1 INTRODUCTION TO CLIENT OPERATING SYSTEM

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   1.1.1 Function of Operating System
   1.1.2 Classification of Operating Systems
   1.1.3 Client Operating System

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   1.2.4 Windows 95
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Objectives

At the end of this chapter students should be able to:
- Understand the computer operating system
- Classify different operating system
- Explain client operating system
- List different Microsoft client operating system
- Learn about Linux
- Explain the properties of Linux
- Define client operating system
- Learn about Macintosh operating system
1.1 THE OPERATING SYSTEM

Operating system is the software which controls the system hardware. It interacts with users and application software, provides an interface for users to access and control hardware as shown in Figure 1-1. It acts as an intermediary between the user of a computer and the computer hardware.

![Diagram of operating system controlling hardware](image)

Operating system is the nucleus of all software activities just like the processor is the nucleus of the computer system.

Two major categories of system software are the operating system and utility programs.

Operating systems are part of system software which differs from other program like word processor or spreadsheets which we use to carry out different specific task.

Operating system is the most important program that runs on any computer system. Every general-purpose computer must have an operating system in order to run. The other programs like Microsoft Word or Excel run on the operating system. Operating system provides the platform for other software to run.

Operating system is the first program loaded into memory when the computer is turned on. It brings life to the computer hardware when it is loaded. Without it, you cannot use your computer nor run the other programs like MS Word, Excel, MS calculator, Paint or any other applications.
Software can be divided into two general classes: **systems software** and **applications software**.

**Systems software** consists of low-level programs that interact with the computer at a very basic level. This includes operating systems, compilers, and utilities for managing computer resources.

In contrast, **applications software** (also called end-user programs) includes database programs, word processors, and spreadsheets. Figuratively speaking, applications software sits on top of systems software because it is unable to run without the operating system and system utilities.

Operating system facilitates the **communication** between user and computer. When you give the computer a command, the operating system relays the instructions to the **microprocessor** or CPU which is the **brain** of the computer. You cannot speak directly to the CPU because it only understands **machine language**. When you are working in an **application software** program, such as Microsoft Word, commands that you give the application are sent through the **operating system** to the CPU. Windows2000/XP, Windows95/98, Mac OS, UNIX, LINUX and DOS are all examples of operating systems.
For large systems, the operating system has even greater responsibilities and powers. The operating system is also responsible for **security**, ensuring that unauthorized users do not access the system.

As we can see from the Figure 1-4 that operating system is a bridge between computer hardware and application software. One of the main functions of the operating system is to manage these hardware resources and provide the platform for application software to run. So whenever the application software requests any services it has to contact operating system.

### 1.1.1 FUNCTION OF OPERATING SYSTEM

Operating systems itself is very complex software which perform many useful functions, most of them behind the scene which we cannot see.

Some of the functions of operating system is mentioned below:

- Process Management
- Memory Management
- Device Management
- Storage Management
- Application Interface
- User Interface
- Security
- Networking
1.1.1.1 PROCESS MANAGEMENT

Process is any program or service which runs on the computer system. Operating system manages these processes and provide platform for different applications. **Process management** is an operating system's way of dealing with running multiple processes.

Operating system like MS-DOS can run only one process at a time where as Mainframe operating system has capability of running multiple processes at a time, so they are called as **multitasking** operating system.

1.1.1.2 MEMORY MANAGEMENT

Operating system control and manage the memory available to the computer system. It involve in allocation and creation of **virtual memory**; loading data to and from memory to CPU. **Paging** which means organizing data so that the program data is loaded into pages of memory. Another method of managing memory is **swapping**. This involves swapping the content of memory to disk storage, which is done by operating system.

1.1.1.3 DEVICE MANAGEMENT

Input and output devices are connected to computer system. These peripheral devices are managed by computer operating system. Data is send and receive from these devices by help of operating system. Keyboard, mouse, CD ROM and monitor, all these devices need to be coordinated properly to bring desirable output. Sometimes, additional software called device driver is needed to facilitate these device communication.

1.1.1.4 STORAGE AND FILE MANAGEMENT

Computer system has to read data from input device; process it and present it to the output device. The data in most of the cases need to be stored on hard disk or compact CD ROM. Reading data from these devices as writing or storing data must be managed by operating system. There are different file systems for this purpose depending on operating system types and the media on which data is stored.

