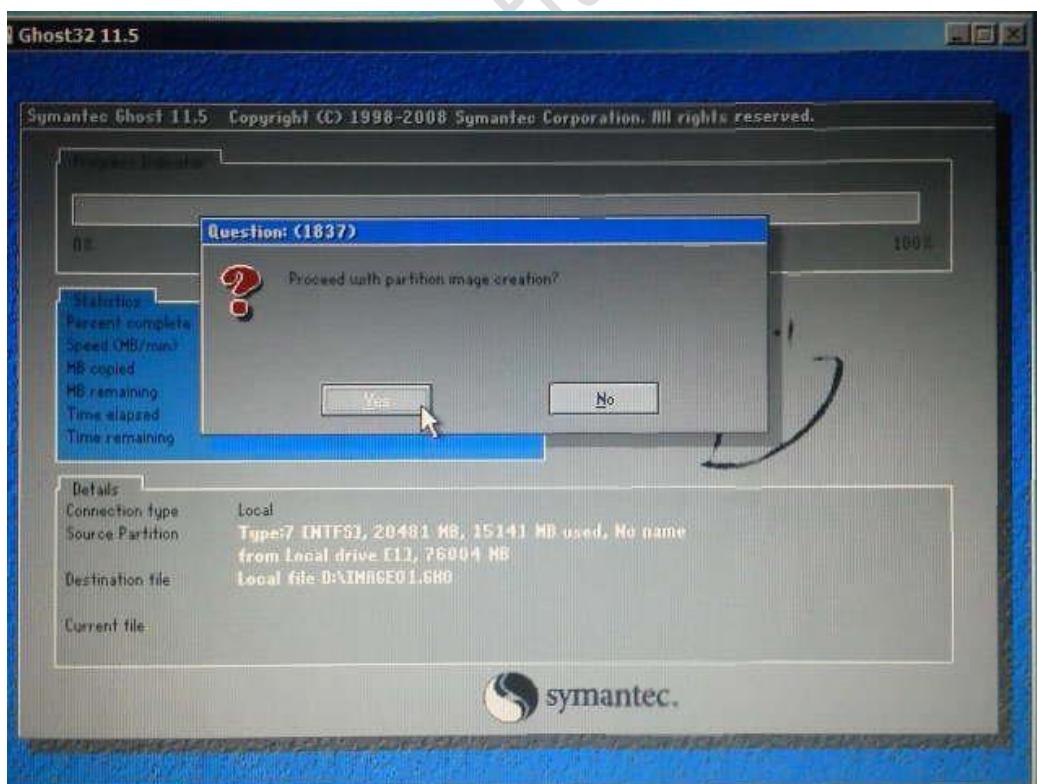
- 5

- 5.

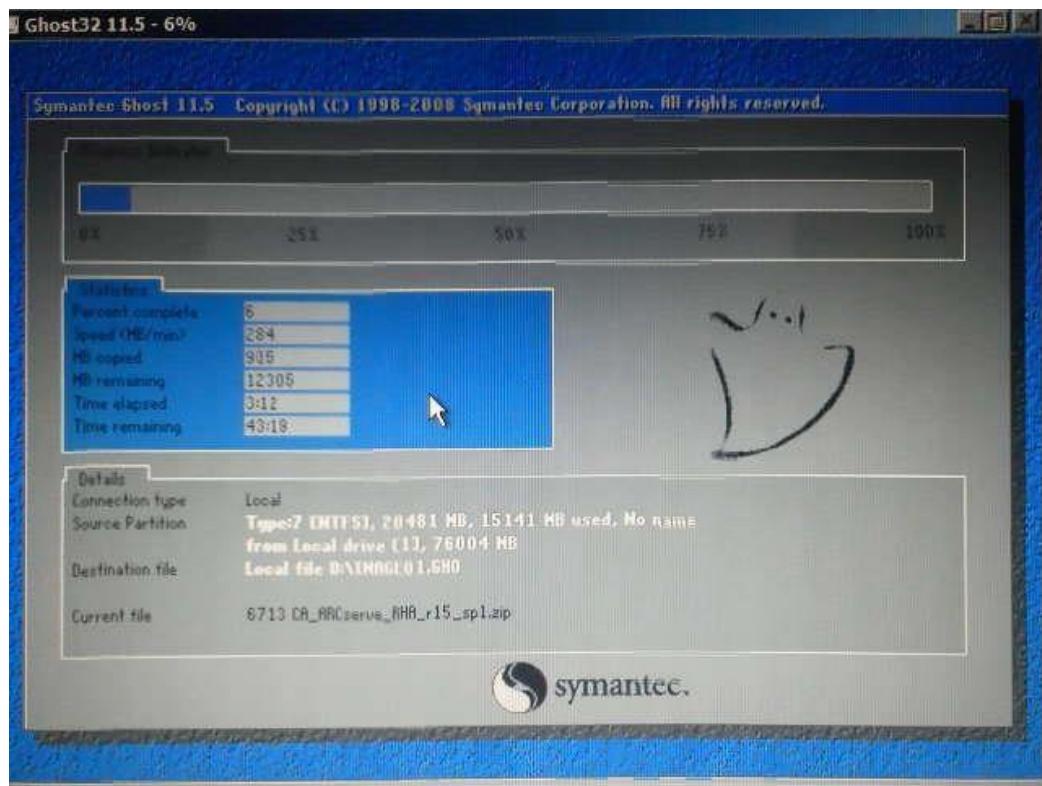
Select destination partition and type file name of the image.



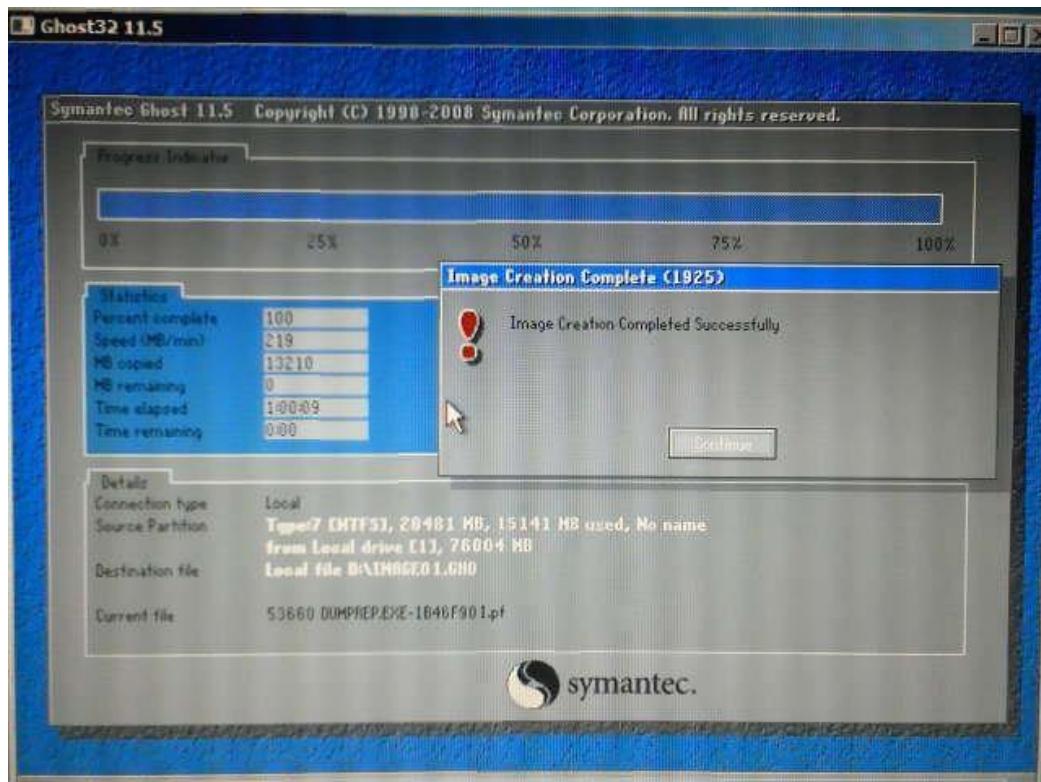
6. Proceed with partition image creation. Click "Yes"



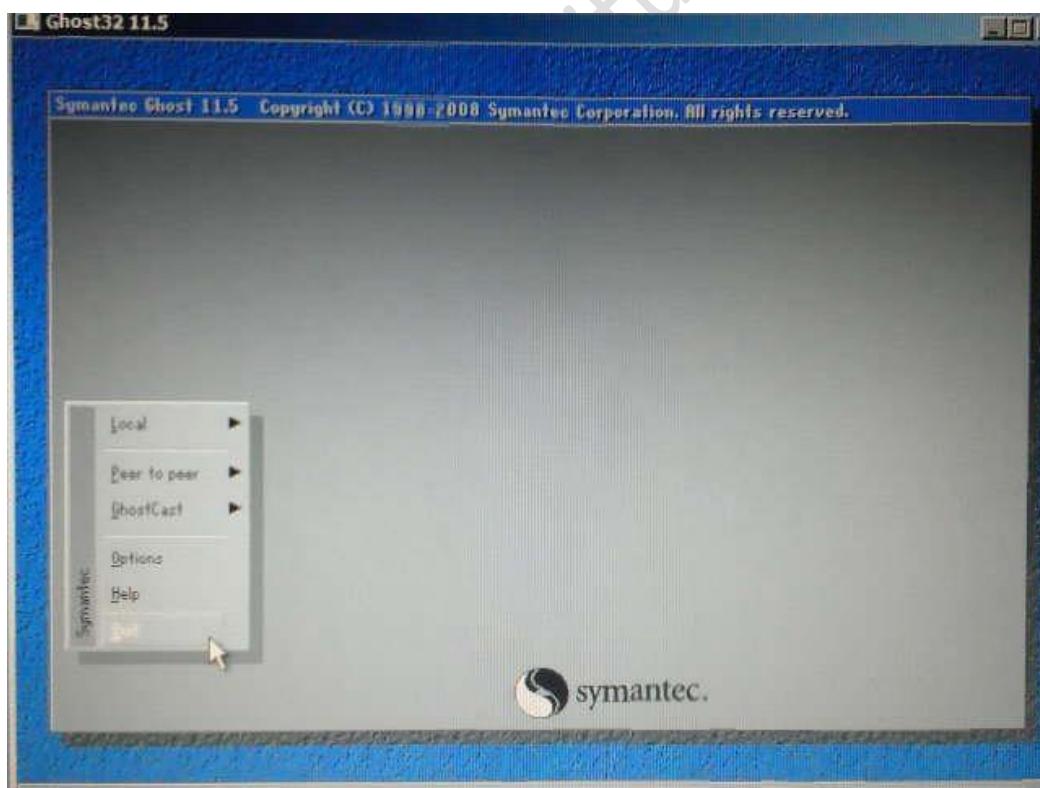
7. Image creation is in progress..



8. Image Creation completed successfully.

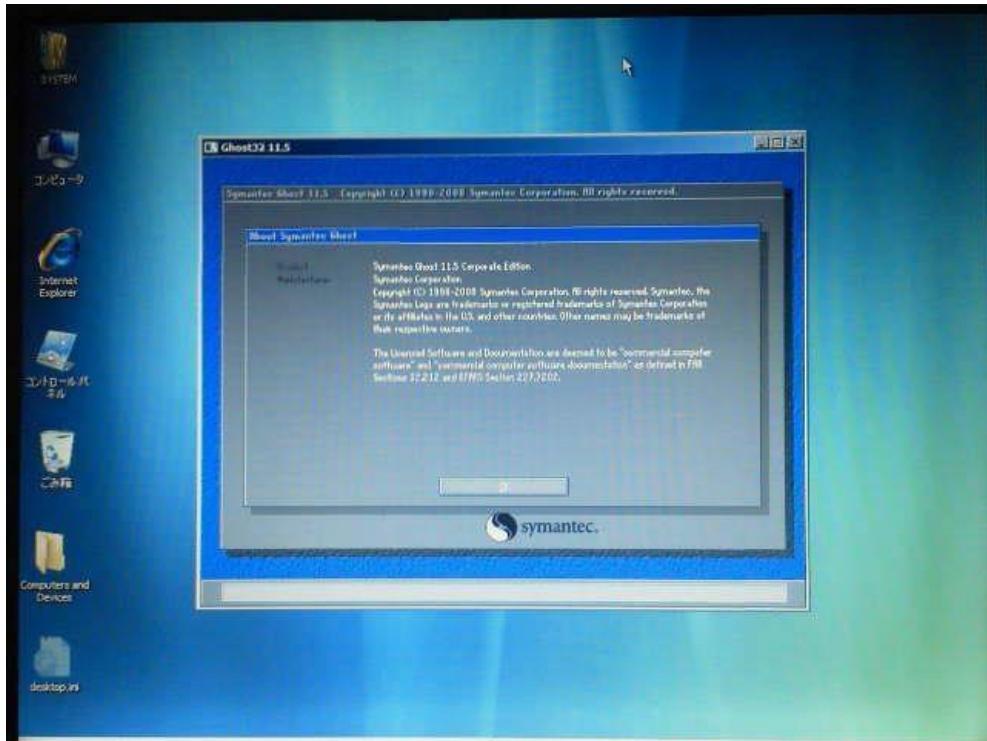


8. Click Quit



To Restore Partition Image

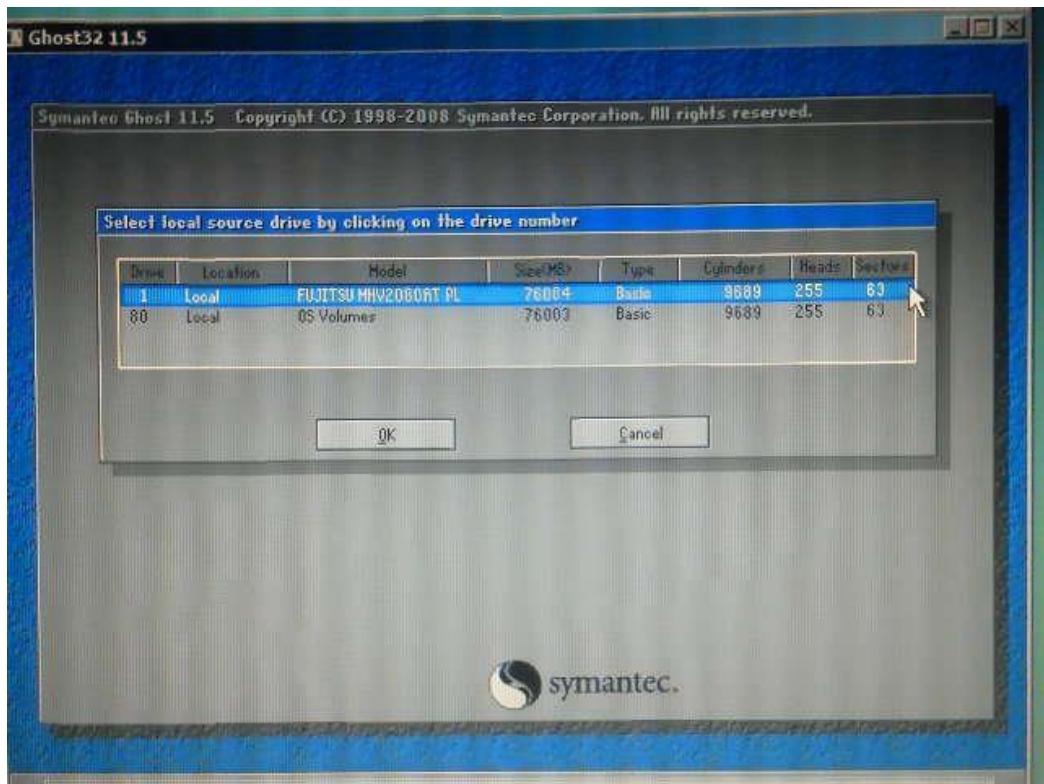
1. Open Ghost program me.



2. Local
→

Partition → From Image

3. Select Source disk



4.

Select the image from the partition
Select the drive to which image is backed up
Image restore completed successfully message came.
Click OK

5.

6.

Advanced Disk Management Tools
(Acronis Disk Partition Recovery)



Disk Partitioning

Reorganize your disk drive for better data protection and disk space use.

Resize, move, copy, split, and merge partitions without data loss.



Disk Partition Recovery

Acronis Recovery Expert, included with Acronis Disk Director, protects your data, allowing you to recover lost or deleted disk partitions.

Be fully armed and ready for any personal, hard- or software failure, virus attack or hacker's intrusive destruction.



Disk Editing

Edit disk drive contents on a low level to recover the information that was deleted by accident or lost due to different soft- and hardware failures or virus attack.

Pre-built Acronis Disk Director allows you to back up and restore critical hard drive sectors, edit contents of hard disk sectors, representing them in the most convenient way.



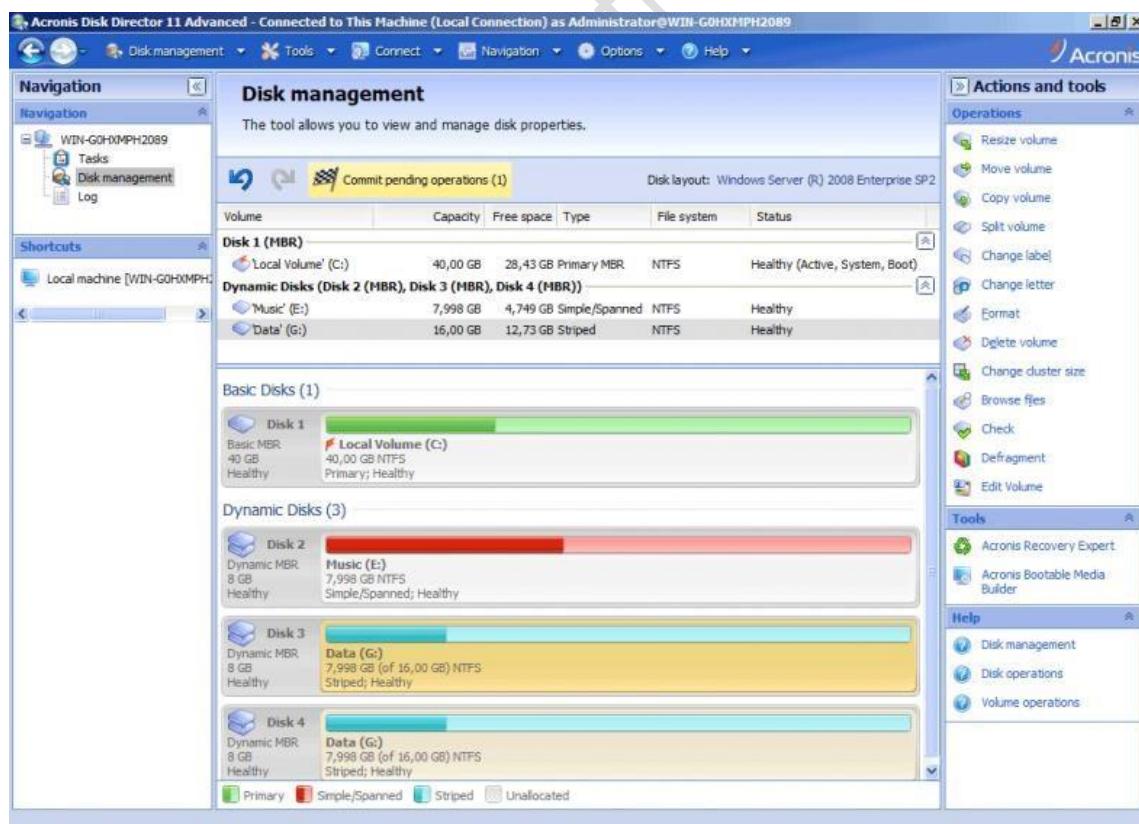
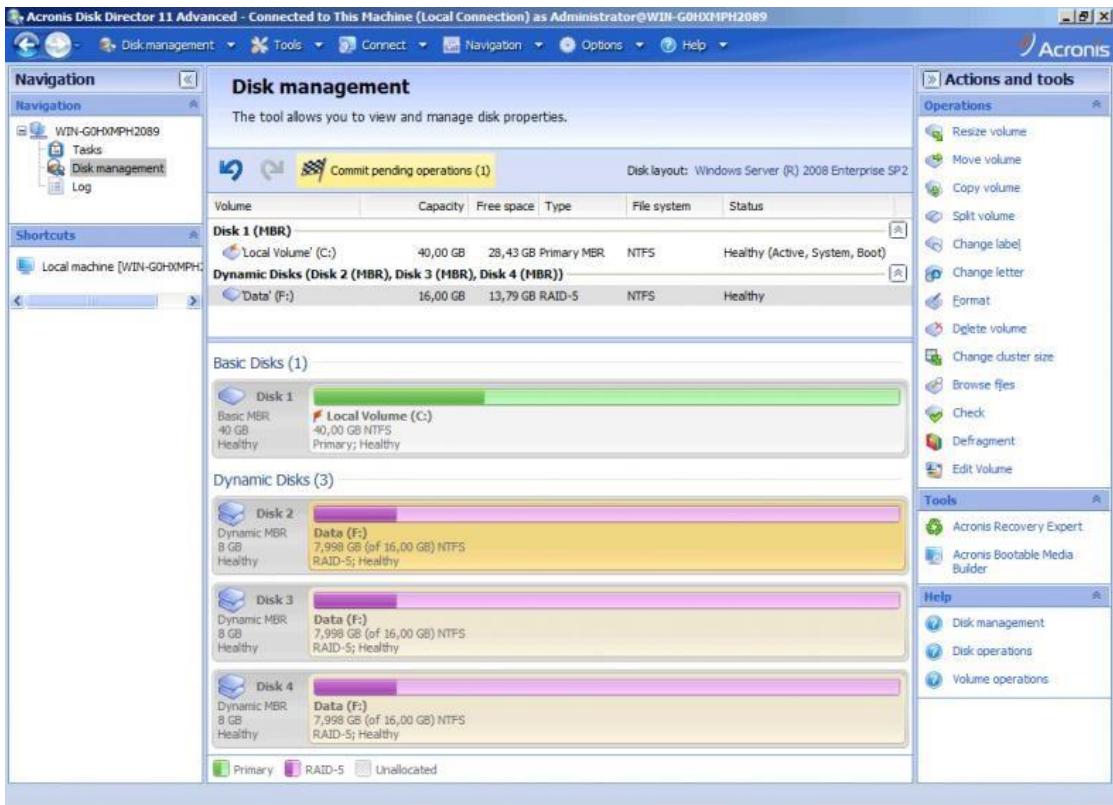
Disk Cloning

