Module Code: CSE401

Session 2: Linux Operating Systems

Session Speaker:

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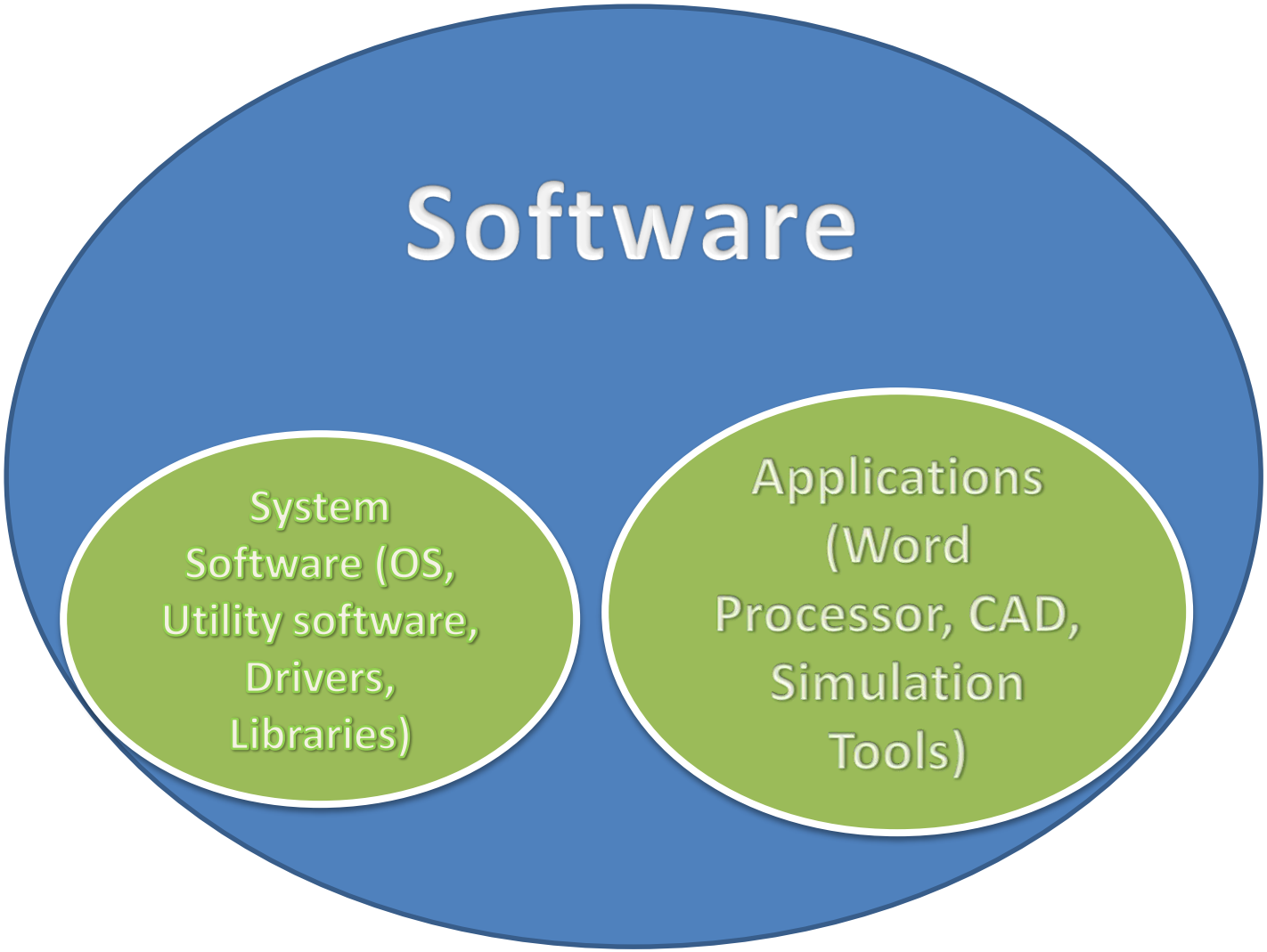
Session Objectives

- To identify system software, including software libraries, operating system and utility software.
- To identify application software
- To describe the basic organization of computer systems and operating systems.
- To provide a grand tour of the major components of operating systems.
- To describe the services an operating system provides to users, processes, and other systems.
- To discuss the various commands linux operating system

Contents

- System software
- Operating system
- Utility software
- Software libraries
- Application software