1.1.1.5 APPLICATION INTERFACE

Operating system provides an application interface for most of the application software like MS Word, Excel and PowerPoint to communication with computer system. Furthermore, application development becomes much simpler since programmers do not need to write complex code to deal with complexity of the operating system. Programmers can spend their energy on software development and leave rest on operating system.
1.1.1.6 GRAPHICAL USER INTERFACE

Most of modern operating systems has integrated graphical user interface (GUI) to interact with the operating system. Customization of operating system can be done using these GUI built in features. Some of the operating system like Linux will allow users to choose from different GUI, because core of the operating system is not tightly bonded together with GUI unlike that of the Windows operating system.

1.1.1.7 SECURITY

Computer hold sensitive and valuable data which must be secured, thus security of operating system has been a major concern. Operating system provides access to a number of resources such as files, user access levels and personal information, which must be protected from unauthorized access. Operating system must be strong enough to handle internal security as well as external security that may arise from networks.

1.1.1.8 NETWORKING

Networking is becoming more common in organization today. To meet the growing need of networking demand, most of the operating system supports networking. Most of current operating systems are capable of using the TCP/IP networking protocols, which allows connecting with other operating systems or devices which supports TCP/IP protocols. Networking is done in order to share resources such as files, printers, and scanners using either wired or wireless connections.

1.1.2 CLASSIFICATION OF OPERATING SYSTEMS

Within the broad family of operating systems, these operating systems are generally classified into different types. They are classified based on the types of computers they control and the sort of applications they support. The broad categories are:

Operating systems can be classified as follows:

- Real-time operating system
- Single-user, Single Task operating system
- Single-user, Multi-tasking operating system
- Multi-user operating system
- Multiprocessing operating system
1.1.2.1 REAL-TIME OPERATING SYSTEM (RTOS)

Real-time operating systems are used to control machinery, scientific instruments and industrial systems. An RTOS typically has very little user-interface capability, and no end-user utilities. Such systems are sealed in a box when it is delivered for use. They are used for very specific function but with great accuracy. They are used in places where speed is crucial. Such operating system is used in fighter plane or to create real time environment.

![Fighter Plane](image1.png)

Figure 1-5 Fighter Planes have Real-Time Operating System

1.1.2.2 SINGLE-USER, SINGLE TASK OPERATING SYSTEM

As the name implies, this operating system is designed to manage the computer so that one user can effectively do one thing at a time. The Palm OS for Palm handheld computers is a good example of a modern single-user, single-task operating system.

![Palm OS](image2.png)

Figure 1-6 Palm OS is Single-user, Single-Task Operating System
1.1.2.3 SINGLE-USER, MULTI-TASKING OPERATING SYSTEM

![Windows XP and Mac OS](image)

Figure 1-7 Windows XP and Mac OS are Multi-Tasking OS

This type of operating system most people use on their desktop and laptop computers today. Microsoft's Windows XP and Apple's Mac OS are both examples of operating systems that will let a single user have several programs in operation at the same time. For example, it's entirely possible for a Windows XP user to write a note in a word processor while listen music with media player and at the same time print pages from Comopoint website as shown in Figure 1-7.

1.1.2.4 MULTI-USER OPERATING SYSTEM

![UNIX- Multi-User Operating System](image)

Figure 1-8 UNIX- Multi-User Operating System
A multi-user operating system allows many different users to take advantage of the computer's resources simultaneously. The operating system must make sure that the requirements of the various users are balanced, and that each of the programs they are using has sufficient and separate resources so that a problem with one user doesn't affect the entire community of users. UNIX and mainframe operating systems, such as MVS, are examples of multi-user operating systems.

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>It's important to differentiate between <strong>multi-user operating systems</strong> and <strong>single-user operating systems</strong> that support networking. Windows 2000 and Novell Netware can each support hundreds or thousands of networked users, but the operating systems themselves aren't true multi-user operating systems.</td>
</tr>
</tbody>
</table>

### 1.1.2.5 MULTIPROCESSING OPERATING SYSTEM

**Multiprocessing** is the use of two or more **central processing units (CPUs)** within a single computer system. The term also refers to the ability of a system to support more than one processor and/or the ability to allocate tasks between them. Using two processors instead of one will double the performance of the system. The operating system which supports multiprocessing is called **multiprocessing operating system**. Windows NT server and Windows 2000 server are example of multiprocessing operating system.