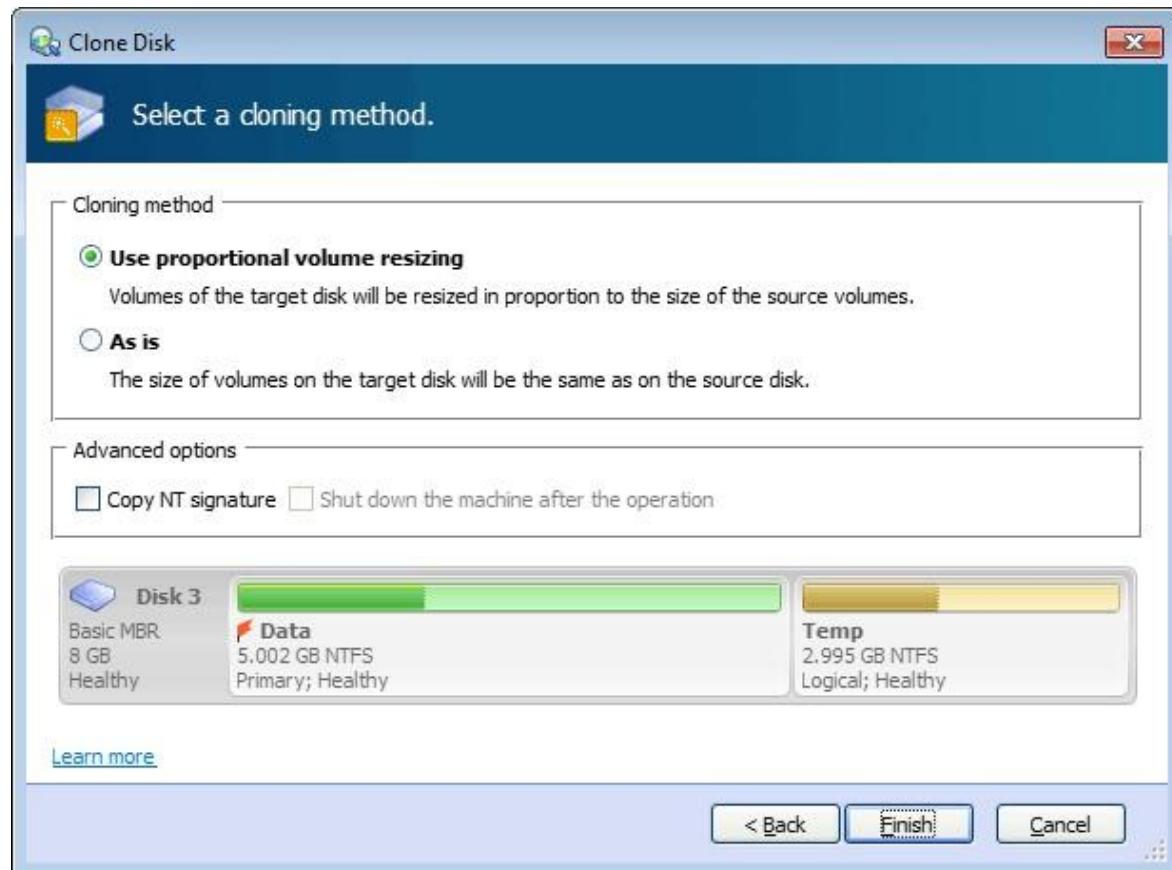
Replace your old disk drive with the new one without reinstalling operating system and applications.

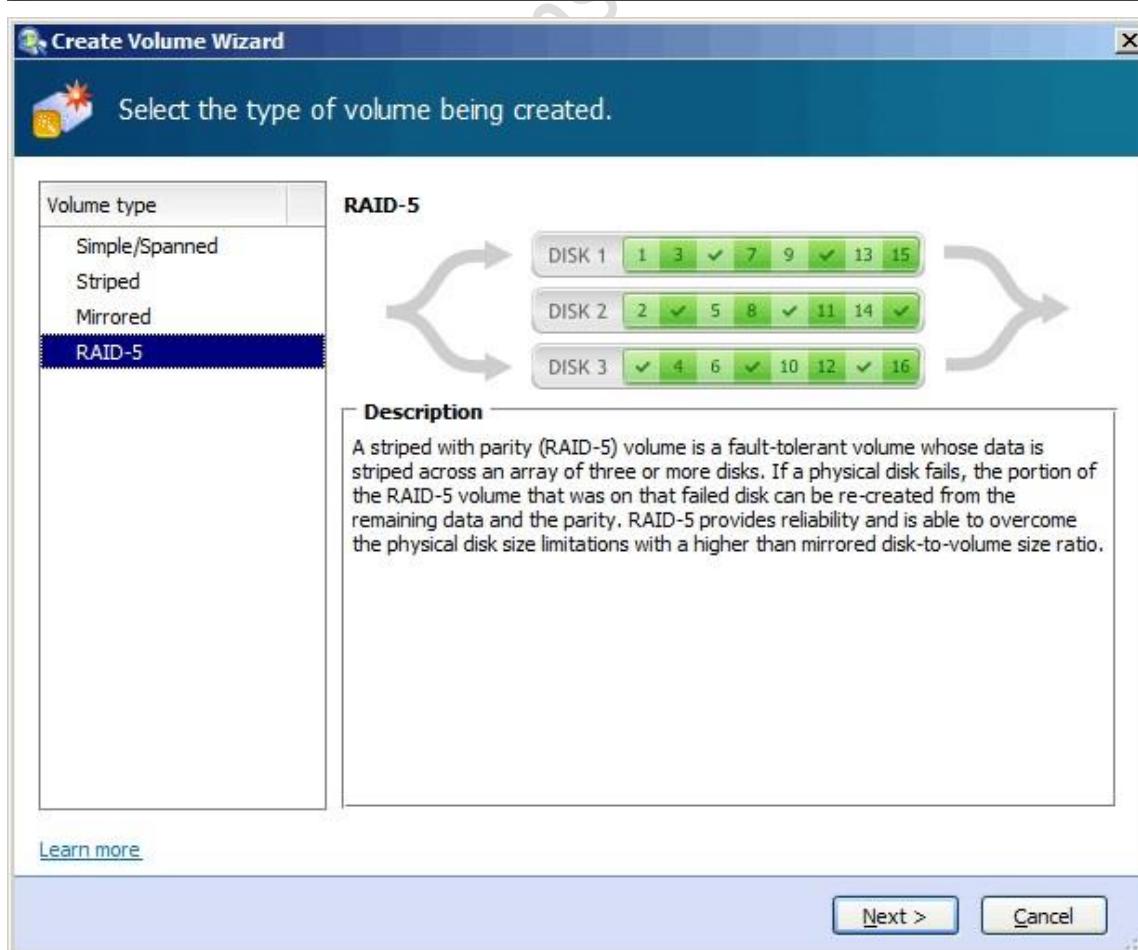
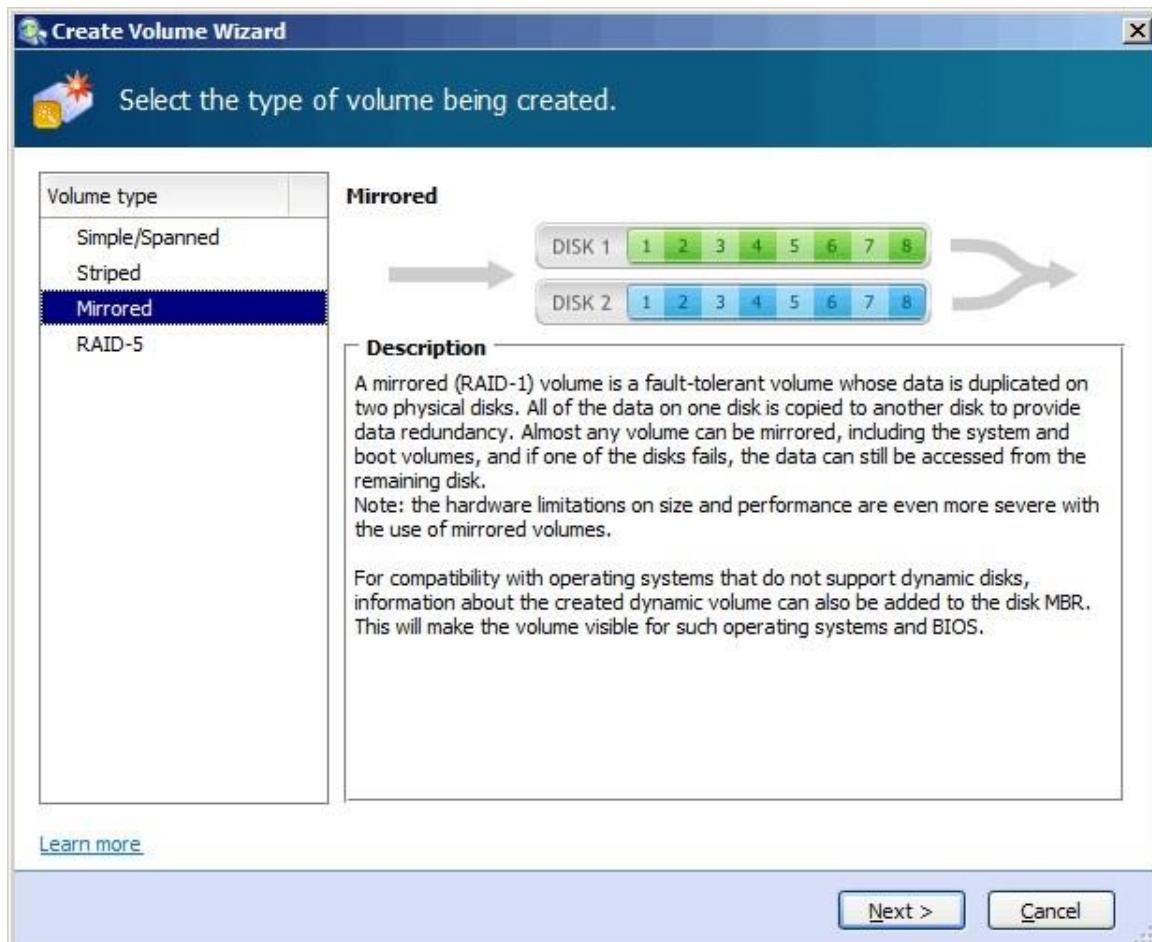
Acronis Disk Director transfers all of the source disk data to a target disk. The source disk volumes can be cloned to the target disk "as is", or resized automatically according to the new disk size.

- Create, convert, copy, move and delete volumes
- Resize, split, and merge volumes without losing your data
- Format and label volumes, specify i-node density, change file systems or clusters size
- Assign volume letters, set active volumes and hide/unhide volumes
- Add or break mirrored volumes or span volume across multiple physical disks
- Create and repair RAID-5 volumes
- Convert between basic/dynamic and MBR/GPT disks
- Initialize newly added hard disks and import foreign disks
- Change disk status between online to offline

- Clone disks







Session Notes

Blank sheet with a table that enables you to jot down their points from the session.



coronainstitute.com

Feedback of Trainee for Module 5

[This will enable the SDE to get a feedback on the unit]

Dear Participant,

Please provide your frank feedback for enhancing the trainings/

Sl. No.	Parameters	Rating		
		Good	Satisfactory	Poor
1.	Preparation of SDE for taking sessions			
2.	Response of SDE to queries			
3.	Interaction of SDE with students			
4.	Use of teaching – learning material			
5.	Communication skills of SDE			
6.	Punctuality of SDE			
7.	Other specific parameters, if any			

Suggestions:

Module 6 – Networking

Objectives

Through a series of theory and practical hands on session , students will get a thorough knowledge about Workgroup and domain model of networking

Unit: No 1-6

Learning outcomes

What is networking ,Types of computer networking

Classification criteria's of networks Significance of study about networking in a hardware course .Scope of the knowledge about networking classification according to models , topologies , protocols and size , Class A, B ,C networks , IP sub netting , DHCP , Routing, AT&T 586 B, A standards , using crimping tool and punch down tool , using Data link layer software to check the LAN, Implementing Windows XP networking in workgroup

What is SAM database,Local security using NTFS file system .Folder and resource sharing in XP .Voice , video , text chat and collaboration with net meeting . Domain model of networking

Difference between a normal client server model and domain. Active Directory Service. Different Versions of windows Server Operating Systems. Difference variants of windows Server Operating Systems.

ADS configuration

What is the significance of DNS along with ADS DC promo . Client configuration with XP and windows 7 machines,What is local account and domain account (local SAM and Domain SAM),Logging on to the network as a domain user, User creation in an ADS environment,User management ,Time and station restriction,Domain wide password policies

Domain wide security policies,Local and network login,Normal issues associated with user management in a practical environment.

Session Notes M6/U1/S1-S5 , U2/S1-S3/ U3/S1-S3 /U4 S1-S12, U6 /S1-S12

Computer Networking

coronainstitute.com

What is Networking

Networking is the concept of sharing resources and services. A network of computers is a group of interconnected systems sharing resources and interacting using a shared communications link. A network, therefore, is a set of interconnected systems with something to share. The shared resource can be data, a printer, a fax modem, or a service such as a database or an email system. The individual systems must be connected through a pathway (called the transmission medium) that is used to transmit the resource or service between the computers. All systems on the pathway must follow a set of common communication rules for data to arrive at its intended destination and for the sending and receiving systems to understand each other. The rules governing computer communication are called protocols. In summary, all networks must have the following:

- A resource to share (resource)
- A pathway to transfer data (transmission medium)
- A set of rules governing how to communicate (protocols)

The two main reasons for using computer networking are to provide services and to reduce equipment costs. Networks enable computers to share their resources by offering services to other computers and users on a network. The following are specific reasons for networking PCs:

- Sharing files á Sharing printers and other devices
- Enabling centralized administration and security of the resources within the system
- Supporting network applications such as electronic mail and database services

MODELS OF NETWORK COMPUTING

After you have the necessary prerequisites for network communication, a structure must be put in place that organizes how communication and sharing occurs. Three methods of organization, or models, generally are recognized. The following are the three models for network computing:

- Centralized computing
- Distributed computing
- Collaborative or cooperative computing

These three models are the basis for the various types of computer networks you learn about in this book. The following sections discuss the three models for network computing. Centralized Computing The first computers were large, expensive, and difficult to manage. Originally, these large mainframe computers were not networked as you are familiar with today. Jobs were entered into the system by reading commands from card decks. The computer executed one job at a time and generated a printout when the job was complete. Terminals, which came later, provided the user with a new mechanism to interact with the centralized computer.

These terminals, however, were merely input/output devices that had no independent processing power. All processing still took place on the central mainframe, hence the name centralized computing. Networks, therefore, served little purpose other than to deliver commands to and get results from the powerful centralized processing device. To this day, large mainframe systems are still being operated around the world, most often by governments and large corporations. An example of centralized computing to which everyone can relate is using an ATM machine. ATMs function as terminals. All processing is done on the mainframe computer to which the ATMs are connected. In summary, the centralized computing model involves the following:

- All processing takes place in the central mainframe computer.
- Terminals are connected to the central computer and function only as input/output devices.

This early computing model worked well in large organizations that could justify the need for these expensive computing devices. One of the drawbacks, however, was that the mainframes were not flexible in their placement (some were the size of a large room) and did not scale down to meet the needs of smaller organizations. New ways of sharing information were necessary to allow computing power to be shared efficiently on smaller networks.

Distributed Computing As personal computers (PCs) were introduced to organizations, a new model of distributed computing emerged. Instead of concentrating computing at a central device, PCs made it possible to give each worker an independent, individual computer. Each PC could receive input and could process information locally, without the aid of another computer. This meant that groups who previously had found the cost of a mainframe environment to be prohibitive were now able to gain the benefits of computing at a far lower cost than that of a mainframe. These PCs, however, did not have the computing power of a mainframe. Thus, in most instances, a company's mainframe could not be replaced by a PC. An analogy might help clarify the difference between the two computing models. A mainframe, which uses a centralized computing model, is like a bus. A bus is a large, powerful vehicle used to transport many people at once. Everyone goes to one location—the bus—to be transported. In the same way, everyone must work through or at a mainframe computer. A personal PC, which uses distributed computing, is like a motorcycle. It transports one person at a time. (Yes, I know a motorcycle can transport two people, but think of it as only having one seat.) Each person can use his own motorcycle to go somewhere without worrying about the other users. PCs enable individuals to work at their own computers rather than through a single large computer.

TYPES OF NETWORKING

Networking is classified according to different criterias , on the basics of geographical area, topology ,models and protocols

GEOGRAPHICAL AREA:

LAN

A local area network (LAN) is a [computer network](#) that interconnects computers within a limited area such as a residence, school, laboratory, or office building.^[1] A local area network is contrasted in principle to a [wide area network](#) (WAN), which covers a larger geographic distance and may involve [leased telecommunication circuits](#), while the media for LANs are locally managed.

WAN

A wide area network (WAN) is a geographically dispersed telecommunications [network](#). The term distinguishes a broader telecommunication structure from a local area network ([LAN](#)). A wide area network may be privately owned or rented, but the term usually connotes the inclusion of public (shared user) networks. An intermediate form of network in terms of geography is a metropolitan area network

MAN

A metropolitan area network (MAN) is a network that interconnects users with computer resources in a geographic area or region larger than that covered by even a large local area network (LAN) but smaller than the area covered by a wide area network (WAN). CAN

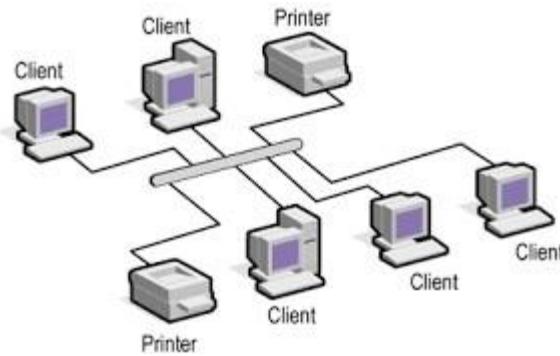
A Campus Area Network (CAN) is a computer network that links the buildings and consists of two or more local area networks (LANs) within the limited geographical area. It can be the college campus, enterprise campus, office buildings, military base, industrial complex.