Types of Software



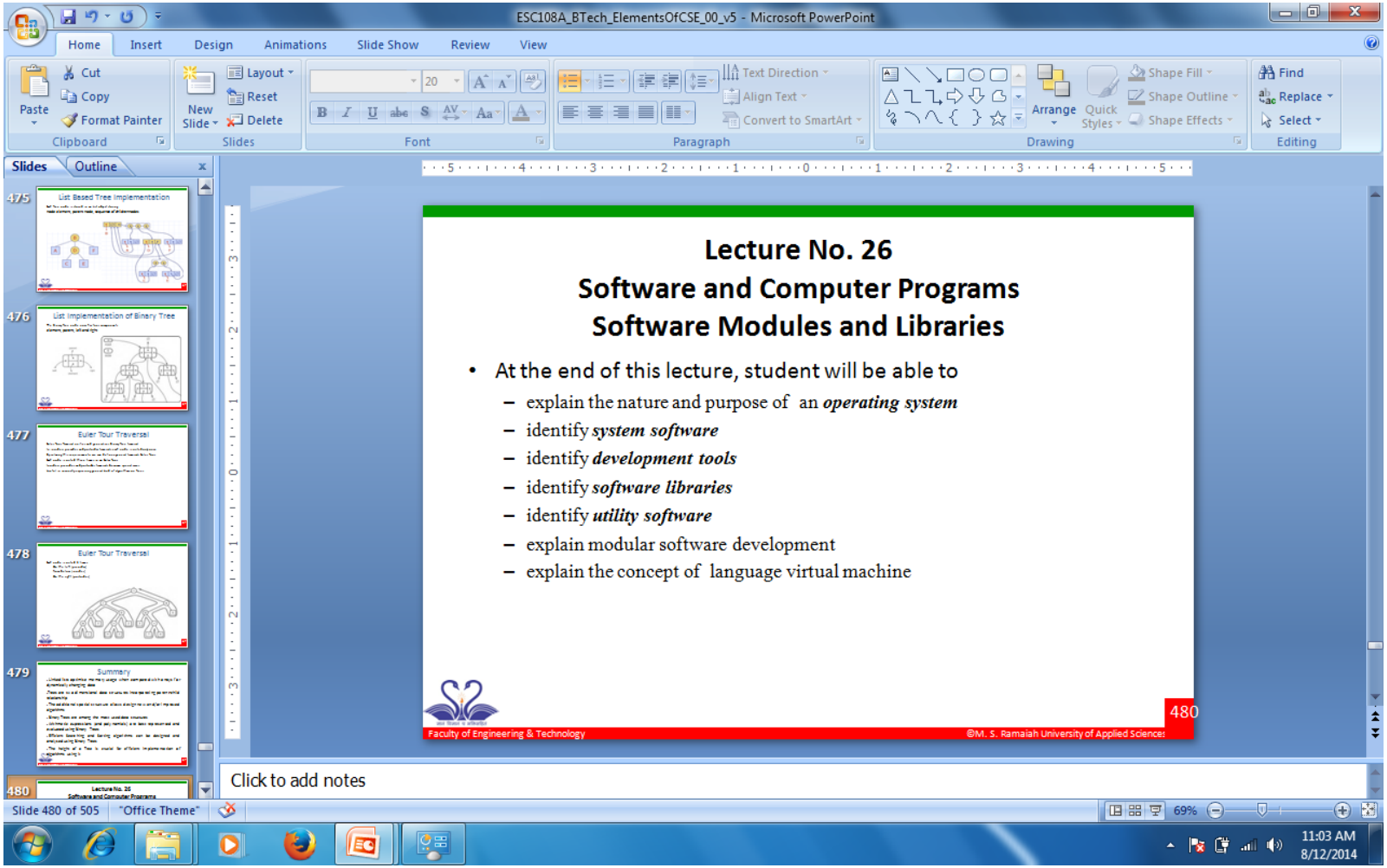
Application Software

- Any software for me to use?

Application Software

- Provided for the user
  - Browser
  - Document management software
  - Presentation software
  - Movie players

Application Software



System Software

- Which software provides an environment for the programs to run?

System Software

- Used for managing the computer hardware and provide a platform for applications to execute
  - Drivers
  - File system libraries
  - Registry
  - Utility software
  - Operating system
  - Runtime Libraries

Operating System

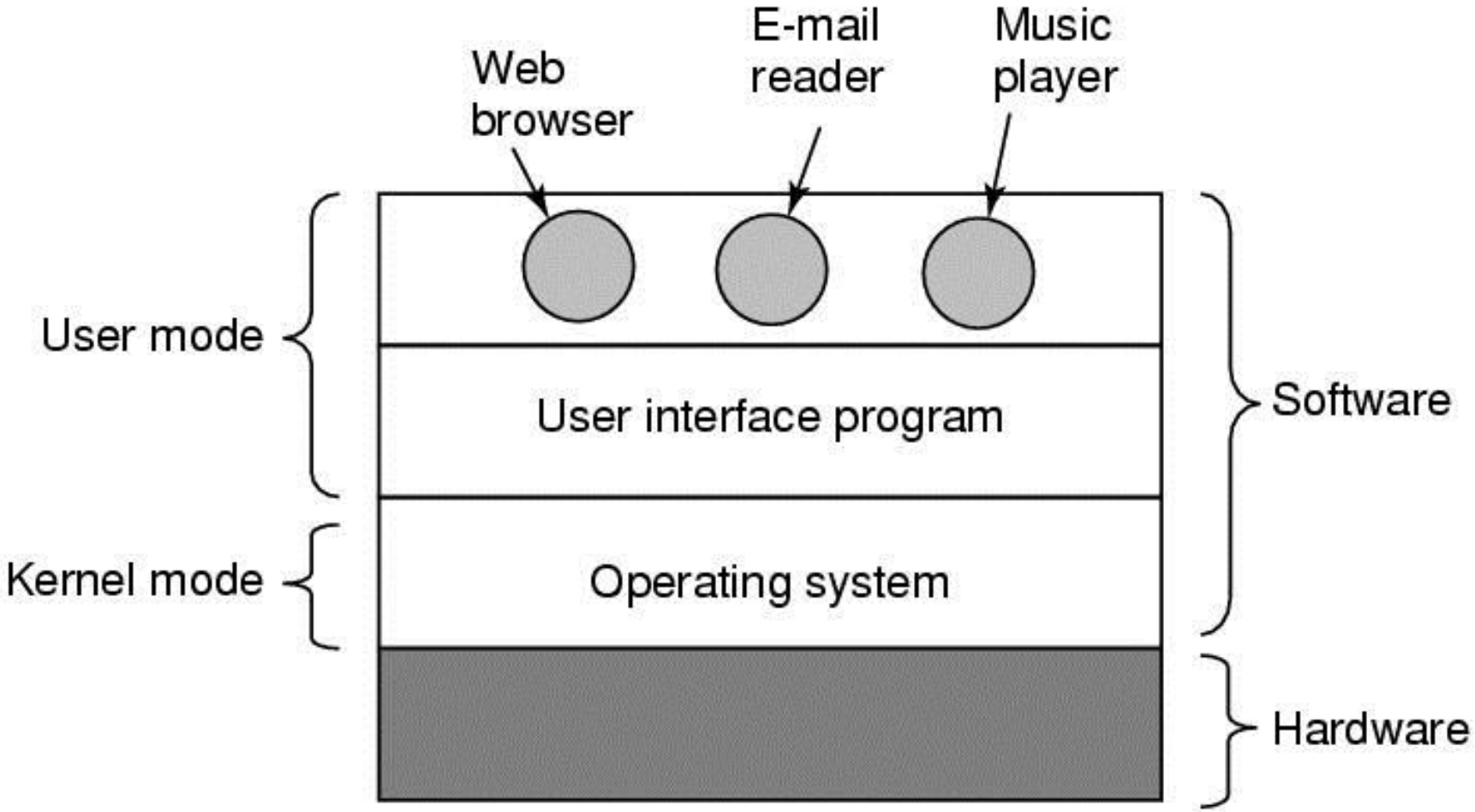
- Why do we need it?

