INTRODUCTION

Any computer system has an operating system. The user interacts with the machine via the operating system. An operating system (OS) is the software that provides an interface between the computer hardware and the application programs or users. An operating system is responsible for the management and coordination of activities and sharing of the resources in computer. The OS acts as a host for application programs that are run on the machine. As a host, one of the purposes of an OS is to handle the details of the operation of computer hardware. OS offers a number of services to application programs and users. Users may also interact with the OS by commands or using a graphical user interface (GUI).

There are various types of operating systems, but all of them essentially perform the same functions. This Unit gives an overview of operating systems. Common OS include Microsoft Windows, Mac OS X, and Linux. The installation process of Microsoft Windows 10 and Ubuntu Linux operating system is illustrated in this Unit. This will enable the students to gain fundamental knowledge and skills required to install and configure Windows 10 and Ubuntu Linux operating systems.
INTRODUCTION

As you know that, CPU is the main processing unit of a computer. It processes the data based on the instructions received. Even for a simple calculation, it performs a series of instructions. Also, operating the several peripheral devices attached to, the computer requires executing certain instructions. The computer system has several resources such as a CPU, memory, storage devices, and network devices. All these resources are accessed by several users and several programs. The CPU manages all these resources.

A computer also requires a basic user interface to interact with the user and provides consistent support to the processor, memory, and devices. An operating system (OS) is a software that satisfies all these needs of the user.

In this Chapter, we will discuss the components of operating system, the different types of operating systems and the functions of operating system. A brief description of some operating systems is also given.

OVERVIEW OF OPERATING SYSTEM

A computer cannot perform any tasks on its own. In any computing process, both the hardware and software work together to accomplish a task. This applies to all the computing devices, including basic calculators, watches, mobile devices, and any other gadgets which use hardware components as well as integrated software components. Different files which are interrelated and accomplish a certain set of tasks make up the operating system. These files are system level files which do scheduling, interrupting, data transferring, managing the flow of data, and are a low level software component of the computer itself. The standard definition of an operating system would be—an operating system is a set of program files which control the resources of the
computer system and allows the communication of hardware components of a computer to the software components of the computer system.

An operating system is one of the essential and important software installed in every computer. A computer is useless without an operating system. The operating system is like a resource manager. It controls and manages all the computer resources including hardware and software. Computer system mainly has four types of resources. These are CPU or processor, main memory or RAM, secondary storage, and the input output devices.

**BOOTING PROCESS OF OPERATING SYSTEM**

When you start the computer, it is observed that some initial text information is displayed on the screen. This is displayed by the firmware. The booting instructions are stored in ROM (read-only memory). Then the booting process starts. After booting, an operating system gets loaded in the main memory (RAM) of the computer. Let us understand the complete booting process. 

- When you power on the computer, the CPU (central processing unit) activates the BIOS (basic input output system).
- The first program activated is POST (power on self-test). Using the CMOS (complementary metal oxide semiconductor) memory it checks all the hardware and confirms that they are functioning properly.
- After that it reads the MBR (master boot record) in boot drive in accordance with the firmware ‘bootstrap loader’ which is provided by the computer manufacturer.
- Then the computer loads in the operating system in boot drive to the RAM.
- Once this is performed, the operating system takes over the control of the computer and displays an user interface to the user.

**FUNCTIONS OR TASKS OF THE OPERATING SYSTEM**

The operating system is a large and complex software consisting of several components. Different components
of OS perform specific tasks to provide overall functionality of the operating system. Figure 4.1 shows the interconnection between resource management in the computer.

Operating system is a large and complex software consisting of several components. Each component of the operating system has its own set of defined inputs and outputs. Different components of OS perform specific tasks to provide the overall functionality of the operating system.

The main functions performed by the operating system are as follows:

**I/O Management**

Input/Output (I/O) is the basic process in any computing device. OS manages I/O devices and makes the I/O process effective. It allows interaction with I/O devices using commands. OS accepts inputs from the input device, stores it in the main memory, asks the CPU to process it, and finally, provides the result to the output device.

**Data Management**

In a computer, the data or programs are stored in a file. The data is managed by performing various operations on a file such as creating, updating, reading, writing,
storing, and deletion. These tasks are performed by using the commands of the operating system. Thus, the operating system functions for data management.

**Fig. 4.3: Data management**

**Memory Management**

Every computer has a primary memory (RAM). This memory should be managed properly for efficient functioning of the computer. Operating system loads the data and programs into RAM before sending it to the CPU for processing. The results obtained after processing are also stored in RAM before sending it to the output devices. After sending the output to output device, OS releases the memory and makes it available for use to other programs. Thus, operating system utilises the RAM efficiently to manage the memory for various processes. The activities of memory management are—allocate memory, free memory, re-allocate memory, and keep track of memory usage.

**Process Management**

Every job to be performed by the computer system is scheduled in the form of processes. These processes are
managed by the operating system. Allocation of a CPU to the processes and making the CPU free when the process is executed is also performed by the operating system. The process management activities handled by the OS are:

1. control access to shared resources like file, memory, I/O, and CPU,
2. control execution of applications,
3. create, execute, and delete a process (system process or user process),
4. cancel or resume a process,
5. schedule a process,
6. synchronisation, communication, and deadlock handling for processes.

![Diagram of process management](image)

**Device Management**

Operating system manages the peripheral devices attached to the computer system. The processes may require certain devices. Operating system finds the status of the device and allocates the appropriate device. Device controllers are used to control the peripheral devices and device drivers are used to control software components. The device management tasks handled by OS are:

1. open, close and write the device driver;
2. communicate, control and monitor the device driver.

**Introduction to Operating System**
File Management

Every computer system consists of a large number of files. A user has to access these files whenever required. Operating system performs file management. File management includes storage and backups of the files, accessing files, handling files and their properties, performing file operations. Location of the file, size, its uses, and status are maintained by the operating system. Whenever a process requires a file allocation, then the file is searched and it is allocated to that process. Whenever the process is completed, then the file allocation is removed. Operating system also prevents the file from viruses or unauthorised access. The file management tasks include:

1. create and delete files,
2. provide access to files,
3. allocate space for files,
4. keep back-up of files,
5. secure files.

