



HNDIT1032

Computer and Network Systems

Week 09- Software &
Operating System

Introduction

- The computer, as a machine, can do nothing for you without the software.
- Software is required for the functioning of computer.
- Software programs instruct computer about the actions to be performed, so as to get the desired output.

Software

- A computer system consists of hardware and software.
- Software is a set of programs that instructs the computer about the tasks to be performed.
- Software tells the computer how the tasks are to be performed; hardware carries out these tasks.

Types of Software

- Software can be broadly classified in two categories:
 - System Software.
 - Application Software.

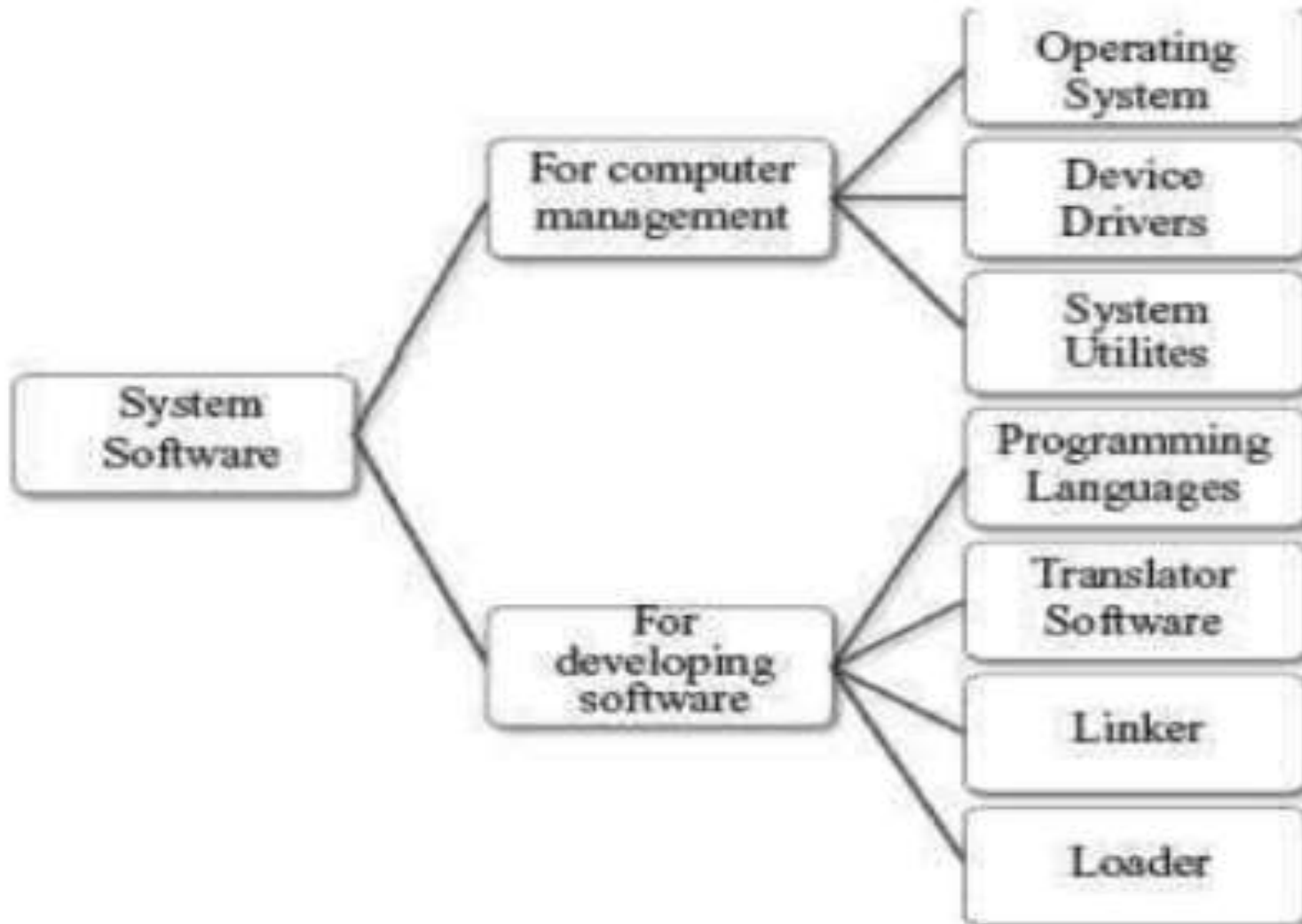
System Software

- The purposes of the system software are:
 - To provide basic functionality to computer,
 - To control computer hardware, and
 - To act as an interface between user, application software and computer hardware.