TOPOLOGY

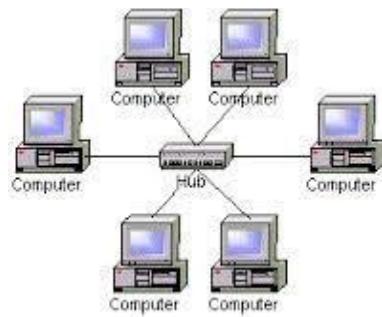
Network topology refers to the physical or logical layout of a network. It defines the way different nodes are placed and interconnected with each other.

Types of topology

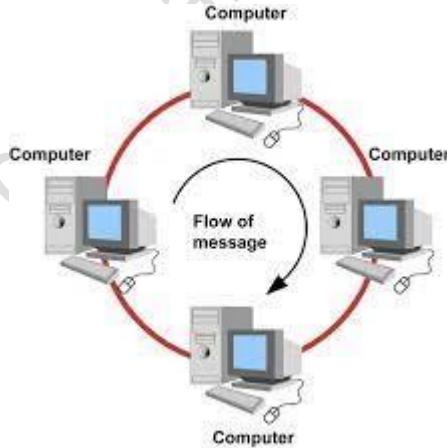
Bus Topology: All the devices/nodes are connected sequentially to the same backbone or transmission line. This is a simple, low-cost topology, but its single point of failure presents a risk



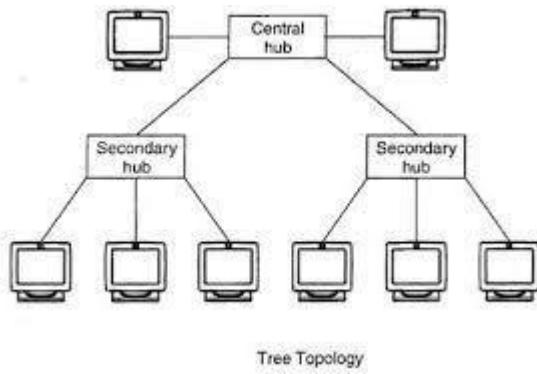
Star Topology: All the nodes in the network are connected to a central device like a hub or switch via cables. Failure of individual nodes or cables does not necessarily create downtime in the network but the failure of a central device can. This topology is the most preferred and popular model.



Ring Topology: All network devices are connected sequentially to a backbone as in bus topology except that the backbone ends at the starting node, forming a ring. Ring topology shares many of bus topology's disadvantages so its use is limited to networks that demand high throughput.



Tree Topology: A root node is connected to two or more sub-level nodes, which themselves are connected hierarchically to sub-level nodes. Physically, the tree topology is similar to bus and star topologies; the network backbone may have a bus topology, while the lowlevel nodes connect using star topology.



Tree Topology

Mesh Topology: The topology in each node is directly connected to some or all the other nodes present in the network. This redundancy makes the network highly fault tolerant but the escalated costs may limit this topology to highly Cost.

PROTOCOL

A protocol is a set of rules that governs the communications between computers on a network. Protocols are divided in to hardware protocols and software protocols .

MODELS

In its simplest form, a peer-to-peer (P2P) network is created when two or more PCs are connected and share resources without going through a separate server computer. A P2P network can be an ad hoc connection—a couple of computers connected via a Universal Serial Bus to transfer files

CLIENT-SERVER MODEL:

The client–server model of computing is a [distributed application](#) structure that partitions tasks or workloads between the providers of a resource or service, called [servers](#), and service requesters, called [clients](#).^[1] Often clients and servers communicate over a[computer network](#) on separate hardware, but both client and server may reside in the same system. A server host runs one or more server programs which share their resources with clients. A client does not share any of its resources, but requests a server's content or service function. Clients therefore initiate communication sessions with servers which await incoming request. Examples of computer applications that use the client–server model are [Email](#), [network printing](#), and the [World Wide Web](#).

A client/server computer network is one which has a centralized infrastructure – one computer, called the “server,” acts as go-between for all other computers, which are called “clients.” The server can share its resources with clients, but clients do not share their resources such as -- computing power or hard drive space -- with the network. A peer-to-peer network – not to be confused with peer-to-peer file sharing through torrents and the like – is one in which there is no central server. All computers are connected and each can act as the server or client

to another. The computers all share resources with each other such as computer processing or hard drive space.

Security

The client/server network is far more secure than the peer-to-peer approach. This is due to the server, which can authenticate a client's access to any other part of the network. Think of it like security at the entrance to a building – you show your pass to the guard and he opens whichever doors you're authorized to enter. In a peer-to-peer network, everyone is a guard and has the master key to any other area – this is fine if all guards know and trust each other but becomes more problematic as the number of clients increases.

Performance

If you have a large number of clients in a peer-to-peer network, you're going to experience performance problems. This could happen with as few as 10 clients, depending on the power of the computers. The client/server arrangement lacks this problem for two main reasons; firstly, the server does a lot of the heavy lifting, and secondly clients aren't required to share their computing power. Also, since all resources are shared on peer-to-peer, there's more chance of someone accidentally breaking something required by another person.

Cost

A client/server network is necessarily more expensive. An additional computer is required to act as the server and because of the extra computing power a server requires, you'll need a high-performance machine. In addition, you'll need dedicated software to run the network such as Windows Server 2008 or some form of Unix or Linux. If you're unfamiliar with the software, you may also have to pay professionals to fix problems that arise. Peer-to-peer networks, lacking a dedicated server, sidestep all of these costs.

Considerations

If you're setting up a home network or a small business network with only a few clients and devices, you have no need for the extra power that a central server provides -- you might as well save your money. However, if you have a large network or need higher security -- for example if a lot of people you don't know will be using the network -- the client/server architecture is for you.

Network OS

An operating system that is designed for a server. Normally, it is a complete operating system with file, task and job management; however, with some earlier products, it was a separate component that ran under the OS; for example, LAN Server required OS/2, and LANTastic required DOS.

Unix , Linux, Solaris and the server versions of Windows (NT,2000,2003,2008,2012)are common network operating systems designed for use in stand-alone servers. Such products may also include a Web server, directory services, messaging system, network management and multiprotocol routing capabilities.

Multiuser File Sharing

A network operating system (NOS) manages concurrent requests from clients and provides the security necessary in a multiuser environment. A file sharing component is installed in each client machine that interacts with the server to share files and applications as well as devices on the network such as printers, faxes and modems.

Windows Peer-to-Peer Networks

The client versions of Windows (98, XP , 7, 8, 8.1 ,10) can also share their files on the network. They may be considered a network operating system, but they are more lightweight than the server versions of Windows with regard to multiuser processing.

WIRELESS NETWORKING

Wireless networks are computer networks that are not connected by cables of any kind. The use of a wireless network enables enterprises to avoid the costly process of introducing cables into buildings or as a connection between different equipment locations. The basis of wireless systems are radio waves, an implementation that takes place at the physical level of network structure

Wireless networks use radio waves to connect devices such as laptops to the Internet, the business network and applications. When laptops are connected to Wi-Fi hot spots in public places, the connection is established to that business's wireless network.

There are four main types of wireless networks:

Wireless Local Area Network (LAN): Links two or more devices using a wireless distribution method, providing a connection through access points to the wider Internet.

Wireless Metropolitan Area Networks (MAN): Connects several wireless LANs.

Wireless Wide Area Network (WAN): Covers large areas such as neighboring towns and cities.

Wireless Personal Area Network (PAN): Interconnects devices in a short span, generally within a person's reach.

Advantages of wireless networking

Convenience

– The wireless nature of such networks allows users to access network resources from nearly any convenient location within their primary networking environment (a home or office). With the increasing saturation of laptop-style computers, this is particularly relevant.

Mobility

– With the emergence of public wireless networks, users can access the internet even outside their normal work environment. Most chain coffee shops, for example, offer their customers a wireless connection to the internet at little or no cost.

Productivity

- Users connected to a wireless network can maintain a nearly constant affiliation with their desired network as they move from place to place. For a business, this implies that an employee can potentially be more productive as his or her work can be accomplished from any convenient location.

Deployment

- Initial setup of an infrastructure-based wireless network requires little more than a single access point. Wired networks, on the other hand, have the additional cost and complexity of actual physical cables being run to numerous locations (which can even be impossible for hard-to-reach locations within a building).

Expandability

- Wireless networks can serve a suddenly-increased number of clients with the existing equipment. In a wired network, additional clients would require additional wiring. Cost
- Wireless networking hardware is at worst a modest increase from wired counterparts. This potentially increased cost is almost always more than outweighed by the savings in cost and labor associated to running physical cables. Disadvantages of wireless network

Security

- To combat this consideration, wireless networks may choose to utilize some of the various encryption technologies available. Some of the more commonly utilized encryption methods, however, are known to have weaknesses that a dedicated adversary can compromise.

Range

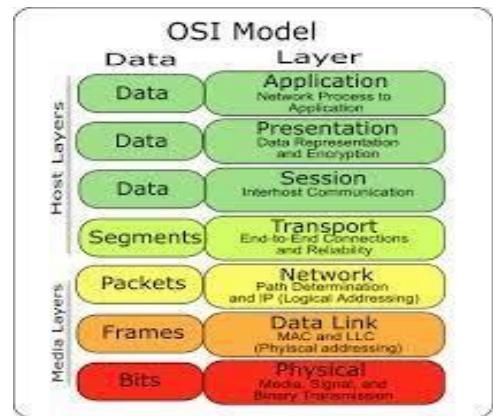
- The typical range of a common 802.11g network with standard equipment is on the order of tens of meters. While sufficient for a typical home, it will be insufficient in a larger structure. To obtain additional range, repeaters or additional access points will have to be purchased. Costs for these items can add up quickly.

Reliability

- Like any radio frequency transmission, wireless networking signals are subject to a wide variety of interference, as well as complex propagation effects that are beyond the control of the network administrator.

Speed

- The speed on most wireless networks (typically 1-54 Mbps) is far slower than even the slowest common wired networks (100Mbps up to several Gbps). However, in specialized environments, the throughput of a wired network might be necessary.



NETWORKING COMPONENTS

NETWORKING STANDARDS

ISO/OSI REFERENCE MODEL

OSI (Open Systems Interconnection) is reference model for how applications can communicate over a network. A reference model is a conceptual framework for understanding relationships. The purpose of the OSI reference model is to guide vendors and developers so the digital communication products and software programs they create will interoperate, and to facilitate clear comparisons among communications tools. Most vendors involved in telecommunications make an attempt to describe their products and services in relation to the OSI model. And although useful for guiding discussion and evaluation, OSI is rarely actually implemented, as few network products or standard tools keep all related functions together in well-defined layers as related to the model. The TCP/IP protocols, which define the Internet, do not map cleanly to the OSI model. The seven Open Systems Interconnection layers are:

[Layer 7: The application layer](#). This is the layer at which communication partners are identified (Is there someone to talk to?), network capacity is assessed (Will the network let me talk to them right now?), and that creates a thing to send or opens the thing received. (This layer is not the application itself, it is the set of services an application should be able to make use of directly, although some applications may perform application layer functions.)

[Layer 6: The presentation layer](#). This layer is usually part of an operating system (OS) and converts incoming and outgoing data from one presentation format to another (for example, from clear text to encrypted text at one end and back to clear text at the other). [Layer 5: The session layer](#). This layer sets up, coordinates and terminates conversations.

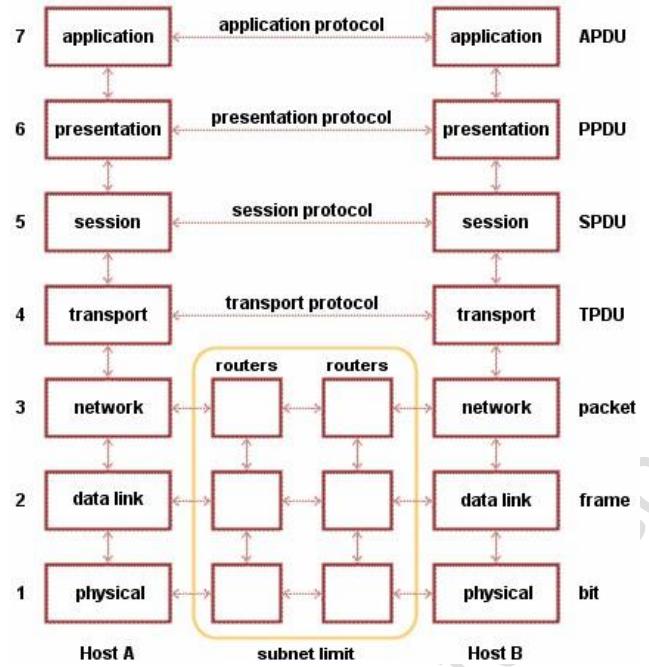
Services include authentication and reconnection after an interruption. On the Internet, Transmission Control Protocol (TCP) and User Datagram Protocol (UDP) provide these services for most applications.

[Layer 4: The transport layer](#). This layer manages packetisation of data, then the delivery of the packets, including checking for errors in the data once it arrives. On the Internet, TCP and UDP provide these services for most applications as well.

[Layer 3: The network layer](#). This layer handles the addressing and routing of the data (sending it in the right direction to the right destination on outgoing transmissions and receiving incoming transmissions at the packet level). IP is the network layer for the Internet.

[Layer 2 : The data-link layer](#). This layer sets up links across the physical network, putting packets into network frames. This layer has two sub-layers, the Logical Link Control Layer and the Media Access Control Layer. Ethernet is the main data link layer in use. [Layer 1: The physical layer](#). This layer conveys the bit stream through the network at the electrical,

optical or radio level. It provides the hardware means of sending and receiving data on a [carrier network](#)



IEEE

The IEEE (Institute of Electrical and Electronics Engineers) describes itself as "the world's largest technical professional society -- promoting the development and application of electro technology and allied sciences for the benefit of humanity, the advancement of the profession, and the well-being of our members."

The IEEE fosters the development of standards that often become national and international standards. The organization publishes a number of journals, has many local chapters, and several large societies in special areas, such as the IEEE Computer Society

NETWORK COMPONENTS

Computer network components include the major parts that are needed to install a network both at the office and home level. Before delving into the installation process, you should be familiar with each part so that you could choose and buy the right component that fits with your network system.

These hardware components include **cable**, **Hub**, **Switch**, **NIC** (network interface card), **modem** and **router**. Depending on the type of network you are going to install, some

of the parts can be eliminated. For example, in a wireless network you don't need cables, hubs so on.

Major computer network components

Computer network requires the following devices (some of them are optional):-

- Network Interface Card (NIC)
- Hub
- Switches
- Cables and connectors
- Router
- Modem

MODEM

A modem modulates outgoing [digital](#) signals from a computer or other digital device to [analog](#) signals for a conventional copper [twisted pair](#) telephone line and demodulates the incoming analog signal and converts it to a digital signal for the digital device

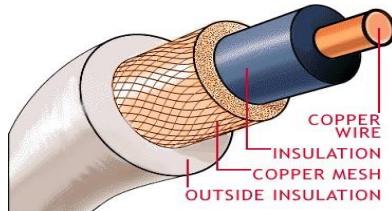
In recent years, the 2400 [bits per second](#) modem that could carry e-mail has become obsolete. 14.4 [Kbps](#) and 28.8 Kbps modems were temporary landing places on the way to the much higher [bandwidth](#) devices and carriers of tomorrow. From early 1998, most new personal computers came with 56 Kbps modems. By comparison, using a digital [Integrated Services Digital Network](#) adapter instead of a conventional modem, the same telephone wire can now carry up to 128 Kbps. With Digital Subscriber Line ([DSL](#)) systems, now being deployed in a number of communities, bandwidth on twisted-pair can be in the megabit range.

NETWORK CABLES

Networking cables are used to connect one network device to other network devices or to connect two or more computers to share printer, scanner etc. Different types of network cables like Coaxial cable, Optical fiber cable, Twisted Pair cables are used depending on the network's topology, protocol and size. The devices can be separated by a few meters (e.g. via [Ethernet](#)) or nearly unlimited distances (e.g. via the interconnections of the Internet). While wireless networks are much easier deployed when total throughput is not an issue, most permanent larger computer networks use cables to transfer signals from one point to another.

Coaxial Cable

A type of wire that consists of a center wire surrounded by insulation and then a grounded shield of braided wire. The shield minimizes electrical and radio frequency interference. Coaxial cabling is the primary type of cabling used by the cable television industry and is also widely used for computer networks, such as Ethernet. Although more expensive than standard telephone wire, it is much less susceptible to interference and can carry much more data.



Optical Fiber Cable

A technology that uses glass (or plastic) threads (fibers) to transmit data. A fiber optic cable consists of a bundle of glass threads, each of which is capable of transmitting messages modulated onto light waves.

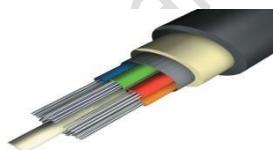
Fiber optics has several advantages over traditional metal communications lines:

Fiber optic cables have a much greater bandwidth than metal cables. . This means that they can carry more data

Fiber optic cables are less susceptible than metal cables to interference.

Fiber optic cables are much thinner and lighter than metal wires.

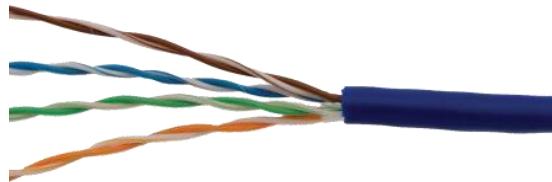
Data can be transmitted digitally (the natural form for computer data) rather than analogically.



TWISTED PAIR

Twisted pair is the ordinary copper wire that connects home and many business computers to the telephone company. To reduce crosstalk or electromagnetic induction between pairs of wires, two insulated copper wires are twisted around each other. Each connection on twisted pair requires both wires. Since some telephone sets or desktop locations require multiple connections, twisted pair is sometimes installed in two or more pairs, all within a single cable. For some business locations, twisted pair is enclosed in a shield that functions as a ground. This is known as shielded twisted pair ([STP](#)). Ordinary wire to the home is unshielded twisted pair ([UTP](#)).