Figure 1-9 Windows 2000 Server Support Multiple Processors
1.1.3 CLIENT OPERATING SYSTEM

In order to understand client operating system, you need to have good understanding of client/server architecture model.

The client/server concept was first introduced in the 1980s in reference to personal computers (PCs) on a network. But only in late 1980s, the client/server model started gaining acceptance.

![Networked Computers](image)

When computers are connected together using different devices like hub, switch and cables for the purpose of sharing resources (hardware and software) is called networking. In most computer networks, one or more central computers called server computers. These servers manage the resources on a network and perform a variety of functions for the other computers on the network called client computers. Client computers are usually PCs or workstations.

PCs, workstations, and thin clients are linked to the server computer to form the network. Thin clients are somewhat less than full-featured PCs (thin) and they are clients of (dependent on) server computer for certain resources, such as storage and some processing.

Any general-purpose computer, a notebook PC to a supercomputer, can be a server computer. But manufacturers built a special class of computers called server computers, which are designed specially for the server function. Less powerful servers handle small businesses while more powerful and larger ones handle network needs of multinational companies.
These different types of computer system use different types of operating systems. In most of the cases, these operating systems can be divided into two broad categories: Server and Client operating systems. Operating system that runs on server computers is called server operating system while on client computer, client operating system takes control.

![Using ATM](image)

**Figure 1-11 Using ATM**

**EXAMPLE**

When you check your bank account from any ATM, a client program in your ATM forwards your request to a server program at the bank. That program may in turn forward the request to its own client program to another bank computer databases server to retrieve account balance information. The balance is returned back to the bank data client, which in turn serves it back to the client in your ATM, which displays the information for you.

The client/server model is a form of **distributed computing** where one program (the client) communicates with another program (the server) for the purpose of exchanging information.

In client/server model, role played by client operating system differ from the role played by server operating system.

The client's responsibility is usually to:

1. Handle the user interface.
2. Translate the user's request into the desired protocol.
3. Send the request to the server.
4. Wait for the server's response.
5. Translate the response into "human-readable" results.
6. Present the results to the user.
The server's functions include:

1. Listen for a client's query.
2. Process that query.
3. Return the results back to the client.

Many operating systems from different vendors exist to meet the need of servers as well as clients' machines. Some of them are mentioned below.

<table>
<thead>
<tr>
<th>Client Operating Systems</th>
<th>Server Operating Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows 95</td>
<td>Windows NT Server</td>
</tr>
<tr>
<td>Windows 98</td>
<td>Windows NT Advanced Server</td>
</tr>
<tr>
<td>Windows Me</td>
<td>Windows 2000 Server</td>
</tr>
<tr>
<td>Windows NT Workstation</td>
<td>Windows 2000 Advanced Server</td>
</tr>
<tr>
<td>Windows 2000 Professional</td>
<td>Windows 2000 Datacenter Server</td>
</tr>
<tr>
<td>Windows Vista</td>
<td>Windows 2003 Server</td>
</tr>
</tbody>
</table>

Figure 1-12 Client and Server Operating Systems from Microsoft

Apart from Microsoft Windows, there are other companies like Apple and Red Hat, with their own operating systems like Mac OS and Red Hat Linux.
1.2 MICROSOFT CLIENT OPERATING SYSTEMS

1.2.1 MS-DOS

MS-DOS (Microsoft Disk Operating System) which was the first command line operating system developed by Microsoft for IBM PCs when it first got its contract from IBM in 1980. At that time Microsoft did not have operating system of its own. It is also called as PC-DOS (personal computer disk operating system) since it runs on IBM personal computers and simply refer as a DOS. It is a non-graphical line-oriented command-driven operating system with a relatively simple and easy interface but of course not easy as windows graphical user interface (GUI).

MS-DOS contains a command interpreter which is integrated in the file called command.com. The file IO.SYS which is also an important file of this operating system provides device routines like the access to the monitor, keyboard, fixed storage disks and interfaces as well as the booting code which form the core of operating system.