Time Sharing Management

Computer network allows the use of the computing power of the server to a number of users through network operating systems. In network environment, each user is allocated a certain amount of time to access the hardware. This access time is moved from one user to another user very fast so that every user has a feel to access the computer for all the time. This time sharing management between the number of users of the computer hardware is performed by the operating systems.
Security Management
In this, the security of one user is protected from other users. Operating system provides security to the data and programs of the user. User authentication, file attributes like read, write, encryption, and back-up of data are used by OS to provide basic protection.

Deadlock Prevention
In a multi-programming environment, multiple processes may try to access the resource. A deadlock is a situation when a process waits endlessly for the requested resource which is being used by another process that is waiting for some other resource (Figure 4.9).

Virtual Storage
In a multiprogramming system, many programs are located in the memory along with the operating system. Some applications require large memory as the whole program cannot be loaded into the memory. If the program is larger than the main memory, then the operating system uses free space of the secondary memory which is known as virtual memory and the secondary storage used for storing which is known as virtual storage. Virtual memory allows the execution of those processes that are not completely in the memory.

Providing User Friendly Interface
One of the important functions of the operating system is to provide the user interface. The user interface is a set of commands or a graphical user interface through which the user interacts with the applications and the hardware. There are two types of user interfaces provided by the operating systems. They are:
1. command line interface – CLI
2. graphical user interface – GUI

Command Line Interface (CLI)

The CLI has a command prompt from where you can issue a command. The CLI accepts the text based commands on the command line or terminal and executes them. In CLI, the correct syntax of commands has to be used, hence the commands need to be remembered by the user. CLI was used by the operating system of the early days. Operating systems—DOS and Unix are the examples of CLI. In using command line interface, the correct syntax has to be used.

Graphical User Interface (GUI)

The modern operating systems such as Windows, Linux, and Mac all use GUI. GUI is easy to operate and user-friendly. GUI provides the ability to use the mouse or fingertips to navigate the commands. It becomes easy to interact with the computers. The operating system with GUI uses four components to interact with the system. These are abbreviated as WIMP (windows, icons, menus, and pointer).

Types of operating systems

Operating systems are normally preloaded on the computer that you purchase. But it is possible to upgrade or install the operating system on your computer. There are three most common types of operating systems—Microsoft Windows, Mac OX, and Linux. For mobile devices, such as smartphones and tablet computers, the commonly used operating systems are Apple iOS and Google Android.

Microsoft Windows

It is a graphical user interface (GUI) based operating system. A typical desktop image of a computer system
on which a Microsoft Window 10 is installed is shown in Figure 4.13.

In this GUI system, all the programs or commands of the operating system are available in the form of icons, buttons, and menus. Everything within the operating system is clearly displayed on the screen by making a combination of graphics and text. Whenever we want to execute any command or program, then the corresponding icon needs to be clicked.

There are various versions of Microsoft Windows OS available. Most recent version of Microsoft Windows OS is Windows 10, which was released in 2015. The earlier versions are Windows 8, released in 2010, and Windows 7, released in 2009. Microsoft Windows is one of the most popular operating systems.

**Mac OS**

It is an operating system that is created by Apple. It is a preloaded OS on Macintosh computer or Macs. A typical image of a Mac desktop is shown in Figure 4.14. Observe that this operating system also has a graphical user interface (GUI). But the GUI of Mac OS is different from that of Microsoft Windows. All the commands and programs available in Mac OS are displayed in the form of icons or buttons. By clicking appropriate buttons, we can execute that program.

There are various versions of Mac OS. Most recent version of Mac OS is OS X which is pronounced as OS 10. The latest version released on 24 September 2018 is Mac OS 10.14 and is named as Mojave (Liberty). The earlier versions of Mac OS are OS X 10.11: El Capitan (Gala) released on 30 September 2015, OS X 10.10: Yosemite (Syrah) released on 16 October 2014, OS X 10.9 Mavericks (Cabernet) released on 22 October 2013, OS X 10.8 Mountain Lion (Zinfandel) released
on 25 July 2012, and OS X 10.7 Lion (Barolo) released on 20 July 2011.

**Linux**

It is a family of open source operating systems. It means that it can be modified and distributed by anyone around the world. Earlier OS that we have discussed such as Windows and Mac OS are proprietary software. It means that they can be modified only by the company that owns it. Whenever you want to use proprietary software on your computer system, you need to purchase it by paying a cost so that you can get a user license. Linux is a freeware, meaning that you need not to pay any cost and you can use it on your computer system. A typical desktop image that runs Linux is shown in Figure 4.15. Observe that Linux is also available in the form of GUI. Every program in the Linux OS is displayed in the form of an icon, button, or graphics. By clicking on the icon or button, we can execute that program. There are many distributors of Linux, for example Ubuntu, Linux Mint, Fedora, Suse, Red Hat, and so on.

**Classification of OS**

Operating systems can be classified based on the following:

**Classification based on Processing Method**

**Multi-programming OS**

In this, two or more programs are executed simultaneously by a single processor. It is used in a multi-user environment.
Multitasking OS

It is capable of running several tasks or programs at the same time. Most of the present operating systems like Microsoft Windows, Linux, and Mac OS are multitasking operating systems.

Multiprocessing OS

It supports running a program in more than one CPU. Two or more processors (CPU) are used to control the different activities or execution of many program instructions simultaneously. Servers are designed to support multiple processors. UNIX is an example of multiprocessing OS.

Time-sharing system

In this, the processor is shared among many users. The CPU switches so rapidly from one user to another, that every user gets the impression of getting the services of CPU for all the time.

Multithreading OS

This has the ability to divide the process into sub-processes known as threads and execute them concurrently. Threads are individual processes that execute simultaneously in multi-tasking OS.

Batch processing OS

In this, similar jobs are grouped together for processing. It consists of programs, data, and system commands. The time taken between job submission and job completion is very high. It is suitable for programs with large computation time where user involvement is not necessary.
Examples are payroll, forecasting, and statistical analysis.

**Online processing operating system**

In this, transactions are processed immediately and output is provided to the user. Most of the present systems use online processing. Bank transactions are an example of online processing system.

**Real-time OS**

This method receives data, processes it, and returns results quickly to affect the functioning of the system at that time. It is an online processing system where the processing time is critical. Monitoring and controlling nuclear power stations, rocket launching systems, are examples of real time systems.