UTP

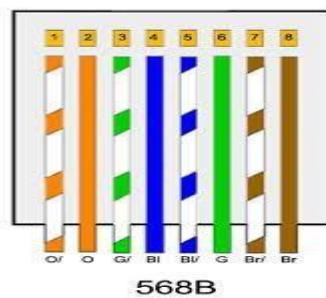
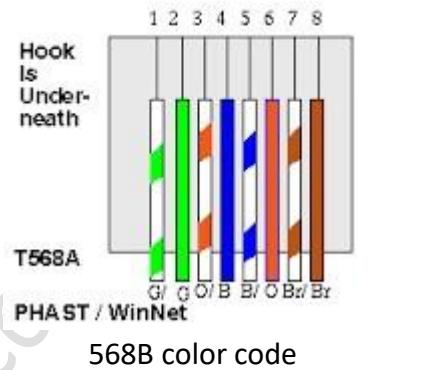


The UTP Categories

Cat 1	Data rate up to 1Mbps - Traditional Telephone & ISDN - Modem
Cat 2	Data rate up to 4 Mbps - Token Ring
Cat 3	Data rate up to 10Mbps - Token Ring & 10BASE-T
Cat 4	Data rate up to 16Mbps - Token Ring
Cat 5	Data rate up to 100Mbps - Ethernet (10Mbps), Fast Ethernet (100Mbps) and Token ring (16Mbps)
Cat 5e	Data rate up to 1000Mbps - Gigabit Ethernet
Cat 6	Data rate up to 1000Mbps - Gigabit Ethernet

*The 6 different Unshielded Twisted Pair categories
Max length depends on network topology and protocol
UTP is mostly used in Star Topologies*

UTP Cables are divided into two depends upon the color code are 568A&568B 568A Color code



UTP Cables are two types

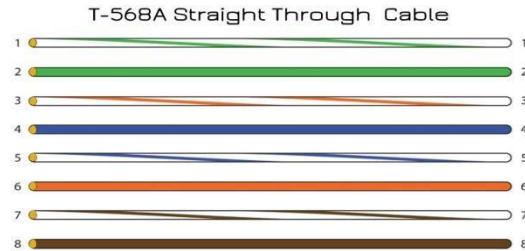
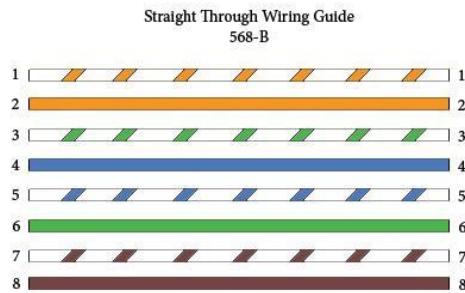
Straight throw

Cross over

Straight-Through Wired Cables

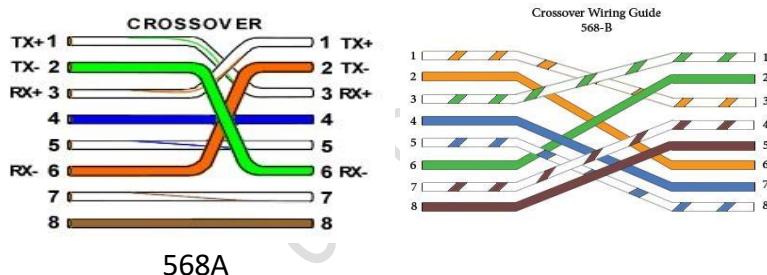
Straight-Through refers to cables that have the pin assignments on each end of the cable. In other words Pin 1 connector A goes to Pin 1 on connector B, Pin 2 to Pin 2 ect. StraightThrough

wired cables are most commonly used to connect a host to client. When we talk about cat5e patch cables, the Straight-Through wired cat5e patch cable is used to connect computers, printers and other network client devices to the router switch or hub (the host device in this instance).



Crossover Wired Cables

Crossover wired cables (commonly called crossover cables) are very much like Straight-Through cables with the exception that TX and RX lines are crossed (they are at oposite positions on either end of the cable). Using the 568-B standard as an example below you will see that Pin 1 on connector A goes to Pin 3 on connector B. Pin 2 on connector A goes to Pin 6 on connector B etc. Crossover cables are most commonly used to connect two hosts directly. Examples would be connecting a computer directly to another computer, connecting a switch directly to another switch, or connecting a router to a router. Note: While in the past when connecting two host devices directly a crossover cable was required. Now days most devices have auto sensing technology that detects the cable and device and crosses pairs when needed.

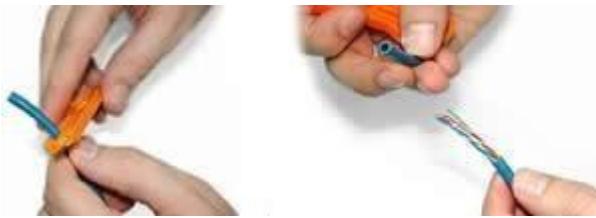


Using a [Crimping Tool](#), trim the end of the cable you're terminating, to ensure that the ends of the conducting wires are even.



STEP 2

Being careful not to damage the inner conducting wires, strip off approximately 1 inch of the cable's jacket, using a [modular crimping tool](#) or a [UTP cable stripper](#).



STEP 3

Separate the 4 twisted wire pairs from each other, and then unwind each pair, so that you end up with 8 individual wires. Flatten the wires out as much as possible, since they'll need to be very straight for proper insertion into the connector.



STEP 4

Holding the cable with the wire ends facing away from you. Moving from left to right, arrange the wires in a flat, side-by-side ribbon formation, placing them in the following order: white/orange, solid orange, white/green, solid blue, white/blue, solid green, white/brown, solid brown. STEP 5

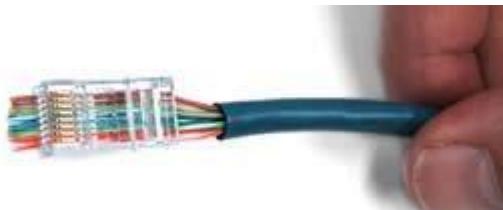


Holding the RJ45 connector so that its pins are facing away from you and the plug-clip side is facing down, carefully insert the flattened, arranged wires into the connector, pushing through until the wire ends emerge from the pins. For strength of connection, also push as much of the cable jacket as possible into the connector.



STEP 6

Check to make sure that the wire ends coming out of the connector's pin side are in the correct order; if not, remove them from the connector, rearrange into proper formation, and re-insert. Remember, once the connector is crimped onto the cable, it's permanent. If you realize that a mistake has been made in wire order after termination, you'll have to cut the connector off and start all over again! STEP 7



Insert the prepared connector/cable assembly into the RJ45 slot in [your crimping tool](#). Firmly squeeze the crimper's handles together until you can't go any further.



Release the handles and repeat this step to ensure a proper crimp.

STEP 8

If your crimper doesn't automatically trim the wire ends upon termination, carefully cut wire ends to make them as flush with the connector's surface as possible. The closer the wire ends are trimmed, the better your final plug-in connection will be.



STEP 9

After the first termination is complete, repeat process on the opposite end of your cable



STP

Often abbreviated STP, a type of copper telephone wiring in which each of the two copper wires that are twisted together are coated with an insulating coating that functions as a ground for the wires. The extra covering in shielded twisted pair wiring protects the transmission line from [electromagnetic interference](#) leaking into or out of the cable. STP cabling often is used in [Ethernet](#) networks, especially fast data rate Ethernets.

NIC

NICs— sometimes called network cards—are the mechanisms by which computers connect to a network. NICs come in all shapes and sizes, and they come in prices to suit all budgets.



Installing Network Cards

Power off the computer and then unplug all cables from the back of the case. Pull the entire case out of its current position and set it down on its right side on a flat work surface. Feel the back edge of the case to find out if the side panel is held on by a metal latch or by two case screws. Remove the screws and set them aside or pull up on the latch to unlock the panel. Push down on the panel and slide it to the left to remove it from the computer. Locate the expansion card slots on the lower left end of the computer's motherboard. Remove the screws holding the metal tab over the open PCI slot or simply pop the tab out if it is a plastic piece. Check the keyed notches on the bottom of the network interface card and line them up with the notches on the PCI expansion slot. Push the card onto the slot and re-attach the screws to hold it in place.

Place the side panel back on the case and re-attach the case screws. Plug the cables back into the case and power the computer on. Wait for the operating system to finish loading and click the "Start" button on the toolbar at the bottom of the Desktop.  Click on "Control Panel" and double-click "Device Manager." Click on the plus sign next to the entry labeled "Network Adapters." Find the name of the network card and right-click on it.  Choose "Update Driver Software" from the menu that will pop up. Wait for the driver to finish downloading and then double-click the name of the network card. Click "Driver." Scroll through the list of options until you find "Enable" or "Disable." Click "Enable" or simply click "OK." If it is Disable you want, you will see an indication of what card is already configured. Connect an Ethernet cable from a modem or router into the port on the network interface card to connect the computer to the Internet or attach it to an existing computer network

MAC ADDERSS

Media Access Control address, a [hardware](#) address that uniquely identifies each [node](#) of a [network](#). In [IEEE](#) 802 networks, the [Data Link Control \(DLC\) layer](#) of the [OSI Reference Model](#) is divided into two sub-layers: the [Logical Link Control \(LLC\) layer](#) and the Media Access Control (MAC) layer. The MAC layer interfaces directly with the network medium. Consequently, each different type of network medium requires a different MAC layer. On networks that do not conform to the IEEE 802 standards but do conform to the OSI Reference Model, the node address is called the [Data Link Control \(DLC\)](#) address.

How to Find a MAC Address

To display your MAC address on a Windows NT/2000/2003/XP/Visa computer: Click START

Go to ACCESSORIES

Select Command Prompt

Type: (no quotes) " ipconfig /all"

In the "ipconfig /all" results look for the adapter you want to find the MAC address of. The MAC address is the number located next to "Physical Address" in the list.

DEVICES

Switch: A network switch (also called switching hub, bridging hub, officially MAC bridge) is a computer networking device that connects devices together on a computer network, by using packet switching to receive, process and forward data to the destination device



Hub : A common connection point for [devices](#) in a [network](#). Hubs are commonly used to connect [segments](#) of a [LAN](#). A hub contains multiple [ports](#). When a [packet](#) arrives at one port, it is copied to the other ports so that all segments of the LAN can see all packets



Router: A router is a [device](#) that forwards data [packets](#) along[networks](#). A router is connected to at least two networks, commonly two [LANs](#) or [WANs](#) or a LAN and its [ISP's](#) network. Routers are located at [gateways](#), the places where two or more networks connect.

Routers use [headers](#) and forwarding tables to determine the best path for forwarding the packets, and they use [protocols](#) such as [ICMP](#) to communicate with each other and configure the best route between any two hosts.



TCP/IP

TCP/IP (Transmission Control Protocol/Internet Protocol) is the basic communication language or protocol of the Internet. It can also be used as a communications protocol in a private network (either an [intranet](#) or an [extranet](#)). When you are set up with

direct access to the Internet, your computer is provided with a copy of the TCP/IP program just as every other computer that you may send messages to or get information from also has a copy of TCP/IP. .

TCP/IP is responsible for full-fledged data connectivity and transmitting the data end-to-end by providing other functions, including addressing, mapping and acknowledgment. TCP/IP contains four layers, which differ slightly from the OSI model.

IP ADDRESSING

An IP address is a binary number that uniquely identifies computers and other devices on a TCP/IP network. Two IP addressing standards are in use today. The IPv4 standard is most familiar to people and supported everywhere on the Internet, but the newer [IPv6](#) standard is gradually replacing it. IPv4 addresses consist of four bytes (32 bits), while addresses are 16 bytes (128 bits) long.

IPv4

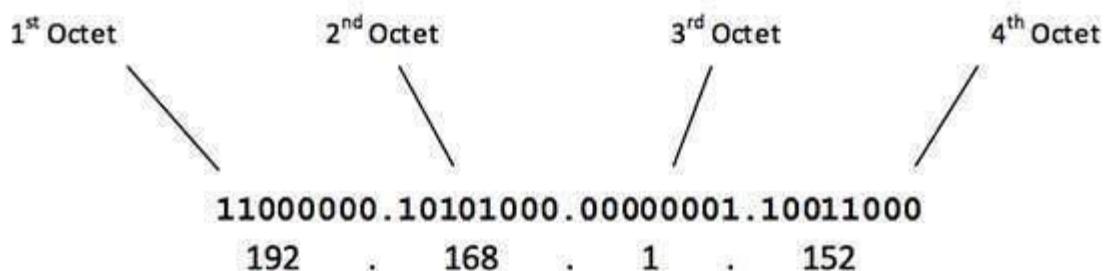
IPv4 (Internet Protocol Version 4) is the fourth revision of the Internet Protocol (IP) used to identify devices on network through an addressing system. The Internet Protocol is designed for use in interconnected systems of packet-switched computer communication networks

IPv4 is the most widely deployed Internet protocol used to connect devices to the Internet. IPv4 uses a 32-bit address scheme allowing for a total of 2^{32} addresses (just over 4 billion addresses). With the growth of the Internet it is expected that the number of unused IPv4 addresses will eventually run out because every device -- including computers, smart phones and game consoles -- that connects to the Internet requires an address.

Internet Protocol hierarchy contains several classes of IP Addresses to be used efficiently in various situations as per the requirement of hosts per network. Broadly, the IPv4 Addressing system is divided into five classes of IP Addresses. All the five classes are identified by the first octet of IP Address.

Internet Corporation for Assigned Names and Numbers is responsible for assigning IP addresses.

The first octet referred here is the left most of all. The octets numbered as follows depicting dotted decimal notation of IP Address:



The number of networks and the number of hosts per class can be derived by this formula:

$$\text{Number of networks} = 2^{\text{network_bits}}$$

$$\text{Number of Hosts/Network} = 2^{\text{host_bits}} - 2$$

When calculating hosts' IP addresses, 2 IP addresses are decreased because they cannot be assigned to hosts, i.e. the first IP of a network is network number and the last IP is reserved for Broadcast IP. Class A Address

The first bit of the first octet is always set to 0 (zero). Thus the first octet ranges from 1 – 127, i.e.

$$\begin{array}{l} \text{00000001} - \text{01111111} \\ \quad 1 - 127 \end{array}$$

Class A addresses only include IP starting from 1.x.x.x to 126.x.x.x only. The IP range 127.x.x.x is reserved for loopback IP addresses.

The default subnet mask for Class A IP address is 255.0.0.0 which implies that Class A addressing can have 126 networks (2⁷-2) and 16777214 hosts (2²⁴-2).

Class A IP address format is thus:0NNNNNNN.HHHHHHHH.HHHHHHHH.HHHHHHHH

Class B Address

An IP address which belongs to class B has the first two bits in the first octet set to 10, i.e.

$$\begin{array}{l} \text{10000000} - \text{10111111} \\ \quad 128 - 191 \end{array}$$

Class B IP Addresses range from 128.0.x.x to 191.255.x.x. The default subnet mask for Class B is 255.255.x.x.

Class B has 16384 (214) Network addresses and 65534 (216-2) Host addresses.

Class B IP address format is:10NNNNNN.NNNNNNNN.HHHHHHHH.HHHHHHHH

Class C Address

The first octet of Class C IP address has its first 3 bits set to 110, that is:

$$\begin{array}{l} \text{11000000} - \text{11011111} \\ \quad 192 - 223 \end{array}$$

Class C IP addresses range from 192.0.0.x to 223.255.255.x. The default subnet mask for Class C is 255.255.255.x.

Class C gives 2097152 (221) Network addresses and 254 (2⁸-2) Host addresses.

Class C IP address format is:110NNNNN.NNNNNNNN.NNNNNNNN.HHHHHHHH

Class D Address

Very first four bits of the first octet in Class D IP addresses are set to 1110, giving a range of:

$$\begin{array}{l} \text{11100000} - \text{11101111} \\ \quad 224 - 239 \end{array}$$

Class D has IP address rage from 224.0.0.0 to 239.255.255.255. Class D is reserved for Multicasting. In multicasting data is not destined for a particular host, that is why there is no need to extract host address from the IP address, and Class D does not have any subnet mask. Class E Address his IP Class is reserved for experimental purposes only for R&D or Study. IP addresses in this class ranges from 240.0.0.0 to 255.255.255.254. Like Class D, this class too is not equipped with any subnet mask.

PUBLIC & PRIVATE IP

Public Addresses

Public addresses are assigned by Inter NIC and consist of class-based network IDs or blocks of CIDR-based addresses (called CIDR blocks) that are guaranteed to be globally unique to the Internet.

When the public addresses are assigned, routes are programmed into the routers of the Internet so that traffic to the assigned public addresses can reach their locations. Traffic to destination public addresses are reachable on the Internet.

For example, when an organization is assigned a CIDR block in the form of a network ID and subnet mask, that [network ID, subnet mask] pair also exists as a route in the routers of the Internet. IP packets destined to an address within the CIDR block are routed to the proper destination. PRIVATE IP

Each IP node requires an IP address that is globally unique to the IP internetwork. In the case of the Internet, each IP node on a network connected to the Internet requires an IP address that is globally unique to the Internet. As the Internet grew, organizations connecting to the Internet required a public address for each node on their intranets. This requirement placed a huge demand on the pool of available public addresses.

When analyzing the addressing needs of organizations, the designers of the Internet noted that for many organizations, most of the hosts on the organization's intranet did not require direct connectivity to Internet hosts. Those hosts that did require a specific set of Internet services, such as the World Wide Web access and e-mail, typically access the Internet services through Application layer gateways such as proxy servers and e-mail servers. The result is that most organizations only required a small amount of public addresses for those nodes (such as proxies, routers, firewalls, and translators) that were directly connected to the Internet.

Note: Class A addresses 127.0.0.0 to 127.255.255.255 cannot be used and is reserved for loopback and diagnostic functions.

Class	1st Octet Decimal Range	1st Octet High Order Bits	Network/Host ID (N=Network, H=Host)	Default Subnet Mask	Number of Networks	Hosts per Network (Usable Addresses)
A	1 – 126*	0	N.H.H.H	255.0.0.0	126 (27 – 2)	16,777,214 (224 – 2)
B	128 – 191	10	N.N.H.H	255.255.0.0	16,382 (214 – 2)	65,534 (216 – 2)
C	192 – 223	110	N.N.N.H	255.255.255.0	2,097,150 (221 – 2)	254 (28 – 2)
D	224 – 239	1110	Reserved for Multicasting			
E	240 – 254	1111	Experimental; used for research			

Class	Private Networks	Subnet Mask	Address Range
-------	------------------	-------------	---------------

A	10.0.0.0	255.0.0.0	10.0.0.0 - 10.255.255.255
B	172.16.0.0 - 172.31.0.0	255.240.0.0	172.16.0.0 - 172.31.255.255
C	192.168.0.0	255.255.0.0	192.168.0.0 - 192.168.255.255

IP addressing can be divided into 2 type static IP, Dynamic IP Static IP

A static Internet Protocol (IP) address (static IP address) is a permanent number assigned to a computer by an Internet service provider (ISP). Static IP addresses are useful for gaming, website hosting or Voice over Internet Protocol (VoIP) services. Speed and reliability are key advantages. Because a static address is constant, systems with static IP addresses are vulnerable to data mining and increased security risks.

A static IP address is also known as a fixed address. This means that a computer with an assigned static IP address uses the same IP address when connecting to the Internet.

Dynamic IP

Dynamic IP addresses are generally implemented by Internet service providers and networks that have a large number of connecting clients or end-nodes. Unlike static IP addresses, dynamic IP addresses are not permanent. A dynamic IP is assigned to a node until it's connected to the network; therefore, the same node may have a different IP address every time it reconnects with the network.

The assigning, reassigning and modification of dynamic IP addresses is managed by a Dynamic Host Configuration Protocol (DHCP) server. One of the primary reasons behind having dynamic IP addresses is the shortage of static IP address on IPv4. Dynamic IP addresses allow a single IP address to be shuffled between many different nodes to circumvent this problem.

