

UNIT 8

Operating System Troubleshooting

A computer can run properly in presence of a special software program called *operating system*. For instance, probably you are using Windows 7 or Windows 10 in your PC. On the top of an operating system all other programs are installed. The operating system works like a manager of the computer system.

Lesson 1: Operating System: Basics and Installation

1.1 Learning Objectives

Upon completion of this lesson of the Unit you will be able to:

- Understand the basic concept of operating system and its functions.
- Learn how to install an operating system.

1.2 Operating System and Its Functions

Before we start operating system problems and troubleshooting it is important to have a clear idea about what is an operating system and what functions it performs.

Operating System: An operating system is a program that acts as an interface between the user and the computer hardware and controls the execution of all kinds of programs.

Example: Followings are the some popular operating systems:



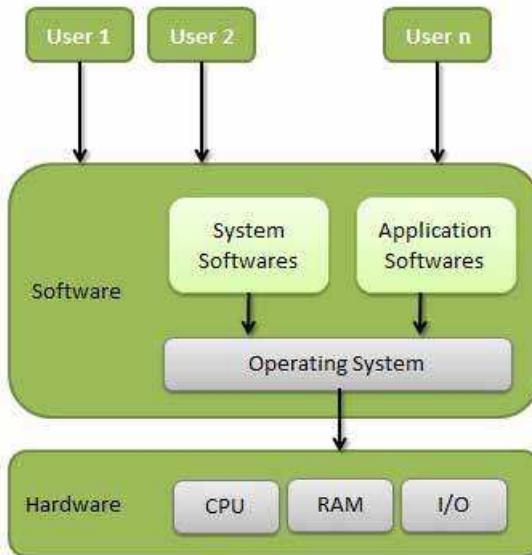


Figure 8 .1: Operating System: Concept

- Microsoft Windows: Such as Windows XP, Windows 7, Windows 10.
- Unix and its variants: Such as HP-UX, IBM's AIX, Red Hat, Debian, Ubuntu, Linux Mint.
- Mac OS X: It is developed, marketed, and sold by Apple Inc.,

Terminology: Before we get too far into our discussion of operating systems, it is essential to define a few key terms. The following are some terms you will come across as you study this chapter:

- **Version, Build No and Release Date:** A particular revision of a piece of software, normally described by a number that indicates how new the product is in relation to other versions of the product in the market. This number has three parts: the first part is called *Version Number*, the second one is called *Build No.* and the last one indicates its *Release Date*. Table 8 shows some version information for Windows operating system.
- **Source:** The actual code that defines how a piece of software works. Computer operating systems can be *open source*, meaning the OS can be examined, enhanced and modified by anyone, or they can be *closed source*. In the later case, only an owner or developer can modify or examine the code. *A word often used interchangeably with closed source is proprietary.* Again, open source are free while proprietary copies are

Table 8: Version Information of Windows

Operating System	Version / Build / Date
Windows Vista	6.0.6000 (08.11.2006)
Windows Vista, Service Pack 2	6.0.6002 (04.02.2008)
Windows Server 2008	6.0.6001 (27.02.2008)
Windows 7, RTM (Release to Manufacturing)	6.1.7600.16385 (22.10.2009)
Windows 10	10.0.11082 (16.12.2015)

subject to purchase.

- **Shell:** A program that runs on top of the operating system (OS) and allows the user to issue commands. For instance, commands `dir` and `ls` are equivalent for Windows and Linux namely for *displaying a list of a folder's files and sub-folders*.
- **Cooperative multitasking:** Early versions of Windows operating system worked in this fashion for performing multiple tasks. In this case, the multitasking depends on the application itself for using the processor and freeing up for others. Sometimes the application is unable to free the processor it is using due to many reasons. Eventually the processor fails to process any other application causing an *entire system lock*.
- **Preemptive multitasking:** In a multitasking method the operating system controls the use of processor by allocating a specific time for each application. It means, after that time the control of processor is taken away from the running application and given to another application. In this case, if an application crashes the operating system takes control of the processor away from the locked application and passes it on to the next application. It removes the possibility of locking the entire system, rather only a specific application can be locked up.
- **Multithreading:** Thread is a light weight process. Operating system that supports multithreading performs more tasks in parallel. Multithreading in operating system ensures i) resource sharing and ii) scalability. For example, when you create a word document a number of threads run, for instance one for spell checking, second one for processing user input and so on.
- **32-bit & 64-bit:** The operating system can be either 32-bit or 64-bit. As the number of bits increases it ensures two major benefits:

- More bits can process larger chunks of data at a time which results in higher accuracy.
- More bits means system can address a larger number of locations in physical memory. Addressing larger amount of physical memory is often needed by computation-intensive applications such as graphics processing.