Operating System

- A place to run programs
- Gives an interface to user
- Manages hardware using “Drivers”

- An OS is a program that acts an intermediary between the user of a computer and computer hardware
- Example
  - DOS, Linux, Windows

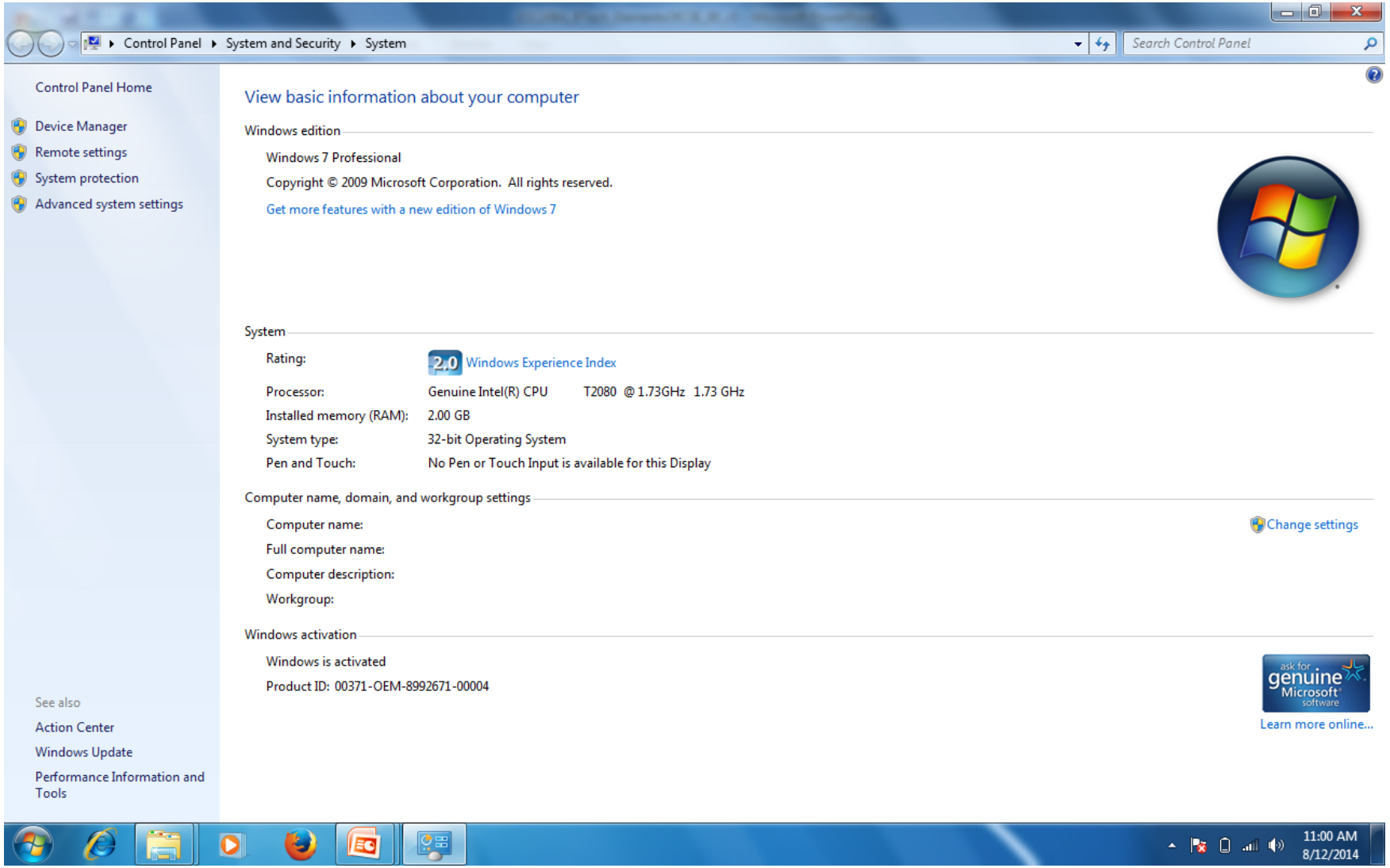
Where does the OS fit in?