Categories of System Software

- On the basis of their functionality, system software may be broadly divided into two categories
 - Management and functionality of computer.
 - Development of application software

Categories of System Software



Application Software

- The software that a user uses for accomplishing a specific task is the application software.
- Application software may be a single program or a set of programs.
- A set of programs that are written for a specific purpose and provide the required functionality is called software package.

Examples of Application Software

- Word Processing Software
- Image Processing Software
- Accounting Software
- Spreadsheet Software
- Presentation Software
- CAD/CAM Software
- Web Browser Software

Software Market

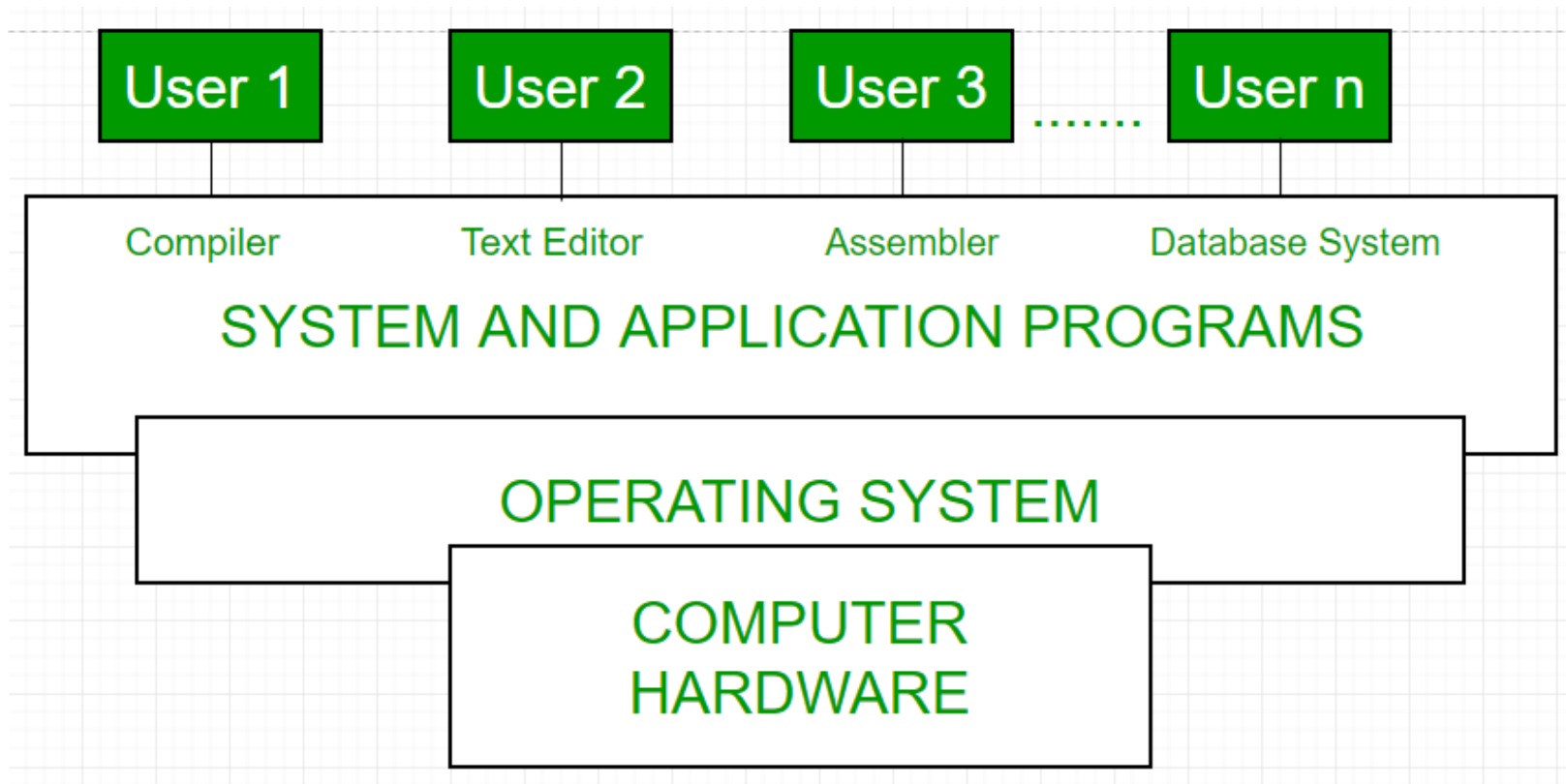
- Retail Software
- OEM Software stands
- Demo Software
- Shareware
- Freeware
- Public Domain Software
- Open-Source Software