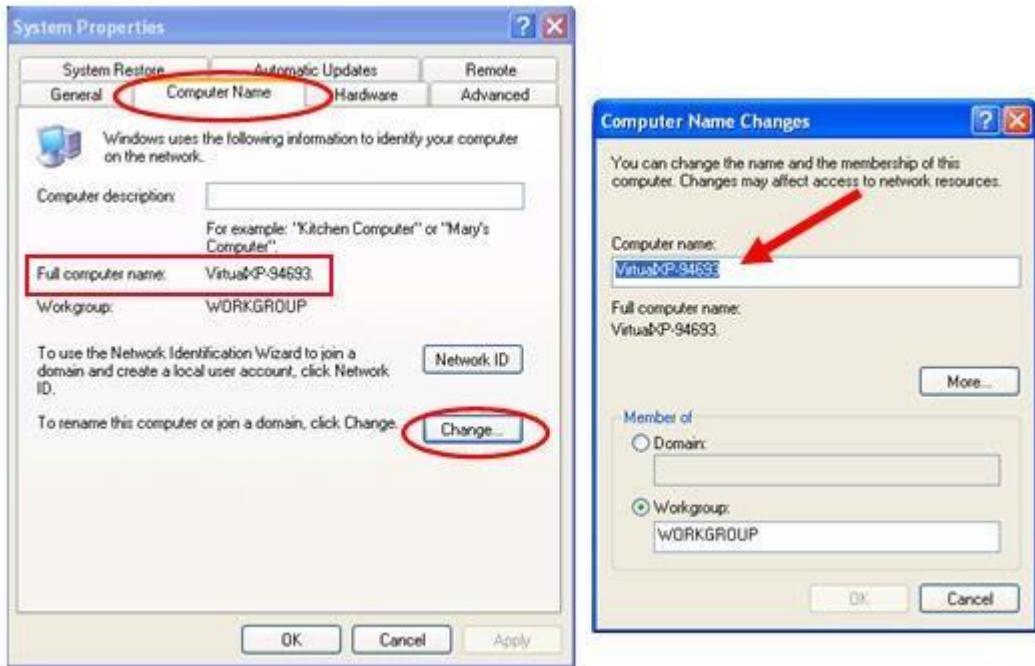
PEER TO PEER MODEL (WORKGROUP MODEL) Network Implementation

We are discussing in the chapter windows XP ,7, 8 peer to peer model(workgroup model)

How to set up Peer to Peer Network /Workgroup mode (windows xp)

Connect the cables in system to switch (check all the system in your network were connected) Set the computer name &workgroup

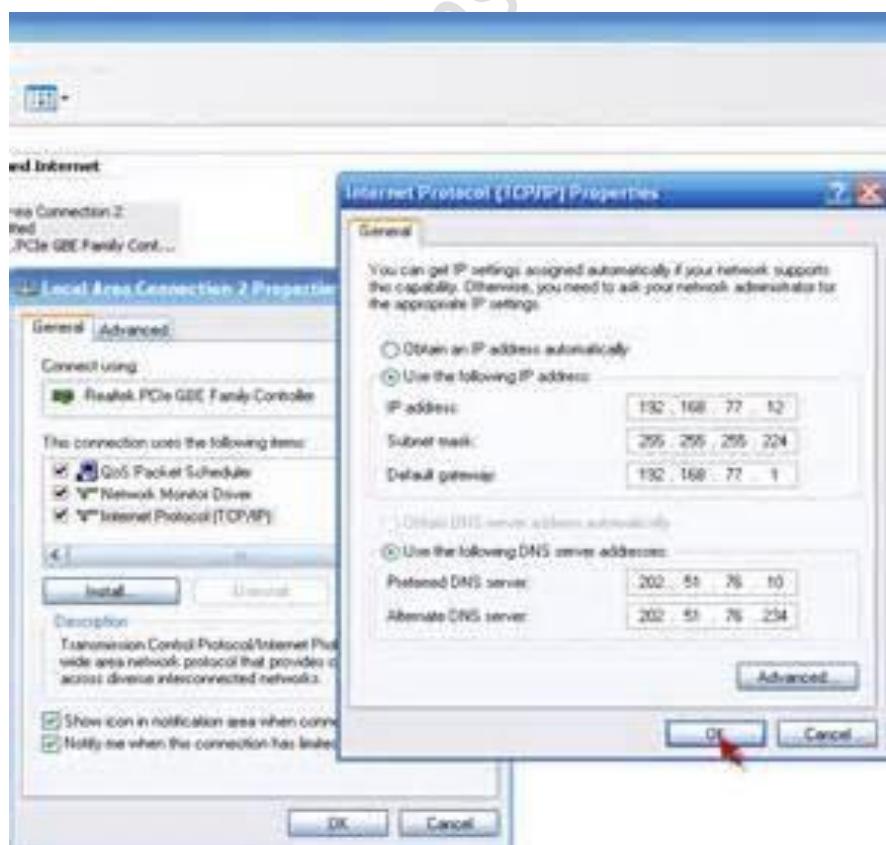
Right click my computer >properties > computer name > select change tab > set computer name &workgroup >restart the system



NOTE: computer name must be unique in network Workgroup name must be same in network

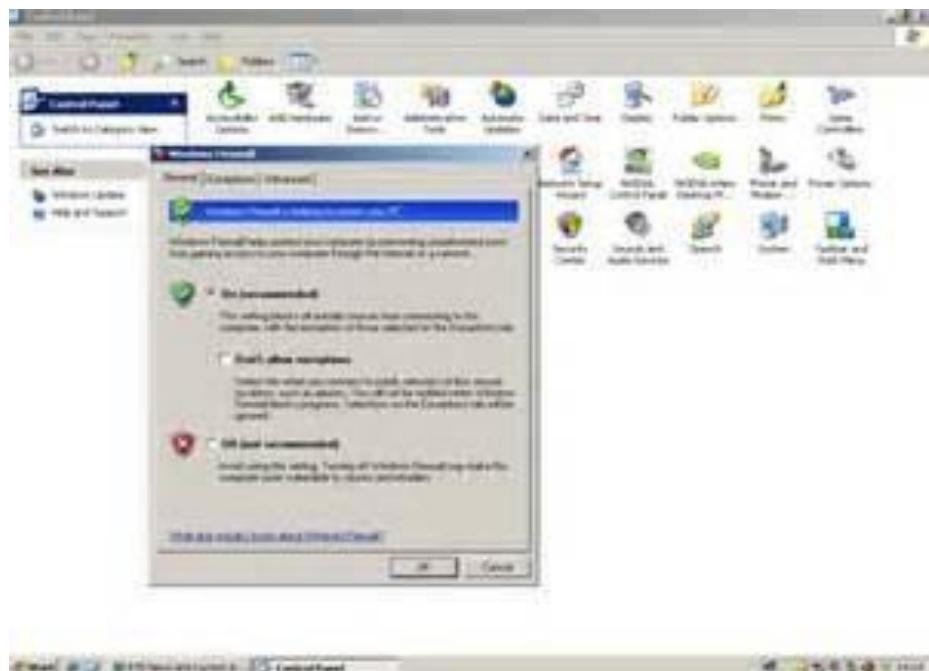
To set the IP address

Right click the my network place > properties >right click local area network >properties >select TCP/IP protocol >set the IP address &subnet mask



Check windows fire wall is off

Start > control panel > windows fire wall > turn off fire wall



NOTE: Windows fire wall : A firewall is a [network](#) security system, either hardware- or software-based, that controls incoming and outgoing network traffic based on a set of rules

To check IP address using command

Start > run > cmd > type command “ ipconfig ”

NOTE: To check computer name, workgroup ,mac address to use the command “ ipconfig /all”

Set the this all steps in all computers

To check connection in all computer using command

In command prompt

Type “ping IP address of another computer/computer name”

```
Microsoft (R) Windows Data
(C)Copyright Microsoft Corp. 1998-2001.
C:\>ping www.youtube.com
Pinging youtube-w1.l.google.com [74.125.127.113] with 32 bytes of data:
Reply From 74.125.127.113: bytes=32 time<5ms TTL=247

Ping statistics for 74.125.127.113:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 53ms, Maximum = 55ms, Average = 53ms
C:\>
```

NOTE: If you can check connection continually using command " ping IP address/computer name -t "

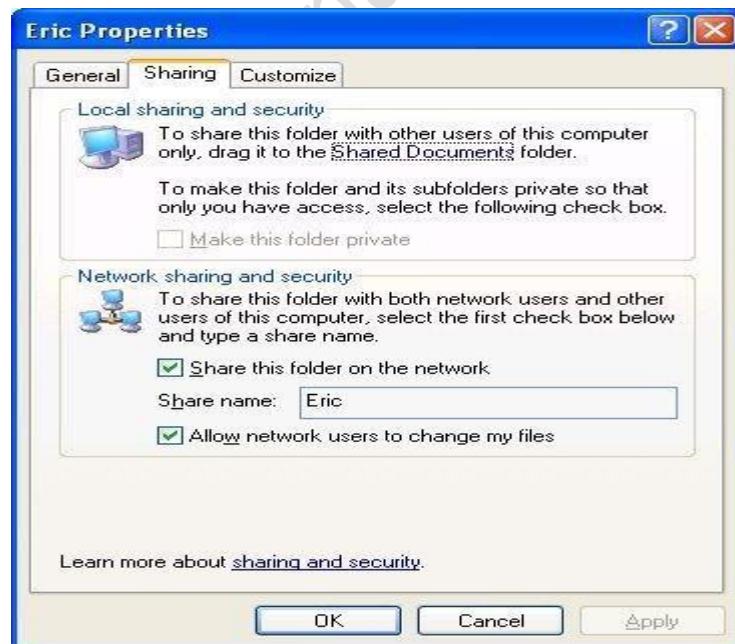
SHARING FOLDER /DRIVE

BY SHARING YOUR COMPUTER'S RESOURCES, such as its files and folders, you let other people who use your computer and other people on your network use these resources. With the Windows Vista operating system, sharing your files and folders with other users—either locally or over the network—is simple and straightforward

To share a drive or a folder on the network with Windows XP, follow these steps: Open Windows Explorer or My Documents, and then locate the drive or folder you want to share. Right-click the drive or folder, and then click Sharing and Security. If you are sharing a drive, under the Sharing tab, click the If you understand the risk but still want to share the root of the drive, click here.

Under the Sharing tab, as shown in the picture below, you can do one of the following: Share this folder on the network - This allows you to share the contents of the drive or folder available to other users on the network.

Allow network users to change my files - This allows network users to change files over the network. This option is only available when the "Share this folder on the network" checkbox is checked.



Click Apply, and then click Ok.

Notes: Keep a share name with 12 characters or less. This way other versions of Windows can access the share and will make the folder fully accessible over the network. You also cannot create shares in user's profiles or in the Guest account

TO ACCESS SHARING FOLDER/ DRIVE

Start >run > computer name/IP address of the computer

Open my network place >view workgroup computers > open the computer

Start >search >computer/people > type computer name /IPaddress

MAPPING NETWORK DRIVE

In a network, drive mappings reference remote drives, and you have the option of assigning the letter of your choice. For example, on your local machine, you might map S: to refer to drive C: on a server. Each time S: is referenced on the local machine, the drive on the server is substituted behind the scenes. The mapping may also be set up to refer only to a specific folder on the remote machine, not the entire drive.

HOW TO MAPPING A DRIVE

Right-click My Computer, and then click Map Network Drive. In the Drive box, click a Drive letter.

Note: Shared drives and shared folders can be mapped. Unless permissions forbid it, when you access a shared drive or folder you can also access subfolders. However, you cannot map a drive for a subfolder that isn't explicitly configured as a shared resource. The ability to map subfolders is not available in Windows.

In the Folder box, type the folder path or browse the folder you want to mapping



If you need to connect as a different user, click different user name and enter the user name and password. Click OK.

5.Click Finish

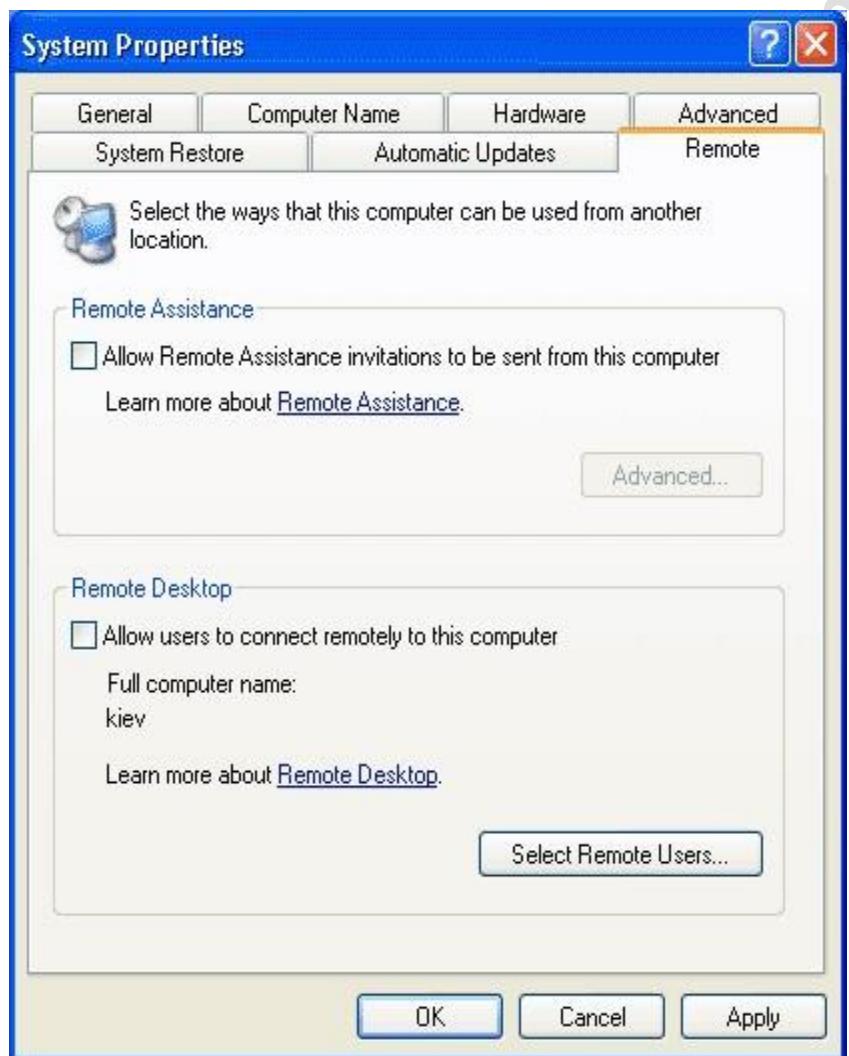
How to Disconnect a Network Drive Open

My Computer.

Right-click the icon for the mapped drive and choose Disconnect.

REMOTE DESKTOP

A remote desktop is a separate program or feature found on most operating systems that allows a user to access an operating computer system's desktop. The access occurs via the Internet or through another network in another geographical location and allows users to interact with that system as if they were physically at their own computer. USB devices with the ability to recreate a remote user's desktop are commonly called secure portable offices. Go to Control Panel | System Properties and select the Remote tab to display the options shown in Figure



Select Allow Users To Connect Remotely To This Computer. You will see a dialog box reminding you to set up permissions and open up the appropriate ports on your firewall. Click the Select

Remote Users button to open the dialog box shown in Figure B. Here, you can give the appropriate user(s) access to Remote Desktop. Click Add | Advanced | Find Now to display all of your users. Select your users and click OK.



Note

All Administrators have access regardless of whether they are added to the list.

Connecting remotely

You're now ready to connect to your computer from another Windows machine
Start >all programs > accessories >communication > remote desktop>type computer name /IP address >connect > type username and password



Microsoft introduced the NetMeeting application to allow for VoIP communications and video conferencing. NetMeeting used the [H.323](#) protocol for video conferencing and was also compatible with OpenH323 clients like Ekiga and Internet Locator Service (ILS). It also allowed for application and desktop sharing, remote desktop sharing and transfer of files between client computers.

NetMeeting was available for use starting with later versions of Internet Explorer 3 and Windows 95 OSR2 and continued up through Windows XP. NetMeeting was one of the most popular applications for video conferencing, until free video conferencing solutions appeared in applications like Yahoo! Messenger, MSN Messenger, and [Skype](#). Microsoft changed course at this point and focused on Windows Messenger and Microsoft Office Live Meeting for its offering of video conferencing capabilities.

CONFIGURE NETMETTING

To activate NetMeeting, click Start, then choose Run.

In the Open dialog box, remove any other text that may be there, enter the first four letters of the word Conference (CONF) and then click OK.

The first setup screen appears listing all that NetMeeting can do. Click Next.

Fill-in your First Name, Last Name, and E-mail address. The Location and Comments fields may be left blank. Click Next.

Uncheck the "Log on to a directory server when NetMeeting starts" box. Click Next.

Select "Cable, xDSL or ISDN" as your connection speed. Click Next.

Uncheck both "Put a shortcut to ..." choices. Click Next.

In the Audio Tuning Wizard, click Next.

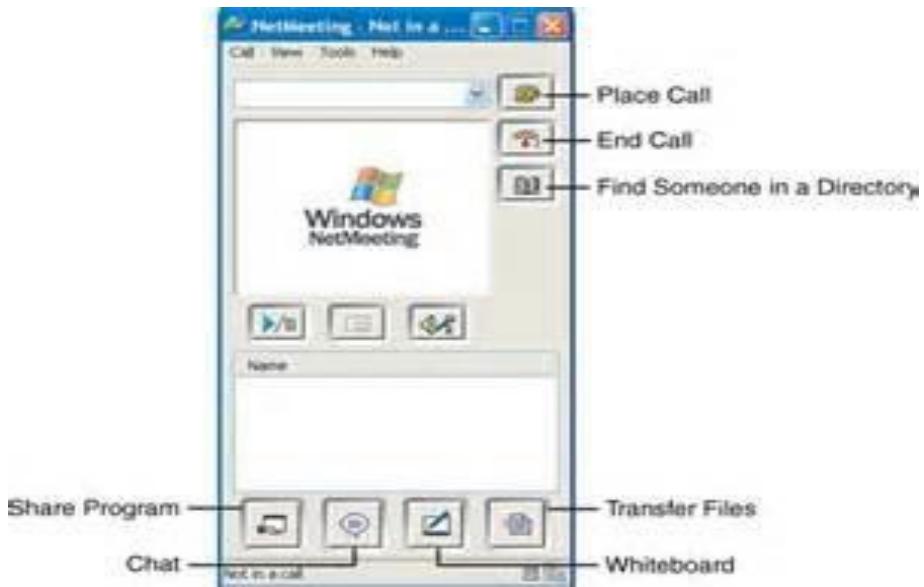
Do not click Test. We are not worried about setting up the Audio feature for our use. Drag the slider all the way to the left. Click Next.

Do not read the text or speak. Drag the slider all the way to the left. Click Next.

Click Finish. Wait for NetMeeting to install and load.

When the NetMeeting window appears, the Titlebar will say "NetMeeting - Not in a Call."

Please locate the NetMeeting icon (green world with yellow stripes) in the taskbar.



Opening NetMeeting and Calling

The NetMeeting window should be open. The Title bar will say "NetMeeting - Not in a Call." In the Host IP address box at the top of the NetMeeting window (there is a drop-down arrow at the right hand edge of the box, enter the IP Address that has been given to you

Ex: 128.118.93.233

Click on the Phone icon to the right of the Host IP address box.

* You should see a "Waiting for a response from" message.

* When the person clicks Accept at their end, you will see the portion of their screen that they have set to be shared. When you connected to the Support other machine, the NetMeeting window was minimized to your Taskbar. You need to bring the NetMeeting window back to the front (e.g. maximize it).

In the Taskbar, look for something called "NetMeeting - 1 Connection". Click it ONCE (this is with a 'left' click, do not right-click it).

* The NetMeeting window should re-appear. You should see your name and the IT Support staff's name listed in the Name box.

* KEY STEP: you must now allow the IT Support staff to "see" and control your machine.

From the Tools menu choose Sharing.

In the "Sharing - Nothing" window that appears, select Desktop. If you have other applications open, 'Desktop' should be the first choice in the list.

Click the Share button on the right.

Click the Allow Control button.

Click the Automatically accept requests for control check box. Click Close.



Disconnect from NetMeeting

To end the call, in the NetMeeting window, click the End Call button (looks like a phone receiver being hung up with a red arrow).

The names will disappear. At this point the IT Support staff can no longer see your machine. From the Call menu choose Exit.