**Classification of OS based on User Interface**

As we have already learned, there are two types of user interface. One is command line interface (CLI) and other is graphical user interface (GUI). The operating system is also classified on the basis of user interface.

**Classification of OS based on Mode of User**

Under this classification, the OS is classified as single user or multi-user.

**Single user OS**

The majority of small microcomputer based systems have single user OS, which allows a single user to operate the machine in an interactive mode. It allows only one user program to use the system. MS-DOS, PC-DOS are single user operating system.
Multi-user OS

A multi-user OS allows two or more users to run programs at the same time. The multi-user OS shares computer resources among these users, allowing each a small slice of the processor time. This concept is known as time sharing. Example of multi-user OS are UNIX, LINUX.

![Multi-user OS Diagram](image)

**Components of Operating System**

We identify the operating system by its user interface. The look or initial screen of various operating systems looks different, but architectural view of the various operating systems remains the same. There are essentially three components of operating system as described below:

1. the device driver
2. the kernel
3. the shell

**The Device Driver**

This component is close to computer hardware. The device drivers are required for proper functioning of the devices attached to the computer system. These drivers can be installed or uninstalled as and when required. The kernel uses it for operating and controlling.
The Kernel

It is the core of the operating system. It performs all the major functions of the operating system. It manages resources, controls program execution, and schedules program execution. It is the main operating system. It detects the new hardware when attached and installs the device driver for it to function properly.

The Shell

We identify the operating system by how the shell looks. It provides the user interface to interact with the kernel and hardware. There are two types of user interface — command line interface (CLI) and graphical user interface (GUI) as explained in the Chapter earlier.

The File System

The operating system provides a file system interface to secondary storage. A file system contains files and directories (folders). Directory is a container that may contain files and other directories known as subdirectories. A file is the basic unit secondary data storage on computers. Any data is stored in a file in the file system. The file has two components, file name and extension. File system that is stored on the disk may have a large number of files and/or directories. Every file system starts with a root directory.

Check Your Progress

A. Multiple choice questions

1. Operating system loads in ____________.
   (a) RAM   (b) CMOS
   (c) ROM   (d) CPU

2. What is an operating system?
   (a) Collection of programs that manages hardware resources

Fig. 4.24: Components of OS
(b) System service provider to the application programs
(c) Link to interface the hardware and application programs
(d) All of the mentioned

3. Which operating system allows multiple users simultaneously?
(a) Multi-user OS
(b) Multi-tasking OS
(c) Real time OS
(d) All of these

4. Logical extension of multi-programming operating system is _______________.
(a) time sharing
(b) multi-tasking
(c) single programming
(d) Both (a) and (b)

5. When a computer starts, operating system checks all the ____________ and loads their drivers so a user can work properly.
(a) programs
(b) devices
(c) drivers
(d) network

6. ____________ creates a link between a user and the computer.
(a) Device driver
(b) Utilities
(c) Operating system
(d) Image view

7. Multi-processor system has a ____________.
(a) small system
(b) tightly coupled system
(c) loosely coupled system
(d) macro system

8. Which one of the following error will be handled by the operating system?
(a) Power failure
(b) Lack of paper in printer
(c) Connection failure in the network
(d) All of the above mentioned

9. By operating system, the resource management can be done via ____________.
(a) time division multiplexing
(b) space division multiplexing
(c) Both time and space division multiplexing
(d) None of the mentioned

10. ____________ is the most popular type of operating system for personal computers.
(a) Linux
(b) Unix
(c) Microsoft Windows
(d) Mac OS

B. Fill in the blanks
1. Microsoft Windows is a graphical user interface (GUI) ____________.
2. Mac OS is an operating system that is created by ____________.
3. Linux is a family of ____________ operating systems
4. In multi-programming OS, two or more programs are executed simultaneously by ____________ processor.
5. A multi-processing OS supports running a program in more than one ______________.
6. The similar jobs grouped together for processing is called ______________.
7. Bank transaction is an example of ______________ processing system.
8. A multi-user OS allows two or more users to run programs at the ______________.
9. The look or initial screen of various operating systems looks ______________.
10. The kernel is the core of ______________.
11. The shell provides the user interface to interact with the kernel and ______________.
12. The operating system provides a file system interface to ______________ storage.
13. A file system contains files and ______________.

C. Short answer questions
1. What is an operating system?
2. List the various types of operating systems.
3. Describe the booting process of the operating system.
4. List the main function of the OS.
5. What are tasks of the operating system?
6. What is an interface and why it is an important aspect in the operating system?
7. Describe different types of operating systems.
8. Discuss different categories of operating systems.
9. What is single user and single task OS?
10. What is single user and multitasking OS?
11. What is time sharing?
12. What is a multi-user OS?
13. What is a multiprocessing OS?
14. Give one example each of OS using CLI and GUI interfaces.
15. What do you mean by a CLI interface?
16. What do you mean by a GUI interface?
17. What are the major components of an operating system?
18. Why is the file system important in an operating system?
19. Define real time operating systems with an example.
Chapter 5

Installation and Configuration of Windows 10

Introduction

Windows 10 operating system is available for many devices such as phones, tablets, laptops, and desktop computers. It is also available in multiple editions and in both 32-bit and 64-bit versions. First, one needs to choose the appropriate edition and architecture of Windows to provide the necessary features, such as Secure Boot, Client Hyper-V, Cortana, and others. It is also important to verify the compatibility of existing hardware such as printers, scanners, and other peripherals with Windows 10.

In a new computer, a clean installation of Windows 10 is the preferred option. For a new computer, the user needs to select another appropriate installation option as per their requirements. This installation will resolve startup and shut down problems as well as memory usage and app issues. Also, you can get rid of viruses and other types of malware, fix system corruption, and improve battery life.