Operating System(OS)

- Any computer system you use has an operating system.
- The user interacts with the machine via the operating system.
- A software on the machine interacts with the hardware via the operating system.
- Operating system intermediates between the hardware and the user.

View of OS



Types of OS

- Single User and Single Task OS
- Single User and Multitasking OS
- Multiuser OS
- Multiprocessing OS
- Real Time OS
- Embedded OS

Single User Single Task

- This is for use by a single user for a standalone single computer for performing a single task.
- Operating system for Personal Computers (PC) are single user OS.
- For example, if the user is editing a document, then a document cannot be printed on the printer simultaneously.
- Example MS DOS

Single User Multitasking

- This is allows execution of more than one task or process concurrently.
- The processor switches rapidly between processes.
- For example, the user can listen to music on the computer while writing an article using a word processor software.
- Example Windows OS.

Multuser OS

- This is used in computer networks that allow same data and applications to be accessed by multiple users at the same time.
- Linux, UNIX, and Windows are examples of multi user OS.

Multiprocessing OS

- This have two or more processors for a single running process.
- Processing takes place in parallel and is also called parallel processing.
- Since execution takes place in parallel, they are used for high speed execution, and to increase the power of computer.
- Linux, UNIX and Windows

Real Time OS

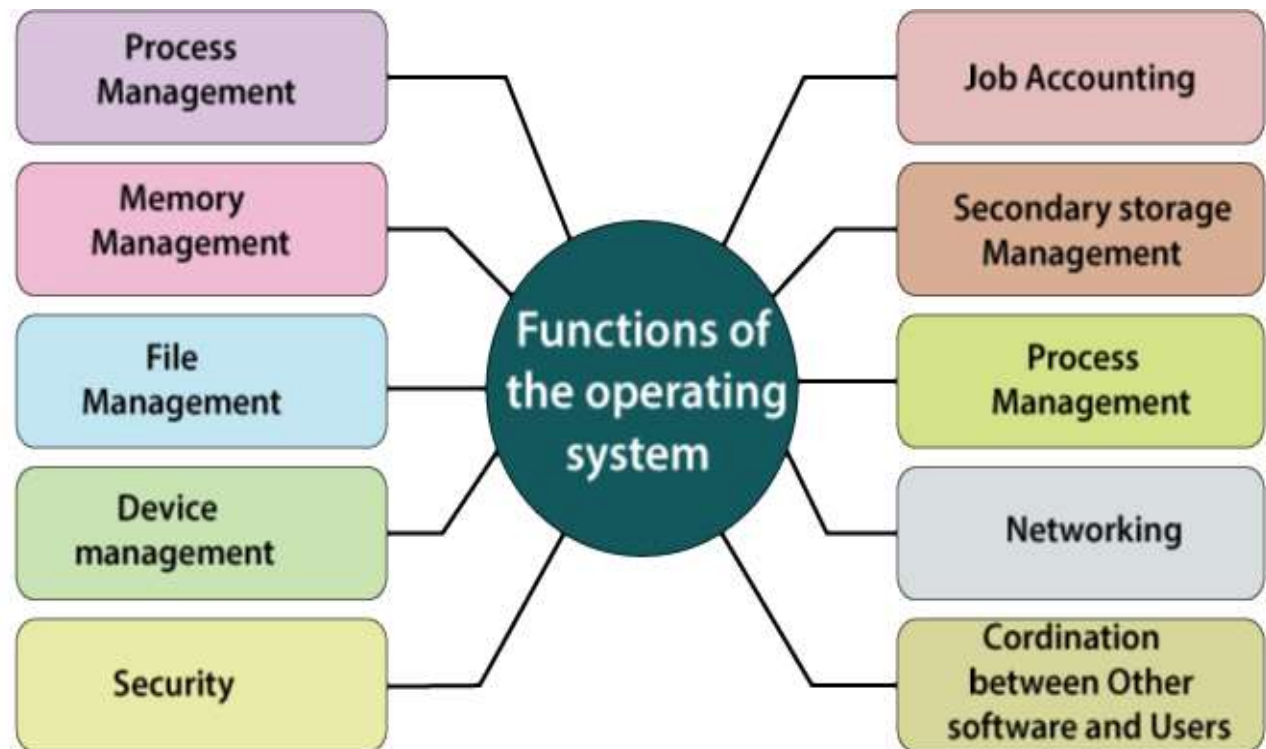
- Real time OS are designed to respond to an event within a predetermined time.
- These operating systems are used to control processes. Processing is done within a time constraint.
- They are used to respond to queries in areas like medical imaging system, industrial control systems etc.

Embedded OS

- This is embedded in a device in the ROM.
- They are specific to a device and are less resource intensive.
- They are used in appliances like microwaves, washing machines, traffic control systems etc.

Functions of OS

- Process Management