WINDOWS 7 NETWORKING CONFIGURATION

To check the physical connection in the network

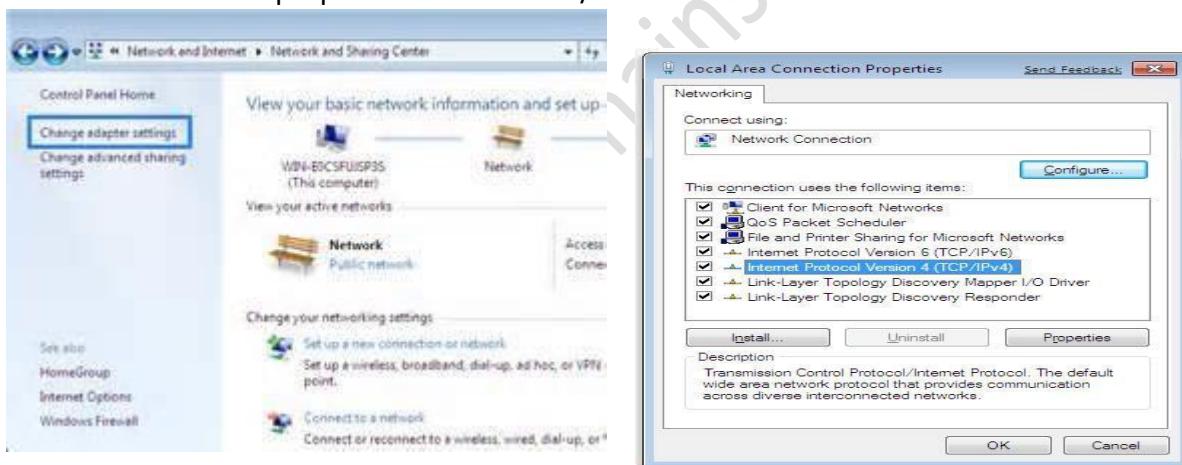
To set the computer name& workgroup

My computer > properties > change settings > computer name > change workgroup name & computer name > restart the system



To set the IP address

Right click network > properties > change adapter settings > right click local area connection > properties > select TCP/IPV4 > set IP address& subnet mask >ok



NOTE: In windows 7 ipv4 & ipv6 are use

Check the windows fire wall



Check the IP address & check the communication between the computers using commands ipconfig ,ping

```
C:\>ipconfig /all
Windows IP Configuration

Ethernet adapter Local Area Connection:
  Connection-specific DNS Suffix: corp.microsoft.com
  Link-local IPv6 Address . . . . . : fe80::8c9c:5023%334
  Primary IPv4 Address . . . . . : 192.168.0.4
  Subnet Mask . . . . . : 255.255.255.0
  Default Gateway . . . . . : 192.168.0.1
  DHCP Server . . . . . : 192.168.0.1
  Lease Obtained: Monday, April 1, 2013 10:43:35 AM
  Lease Expires: Friday, April 5, 2013 10:43:35 AM
  MTU 1500 bytes, Queueing Discipline pfq

Wi-Fi adapter Wireless Network Connection:
  Connection-specific DNS Suffix: corp.microsoft.com
  Link-local IPv6 Address . . . . . : fe80::8c9c:5023%335
  Primary IPv4 Address . . . . . : 192.168.0.5
  Subnet Mask . . . . . : 255.255.255.0
  Default Gateway . . . . . : 192.168.0.1
  DHCP Server . . . . . : 192.168.0.1
  Lease Obtained: Monday, April 1, 2013 10:43:35 AM
  Lease Expires: Friday, April 5, 2013 10:43:35 AM
  MTU 1500 bytes, Queueing Discipline pfq

C:\>ping 192.168.0.5

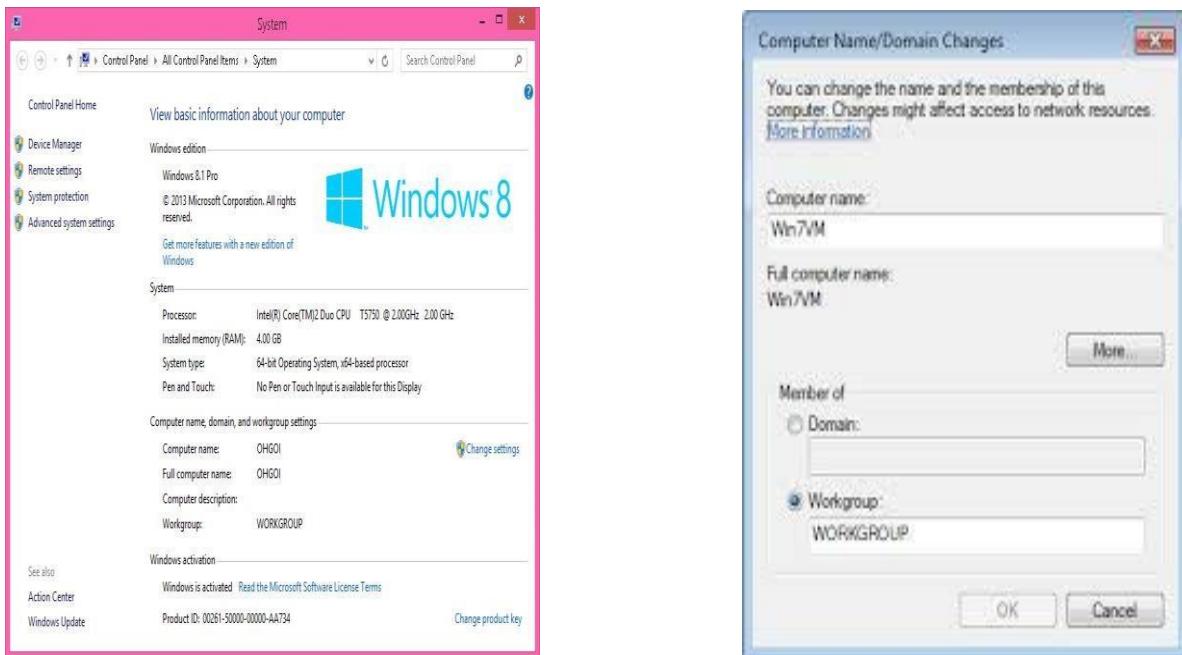
Pinging 192.168.0.5 [192.168.0.5] with 32 bytes of data:
PING: sendto failed: No route to host

C:\>
```

WINDOWS 8 NETWORKING CONFIGURATION

1. To check the physical connection in the network
2. To set the computer name & workgroup

My computer > properties > change settings > computer name > change workgroup name & computer name > restart the system



3. set the ip address

Right click network tab >properties >change adapter setting >right click local area connection >properties >select TCP/IP V4 > set ip address > ok

4. To check windows fire wall off

5. To check ip address& communication between computers

SHARING FOLDER/DRIVE IN 7/8

Right-click the folder or drive you want to share.

Click Properties. From the Sharing tab, click Advanced Sharing.

Click Share this folder.

In the appropriate fields, type the name of the share (as it appears to other computers), the maximum number of simultaneous users, and any comments that should appear beside it. If you would like to grant access to particular groups or individuals, click Permissions to add the appropriate groups or usernames.

If you are using NTFS, check the permissions in the Security tab to ensure that they are properly set to allow access to the share. Because Security settings override Share permissions, it is possible for people on the Permissions list to be denied access to the share because they either are not specified or are denied specifically in the Security list.



7.Apply >ok

Accessing a shared folder/drive start > run
>\IP address or computer name



OR

Open network > select the shared folder in the computer > open > access shared folder/drive

To share a printer:

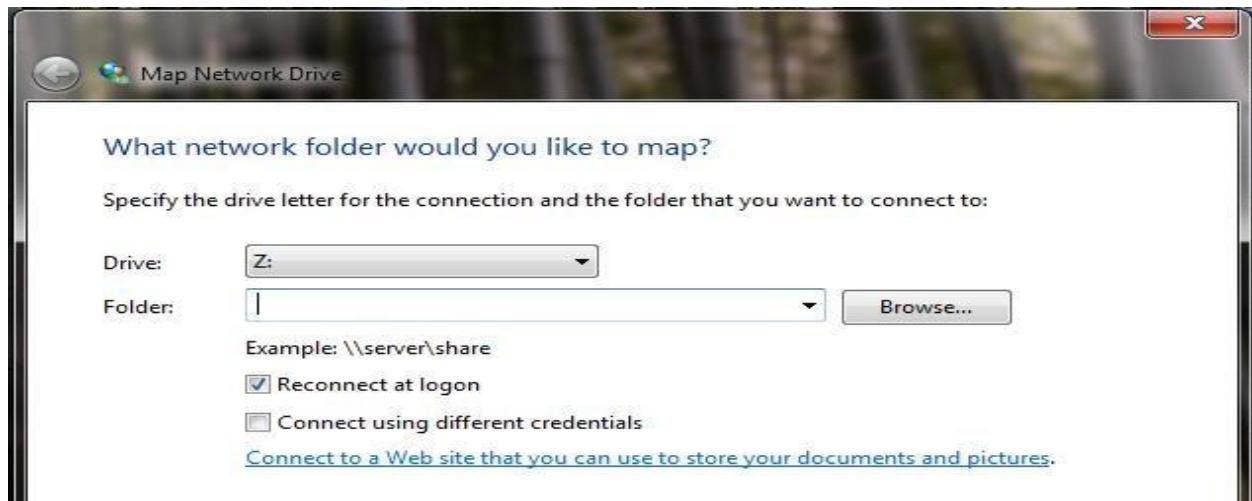
From the Control Panel, open Devices and Printers.

Right-click the printer you want to share. Click Printer Properties, and then select the Sharing tab.

Check Share this Printer. Under Share name, select a shared name to identify the printer.

Mapping Network drive

On the Start menu, right click computer >select mapping network drive



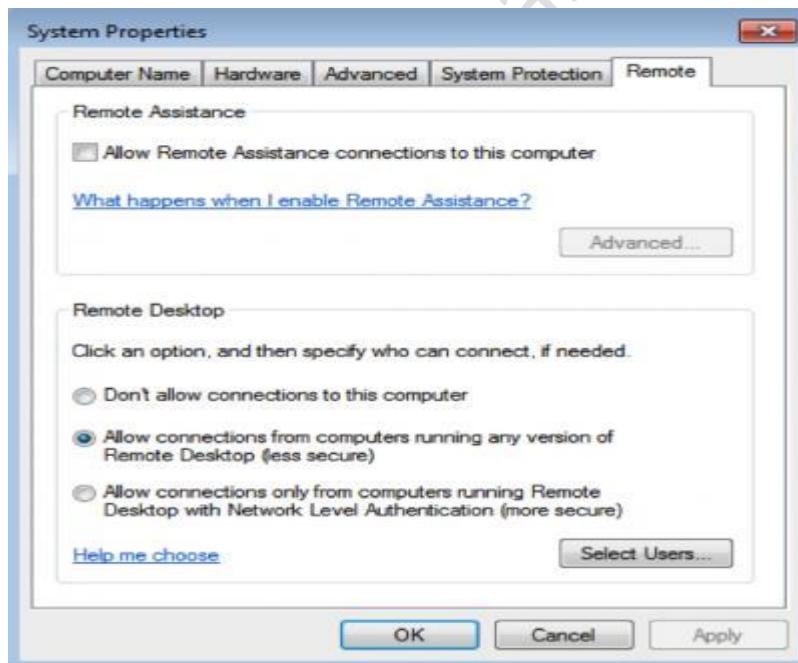
Select drive letter and type the path/browse the path

Finish

Remote desktop configuration

If you would like to connect to your work computer from home, and your desktop work computer is running Windows 7, then you will need to set up your work computer to allow you access. You do this from the Control Panel by selecting "Allow remote access" from the System category:

You need to allow remote access as shown below:



Select "Select Users", and add your userid. Note: you need to be administrator to do this.



Using Remote Desktop to connect to another computer

If you have Windows 7 or Windows 8 on your home computer, it is very easy to connect to your computer at work. Remember that you need to leave your office computer on. Click on the Start button, point to All Programs, point to Accessories, and then click on Remote Desktop Connection. Or just search for Remote Connection.

In Computer window, type the computer name for your office computer. If you don't know your computer name, you will need to find out at work. On your office computer, doubleclick on the System icon in Control Panel, then click on the Computer Nametab. You will see an entry for Full Computer Name.

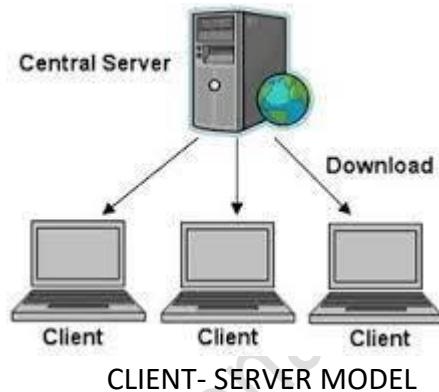
Click Connect.

The Log on to Windows dialog box appears. Type in your user name, password and domain. The Remote Desktop window will open and you are now using your computer at work. Your office computer will remain locked, and no one will be able to see the work you are doing on your office computer.



CLIENT – SERVER MODEL / DOMAIN MODEL

A client-server network is a central computer, also known as a server, which hosts data and other forms of resources. Clients such as laptops and desktop computers contact the server and request to use data or share its other resources with it. A client-server network is designed for end-users called clients to access resources (such as files, songs, video collections or some other service) from a central computer called a server. A server's sole purpose is to do what its name implies - serve its clients! You may have been using this configuration and not even have known it. Have you ever played Xbox Live or used the PlayStation Network? Your Xbox One is the client, and when it logs into the network, it contacts the Xbox Live servers to retrieve gaming resources like updates, video and game demos.



A server operating system (OS) is a type of operating system that is designed to be installed and used on a server computer.

It is an advanced version of an operating system, having features and capabilities required within a client-server architecture or similar enterprise computing environment.

Some common examples of server OSs include:

Red Hat Enterprise Linux

Windows Server

Mac OS X Server

Some of the key features of a server operating system include:

Execute all or most processes from OS commands

Advanced-level hardware, software and network configuration services

Install/deploy business applications and/or web applications

Provides central interface to manage users, implement security and other administrative processes

Manages Ability to access the server both in GUI and command-level interface and monitors client computers and/or operating systems

Different between workgroup model & Client server model(domain model) In a workgroup:

All computers are peers; no computer has control over another computer.

Each computer has a set of user accounts. To use any computer in the workgroup, you must have an account on that computer.

There are typically no more than ten to twenty computers.

All computers must be on the same local network or subnet.

In a domain:

One or more computers are servers. Network administrators use servers to control the security and permissions for all computers on the domain. This makes it easy to make changes because the changes are automatically made to all computers.

If you have a user account on the domain, you can log on to any computer on the domain without needing an account on that computer.

There can be hundreds or thousands of computers.

The computers can be on different local networks.

DOMAIN

group of computers and devices on a network that are administered as a unit with common rules and procedures. Within the Internet, domains are defined by the IP address. All devices sharing a common part of the IP address are said to be in the same domain..

Local SAM & Domain SAM (Local account & Domain account)

Local account

When a user logs on with a local user account the scope and access that the user has access to, is significantly reduced. Local user accounts only have access to resources on the local computer and nothing else. A local user account can't be placed on an access control list (ACL) or placed in a domain group. Thus, the access in a corporate environment is diminished enough to make the configuration undesired.

Domain account

The scope of a domain account is where the power of a Windows Active Directory domain comes into play. Domain user accounts can be configured for the following:

Domain group membership

Located on an ACL for ANY resource on any computer that has also joined the domain

Located in a local group of ANY computer that has joined the domain

Placed in a user right of ANY computer that has joined the domain

To receive centralized Group Policy settings to set security, profile, desktop, etc. information As you can see, the role of a domain user account is a "true enterprise" account. To allow users to logon with a local account creates an insecure situation, as there is little that can be done to control local accounts. Domain user accounts can be controlled, disabled, and managed centrally.

A D S (Active directory service)

Active Directory is a special-purpose database — it is not a registry replacement. The directory is designed to handle a large number of read and search operations and a significantly smaller number of changes and updates. Active Directory data is hierarchical, replicated, and extensible. Because it is replicated, you do not want to store dynamic data, such as corporate stock prices or CPU performance. If your data is machine-specific, store the data in the registry. Typical examples of data stored in the directory include printer queue data, user contact data, and network/computer configuration data. The Active Directory database consists of objects and attributes. Objects and attribute definitions are stored in the Active Directory schema.

DNS(Domain Name System)

Domain Name System (or Service or Server), an [Internet](#) service that translates [domain names](#) into IP addresses. Because domain names are alphabetic, they're easier to remember. The Internet however, is really based on [IP addresses](#). Every time you use a domain name, therefore, a DNS service must translate the name into the corresponding IP address. For example, the domain name www.example.com might translate to 198.105.232.4.

The DNS system is, in fact, its own [network](#). If one DNS server doesn't know how to translate a particular domain name, it asks another one, and so on, until the correct IP address is returned

DHCP (Dynamic Host Configuration Protocol)

Dynamic Host Configuration Protocol (DHCP) is a client/server protocol that automatically provides an Internet Protocol (IP) host with its IP address and other related configuration information such as the subnet mask and default gateway. RFCs 2131 and 2132 define DHCP as an Internet Engineering Task Force (IETF) standard based on Bootstrap Protocol (BOOTP), a protocol with which DHCP shares many implementation details. DHCP allows hosts to obtain required TCP/IP configuration information from a DHCP server.

Windows Server® 2008 includes the DHCP Server service, which is an optional networking component. All Windows-based clients include the DHCP client as part of TCP/IP, including Windows Vista®, the Windows Server® 2003 operating system, the Windows® XP Professional operating system, Microsoft Windows® 2000 Professional operating system, Microsoft Windows® NT® Workstation® 4.0 operating system, Microsoft Windows® Millennium Edition operating system, and the Microsoft Windows® 98 operating system.

Benefits of DHCP

Reliable IP address configuration. DHCP minimizes configuration errors caused by manual IP address configuration, such as typographical errors, or address conflicts caused by the assignment of an IP address to more than one computer at the same time.

Reduced network administration. DHCP includes the following features to reduce network administration:

Centralized and automated TCP/IP configuration.

The ability to define TCP/IP configurations from a central location.

The ability to assign a full range of additional TCP/IP configuration values by means of DHCP options.

The efficient handling of IP address changes for clients that must be updated frequently, such as those for portable computers that move to different locations on a wireless network.

The forwarding of initial DHCP messages by using a DHCP relay agent, which eliminates the need for a DHCP server on every subnet.

In the chapter we are discussing about the windows server OS 2003,2008,2012 CLIENT-SERVER MODEL IN 2003 SERVER OS

Windows 2003 server Installation

Put the Windows Server 2003 CD into the CD drive and turn your computer on. If you can't open the CD drive while your computer is off, put the CD into the drive while the computer is on, and then restart your computer. This is so the computer loads from the CD to begin the installation process.

Wait as the Windows Setup screen loads. Hit the "Enter" button once the "Welcome to Setup" message appears. Read the Windows Licensing Agreement and hit the "F8" button to agree to the terms and continue to the next screen



3. Create the partition on your hard drive where you will install Windows Server 2003. Highlight "Un partitioned space" and hit the "C" key. Type in the amount of the drive you would like to partition. If you want to use the whole drive, type in the same number as shown next to "The maximum size for the new partition." Hit the "Enter" key, and then hit "Enter" again on the next screen to confirm your drive selection.

4. Use the arrow keys to highlight "Format the partition using the NTSF file system." Hit the "Enter" key. Wait as the installer formats the drive. Then, wait as the installer copies the Windows Server 2003 files to your hard drive. A yellow progress bar will show you the progress of each of these processes.

5.. Hit the "Enter" key to reboot your computer after the setup process completes. Wait as the installer loads device drivers for your computer. Click "Next" on the screen titled "Regional and Language Options.

6. Enter your name and organization on the next screen and click "Next." Then, enter the product key that came with your CD and click "Next." Click the radio button next to "Per server" and enter the number of connections to your server that you will need. Click "Next."



7. Think of an administrator password and enter it on the next screen. Change the computer name if you don't like the default name and click "Next." Select your time zone and click "Next."
8. Configure your network settings by clicking "Custom settings" on the screen titled "Network Settings" and clicking "Next." Choose "Internet Protocol (TCP/IP)" and click "Properties." Choose either "Obtain an IP address automatically" if you don't know your IP address, or choose "Use the following IP address" and enter the IP address in the text box. Click "OK" and then click "Next"
9. Leave the "No" option selected on the "Workgroup or Computer Domain" page and click "Next." Wait as the installation process continues installing; a message to the left of the screen will tell you how many minutes the remaining installation process will take. Your installation will be complete once the installer reboots your computer.

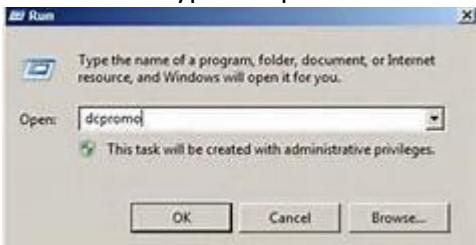
A D S CONFIGURATION

Check the networking connection

Set the IP address

Right click My network place >properties >local area connection > TCP/IP address >set the IP address >ok

Start >run > type “ dcpromo ” >



On the first page of the Active Directory Installation Wizard, click Next.