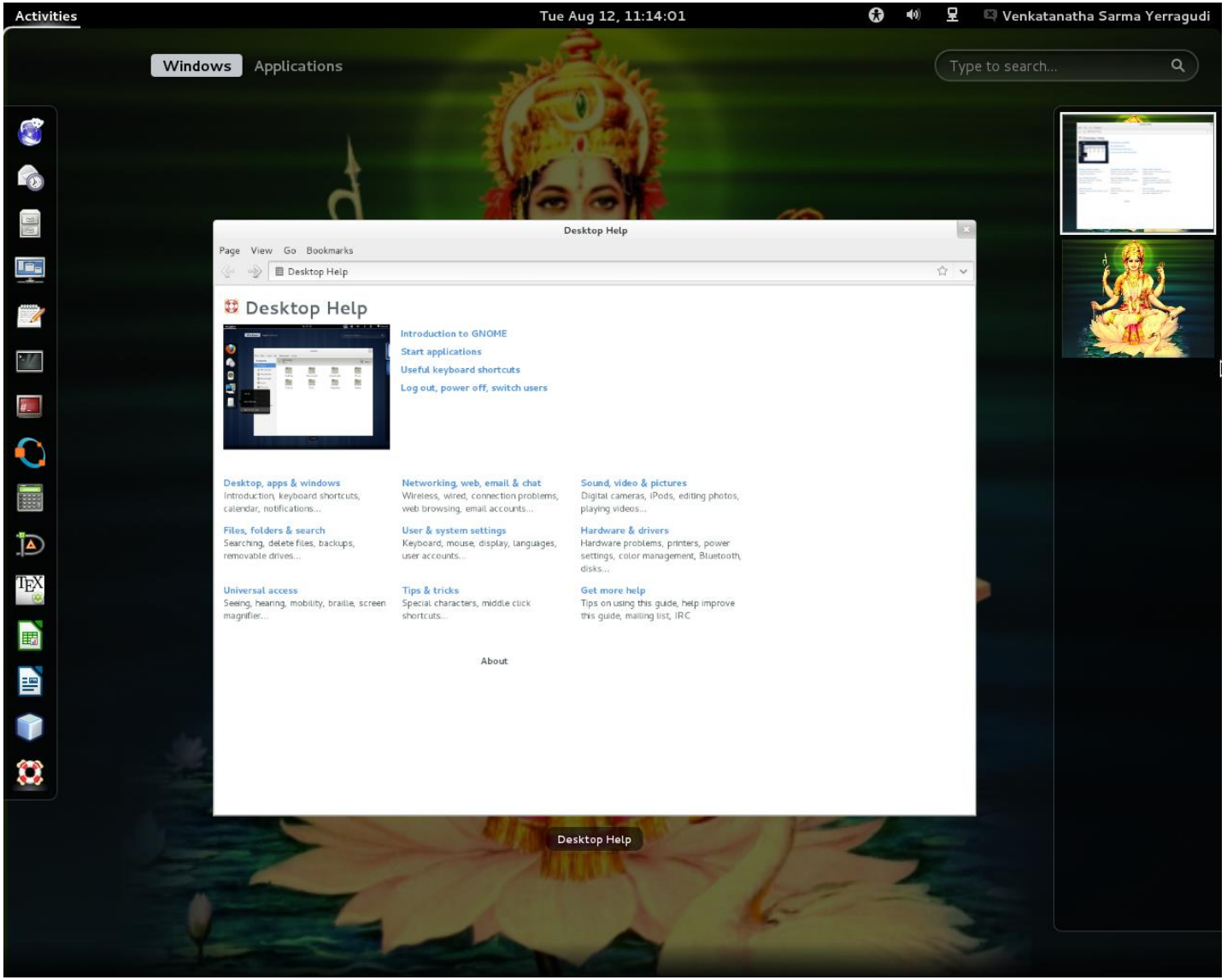
Services Provided by an OS

- Memory management
  - Allocating memory to running programs and deallocation
- Processor management
  - Processing jobs, job scheduling
- Device management
  - Deals with specific input and output units
- File management
  - Deals with where the files are stores, their status and memory locations

Operating System



Operating System



Utility Software

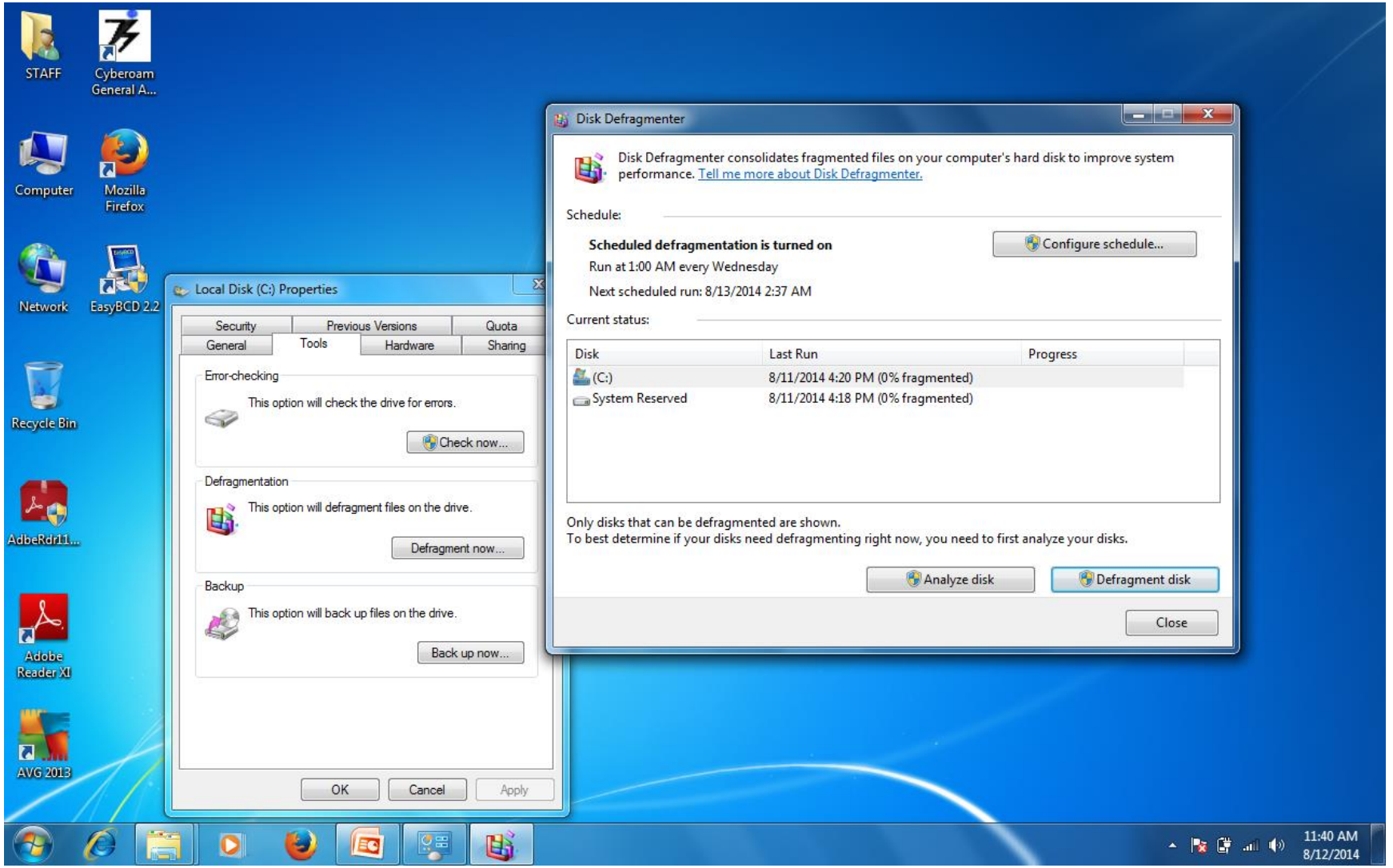
- Is there any software that I can use to make my system run faster?