- Memory Management
- File Management
- Device Management
- Protection & Security
- Communication
- User Interface



Process Management

- A process is a program in a state of execution.
- A process can be created, executed, and stopped.
- To accomplish a task, a process needs to have access to different system resources like I/O devices, CPU, memory etc.
- The process management function of an operating system handles allocation of resources to the processes in an efficient manner.

Memory Management

- In a computer, there may be multiple processes executing at the same time.
- Memory management is one of the tasks handled by the operating system.
- Memory management schemes handle the allocation of memory to different processes.
- Paging, Virtual memory



Virtual Memory

- A computer can address more memory than the amount physically installed on the system.
- This extra memory is actually called virtual memory and it is a section of a hard disk that's set up to emulate the computer's RAM.

File Management

- The file management function of the operating system involves handling the file system which consists of two parts—a set of files, and a directory structure.
- File is a collection of related information, has a name, and is stored on a secondary storage.
- It is the smallest named unit that can be written to a secondary storage device.

Device Management

- An operating system communicates with the devices controllers with the help of device drivers while allocating the device to the various processes running on the computer system.
- Device drivers are the software programs that are used by an operating system to control the functioning of various devices in a uniform manner.

Protection & Security

- User accounts—individual accounts for user Authentication—using password protection
- Access rights—define rights for access of different kind of information for different people.
- Data encryption—store data

User Interface(UI)

- The primary goal of operating system is to make the computer convenient for use by its user.
- It should allow users to easily access and communicate with the applications and the hardware.