In 1982, 50 companies licensed MS-DOS thus making it a binary standard for all IBM compatible systems. All software and hardware manufacturer built on this DOS standard at that time. In 1984 the number of PC and MS-DOS resellers increased to over 200. Later, IBM introduced the AT computer, which refined the market for personal computer with MS-DOS 3.0/3.1. MS-DOS already spread worldwide on Intel x86 computers by 1985.

Some of the major version of DOS as follows:

<table>
<thead>
<tr>
<th>Date</th>
<th>Version</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1981</td>
<td>MS-DOS 1.0</td>
<td>Support Max128Kbyte RAM</td>
</tr>
<tr>
<td>1983</td>
<td>MS-DOS 2.0</td>
<td>Support IBM 10 Mbyte HDD, Directory</td>
</tr>
<tr>
<td>1984</td>
<td>MS-DOS 3.0</td>
<td>Support High Density Floppy Disk, 32 Mbyte HDD</td>
</tr>
<tr>
<td>1988</td>
<td>MS-DOS 4.0</td>
<td>Support 2GB HDD partition, better memory support</td>
</tr>
<tr>
<td>1991</td>
<td>MS-DOS 5.0</td>
<td>More tools added, better memory and HDD support</td>
</tr>
<tr>
<td>1992</td>
<td>MS-DOS 6.0</td>
<td>DoubleSpace, AntiVirus, Defrag and other tools added</td>
</tr>
<tr>
<td>1995</td>
<td>MS-DOS 7.0</td>
<td>MS-DOS component for Windows 95 support</td>
</tr>
<tr>
<td>2000</td>
<td>MS-DOS 8.0</td>
<td>MS-DOS component for Windows ME, last DOS version</td>
</tr>
</tbody>
</table>

Table 1 Major version of DOS
1.2.1.1 LAB: FAMILIARIZING WITH DOS COMMANDS

DOS is the integral part of almost all of the Microsoft operating system. Still today, most of troubleshooting problems prior to booting or in case of boot problem is done using DOS commands. Leaning basic DOS command help to handle PC with more confidence.

In this lab you will lean the following:

- View the content of a directory
- Change from one directory to another
- Create and delete directory
- Change from one drive to another
- Copy files
- Rename files
- Delete files
- Format a Floppy and Hard Disk

### NOTE
Directory and folder are the same things, which contain files inside.

1.2.1.1.1 THE COMMAND PROMPT

When you first turn on your computer, you will see some cryptic information flash by. MS-DOS displays this information to let you know how it is configuring your computer. In Windows XP, when you click start >accessories>command prompt. The command interpreter will open where you can type any DOS commands.

![Command Prompt](image)

Figure 1-13 Command Interpreter Windows

This is called the command prompt or DOS prompt. The flashing underscore next to the command prompt is called the cursor. The cursor shows where the command you type will appear.

1.2.1.1.2 TO VIEW THE CONTENT OF A DIRECTORY

At command prompt issue **dir** command and press enter, you will see the output as in Figure 1-14 (may vary from system to system, dir stands for directory)
Similarly, you can view the content of any other directory.

Try following command and note the output

```plaintext
dir C:\windows
dir windows
dir C:
dir D:
dir /?
dir /p
dir /w
dir /p /w
```

### 1.2.1.1.3 CHANGE FROM ONE DIRECTORY TO ANOTHER

To change directories, you will use the `cd` command. The `cd` command stands for **change directory**.

Type the following command `cd c:\windows` at command prompt and press enter key, you will get output as shown in Figure 1-15

```
C:\>cd windows
C:\WINDOWS>
```

Try the following commands and observe the output.

```plaintext
cd 
cd /?
cd d:/directory_name
```

**NOTE:** `directory_name` is any directory which is on D drive of your hard disk
1.2.1.1.4 CREATING A NEW DIRECTORY

You are going to create two new directories by name of cosmopoint and ClientOS. Command for creating new directory is `mkdir` followed by directory name as shown in Figure 1-16. (`mkdir` stands for make directory)

![Figure 1-16 Mkdir Command](image)

Verify that you have successfully created two directories by issuing `dir` command. You can also change directory and see if there is any file inside these directories.