Older operating systems (e.g. Windows 95) are 32-bit while new ones (e.g. Windows 10) are 64-bit.

1.2.1 Operating System Functions

This section highlights the basic functions of an operating system.

■ **Memory Management:** Memory management refers to management of primary memory or main memory. Main memory is a large array of words or bytes where each word or byte has its own address. Main memory provides a *fast storage* that can be accessed directly by the CPU. Operating system performs the following activities for memory management.

- Stores the statistic of primary memory usage. It includes how much memory is used and how much is available or free.
- In multiprogramming, operating system decides which process will get memory when and how much.
- Allocates the memory when the process requests it to do so.
- Frees (de-allocate) the memory when the process no longer needs it or it is terminated/finished.

■ **Processor Management:** In multiprogramming environment, operating system distributes the processor time for each process. This function is called *process scheduling*. Operating system does the following tasks for processor management.

- Keeps tracks of processor and status of process. Program responsible for this task is known as *traffic controller*.
- Allocates the processor(CPU) to a process.
- De-allocates processor when processor is no longer required.

■ **Device Management:** Operating system manages device communication through their respective drivers. The followings are the activities for device management performed by operating system.

- Keeps tracks of all devices. Program responsible for this task is known as the *I/O controller*.
- Decides which process gets the device when and for how much time.
- Allocates the device in the efficient way.
- De-allocates devices when the current process is terminated.

1.3 Installation of Operating System

In order to install the operating system we have selected *Microsoft's Windows 7* version because of its stability and popularity.

Followings are the steps to install Windows 7 in your computer.

1.3.1 Planning the Installation

As with any OS installation, we must first plan the installation process. Here are some of the most important things we should take into consideration when planning for Windows 7 installation:

- Check System Requirements
- Check Hardware and Software Compatibility
- Determine Disk Partitioning Options
- Complete a Pre-Installation Checklist

The minimum recommended specifications for Windows 7:

- ✓ 1 GHz 32-bit or 64-bit processor
- ✓ 1 GB of system memory
- ✓ 16 GB of available disk space
- ✓ Support for DirectX 9 graphics with 128 MB memory
- ✓ DVD-R/W Drive
- ✓ Internet access (to activate the Windows and get updates)

Select the appropriate version: The very first decision is whether the 32-bit or 64-bit version of Windows 7 should be installed. As mentioned earlier more bit means more memory addressing capability, so for machine with higher amount of RAM (i.e. more than 4GB) is suitable for 64-bit version.

1.3.2 Beginning the Installation Process

Step 1: Boot from the DVD. When installing on a physical computer insert your Windows 7 DVD media into your DVD drive and reboot your computer. If you are asked to press a key to boot from DVD or CD, press any key. For this purpose, you may need to change the *boot sequence* from the BIOS.

A black window as shown in Figure 8 .2 will appear while the DVD content is read. Next, a Starting Windows screen will appear as shown in Figure 8 .3.

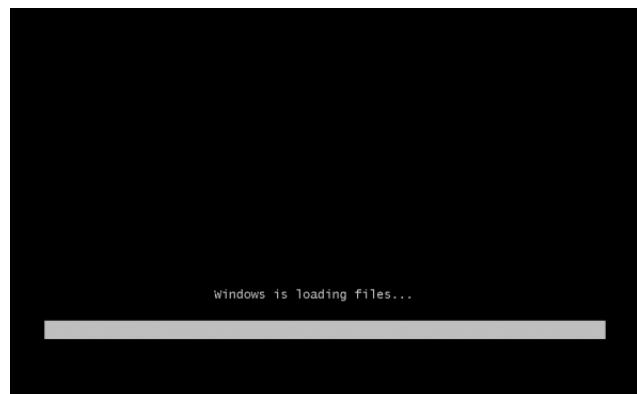


Figure 8 .2: Windows Installation Step 1



Figure 8 .3: Windows Installation Step 1 (Cont.)

Step 2: Basic Settings of Installation. Previous versions of Windows such as Vista and Windows Server 2008 had noticeable text phase of the setup

process. Windows 7 will boot directly into the Graphical User Interface (GUI) mode.

After a few moments you will see the first prompt like Figure 8 .4



Figure 8 .4: Windows Installation Step 3

Now click next button and you will see the screen as in Figure 8 .6.



Figure 8 .5: Windows Installation Step 3 (Cont.)

Step 3: License Agreement. After clicking on the **Install Now** button the following screen will appear. Mark the checkbox *I accept the license terms*.