Windows 10 System Requirements

Today’s modern computers are capable of installing Windows 10. However, if you wish to check the hardware requirements of old computers, check the minimum hardware requirements as follows:

1. processor: 1 gigahertz (Ghz) or faster processor
2. memory: 1GB RAM for 32-bit or 2GB RAM for 64-bit
3. storage: 16 GB of disk space for 32-bit or 20 GB for 64-bit
4. graphics card: DirectX 9 or later with WDDM 1.0 driver
5. display: 800x600 pixels

It is also recommended to have an internet connection to download and install updates.
**NOTES**

**WINDOWS 10 UPGRADE OR CLEAN INSTALLATION**

It is possible to upgrade Windows 10 on the existing computers or you can choose the clean installation. If you have the licensed copy of Windows 7, then it is possible to upgrade it to Windows 10. You can choose any one of the following three methods for upgrading to Windows 10:

**Inplace upgrade:** The existing operating system can be updated to Windows 10 without destroying the user data and settings. It is the recommended and most preferred method for most of the users who wish to upgrade to Windows 10 in the existing hardware. In this method, Windows 10 setup program automatically retains the settings. It is important to backup user data files before starting the upgrade to avoid possible data loss. A procedure for inplace upgrade is as below:

1. check whether the computer meets minimum hardware requirements for Windows 10 and that supports all hardware,
2. verify that all the applications work on Windows 10,
3. back up the user’s data files,
4. run the setup.exe program on the Windows 10 product DVD,
5. choose ‘upgrade’ when prompted and complete the setup wizard.

**Side-by-side migration:** In this method, the source and destination computers are different. You need to install Windows 10 on a new computer and then migrate the data and user setting from the earlier operating system to the new computer.

**Wipe-and-load migration:** In this method, you have to back up the user data and settings to an external location and then install Windows 10 on the existing computer. After that you have to restore the user data and settings.

**WINDOWS 10 EDITIONS**

This comes in various editions ranging from a single device to large enterprise. The specific editions of Windows 10 are listed below:
Windows 10 Home: It is designed for home users and includes features such as Microsoft Edge, Continuum tablet mode for touch devices, Cortana, Windows Hello, virtual desktops and number of built-in Windows apps such as Photos, Maps, Calendar, Music, and Video. In Windows 10 Home, you cannot control updates as of the earlier Windows and these are received automatically.

Windows 10 Pro: It includes the same features as in Windows 10 Home with some additional features, such as, Domain Join and Group Policy Management, Microsoft Azure Active Directory Join, BitLocker, Enterprise Mode for Internet Explorer 11, Client Hyper-V, Microsoft Store for organisations, Windows Information Protection (WIP). In Windows 10 Pro, updates are provided more quickly.

Windows 10 Enterprise: It provides some more additional features other than those provided by Windows 10 Pro including Direct Access, Windows To Go Creator, AppLocker, Branch Cache, start screen control with Group Policy, Windows Defender Credential Guard and Windows Defender Device Guard.

Windows 10 Education: It provides the same features as Windows 10 Enterprise, but does not support for LTSC. Windows 10 Education is only available through Academic Volume Licensing.

Windows 10 Mobile: It is designed for phones and smaller tablets. It offers the same features as that of Windows 10 Home desktop edition.

Windows 10 Mobile Enterprise: It offers features similar to Windows 10 Mobile. It provides security updates more quickly. It is available only to Volume Licensing customers.

Windows 10 Business Edition: Microsoft also provides a special Windows 10 Business edition, which is included as a part of Microsoft 365 Business.

32-bit and 64-bit versions of Windows 10

All desktop edition of Windows 10 come in 32-bit and 64-bit. The 64-bit versions of Windows 10 provides the following advantages:
**Memory:** The 64-bit versions of Windows 10 can address more physical memory than 32-bit versions. 32-bit versions are limited to 4GB of RAM, whereas 64-bit versions have no such limitation.

**Security:** Features such as Kernel Patch Protection, mandatory kernel-mode driver signing, and Data Execution Prevention (DEP).

**Client Hyper-V:** This feature is only available on 64-bit versions of Windows 10.

**Performance:** The 64 bit processors can handle more data during each CPU clock cycle.

**General features**

The following general features of Windows 10 provide general usability and functional improvements:

**Client Hyper-V:** enables to create, manage, and run virtual machines. For this feature, you should have a 64-bit version of Windows 10 Pro or Windows 10 Enterprise edition, a computer that supports SLAT, additional 2 GB of physical memory to support running the virtual machines.

**Cortana:** you can use Cortana as a digital assistant to control Windows 10 and perform tasks such as writing email, setting reminders, and performing web searches. Since Cortana is voice-activated and controlled, Windows 10 device requires a microphone.

**Continuum:** Windows 10 is available on a variety of devices types and form factors. With Continuum, Microsoft endeavors to optimise the user experience across device types by detecting the hardware on your device and changing to that hardware. For example, Windows 10 determines when you are using a non-touch desktop computer and enables traditional interaction with the operating system by use of a mouse. For users of hybrid devices, such as the new Microsoft Surface Pro, when you disconnect a keyboard cover, Windows 10 switches to tablet mode. When you use Windows 10 Mobile, Continuum enables you to use a second external display and optimises app behaviour on that display.
**Miracast:** Windows 10 uses Miracast to connect your Windows device wirelessly to an external monitor or projector. The only thing you need is a Miracast compatible external monitor or projector.

**Touch:** Windows 10, like Windows 8 before it, is a touch-centric operating system. Although you do not need a touch device to use Windows 10, some features are made more usable through the use of touch. To use touch, your tablet or display monitor must support touch.

**OneDrive:** users of OneDrive are entitled to 5 GB free online storage. OneDrive provides this storage. It is built into the Windows 10 operating system like any other type of storage, and consequently, it is easy to use. You must have a Microsoft account to use OneDrive.

**Sync your settings:** when you use more than one Windows 10 device, it is convenient for your user settings to move with you to the new device. You can use the ‘Sync Your Settings’ feature of Windows 10 to ensure that settings such as theme, Internet Explorer and Edge settings (including favorites), passwords, language, and ease of access are synchronised between your devices. You must have a Microsoft account to use this feature.

**Configuring Correct Boot Order**
The operating system Windows 10 has been provided to you on a DVD media. If not, then prepare the bootable media DVD or USB pen drive by using the standard process. Set the boot order first according to installation media that you are using for installation.

Inside the BIOS interface, look for the ‘Boot’ menu (Figure 5.1), and configure the boot order to start from the DVD or USB drive according to installation media. Save the new changes.