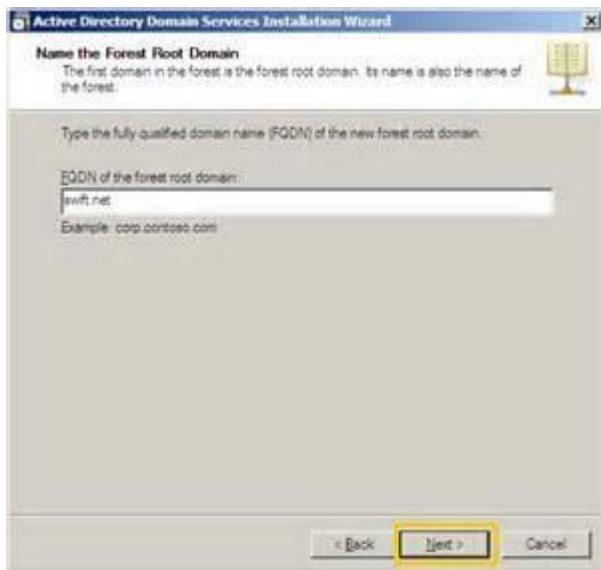
On the next page of the Active Directory Installation Wizard, click Next.

On the Domain Controller Type page, click Domain Controller for a new domain, and then click Next.

On the Create New Domain page, click Domain in a new forest, and then click Next.



On the New Domain Name page, in the Full DNS name for new domain box, type domain name with .com or .in and then click Next.



On the Database and Log Folders page, accept the defaults in the Database folder box and the Log folder box, and then click Next.

On the Shared System Volume page, accept the default in the Folder location box, and then click Next.

On the DNS Registration Diagnostics page, click Install and configure the DNS server on this computer and set this computer to use this DNS server as its preferred DNS Server, and then click Next.

On the Permissions page, click Permissions compatible only with Windows 2000 or Windows Server 2003 operating systems, and then click Next.

On the Directory Services Restore Mode Administrator Password page, enter a password in the Restore Mode Password box, retype the password to confirm it in the Confirm password box, and then click Next.

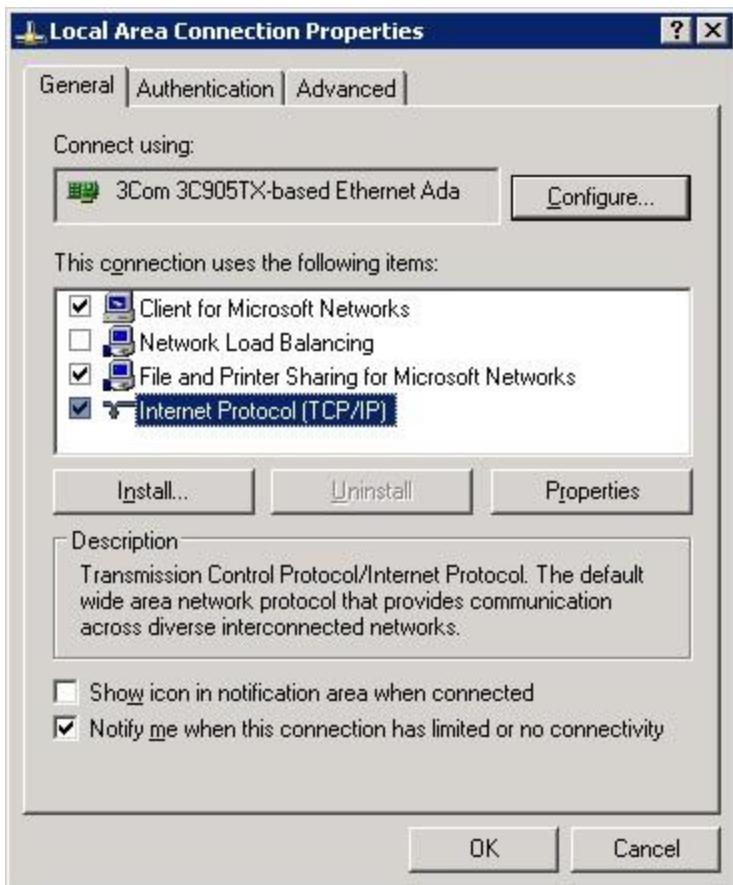
On the Summary page, confirm the information is correct, and then click Next.

When prompted to restart the computer, click Restart now.

After the computer restarts, log on to the domain

CLIENT CONFIGURATION

1. At the computer that you are configuring to use DNS, click Start, point to Control Panel, and then click Network Connections.
2. Right-click the network connection that you want to configure, and then click Properties.
3. On the General tab, click Internet Protocol (TCP/IP), and then click Properties.



4. Set the IP address and DNS address/obtained IP automatically 5.

Click OK to exit.

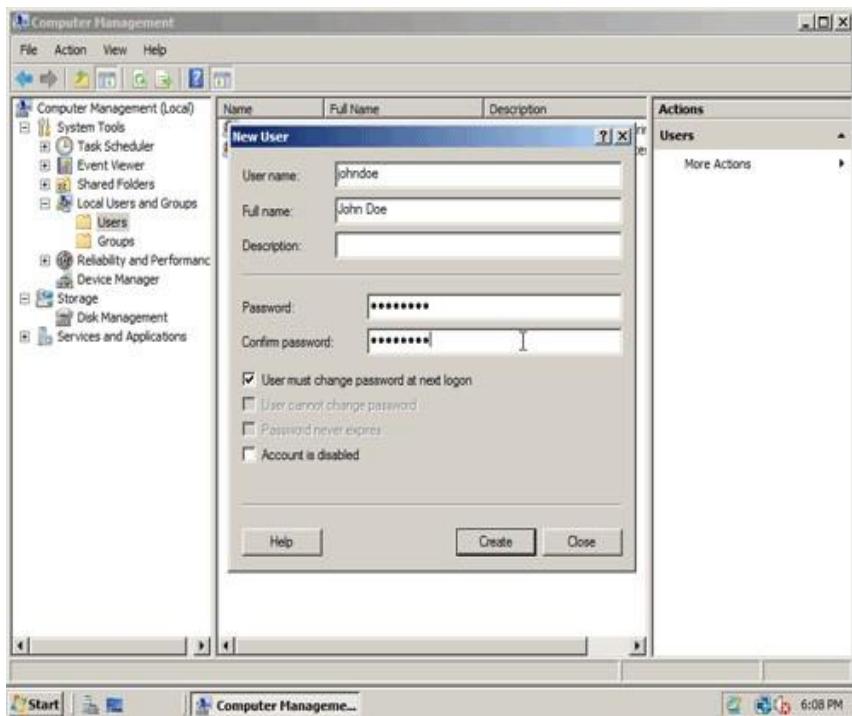
6. In Control Panel, double-click System.
7. On the Computer Name tab, click Change.
8. In Computer name, type the name of the computer (the host name).
9. Click Domain, and then type the name of the domain you want the computer to join.



10 .Click OK to close all dialog boxes. type username and password to permission for join in the group

USER CREATION IN SERVER

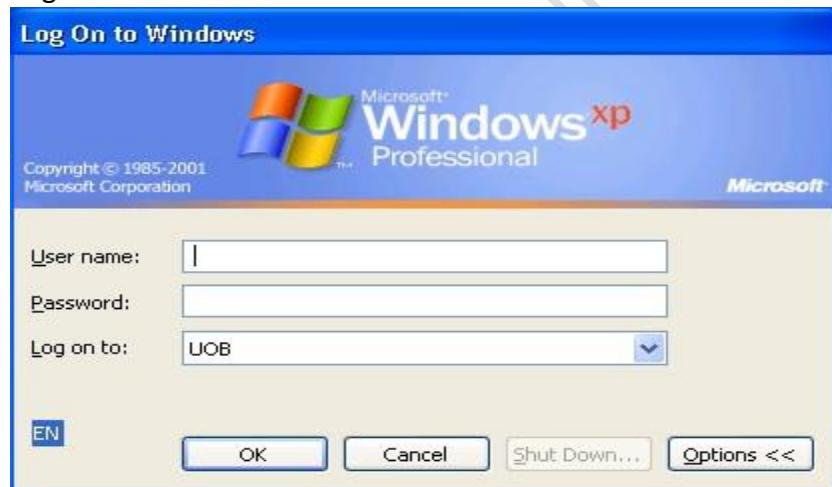
Start > administrative tools > active directory users and computers > right click user tab > new > user > type user name > password > ok



NOTE: Password must be complexity : that means password contain number ,letter ,symbols etc

TO logon to the user in client machine

In logon window



Type username &select logon on to tab to select your domain name

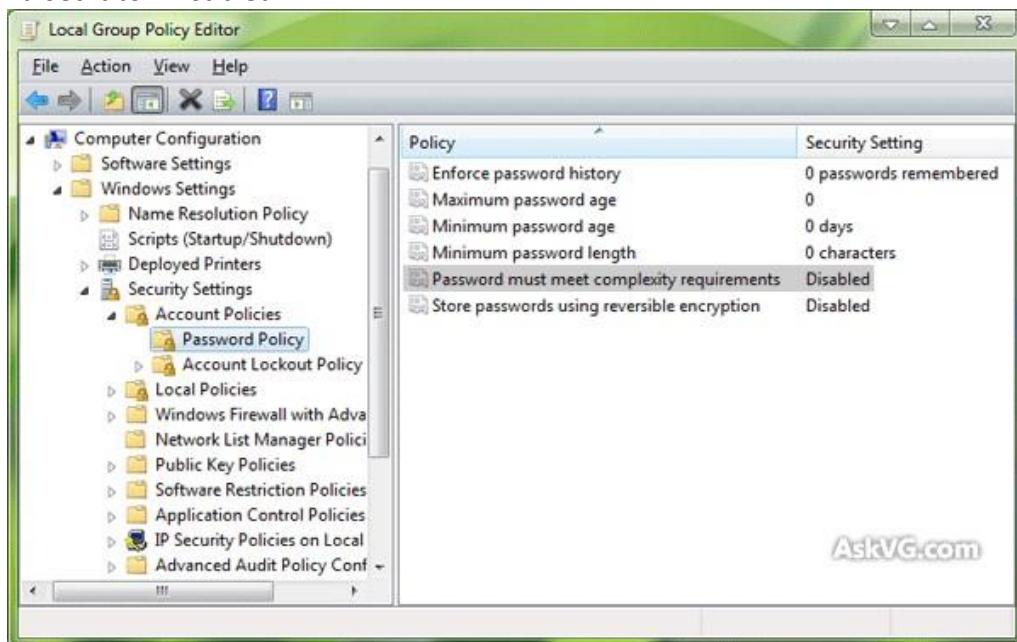
Password Policy

In many operating systems, the most common method to authenticate a user's identity is to use a secret passphrase or password. A secure network environment requires all users to use strong

passwords, which have at least eight characters and include a combination of letters, numbers, and symbols. These passwords help prevent the compromise of user accounts and administrative accounts by unauthorized users who use manual methods or automated tools to guess weak passwords. Strong passwords that are changed regularly reduce the likelihood of a successful password attack.

Password policy changing:

1. Start > administrative tools > group policy management
2. Computer Configuration -> Windows Settings -> Security Settings -> Account Policies -> Password Policy
3. In right-side pane, double-click on "Password must meet complexity requirements" option and set it to "Disabled".



You can also set password length ,password age,

4.start > run > gpupdate /force

Time restriction

Windows Server 2003 can be [configured](#) to restrict the hours and days that a user may log on to a Windows Server 2003 domain Time restriction configuration :

Start the Active Directory Users and Computers snap-in. To do this, click Start, point to Administrative Tools, and then click Active Directory Users and Computers.

In the console tree, click the container that contains the user account that you want.

In the right pane, right-click the user account, and then click Properties.

Click the Account tab, and then click Logon Hours.

Click All to select all available times, and then click Logon Denied.

Select the time blocks that you want to allow this user to log on to the domain, and then click Logon Permitted.

A status line under the logon hours table displays the currently selected logon times. For example, Monday through Friday from 8 A.M. to 5 P.M..

When you are finished configuring logon hours, click OK, and then click OK in the user account Properties dialog box.

Quit the Active Directory Users and Computers snap-in

File sharing & Folder sharing

Create folder > right click the folder that you want to share, (for example, Accounts Receivable), and then click Sharing and Security.

Click Share this folder.

Windows automatically uses the name of the folder as the share name (if there is not already another share that uses the name on the computer). You can change the share name if you want to use a different name.

Click Permissions.

In the Permissions for Folder Name dialog box, click Add.

In the Select Users or Groups dialog box, type the names of the users or groups that you want to add to the shared folder, and then click OK.

To grant or remove a user or group permission for the shared folder, click the user or group in the Group or user names box, and then click to select the Allow or Deny check box next to the permission that you want to grant or deny.

Click the Everyone group in the Group or user names box, and then click Remove.

Click OK

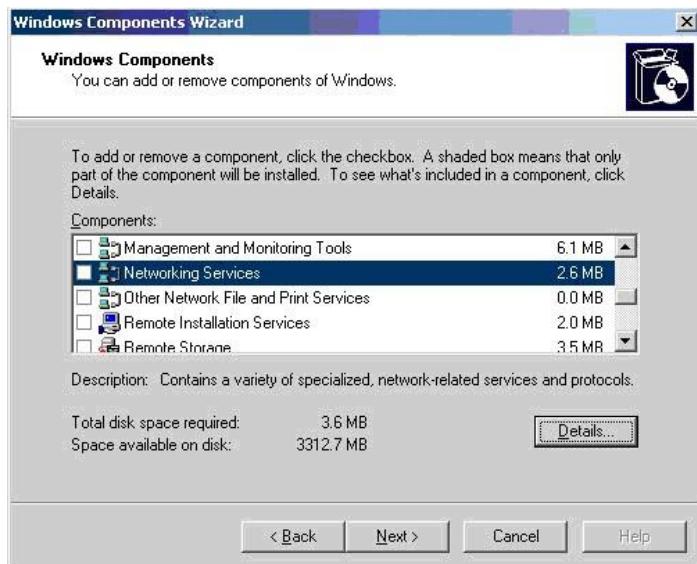
Mapping drive:

Start >administrative tools >active directory users &computers >right click the user>select profile tab >in connect to> select drive letter >type the path \\ IP address or server name\shared folder name\username .ok

DHCP Configuration

Install DHCP

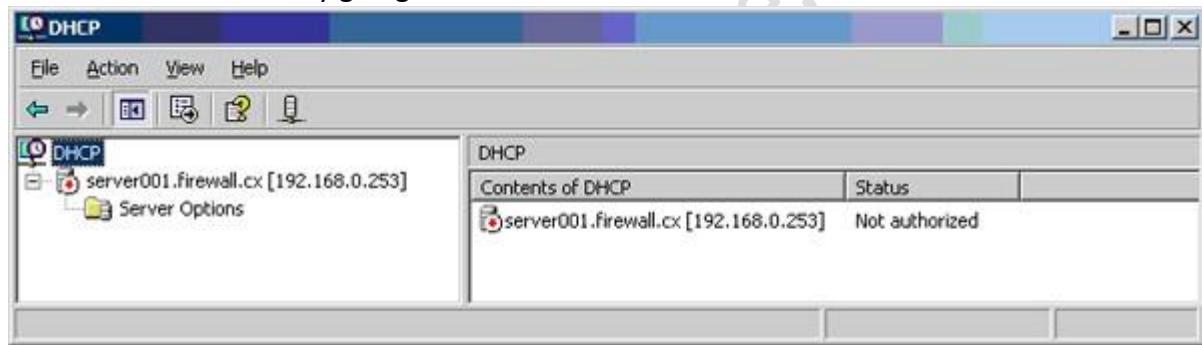
1. Go to Start > Control Panel > Add or Remove Programs .
2. When the Add or Remove Programs window launches, click Add/Remove Windows Components in the left pane.
3. When the Windows Components Wizard comes up, scroll down and highlight Networking Services and then click the Details button.



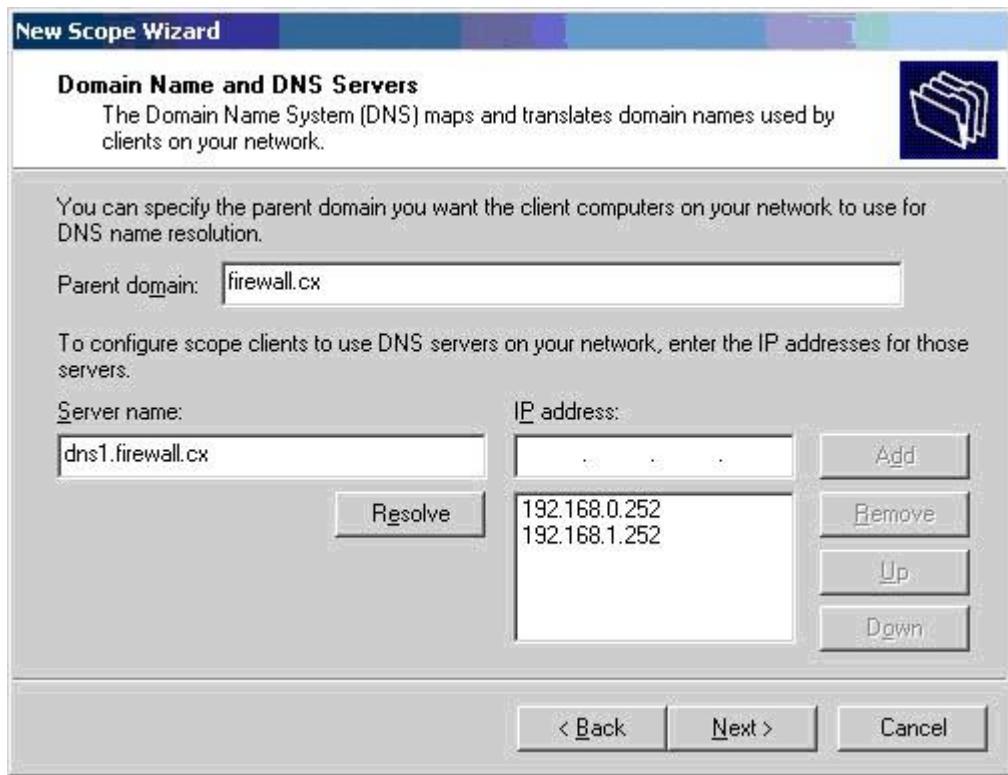
4. When the Networking Services window comes up, place a check mark next to Dynamic Host Configuration Protocol (DHCP) and click OK and OK again

Configure DHCP

1.. Launch the DHCP MMC by going to Start > Administrative Tools > DHCP



2. Right-click the server node in the left pane and choose New Scope . This will launch the New Scope Wizard.
3. On the New Scope Wizard, click Next .
4. Specify a scope name and scope description. For the scope Name
5. Specify an IP address range and subnet mask
6. Specify IP addresses to exclude IP address
7. Specify the lease duration for the scope.
8. Configure DHCP Options. Make sure "Yes, I want to configure these settings now" is selected and click Next to begin configuring DHCP options.
9. Specify the router IP address.
10. Configure domain name and DNS servers



11. Configure WINS servers.
12. Finally, the wizard asks whether you want to activate the scope now, or choose “No, I will activate this scope later” and click Next and then Finish to conclude the New Scope Wizard and return to the DHCP MMC.

IN CLIENT COMPUTER:

Right click My network place >properties >right click local area connection > properties >TCP/IP >select obtained IP automatically & obtained DNS IP automatically >ok

Check the IP address using commands

UN Installing DHCP : delete

scope

start >administrative tools >server manager > remove roles >un tick DHCP >next >finish

Uninstall Active Directory

Click Start, click Run, type dcpromo and then click OK.

The Active Directory Installation Wizard appears. Click Next at the Welcome screen. You have an option to select This server is the last domain controller in the domain. If you select this option, the wizard attempts to remove the domain from the forest. Do not select this option. Click Next.

At the Administrative Password screen, enter and confirm the password that you want to assign to the local Administrator account after Active Directory is removed. Click Next. At the Summary screen, verify that the information is correct and then click Next to proceed with the removal.

The wizard proceeds to remove Active Directory. After it finishes, the wizard displays a completion screen. Click Finish to close the wizard.

Click Restart to restart the domain controller.