1.2.1.1.5 DELETING EXISTING DIRECTORY

`Rd` command which stands for remove directory is used for removing the existing directory from computer hard disk. Please note that only directory which is empty can be removed. Directory containing files inside must be deleted before the directory can be removed. Remove both directories ClientOS and Cosmopoint which you created just now and verify the action.

```
rml Cosmopoint
rd ClientOS
dir
```
1.2.1.1.6 CHANGING DRIVE

Change drive is very easy, just type the drive letter like A, B, C or D followed by : sign, for example c:\> E: then press enter, cursor will change into e:\> indicating that drive has been changed, and any new command will effect drive e now.

1.2.1.1.7 COPYING FILE

Copying files means creating a duplicate of the original file without deleting the original file. This command is very useful for many reasons. For example, if you want to install windows XP, you can copy all the files from CD to hard disk first and install windows from there; the installation process will be faster as well as it will make sure that CD files are not corrupted while copying.

To copy a file, you will use the copy command. When you use the copy command, you must include two parameters. The first is the location and name of the file you want to copy, or the source. The second is the location to which you want to copy the file, or the destination. You separate the source and destination with a space. The copy command follows this pattern:

Copy source destination

First create two directories as before ClientOS and Compoint. Then use notepad to create two text files called dos1.txt and dos2.txt and save into ClientOS directory. Don’t worry about content of dos1.txt and dos2.txt put anything you like. After that, copy these two files (dos1.txt and dos2.txt) to Cosmopoint directory. You can also use DOS editor called edit.com to create simple text files. Type edit to run dos editor.
You can use wildcards to copy a group of files from any DOS directory to another. In a card game, a wildcard matches any card in the deck. In MS-DOS, the asterisk (*) wildcard matches any character in that position and all the other positions that follow it. Where as question mark (?) wildcard matches any one character at that position. If you want to copy a group of files with similar names, using wildcards is easier than copying each file individually.

So in above example copy both text files at once from ClientOS folder to Cosmopoint folder using wildcard

```bash
copy C:\ClientOS\dos*.* c:\cosmopoint\1 file(s) copied.
```

Create files **dos3.txt**, **dos5.doc** and **mydos.doc** inside **ClintOS** directory and try following commands:

```bash
copy C:\ClientOS\dos?.txt c:\cosmopoint\copy c:\ClientOS\*dos.doc c:\cosmopoint\```
1.2.1.1.8 RENAMING FILE

To rename a file, use the `ren` command. The `ren` command stands for `rename`. When you use the `ren` command, you must include two parameters.

The first is the **file you want to rename**, and the second is the **new name for the file**. You separate the two names with a space. The `ren` command follows this pattern:

```
ren oldname newname
```

To rename the `dos3.txt` file to `newdos.txt`, type the following at the command prompt:

```
ren dos3.txt newdos.txt
```

1.2.1.1.9 DELETING FILE

To delete a file, use the `del` command. The `del` command stands for `delete`.

Delete the `dos1.txt` file by typing the following at the command prompt:

```
del dos1.txt
```

1.2.1.1.10 FORMATTING DISKS

When you purchase new hard disk or floppy disk, you may be required to format them before you can use them.

**CAUTION**

The data on the disk you format will be erased and will be lost, so make sure you select a disk that does not contain information you may need later. Never format hard disk, unless it is must and you know what you are doing.

To format a floppy disk, insert the blank floppy disk into the floppy drive and type following `dos` command:

```
format a:
```
1.2.1.2 WINDOWS 1.0

Microsoft released it cheap price Windows 1.0 on 5 floppy disks, which has complete software package for most of the general use like Paint, Write, Calendar, Notepad, Cardfile as well as a terminal emulator. It has screen resolution of 640x350 pixels with 16 colours.

1.2.1.3 WINDOWS 3.X
Microsoft released Windows 3.0 for the first time in May 1990. It was a 16-bit operating system, which supported a pointing device like a mouse for its graphical user interface. Unlike DOS, the user could apparently work with several applications in the cooperative multitasking proceedings at the same time now. After this, Microsoft released Windows 3.10 and later Windows 3.11 for workgroups (WfW). WfW extended Windows by network abilities for use as a client in a network. WfW could combine and show up to 25 computers in a working group.

### Features of Windows 3.x

- Standard (286) mode
- Larger memory support
- 386 Enhanced mode, with large memory and multiple preemptive DOS session support
- Support for Program Manager
- Support for File Manager
- Network support
- Support for more than 16 colours
1.2.1.4 WINDOWS 95

Windows 95, the successor of Windows 3.11 is a completely new designed Windows compared with its earlier Windows. It is 32-bit operating system with new interface. It fully supports 32-bit applications. It also supports 16 bit applications. But still, Windows 95 and Windows ME need DOS support while loading up program. Windows 95 is used in home and offices as well as network clients.

The important part of Windows 95 is the registry, which is responsible for handling core components of Windows and its behaviors. The registry is made out of system.dat and user.dat files which are located in Windows directory. Another two important files are system.ini and win.ini which contain the windows startup configurations.

<table>
<thead>
<tr>
<th>Features of Windows 95</th>
</tr>
</thead>
<tbody>
<tr>
<td>- RAM requirement-4Mbytes</td>
</tr>
<tr>
<td>- Hard disk requirement-50 Mbytes</td>
</tr>
<tr>
<td>- Supports FAT32, FAT16 and VFAT file system</td>
</tr>
<tr>
<td>- Multitasking for 32-bit programs</td>
</tr>
<tr>
<td>- Support x86 processors</td>
</tr>
<tr>
<td>- Plug and Play feature</td>
</tr>
<tr>
<td>- Support for high number of device drivers</td>
</tr>
<tr>
<td>- Compatibility with old system (16-bit software support)</td>
</tr>
</tbody>
</table>
1.2.1.5 WINDOWS 98/ME

Windows 98 is a revised version and the successor of previously released Windows 95. Most of the bugs found in Windows 95 have been fixed in Windows 98. Also, Windows 98 provides better support for hardware as well as support for multiple monitors. Although Windows 98 has FAT32 file systems, it can access NTFS and Linux file system ext2 with some additional tools from third-party vendors. Windows 98/ME is widely used in home and offices as well as network clients.

Features of Windows 98

- Extended support for the connection to networks
- Integrated Internet Explorer 4.0 and web optimized
- Internet Connection Sharing (ICS)
- 32-bit operating system
- Supports up to 512 Mbyte RAM
- Support file size up to 4 Gbyte
- Minimum Hardware Requirements: 16 Mbyte RAM, 300 Mbyte hard disk space
- Multi monitoring Support (up to 4)
- Support file system FAT16, better use FAT32, access to NTFS and Linux ext2 file system with 3rd party tools
- Preemptive multitasking for 32-bit applications
- Support x86 CPUs and compatible
1.2.1.6 WINDOWS NT WORKSTATION

The Windows NT is designed keeping in view the need of corporate workstation and servers. NT stands for new technology. Windows NT Workstation works as a client operating system in offices and homes. Windows NT has graphical user interface similar to Windows 95 and Windows 98, but it is more robust and reliable operating system than Microsoft previous Windows. It has advanced security and administrative features. Microsoft later released Windows 2000 based on NT technology.

<table>
<thead>
<tr>
<th>Features of Windows NT</th>
</tr>
</thead>
<tbody>
<tr>
<td>All tasks can be processed through the GUI</td>
</tr>
<tr>
<td>Multiple task can be processed at one time</td>
</tr>
<tr>
<td>Windows NT workstation can provide a network server function</td>
</tr>
<tr>
<td>Windows NT has good security features</td>
</tr>
<tr>
<td>It supports Intel and RISC processors</td>
</tr>
<tr>
<td>Designed for network environment</td>
</tr>
<tr>
<td>Support secure NTFS file system</td>
</tr>
<tr>
<td>Support for multiprocessor</td>
</tr>
<tr>
<td>Larger and better hardware support</td>
</tr>
<tr>
<td>Built in fault tolerance (disk mirroring, RAID)</td>
</tr>
<tr>
<td>Built in system administration tools</td>
</tr>
</tbody>
</table>
1.2.1.7 WINDOWS 2000 PROFESSIONAL

Windows 2000 is part of Microsoft Windows NT line of operating systems which was released in February 2000. Windows 2000 was made available in four editions:

- Windows 2000 Professional
- Windows 2000 Server
- Windows 2000 Advanced Server Limited Edition
- Windows 2000 Datacenter Server Limited Edition