Types of UI

- The users can interact with the computer by using mainly two kinds of interfaces
 - Command Line Interface (CLI)
 - Graphical User Interface (GUI)

Command Line Interface

- CLI requires the user to interact with operating system in the form of **text keyed** in from the keyboard.
- In this, the user ***should to learn and remember the different commands*** required for copying, deleting, opening a file or folder etc.
- Example **MS-DOS & Linux shell**

Example- MS-DOS

```
C:\WINDOWS\system32\cmd.exe
10/04/2007 04:51 PM <DIR> Start Menu
01/27/2003 03:15 PM <DIR> Templates
02/07/2003 02:35 PM <DIR> WINDOWS
5 File(s) 238,543 bytes
19 Dir(s) 47,378,472,960 bytes free

C:\Documents and Settings\kheintz>cd ..
C:\Documents and Settings>cd ..
C:\>dir
Volume in drive C is media 02
Volume Serial Number is BC2E-0ED8

Directory of C:\

06/10/2004 03:59 PM 0 0000_
09/15/2003 10:01 AM 90 AUTOEXEC.BAT
02/07/2003 12:33 PM 2 autoexec.ixl
10/21/2008 01:18 PM <DIR> Batch_Upload
01/27/2003 03:19 PM 0 CONFIG.SYS
06/13/2005 02:58 PM 3,197 DEBUG.TXT
02/28/2005 02:47 PM <DIR> dell
01/30/2009 07:12 PM <DIR> divx
10/13/2008 03:26 PM <DIR> Documents and Settings
02/28/2005 02:48 PM <DIR> drortmp
04/20/2009 01:52 PM <DIR> ev97dos
02/11/2009 12:14 PM 330,347 fwlog.txt
02/10/2009 05:27 PM 4,194,402 fwlog.txt.old
05/30/2008 03:58 PM <DIR> KPCMS
03/09/2004 11:12 AM <DIR> Microtek
04/16/2009 05:59 PM <DIR> My Downloads
01/27/2003 05:19 PM <DIR> My Music
10/24/2005 01:42 PM <DIR> NPS
11/05/2008 04:43 PM <DIR> prntdrvr
04/16/2009 06:10 PM <DIR> Program Files
12/09/2003 06:27 PM 56,710 service.txt
11/09/2005 11:33 AM <DIR> spoolerlogs
02/20/2008 10:45 AM <DIR> Temp
09/15/2003 10:01 AM 0 Tempfile.txt
04/16/2009 06:15 PM <DIR> WINDOWS
11/06/2003 02:17 PM <DIR> WUTemp
9 File(s) 4,584,748 bytes
17 Dir(s) 47,378,472,960 bytes free

C:\>
```

Graphical User Interface

- The interface consists of icons, menus, windows, and pointers.
- The user need not learn the commands, instead, the user can give instructions by moving the pointer on the screen using a mouse and pressing the mouse button
- MS Windows, Linux, Mac OS

Example-GUI



Examples of OS

- Ms DOS
- Windows 11
- Linux
- Mac OS
- Android
- IOS

MS-DOS

- MS-DOS was the first widely-installed operating system for PCs in 1980s.
- MS-DOS is easy to load and install. It neither requires much memory for the operating system, nor a very powerful computer to run on.
- MS-DOS is a command line user interface operating system. This means that the user has to type single line commands through the command interface.

Windows OS

- Windows is a personal computer operating system from Microsoft.
- The Windows family of OS which is currently in use includes the Windows 9x family (Windows 95, Windows 98 and Windows 2000), Windows XP, Windows Vista, and Windows 7,8,11 operating systems.
- Windows family of OS is GUI-based operating system. Since GUI interfaces are easy to use and are user-friendly, these have become very popular.

Linux OS

- Linux is a 32-bit, multi-tasking OS. It supports multiple users and multiple processors.
- Linux is a reliable and secure OS, and is available almost for free. So, Linux is fast becoming very popular and powerful OS.
- Linux OS is easily available, such as Redhat Linux ver. 9, and, Debian-s—Ubuntu, Kubuntu, and Edubuntu.

Example-Linux OS



MacOS

- MacOS is a Unix operating system developed and marketed by Apple Inc since 2001.
- It is the primary operating system for Apple's Mac computers.
- Within the market of desktop and laptop computers it is the second most widely used desktop OS.

Mobile OS



References

- Clements, A., The Principles of Computer Hardware, Oxford University Press (4th Ed), 2006.