Utility Software

- Software that is used to analyse, configure, optimise and maintain the computer system
  - Disk and File System management Tools
  - Antivirus
  - Firewall

- Also a System Software

Utility Software



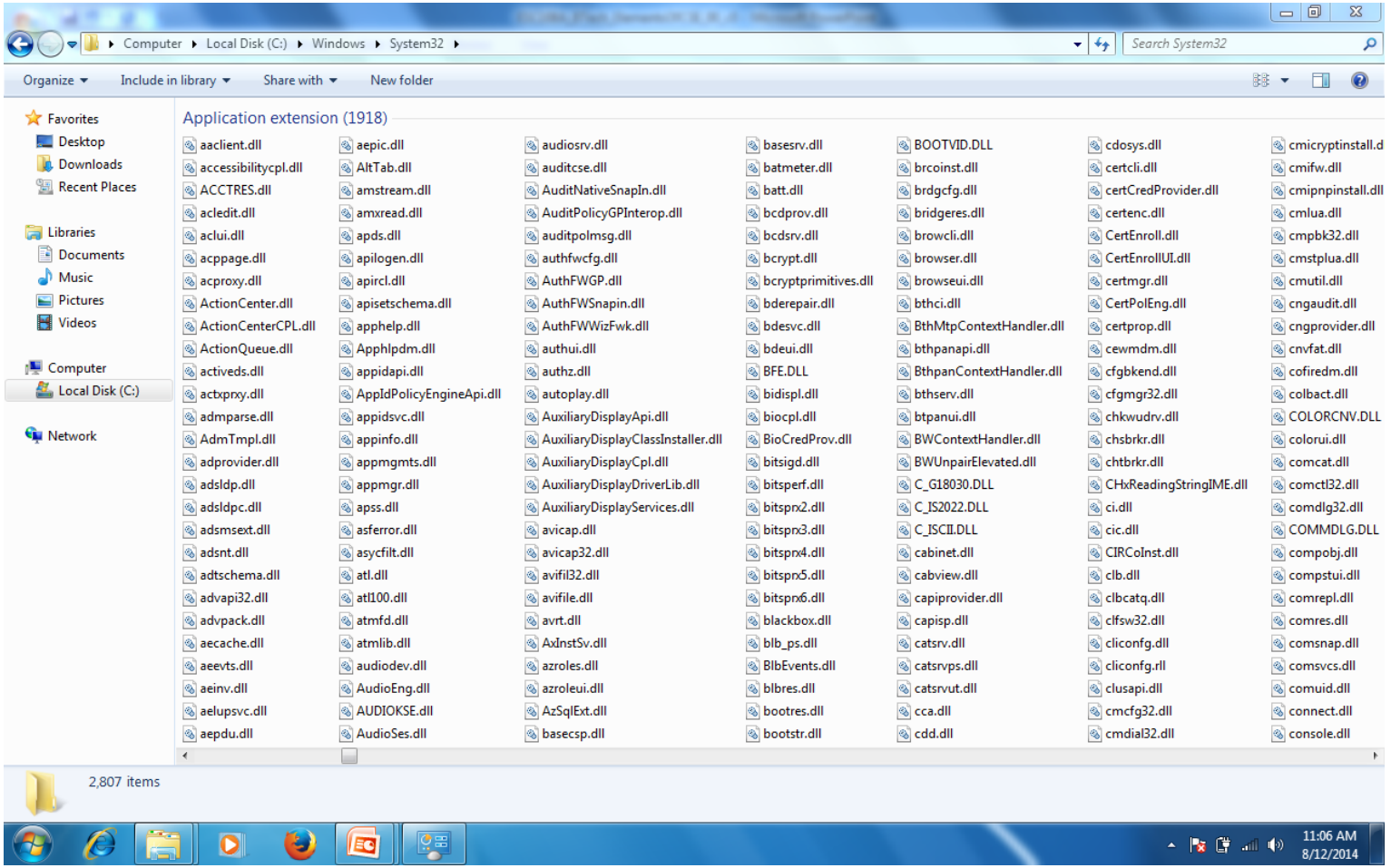
Software Libraries

- Who defined printf?

Software Libraries

- Provide functions
  - Used by many executables
  - Reduces code, increases reuse
  - DLLs in Windows
  - SO in Linux