The bootable media can be prepared by using the windows tool or Microsoft Media Creation Tool or third-party tools like Rufus, Yumi.
Performing a Clean Installation of Windows 10

To perform a clean installation of Windows 10, insert a bootable media DVD or USB pen drive in your computer system, and press any key to boot from the bootable disk as shown in Figure 5.2. Let the disk allow the loading of the setup file as shown in Figure 5.3. Follow the steps below for clean installation of Windows 10.

(i) Insert a bootable media DVD or USB pen drive in your computer system. Provide the details of language, time zone, and keyboard layout as shown in Figure 5.4. Then click on the ‘Next’ button.

(ii) Click the ‘Install now’ button as shown in Figure 5.5.

![Fig. 5.2: Press any key for booting](image1)
![Fig. 5.3: Loading setup file](image2)
![Fig. 5.4: Select language, time, and currency](image3)
![Fig. 5.5: Installation window and input](image4)
(iii) In the next window, you will be asked to enter the product key. Enter it and click on the ‘Next’ button to proceed. In case you don’t have the product key currently, then you can skip to enter the product key by clicking on the option ‘I don’t have a product key’ to continue the installation as shown in Figure 5.7 below.

(iv) A new window as shown in Figure 5.8 will appear where you have to accept the licence terms by putting the tick (✓) on the checkbox ‘I accept the license terms’.

(v) Click the ‘Next’ button as shown in Figure 5.8.

(vi) Click on the ‘Custom: Install Windows only (advanced)’ option as shown in Figure 5.9.

Installation and Configuration of Windows 10
(vii) Select the partition with the current installation of Windows (usually “Drive 0”), and click the ‘Delete’ button to remove it from the hard drive.

(viii) Click the ‘Yes’ button to confirm the deletion.

(ix) Select the empty drive (‘Drive 0 Unallocated Space’) and click on the ‘Next’ button as shown in Figure 5.11.

(x) After completion of these steps, the set-up will proceed to install Windows 10 as shown in Figure 5.12.

(xi) After complete installation, the initial, window will appear on the computer screen as shown in Figure 5.13.

**Post Installation Tasks**

After installation of Windows 10, you need to perform certain post installation tasks.

(i) Check whether Windows is activated or not. To confirm that you’re running an activated copy of Windows 10, open ‘Settings’. For this, press the windows key and type settings in the textbox. The Windows setting will be displayed as shown in Figure 5.14.
(ii) Click on ‘Update & Security’ as shown in Figure 5.15.

![Fig. 5.14: Window setting](image)

![Fig. 5.15: Selecting update and security](image)

(iii) Click on ‘Activation’ as shown in Figure 5.16.

(iv) Under the ‘Activation’ head, Windows edition and activation status is displayed as ‘Windows is activated with a digital license’ as shown in Figure 5.16. This confirms that your Windows 10 is activated. Instead of this if it shows the message ‘Windows is not activated’, then you need to activate the Window by entering the product key.

![Fig. 5.16: Selecting activation](image)

![Fig. 5.17: Selecting activation](image)
To install the latest updates:

(i) Open ‘Settings’ as shown in Figure 5.14.

(ii) Click on ‘Update & Security’ as shown in Figure 5.15.

(iii) Click on ‘Windows Update’ as shown in Figure 5.18.

Region and language support in Windows 10

Windows 10 supports 111 languages of 190 countries and regions. If you want to change the language, you can download any of the additional languages for Windows 10. The following activity demonstrates how to add an input language to your PC.

Practical Activity

Configure Windows 10 for language support

2. Under ‘Languages’ select ‘Add a Language’.
3. Select the language you want to use from the list, as shown in Figure 1.
4. Windows 10 searches ‘Windows Update’ for the desired language and then installs it on your computer.

![Fig. 2: Selecting ‘Windows update’](image)

![Fig. 3: Check for updates](image)

5. Click the ‘Check for updates’ button as shown in Figure 3.

Device driver

1. To confirm that all the device drivers have been installed correctly, invoke the ‘Device Manager’ through the Windows key as shown in Figure 5.19.

![Fig. 5.19: Invoke device manager through the Windows key](image)

2. Search for ‘Device Manager’ as shown in Figure 5.20. The device manager window will open as shown in Figure 5.21.

![Fig. 5.20: Search device manager](image)

3. Observe that the drivers for all the devices are installed. In the case of any missing driver, download the latest available driver for the device manufacturer and install it.

Installation and Configuration of Windows 10
Windows 10 automatically updates the device driver. If you do not want to update the device driver, then you can turn off the automatic installation of device driver. The following activity will demonstrate how to turn on or off the automatic installation of device driver.

**Practical Activity**

**Turning off automatic installation of device driver**

1. Open 'Control Panel', click on 'Devices and Printers'.
2. The icons of the various devices will be displayed. Right-click on the 'Desktop' icon. The Desktop icon shows your computer name. Then select and click on the 'Device installation settings', as shown in Figure 1.
3. 'Device installation settings' dialog box will appear as shown in Figure 2. By default the 'Yes' option is selected. Choose the option 'No' and then click on the 'Save Changes' button.

**Fig. 1: Disabling the automatic device driver software installation**

**Fig. 5.21: Device manager window**
4. The changes will be saved which will turn off the automatic updates.

Static IP address configuration in Windows 10

To access Internet on your computer, you need to configure the network settings in Windows. Internet connection availability and access in Windows is indicated via an icon residing on the taskbar. If you see a yellow triangle exclamation mark on the network icon, it means that, it has limited network connectivity.

(i) Right-click the network icon in the taskbar and select ‘Open Network & Internet settings’ as shown in Figure 5.23.

Fig. 5.22: Selecting network access option

Fig. 5.23: Open ‘Network & Internet settings’

Fig. 5.24: Open Ethernet setting

Fig. 5.25: Change adapter options

Installation and Configuration of Windows 10
(ii) In the ‘Open Network & Internet Setting’ window, click on ‘Ethernet’ as shown in Figure 5.24, to see the settings of your connection. You can change the related settings as shown in Figure 5.25.

(iii) Right click your active network adapter and choose ‘Properties’, as shown in Figure 5.26.

(iv) Under ‘This connection is using the following items’, double click on ‘Internet Protocol Version 4 (TCP/IPv4)’, as shown in Figure 5.27 to change the current IP address and the DNS server.