Step 4: Start Installation. Next, unless you are upgrading an existing Windows installation, press the **Custom (Advanced)** installation type button. *Note that in this case, the Upgrade button is disabled because this specific installation is performed on a new computer without any previous operating system on it.*

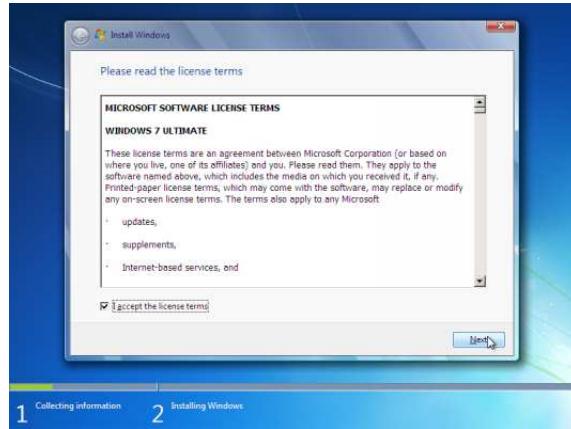


Figure 8 .6: Windows Installation Step 3

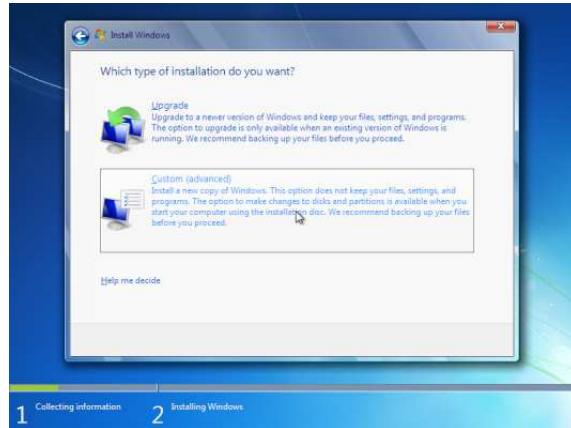


Figure 8 .7: Windows Installation Step 4

Step 5: Select the Installation Partition. If the computer has a new hard disk that has not been formatted before, you will have the option to create a new partition on it.

- If you do not want to specify a specific partition to install Windows on click **Next** to begin the installation.
- If you want to create, extend, delete, or format a partition, click **Drive options (advanced)**, click the option you want, and then follow the instructions.

The setup process will now begin to copy files from the installation DVD media to the hard disk. A figure like 8 .9 should appear.

This process may take time depending on the type of hardware your computer uses. The computer will reboot by itself and the you will find the prompt

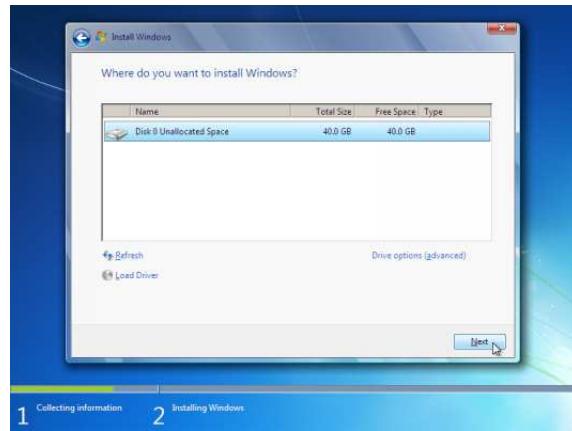


Figure 8 .8: Windows Installation Step 5

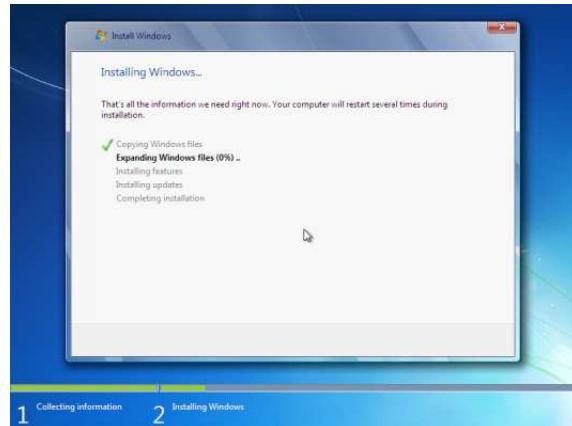


Figure 8 .9: Windows Installation Step 6

to set the user and computer name. By default, the computer name will be *username-PC*, where *username* is the username you have already entered.



Figure 8 .10: Windows Installation Step 7

1.4 Exercise

1.4.1 Multiple Choice Question

1. What is the version number of Windows 7?
 - a) 5
 - b) 5.5
 - c) 7
 - d) 6

2. Which one is true about Cooperative Multitasking?
 - a All modern operating systems provides Cooperative Multitasking.
 - b It may experience entire system lock.
 - c It depends only on processor.
 - d Application has no control over it.

1.4.2 Analytical Question

1. What is an Operating System? Describe its various functions.

2. Describe the step by step process to install Windows 7 in your computer.