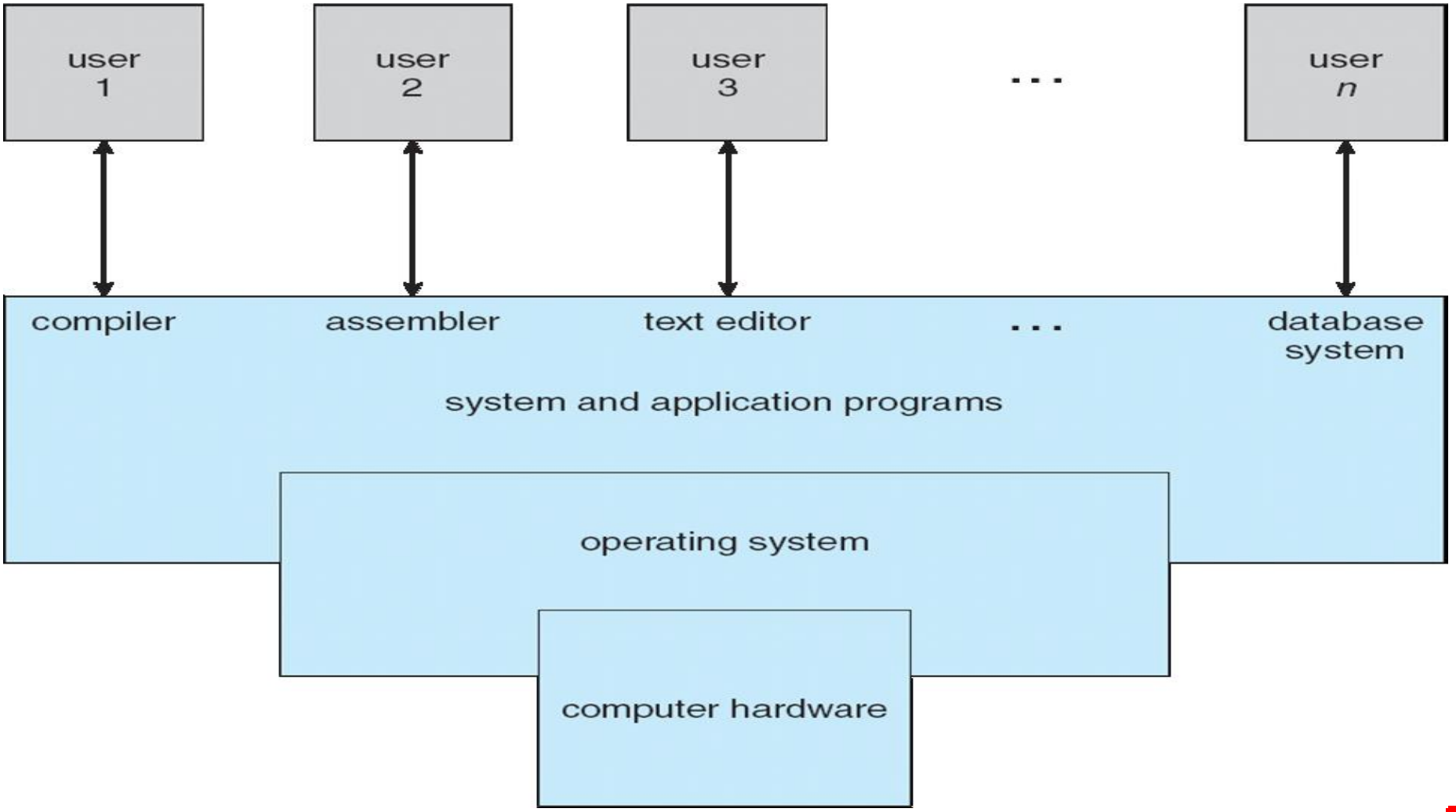
Software Libraries



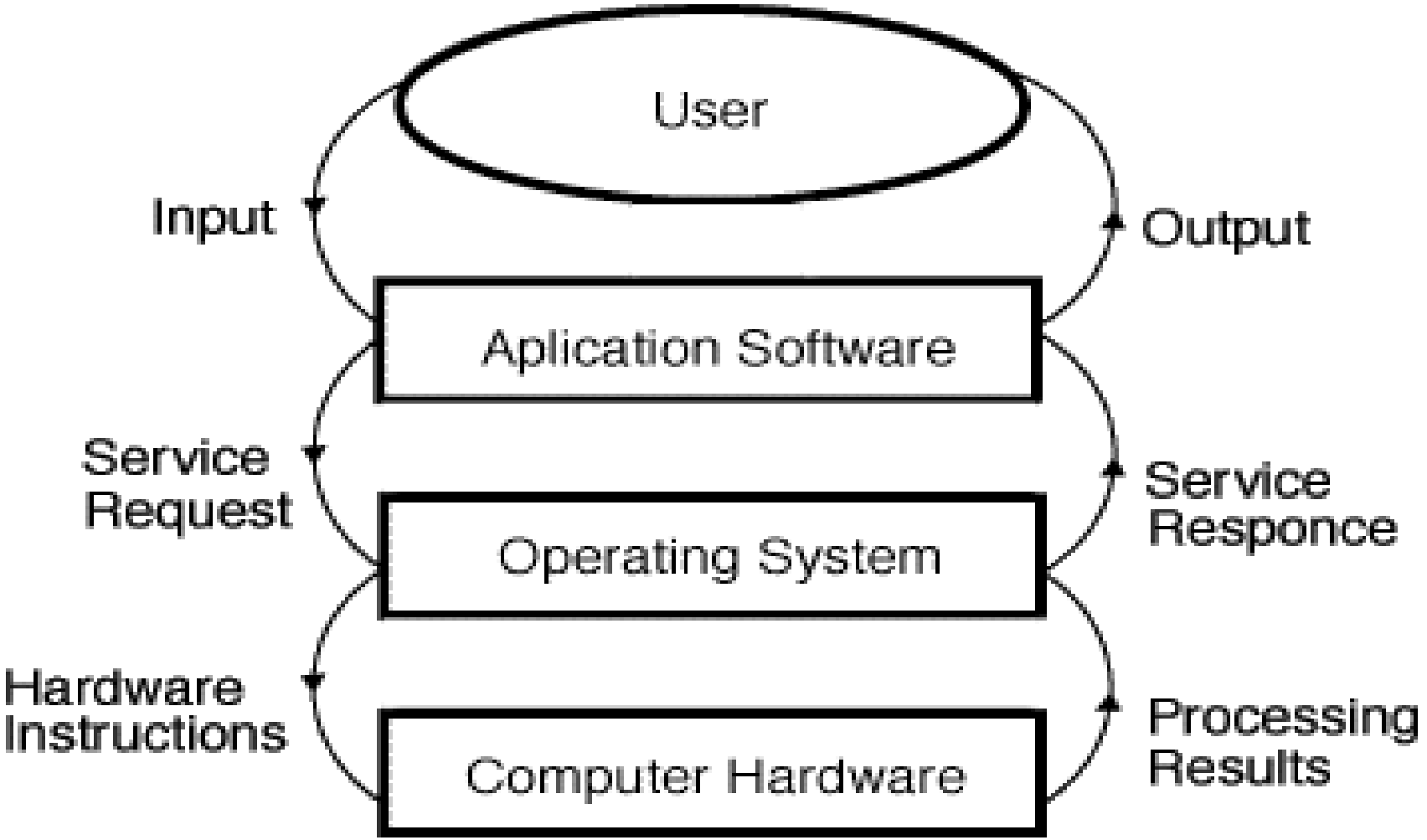
Computer System Components

1. Hardware – provides basic computing resources (CPU, Memory, I/O devices, Communication).
2. Operating System – controls and coordinates use of the hardware among various application programs for various users.
3. System & Application Programs – ways in which the system resources are used to solve computing problems of the users (Word processors, Compilers, Web browsers, Database systems, Video games).
4. Users – (People, Machines, other computers).