(v) Select ‘Use the following IP address’ as shown in Figure 5.29, and you will be able to edit the IP and DNS fields. You should know what IP address to put as the gateway and subnet mask.

(vi) Enter the valid IP address, subnet mask, and default gateway as shown in Figure 5.29.

(vii) You can see the network connection details by clicking on the ‘Details’ as shown in Figure 5.30. The connection details will be displayed as shown in Figure 5.31.
Installing printer

A printer is essentially required for taking print outs from the computer. The following activity illustrates the installation of a printer in Windows 10.

**Practical Activity**

**Installation of printer**

**Step 1:** Click and run setup .exe file of printer as shown in Figure 1. The setup.exe file will extract as shown in Figure 2.

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*Fig. 1: Run printer .exe setup file*
**Step 2:** Click on install button as shown in Figure 3.

![Fig. 3: HP Printer Installation](image)

**Step 3:** Click on 'Add another printer' as shown in Figure 4.

![Fig. 4: Connect device window](image)

**Step 4:** Check whether device is connected or not.
Fig. 5: Connect device window

Fig. 6: Installing driver

Fig. 7: Successfully setup completed

Installation and Configuration of Windows 10
Practical Activity

Installation of Scanner
Scanner is another important peripheral commonly required by the user. The following activity illustrates the installation of scanner in Windows 10.

Step 1: Run Scanner setup.exe file as shown in Figure 1. The setup.exe file will extract as shown in Figure 2.

Step 2: Click on install software as shown Figure 3.

Step 3: A new window as shown in Figure 6 will appear where you have to accept the license terms and by putting the tick (✓) on the checkbox ‘I have reviewed and accept the installation agreements and settings’.

Fig. 1: Run scanner setup.exe file

Fig. 2: Scanner setup.exe extracting window

Fig. 3: HP driver installation window

Fig. 4: Checking system
**Fig. 5:** Scanjet permission — allow all installation process window

**Fig. 6:** Accepting ‘End User license Agreement’

**Fig. 7:** Ready to install

**Fig. 8:** Installing software

**Fig. 9:** Connect scanner to PC

**Fig. 10:** Successful setup installation

**Installation and Configuration of Windows 10**
Step 4: Connect your scanner to PC.

Installation of antivirus software

It is essential to install an antivirus software to protect your computer from viruses and worms. The antivirus software should also be updated from time to time. Use only one antivirus program in a computer system. More than one antivirus program can cause problems. There are various free as well as paid antivirus software available in the market. For example, Microsoft Security Essential, Quick Heal, Kaspersky, AVG, F-Secure, Norton, McAfee, bit defender, Avast, and Avira as shown in Figure 5.32.

You can choose any one of these as per your choice. The installation process of ‘Quick Heal Total Security’ antivirus is given below as an example.

System requirements

To use Quick Heal Total Security antivirus, your system must meet the following minimum requirements: (However, a higher configuration will give better results.)
1. CD/DVD Drive
2. Internet Explorer 6 or later
3. Internet connection to receive updates
4. For Microsoft Windows 10, 1 gigahertz or faster CPU with 1GB RAM for 32 bit and 2 GB RAM for 64 bit operating system.

Before installing an antivirus program consider following the points:
1. close all open applications, browsers, programs, and documents for uninterrupted installation,
2. ensure that you have administrative rights for installing ‘Quick Heal’ antivirus.

**Practical Activity**

**Standard installation of Quick Heal Total Security**

**Step 1.** First, download the antivirus installer from the Quick Heal website. Click on the download button to download the software.

**Step 2.** Wait until the setup wizard checks and finds the updated and latest version of the antivirus or just click on the ‘Skip’ button to install the current version.

**Step 3.** Click on the ‘Next’ button to start setup or you can review the End-User License Agreement (EULA) as shown in Figure 3.

**Step 4.** Click ‘Next’ to review the ‘Install Location’ of Quick Heal Total Security as shown in Figure 4.

**Step 5.** Installation process continues as shown in Figure 5.

**Step 6.** Installation successfully completed, now click on ‘Register Now’ as shown in Figure 6.

**Fig 1: Quick Heal initialising installer** **Fig 2: Preparing installation window**

**Installation and Configuration of Windows 10**
**Step 7.** Review the features of Quick Heal Total Security antivirus by clicking ‘continue’. This step is optional; you can skip it if you wish.

Fig. 3: ‘End User License Agreement’ window

Fig. 4: Selecting ‘Install Location’ window

Fig. 5: Installation process progress window

Fig. 6: Installation completed window

Fig. 7: Home window of Quick Heal Total Security antivirus
After you have installed and launched Quick Heal Total Security antivirus, activate it and scan your computer with this antivirus.

**Run a full system scan**

After installing and updating the antivirus software, start a full system scan process. Some antivirus software programs have different types of scanning and you have to run the most important type, known as full system scan. Scanning will take time depending on the disk size and data size. During full scan, you can continue any of your other work.

There could be a situation that the antivirus may not detect any virus or malware while an user is working on a computer. In such case, it is suggested to run a full system scan as shown in Figure 5.33 and 5.34 and any viruses may be removed.

![Fig. 5.33: Full system scan window](image)

![Fig. 5.34: Full system scan window](image)

**Review discovered threats and recommended action**

During the scanning process or after completing scanning, the antivirus program will inform you about the various discovered threats and suitable action to be taken. Although the recommended action will be the best option, but you can take any action from the available choices. If the antivirus is not able to remove any type of infection, then just search for a proper solution on the internet or ask a professional, don’t ignore the problem. You can also contact the support team or customer care of the antivirus software.
Malware

The antivirus program may also have an anti-malware program too. If not, then install an anti-malware program and check the system again for any malware infection. Antivirus and anti-malware both programs scan for different things but they work in a similar way.

In the worst case, if you are unable to clean your computer from virus or malware or not able to repair the damaged operating system files, then take backup of important data and format the system. Reinstall the operating system and application programs. After reinstalling it, first, install the antivirus software program and update the antivirus immediately. After updating, perform the full scan of the system including backup data.