Features of Windows 2000

- Full 32-bit operating system
- Support for NTFS or FAT32 file system
- Support for hard disk drives as big as 32GB when running FAT32
- Windows File Protection, which prevents installed applications from deleting necessary system files
- Elimination of many reboot scenarios
- Support for up to 4GB of Random Access Memory (RAM)
- Microsoft Management Console (MMC)
- Stronger Internet integration with Internet Explorer 5.0.1
1.2.1.8 WINDOWS XP

Windows XP was released in late 2001 as a replacement for Windows 95/98 and Windows NT families. Windows XP has two workstation versions: Home and Professional. Both versions include the features Windows 2000. More about Windows XP will be covered in other chapters.

Features of Windows XP

- Fast, easy switching between users or applications on same PC
- New designed desktop with rich graphics
- An enhanced Windows Media Player, which integrates DVD playback, music organization, and CD burning
- Support for Windows Messenger
- Windows Movie Maker, which offers built-in video capture and editing
- Internet Explorer 6, the latest version of the Microsoft web browser
- System Restore, which allows the computer to restore at previous dates
- Built in Network Setup Wizard for network setting
- Allow Remote Desktop connection over the Internet
- Remote assistant
- Better file protection and security
- Encrypting File System, which offers better security by transparently key-encrypting files
- Fast Resume from Hibernation
- Support for 802.1x networking
- Support for secure wireless networking
1.3 INTRODUCTION TO LINUX

When personal computer started becoming powerful and affordable home equipment in 90s, many vendors tried to create operating system for PCs. Olden (still today) computer used to run on UNIX operation system, which is proprietary and expensive.

It all started when a young computer science student called Linus Torvalds, from university of Helsinki wanted to use UNIX for his computer project, but due to propriety and costly in nature, he started some sort of freely available academic version of UNIX, for which he stated coding. He started asking questions, finding solutions and modifying minix code to built his new operating system which we called it LINUX today, after his name Linus. He posted his project on Internet and millions of coders, users and supporters join the Linux team.

Today Linux has joined the desktop market as well as server market. Linux runs as client operating system on a desktop computer as well as on laptop and many more. Linux is well-known as a stable and reliable server, providing database and trading services for companies like Amazon, the well-known online bookshop, US Post Office, the German army and such. Linux is an acceptable choice as a workstation, providing an easy user interface and MS compatible office applications like word processors, spreadsheets, presentations and the like.
1.3.1 PROPERTIES OF LINUX

Linux is reliable and secure operating system, having lots of good properties which are listed below.

1.3.1.1 LINUX IS FREE

The best part of Linux is that, it is free. Free does not means it is bad operating system. Linux can be downloaded for free from thousand of free server from the Internet. No registration fees, no costs per user, free updates, and freely available source code in case you want to change the behaviour of your system.

The license commonly used is the GNU Public License (GPL). The license says that anybody who may want to do so, has the right to change Linux and eventually to redistribute a changed version, on the one condition that the code is still available after redistribution.

1.3.1.2 LINUX IS PORTABLE TO ANY HARDWARE PLATFORM

Linux support many devices and hardware. It can be downloaded, programmed and configured for new devices easily by referring its documentation which is free.

1.3.1.3 LINUX WAS MADE TO KEEP ON RUNNING

Unlike Windows, Linux system expects to run without rebooting all the time. Task can scheduled on the Linux and it will be automatically executed later on time. This property allows for Linux to be applicable also in environments where people don't have the time or the possibility to control their systems night and day.

1.3.1.4 LINUX IS SECURE AND VERSATILE

Since Linux closely resembles the UNIX operating system, it follow the UNIX security model, which is known to be robust and of proven quality. It is very difficult for hackers and antivirus to attack Linux operating system.

1.3.1.5 LINUX IS SCALABLE

Linux runs on wide variety of platform, from a Palmtop with 2MB of memory to a pentabyte storage cluster with hundreds of computers. It runs on supercomputer as well an on personal computer. Apart from computers, it runs on other embedded systems.
1.3.2 LINUX FLAVOURS

There are many implementations of Linux in the market today. Although there are many different distributors of Linux, you will find lots of similarities among them.