Static View of System Components



Dynamic View of System Components



Views of an Operating System

- There are three classical views (in literature):
  1. Resource Manager – manages and allocates resources.
  2. Control program – controls the execution of user programs and operations of I/O devices.
  3. Command Executer – Provides an environment for running user commands.
- But one more modern view: the Operating System as a Virtual Machine.

Command Executer

- Command Executer:
  - Interfaces between the users and machine.
  - Supplies services/utilities to users.
  - Provides the users with a convenient CLI (Command Language Interface), also called a Shell (in UNIX), for entering the user commands.
- Sort of a top-down view.

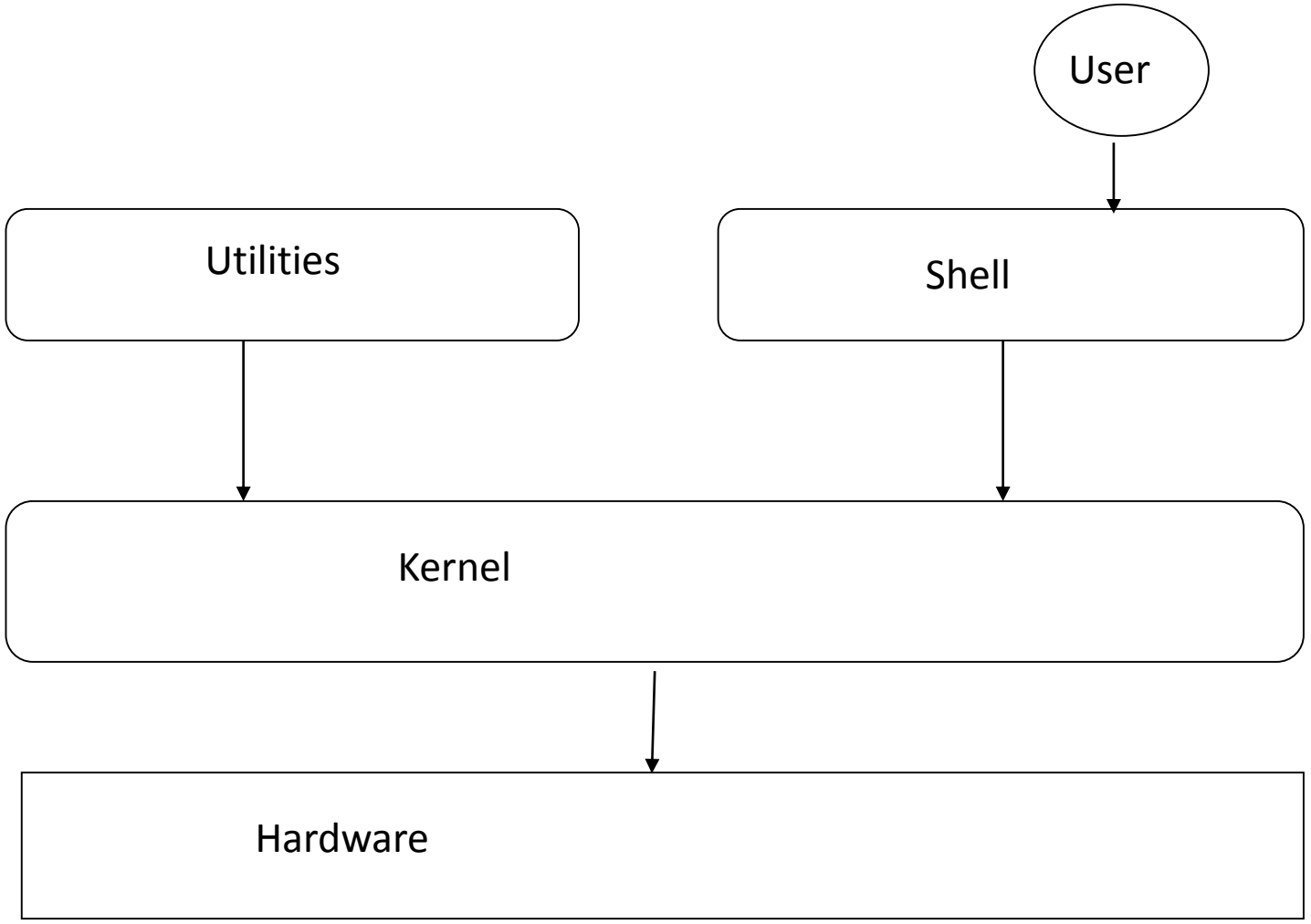
Modern view: Virtual Machine

- Operating System as a Virtual Machine:
  - Multiple OS environments can co-exist on the same primary hard drive, with a virtual partition that allows sharing of files generated in either the "host" operating system or "guest" virtual environment.