Windows 2012 server configuration

Windows Server 2012, codenamed "Windows Server 8", is the sixth release of Windows Server. It is the server version of Windows 8 and succeeds Windows Server 2008 R2. Two pre-release versions, a developer preview and a beta version, were released during development. The software was generally available to customers starting on September 4, 2012. Unlike its predecessor, Windows Server 2012 has no support for Itanium-based computers, and has four editions. Various features were added or improved over Windows Server 2008 R2 (with many placing an emphasis on cloud computing), such as an updated version of Hyper-V, an IP address management role, a new version of Windows Task Manager, and Re FS, a new file system. Windows Server 2012 received generally good reviews in spite of having included the same controversial Metro-based user interface seen in Windows 8.

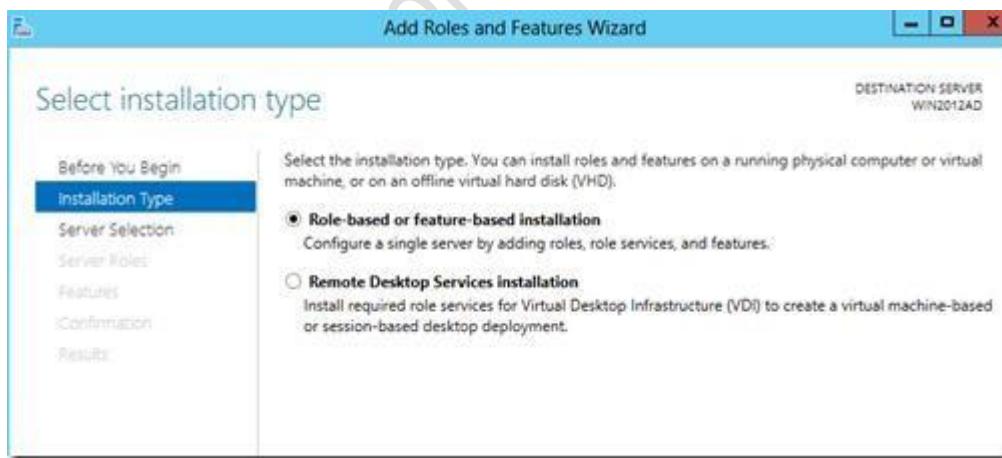
Configure windows server 2012

install server OS set

the IP address

configure active directory domain service

1. From the server manager click on "Add roles and features". You will be presented with the "Before you begin" screen. Click Next. In the "Installation Type" screen click on "Rolebase or feature-based installation"



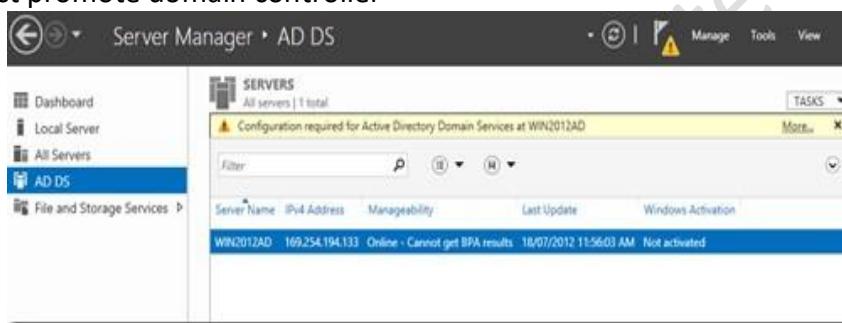
select active directory domain service >next >add features >next > install > restart the system

Select server roles

The screenshot shows the 'Select server roles' window. On the left, a navigation pane lists steps: 'Before You Begin', 'Installation Type', 'Server Selection', 'Server Roles' (which is selected and highlighted in blue), 'Features', 'Confirmation', and 'Results'. The main area is titled 'Select one or more roles to install on the selected server.' It contains a list of roles with checkboxes:

- Active Directory Certificate Services
- Active Directory Domain Services**
- Active Directory Federation Services
- Active Directory Lightweight Directory Services
- Active Directory Rights Management Services
- Application Server
- DHCP Server
- DNS Server
- Fax Server
- File And Storage Services (Installed)
- Hyper-V
- Network Policy and Access Services
- Print and Document Services
- Remote Access
- Remote Desktop Services

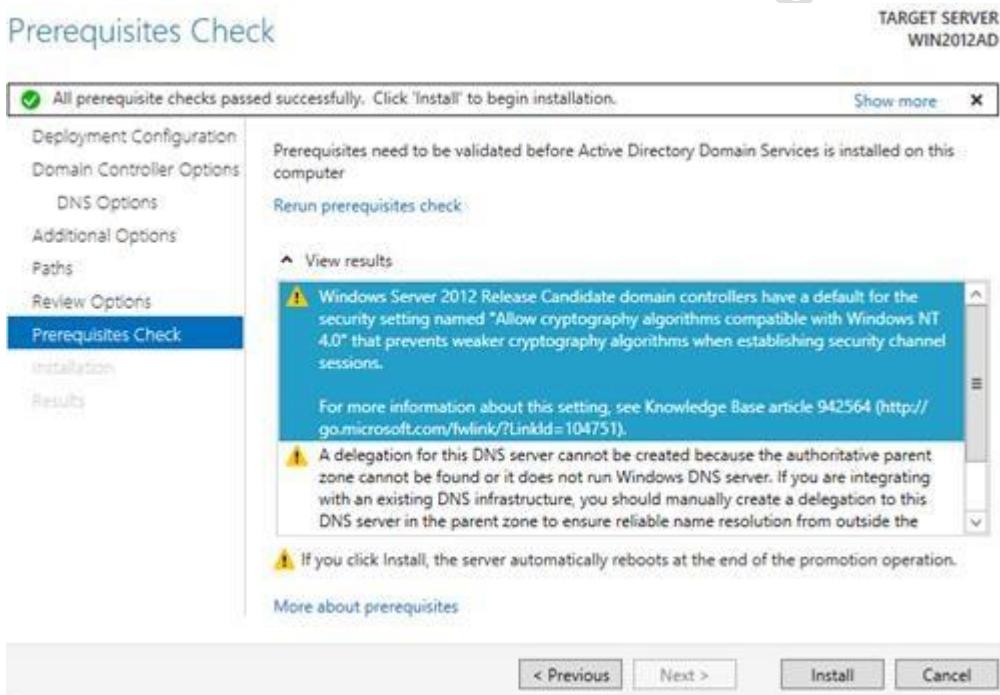
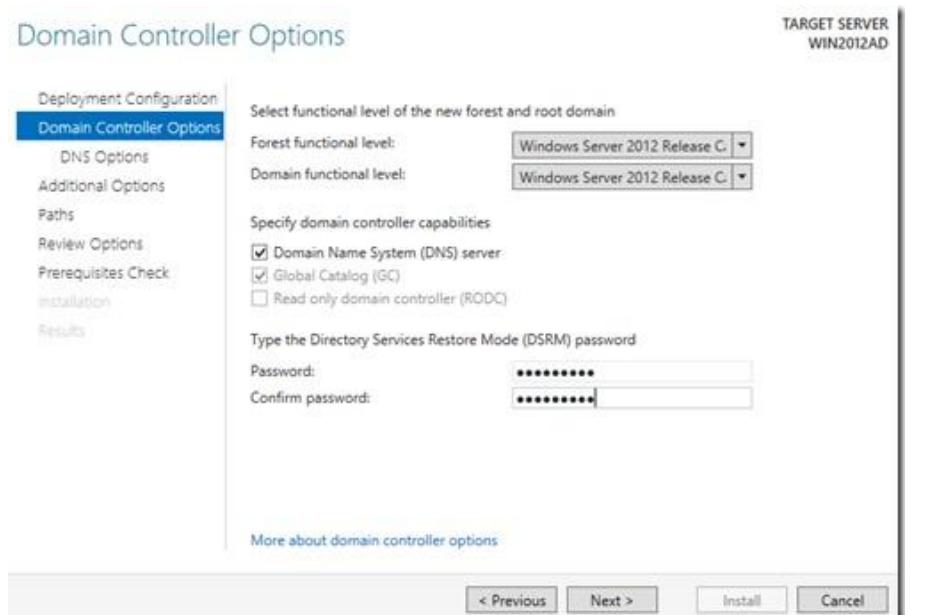
after restarting , promote the active directory ,in server manager >click notification area
>select promote domain controller



The Deployment Configuration screen appears and we will select “Add a new forest” as this is the first domain controller> enter domain name >next



In next window , select forest functional level& domain functional level >type password > next >install



Restart the system

Client configuration

Set the IP address

Start > control panel > network sharing center > change adapter settings > right click local area connection > set IP > ok

Set the domain name

Right click my computer > properties > change > select computer name tab > change > set the domain name > ok

User creation in server

Step 1

First of all logon to your Windows Server 2012. After login, open your Start Menu and click on "Administrative Tools".



Step 2

Now a list of items will appear in front of you from which you must select "Active Directory Users and Computers"

Step 3

Now you will see that your domain exists, in this Tool and many options are available beneath it like Account, Bulletin, Computers, Users etc.

A screenshot of the "Active Directory Users and Computers" management console. The title bar says "Active Directory Users and Computers". The left pane shows a tree view of the directory structure under "Active Directory Users and Computers". One node, "Virtual.net", is expanded, showing sub-nodes like "account", "BuiltIn", "Computers", "Domain Controllers", "ForeignSecurityPrincipal", "Managed Service Account", and "Users". The right pane displays a table with three columns: "Name", "Type", and "Description". There is one entry: "Saved Queries" (Type: Folder) with the description "Folder to store your favo...".

Step 4

Right-click on your domain and go to "New". In New go to the "Users" to add a "New User".

Step 5

Now a form will be available in front of you that you must fill in to provide all necessary details of a new user. After that click on the "Next" button.

The screenshot shows the 'New Object - User' dialog box. It contains fields for First name (Mohit), Last name (Chaudhary), and Full name (Mohit Chaudhary). Below these are fields for User logon name (mohit) and User logon name (pre-Windows 2000) (VIRTUAL\mohit). At the bottom are buttons for < Back, Next >, and Cancel.

Step 6

On clicking the Next button a New Form will be opened in which you need to provide the Password for the new user. Your server will ask you to re-enter the password so that if by mistake you provide the wrong password then you can correct it. There are four other options also from which you can select whether you want to provide permission to the user to change the password on its next logon or you want to restrict him so that he can't change the password. You can also check the "Password never expires" option or you can also disable the account of the user.

The screenshot shows the 'New Object - User' dialog box with password fields filled with '*****'. Under Account Options, the following checkboxes are selected: 'User cannot change password' and 'Password never expires'. At the bottom are buttons for < Back, Next >, and Cancel.

Step 7

Now all the provided values will be shown to you and you will be asked to click on the "Finish" button to finish the work or you can go back to make any changes as required.

NOTE : Logon to this user in client machine

Password policy settings

Open server manager >open group policy management >open our domain tab >right click default domain controller >edit >select windows setting >security setting >password setting >edit the policy >ok

Start >run > gpupdate /force

Time restriction

Start the Active Directory Users and Computers snap-in. To do this, click Start, point to Administrative Tools, and then click Active Directory Users and Computers.

In the console tree, click the container that contains the user account that you want.

In the right pane, right-click the user account, and then click Properties.

Click the Account tab, and then click Logon Hours.

Click All to select all available times, and then click Logon Denied

Select the time blocks that you want to allow this user to log on to the domain, and then click Logon Permitted

When you are finished configuring logon hours, click OK, and then click OK in the user account Properties dialog box.

Quit the Active Directory Users and Computers snap-in

File sharing & Folder sharing

Create folder > right click the folder that you want to share, (for example, Accounts Receivable), and then click Sharing and Security.

Click Share this folder.

Windows automatically uses the name of the folder as the share name (if there is not already another share that uses the name on the computer). You can change the share name if you want to use a different name.

Click Permissions.

In the Permissions for Folder Name dialog box, click Add.

In the Select Users or Groups dialog box, type the names of the users or groups that you want to add to the shared folder, and then click OK.

To grant or remove a user or group permission for the shared folder, click the user or group in the Group or user names box, and then click to select the Allow or Deny check box next to the permission that you want to grant or deny.

Click the Everyone group in the Group or user names box, and then click Remove.

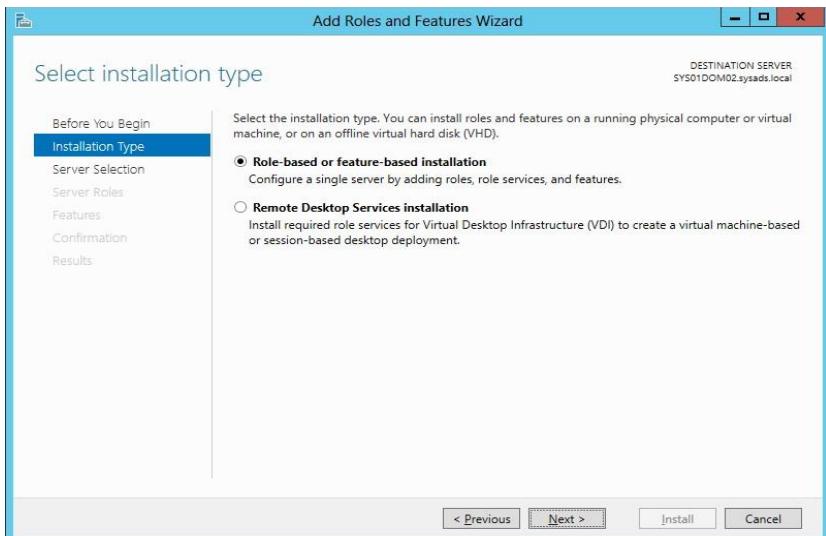
Click OK

Mapping drive:

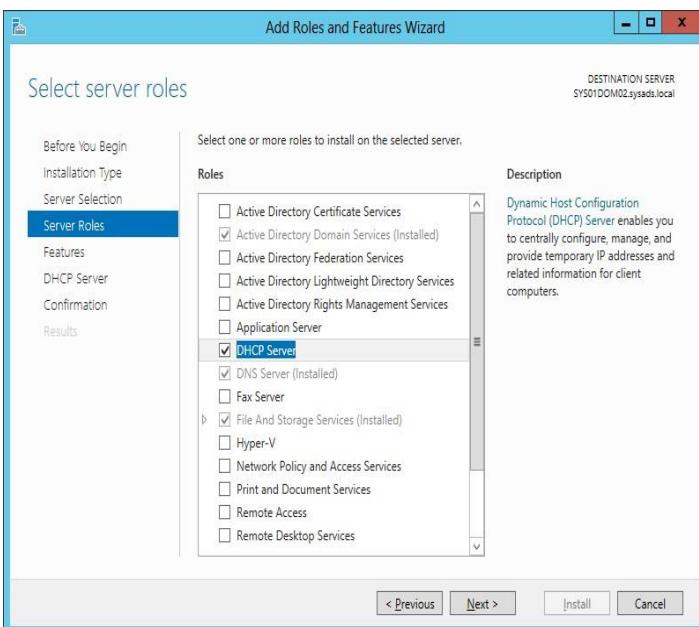
Start >administrative tools >active directory users &computers >right click the user>select profile tab >in connect to> select drive letter >type the path \\ IP address or server name\shared folder name\username .ok DHCP (Dynamic Host Configuration protocol)

Install DHCP

Server manager >add roles &features >select role based features >next

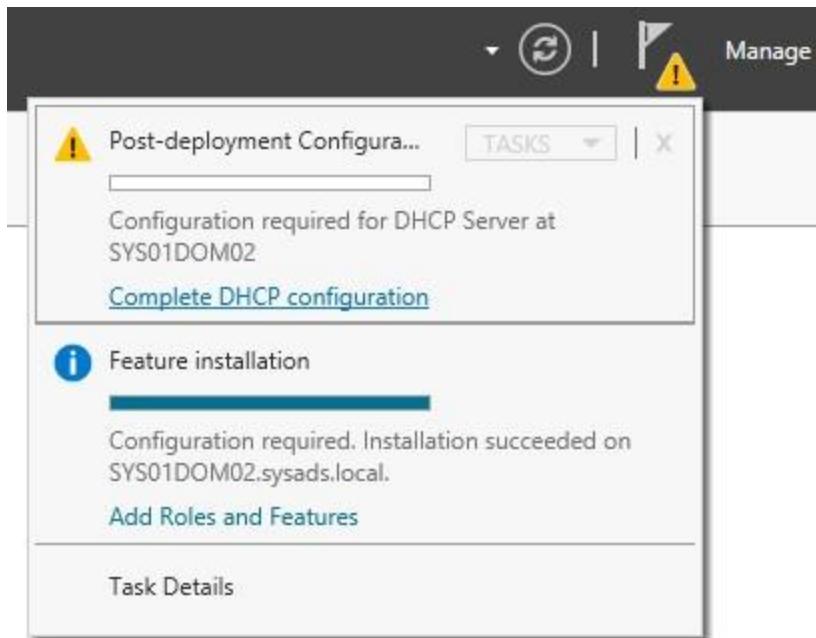


Select DHCP >next >tick the restart the server >install

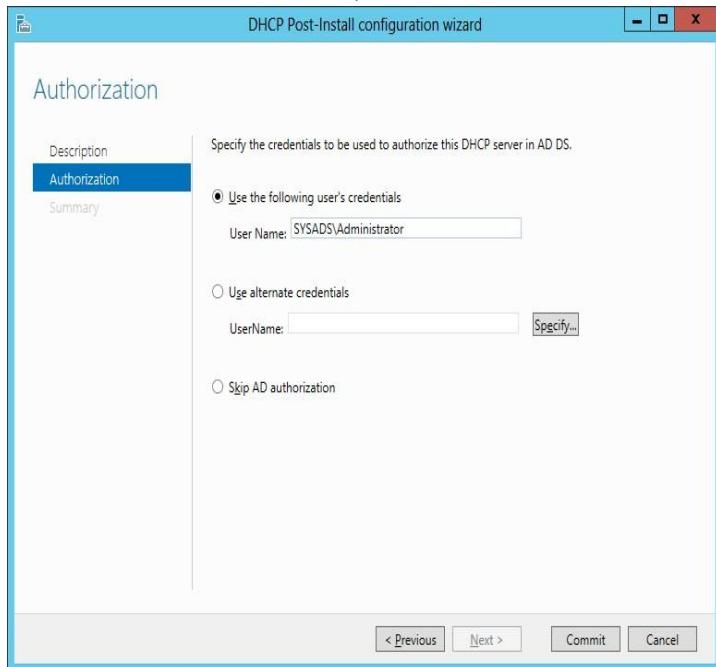


Post deployment DHCP

Open server manager >open notification area > select complete" DHCP configuration"



-On DHCP Post-Install wizard, click Next >click "commit">done



Configure DHCP:

Server manager >open DHCP server >right click the domain tab >new scope >set the IP range ,excluded IP address ,router IP address > next > active scope now >ok

In client machine : set the IP obtained automatically

Uninstall Active directory domain service

Uninstall installed roles &features

Uninstall ADDS

1. Server manager >remove roles &features >select active directory >un tick >remove roll 2. message is appear demote domain controller >click demote domain controller >next tick the force to removal > type password >tick demote

3. restart the system
4. server manager > remove roles > un tick active directory domain service > next > remove > ok



Session Notes

Blank sheet with a table that enables you to jot down their points from the session.

coronainstitute.com

Feedback of Trainee for Module 6

[This will enable the SDE to get a feedback on the unit]

Dear Participant,

Please provide your frank feedback for enhancing the trainings/

Sl. No.	Parameters	Rating		
		Good	Satisfactory	Poor
1.	Preparation of SDE for taking sessions			
2.	Response of SDE to queries			
3.	Interaction of SDE with students			
4.	Use of teaching – learning material			
5.	Communication skills of SDE			
6.	Punctuality of SDE			
7.	Other specific parameters, if any			

Suggestions:

Module 7& 8 – System Troubleshooting

These modules does not teach anything new , but you are going to learn a lot by dealing with real world situations and problems on computer hardware and networking .

Session Notes M7/U1/S1-53

Session Notes M8/U1/S1-S23

coronainstitute.com