Linux may appear slightly different depending on the distribution in your hardware and personal taste, but over all operating system remains the same. The Linux system is based on GNU tools (Gnu's Not UNIX), which provide a set of standard ways to handle and use the system.

Some of the famous Linux distributions are listed below.

<table>
<thead>
<tr>
<th>Distribution</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red Hat Linux</td>
<td>Server, Workstation and mainframe by Red Hat</td>
</tr>
<tr>
<td>Fedora</td>
<td>Distributed by Fedora projects based on Red Hat Linux</td>
</tr>
<tr>
<td>Debian GNU/Linux</td>
<td>Maintain and distributed by Debian project</td>
</tr>
<tr>
<td>Gentoo Linux</td>
<td>Distributed by Gentoo Foundation Inc</td>
</tr>
<tr>
<td>Knoppix</td>
<td>Very famous live CD(Linux on CD), design for easy use</td>
</tr>
<tr>
<td>Linspire</td>
<td>GUI similar to Windows XP</td>
</tr>
<tr>
<td>SUSE Linux</td>
<td>Distributed and maintain by Novell Inc</td>
</tr>
</tbody>
</table>
1.4 INTRODUCING MACINTOSH

Macintosh operating system, commonly known as Mac is a brand name from famous computer company Apple Inc. Mac operating system was designed, developed and marketed by Apple Inc. The original Macintosh was released in January 1984. It used a graphical user interface (GUI) and mouse instead of the then-standard command line interface.

The current Mac products range from Apple's entry level Mac mini desktop, to a mid-range server, the Xserve. Mac systems are used widely in home, education, and creative professional markets. Like normal PCs, modern Macs are capable of running operating systems such as Linux, FreeBSD, Windows, etc.

Macintosh computers used Motorola 68k family of microprocessors, but later company stated switching form Motorola processor to IBM's PowerPC range of CPUs in 1994. Apple began a transition from the PowerPC line to Intel's x86 architecture in 2006.

Currently Apple has announced Mac OS X v10.5 operating system called Leopard.
1.5 SUMMARY

- Operating system is the software which controls the system hardware and it is the nucleus of all software activities.

- Two major categories of system software are the operating system and utility programs.

- Operating system performs many functions like process, memory, device, storage management. It also provides user interface, application interface, security and networking.

- Operating systems can be classified into:
  - Real-time operating system
  - Single-user, Single Task operating system
  - Single-user, Multi-tasking operating system
  - Multi-user operating system
  - Multiprocessing operating system

- Operating system that runs on server computers is called server operating system while on client computer, client operating system takes control.


- Some important DOS commands are:
  - dir- displays directory and files
  - cd- change from one directory to another
  - mkdir- make new directory
  - rd- remove empty directory
  - copy- copy file from one location to another
  - ren- rename a file
  - del- delete a file
  - format- format drive

- Linus Torvalds, from university of Helsinki initiated the idea of Linux operating.

- Linux is free, reliable, secure and scalable operating system. It can works as client operating system as well as server operating system.

- Macintosh operating system, commonly known as Mac is a brand name from famous computer company Apple Inc.
1.6 EXERCISES

A. Select the correct answer for the following MCQ.

1. Which statement is not correct?

A. Operating system control the system hardware
B. Operating system is system software
C. Without operating system computer cannot run
D. Operating system is complex software
E. Operating system is last program loaded into computer memory

2. What is an operating system?

A. The part of the hardware that operates input and output devices.
B. The part of the hardware that operates the mouse and the windows on the monitor.
C. Systems software that coordinates the hardware and software components of a computer system.
D. A section of software that must be part of every program.
E. None

3. Select application software (select 3)?

A. MS Word
B. MS Paint
C. Media Player
D. DOS
E. Driver Software

4. What are functions of an operating system (Select 3)

A. Process Management
B. Memory Management
C. Game Management
D. Graphic Management
E. Networking

5. Which one is not a classification of operating system?

A. Real-time operating system
B. Multi-user operating system
C. Single-user single Task operating system
D. 3D operating system
B. Answer the following questions

1. What is operating system? Why it is so important?

2. List down the functions of an operating system.

3. List 4 classes of operating system.

4. What is a client operating system? List 5 client operating systems from Microsoft.

5. Create two folders called myFolder and yourFolder using DOS command. Create files file1.txt, file2.doc, myfile.txt inside myFolder and copy these files to yourFolder using DOS copy command and wildcards.

6. Write short note on Linux operating system.

7. Write short note on Mac operating system.