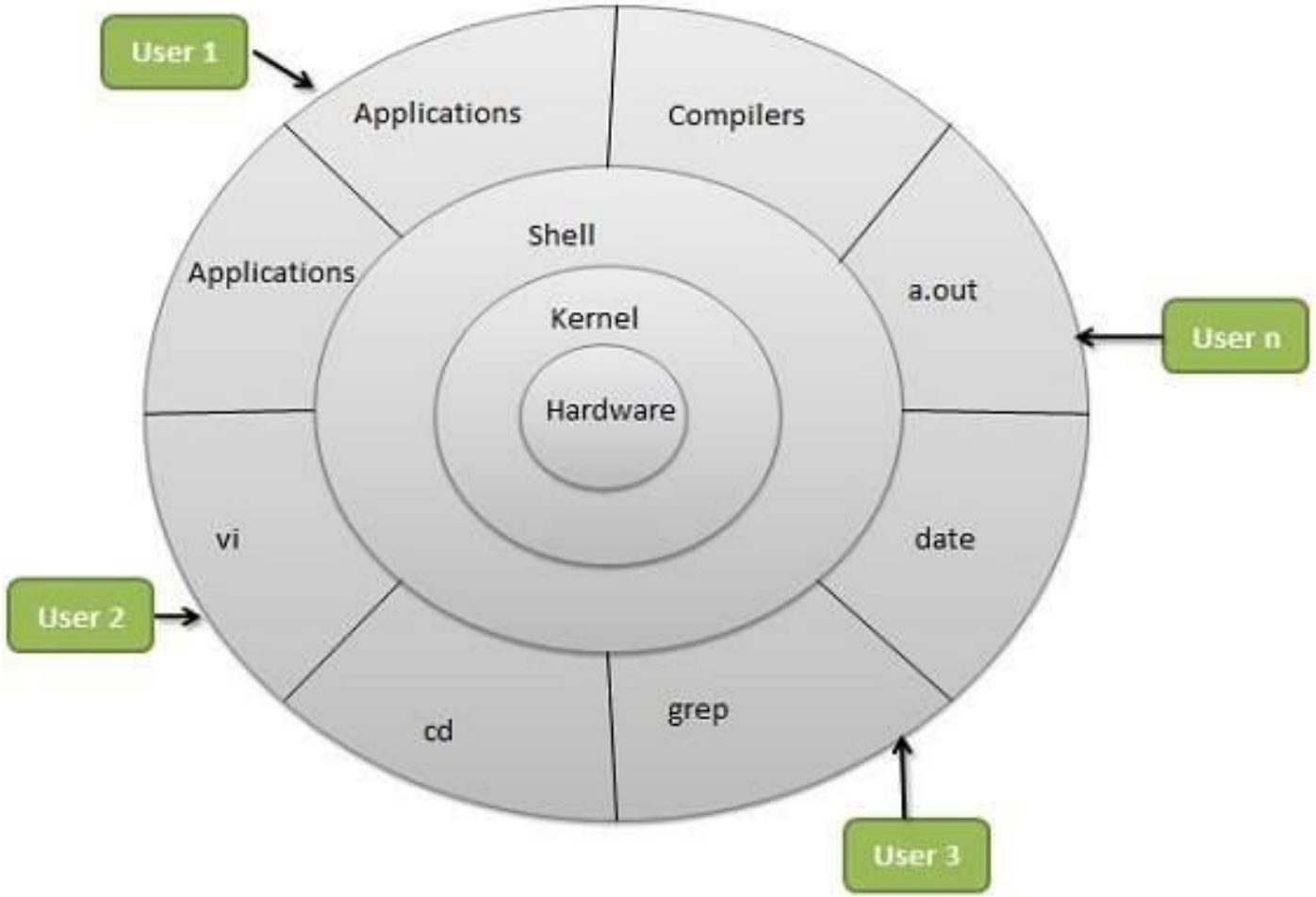
Linux

- The **Linux** open source **operating system**, or **Linux** OS, is a freely distributable, cross-platform **operating system** based on Unix that can be installed on PCs, laptops, netbooks, mobile and tablet devices, video game consoles, servers, supercomputers and more.
- Popular Linux OS distributions include Debian, Ubuntu, Fedora, Red Hat and openSUSE.

Linux Shell and Utilities



General Linux Architecture



CLI is the User OS Interface

CLI (Command Line Interface)allows direct command entry:

- Sometimes implemented in kernel, sometimes by systems program.
- Sometimes multiple flavors implemented – shells.
- Primarily fetches a command from user and executes it.
- Sometimes commands built-in, sometimes just names of programs.
- The shell is a command line interpreter. The user interacts with the kernel through the shell.

Linux Commands

- **pwd command-**‘pwd’ command prints the absolute path to current working directory.

  E.x. $ pwd
  /home/raghu

- **cal command**-Displays calendar of current month.

  E.x. $ cal

  July 2012
  Su Mo Tu We Th Fr Sa
  1 2 3 4 5 6 7
  8 9 10 11 12 13 14
  15 16 17 18 19 20 21
  22 23 24 25 26 27 28
  29 30 31

Linux Commands

- ‘cal ’ will display calendar for specified month and year

```
$ cal 08 1991
August 1991
Su Mo Tu We Th Fr Sa
1 2 3
4 5 6 7 8 9 10
11 12 13 14 15 16 17
18 19 20 21 22 23 24
25 26 27 28 29 30 31
```

- **echo command**-This command will echo whatever you provide it.

```
$ echo "linoxide.com"
linoxide.com
```

Linux Commands

- **date command-**Display current time and date.

  $ date
  Fri Jul 6 01:07:09 IST 2012

- **whoami command-**This command reveals the current logged in user.

  $ whoami
  Raghu

- **clear command-**This command clears the screen.
- **Manual Pages-** '--help' option and 'whatis' command do not provide thorough information about the command. For detailed information, Linux provides man pages and info pages. To see a command's manual page, man command is used.

  $ man date

Linux Commands

- **cd Command**-Change the current working directory to the directory provided as argument.
- **rmdir command**-rmdir' command removes any empty directories, but cannot delete a directory if a file is present in it
  - $ rm files|directories
- **mkdir command-**To create a directory, ‘mkdir’ command is used.
  - $ mkdir example
- **ls command**-List files in current directory
  - $ ls
    example file1.txt file2.txt file3.txt

Linux Commands

1. Write and save the program

   -Vim Editor-Vim is an editor to create or edit a text file

   $vim helloworld.c

2. Compile the program
   - cc helloworld.c (or)
   - cc –o hello helloworld.c
3. Execute the program-To execute the program, you need to run -
   - ./a.out (or)
   - ./hello

Summary

- Computer software is divided in to two types: System software and Application Software
- System software manages the computer system and provides platform for applications to execute
- Application software are the software used by the user
- Computer System Components
- Service provided by operating system
- View of operating system
- Linux commands