Check Your Progress

A. Multiple choice questions

1. Which is a ‘text editor’ for Microsoft Windows?
   (a) MS Word  (b) Ms Excel  
   (c) WordPad  (d) Notepad

2. Which of the following user can use the administrator password to perform administrative tasks?
   (a) Administrator user account  
   (b) Standard user account  
   (c) Power user account  
   (d) Authenticated user account

3. Which function key is pressed during reboot to enter in safe mode of Windows 10?
   (a) F8  (b) F2  
   (c) F1  (d) F9

4. Which one is the latest release of Windows client operating system?
   (a) Windows XP  (b) Windows 7  
   (c) Windows 8  (d) Windows 10

5. Which key combination is used to minimise all open windows and displays on the screen?
   (a) Alt+M  (b) Shift+M  
   (c) Windows Key+D  (d) Ctrl+D

6. What is the maximum number of primary partitions that can be created on a hard disk?
   (a) One  (b) Two  
   (c) Three  (d) Four
7. Which one is the default 'word processor' for Microsoft Windows?
   (a) MS Word  (b) Ms Paint
   (c) WordPad  (d) Notepad

8. Which of the following method is adopted for fresh installation of Windows 10 on a new computer in place upgrade?
   (a) Side-by-side migration
   (b) Clean installation
   (c) In place upgrade
   (d) Wipe-and-load migration

9. Which of the following Windows edition is used to install in mobile and tablets?
   (a) Windows 10 Mobile
   (b) Windows 10 Enterprise LTSC
   (c) Windows 10 Enterprise
   (d) Windows 10 Pro

10. Which of the following feature is available only in 64 bit?
    (a) Client hyper-V  (b) Cortana
    (c) Direct access  (d) Secure Boot

B. State whether the following statements are True or False

1. Antivirus and anti-malware both programs scan for same things but they work in a similar way.
2. After updating the antivirus, never perform a full scan of your system including that of backup data.
3. Every antivirus software programs has the same type of scanning way.
4. Close all open applications, browsers, programs, and documents for uninterrupted installation.
5. Quick Heal is a word processing software in Windows 10.
7. User is able set the boot order.
8. Windows 10 always manually updates the device driver.
10. The Windows task manager allows the user to monitor the current CPU and memory utilisation.

C. Fill in the blanks

1. For Microsoft Windows 10, 1 gigahertz or faster CPU with 1GB RAM for 32 bit and 2 GB RAM for ________ and with operating system.
2. To access Internet on the computer you need to configure ________ setting in Windows.
3. Windows 10 ________ updates the device driver.
4. Windows 10 supports ______ languages.
5. At the time of installation, the partition usually has drive ________.
6. When Windows 10 installation is running it asks for ________.
7. If you have the licensed copy of Windows 7, then it is possible to upgrade it to ________.
8. The existing operating system can be updated to Windows 10 without destroying the ________ data and settings.
9. Windows 10 setup program ________ retains the settings.
10. Windows 10 comes in various ________.

D. **Short answer questions**

1. Write steps of driver installation and removal.
2. What are the Windows 10 system requirements?
3. Write about the different editions of Windows 10 and their features?
4. What features of Windows 10 provide general usability and functional improvements?
5. Write the basic steps for clean installation of Windows 10.
6. What are the post installation tasks?
7. How to uninstall sound or any device driver?
8. How to give IP address and what is the use of IP address?
9. Write steps for installing a printer software.
10. Write steps for installing a scanner software.
CHAPTER 6
INSTALLATION OF UBUNTU LINUX

INTRODUCTION

Ubuntu (pronounced as oo-BOON-too) is an open source operating system sponsored by Canonical Ltd. Primarily, this operating system was developed for personal computers (PCs) but later on, used in servers also. The word ‘Ubuntu’ is from the African Zulu language whose meaning is “humanity to others.” The Ubuntu desktop is very easy to use and easy to install. It includes everything you need to use in your school, home or office. It’s also open source, secure, accessible, and free to download from its official website www.ubuntu.com. In this session, we will understand the installation requirement and installation procedure of Ubuntu desktop operating system using a bootable DVD drive or a USB flash drive.

FEATURES OF UBUNTU LINUX

- Ubuntu is user-friendly.
- Ubuntu is FOSS (free and open source software) operating system.
- Ubuntu can be downloaded from its official website www.ubuntu.com.
- It is more secure as compared to the Windows operating system.
- High customisation, it means you can set your own flavors of working.
- Many Ubuntu flavors are readily available.
- Online Ubuntu community is available to help you out in any problem.
- Minimum hardware is required to install Ubuntu.
- Lots of free software in software centers.

INSTALLATION REQUIREMENTS

Ensure the following technical requirements are in place before starting the installation:
- connect your computer system to an uninterrupted power source,
• ensure that your computer has at least 25GB of free disk storage space,
• make a bootable DVD or a USB flash drive of latest version of Ubuntu. Here we are taking the Ubuntu version 18.04,
• make sure to take data backup before starting the fresh installation.

**Boot from Ubuntu Bootable Disk DVD or USB Flash Drive**

To install Ubuntu, first prepare the bootable disk, either DVD or USB flash drive. Nowadays most computers are able to boot from USB. To install the Ubuntu Linux OS, follow the steps below:

• put the Ubuntu bootable disk in case of DVD into optical/DVD drives and in case of USB flash drive, into the USB socket. Make sure the boot device order has set to the disk being used as either CD/DVD or USB flash drive.
• restart the computer. After restarting, the computer will boot from the bootable DVD and the install window as shown in Figure 6.1 will appear on your computer screen.

There are two options shown, ‘Try Ubuntu’ and ‘Install Ubuntu’. The first option ‘Try Ubuntu’ allows you to just use the Ubuntu on a trial basis without permanent installation; the other option ‘Install Ubuntu’ allows actual installation. It will launch the installer automatically, as shown in Figure 6.1. After selecting the ‘Install Ubuntu’ option, select the language from the left side pane. By default, the language selected is ‘English’. Ubuntu can also be installed in other listed languages.

**Prepare to Install Ubuntu**

Now the installer will recognise your computer configuration and install the device drivers automatically.
If it doesn’t correctly guess the default layout of any device, use the ‘Detect keyboard layout’ button to run through a brief configuration procedure. The English (US) keyboard is selected by default in the keyboard layout option as shown in Figure 6.3.

Press ‘Continue’ to apply. The next window will appear as shown in Figure 6.4, that will ask you the type of installation— ‘Normal installation’ or ‘Minimal installation’.

The normal installation is the default bundle of utilities, applications, games, and media players — a great launchpad for any Linux installation. The minimal installation takes considerably less storage space and allows to install the required stuff. Select the normal or minimal as per your requirement. Generally normal option is selected by the beginners. Below are the other options, the two checkboxes ‘Download updates while installing Ubuntu’ and ‘Install third party...’.

It is recommended to tick both the options. Stay connected to the Internet to get the latest updates while the installation takes place.

**Select Installation Type and Allocate Drive Space**

The next installation window as shown in Figure 6.5 will ask you to provide the installation type. If the computer has already installed any other operating

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**Installation of Ubuntu Linux**
system then you can install the Ubuntu alongside the other operating systems, so that you have the option to boot the computer with any of the operating system. The ‘Erase disk and install Ubuntu’ option will format the hard disk and start the installation of Ubuntu. In this case all the previous data will be lost. If you are an advanced user choose the ‘Something else’ option.

Select the appropriate option and click on continue. The next window as shown in Figure 6.6 will allow you to review the partition and allocate the disk space. Change the partition as per your requirement and click on ‘Install Now’ button.

In any Linux system, there should be three partitions namely, swap, boot, and root (/). If you keep the pre-existing partitions as it is, click on ‘Install Now’ button to proceed the installation with pre-existing partitions. The alert will be displayed. Then click on ‘Continue’ button to continue the installation.

If you have to create the partitions manually as per your requirement, then click on the ‘Change’ button to change the partitions. The ‘Edit partition’ window will be displayed where you can create the partition. First, we will create the swap partition. Swap is a small space on the drive that is used like system memory (RAM). It is recommended to keep the swap area slightly more than

**Note:** Options related to side-by-side installation or erasing a previous installation are only offered when pre-existing installations are detected.
the amount of RAM in your PC. For example, having 1 GB of RAM creates swap area of 2GB (2048 MB) as shown in Figure 6.7. When you click ‘OK’ an alert will be displayed. Then click on ‘Continue’ button as shown in Figure 6.7 to create the partition name ‘swap area’.

A new partition is created with swap area of 2048 MB as shown in Figure 6.8. Next to create ‘/’ boot partition, use Ext4 journaling file system as shown in Figure 6.9.

To create boot partition, select ‘boot’ from dropdown of ‘mount point’. Also, note that the file system which Linux uses is selected by default as Ext4. Click ‘OK’ to create ‘/boot’ partition.

Then create ‘/home’ partition, use Ext4 journaling file system as shown in Figure 6.10.

Then you will need to create ‘/’ partition, Using Ext4 journaling file system as shown in Figure 6.11.
Begin Installation

After creating the partitions as above, the new partition table along with the storage space allocated to each area will be seen as shown in Figure 6.12. To begin installation, click on the ‘Install Now’ button.

Clicking on ‘Install Now’ button, a small pane will appear with an overview of the storage options you have chosen as shown in Figure 6.13. You have the chance to go back by clicking on the ‘Go Back’ button if the details are incorrect.

Fig. 6.12: Begin installation

Fig. 6.13: Write changes to disk

Click ‘Continue’ to fix those changes in place and start the installation process.

Select your location

If you are connected to the internet, your location will be detected automatically. Check if your location is correct and click ‘Forward’ to proceed. If you are not sure of your time zone, type the name of a local town, city, or use the map to select your location.

Fig. 6.14: Select your geographical location

Change login details

Enter your name and the installer will automatically suggest a computer name and username. These can
be changed if you prefer. The computer name is how your computer will appear on the network, while your username will be your login and account name.

Next, enter a strong password (Figure 6.15). The installer will let you know if it’s too weak. You can also choose to enable automatic login and home folder encryption. If your machine is portable, it is recommended to keep automatic login disabled and enable encryption. This should stop people from accessing your personal files if the machine is lost or stolen.

If you enable home folder encryption and you forgot your password, you won’t be able to retrieve any personal data stored in your home folder.

**Background installation**

The installation will now complete in the background while the installation window teaches you a little about how wonderful Ubuntu is. Depending on the speed of your machine and network connection, installation will take a few minutes.

**Installation of Ubuntu Linux**
**Installation complete**

After everything has been installed and configured, a small window will appear, asking you to restart your machine. Click on ‘Restart Now’ and remove either the DVD or USB flash drive when prompted. If you initiated the installation while testing the desktop, you also get the option to continue testing.

Thus, you have successfully installed Ubuntu Linux in your computer. Enter user credentials and use the Linux.

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**CHECK YOUR PROGRESS**

**A. Multiple choice questions**

1. System structure of Linux is _________.
   - (a) Microsoft Windows
   - (b) UNIX
   - (c) Window Vista
   - (d) Monolithic Kernel

2. Linux is an/a _________.
   - (a) closed Source
   - (b) freeware
   - (c) open source software
   - (d) Both (a) and (b)

3. Core of Linux operating system is _________.
   - (a) kernel
   - (b) shell
   - (c) terminal
   - (d) command

4. Which one provides command interpreter environment?
   - (a) kernel
   - (b) shell
   - (c) CPU
   - (d) hardware

5. Which directory contains configuration files in Linux?
   - (a) /etc/
   - (b) /bin/
   - (c) /dev/
   - (d) /root/
6. In Linux, a user can load or upload __________.
   (a) I/O modules
   (b) I/O devices
   (c) Kernel modules
   (d) File base I/O

7. File name that handles interrupts in Linux is __________.
   (a) access file
   (b) control file
   (c) interrupts file
   (d) proc interrupts file

8. In Kernel, signals are used to notify a certain __________.
   (a) decision
   (b) fault
   (c) strategy
   (d) procedure

B. Fill in the blanks

1. Ubuntu is a/an __________ source operating system.
2. On the time of installation of Ubuntu, if you are connected to the internet, your location will be detected __________.
3. Linux is _________ sensitive.
4. Linux considers _________ as its standard input device.
5. The administrative privileges are available to only a user know as _________.

C. Short answer questions

1. What is Linux Kernel?
2. What is the advantage of open source?
3. What are the basic components of Linux?
4. What is GUI?
5. What is the root directory?

Installation of Ubuntu Linux