CSE3241: Operating System and System Programming

Lecture-2

(What an OS Does)

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Outline

- Overview
  - Introduction
    - What is OS?
    - Tasks of OS

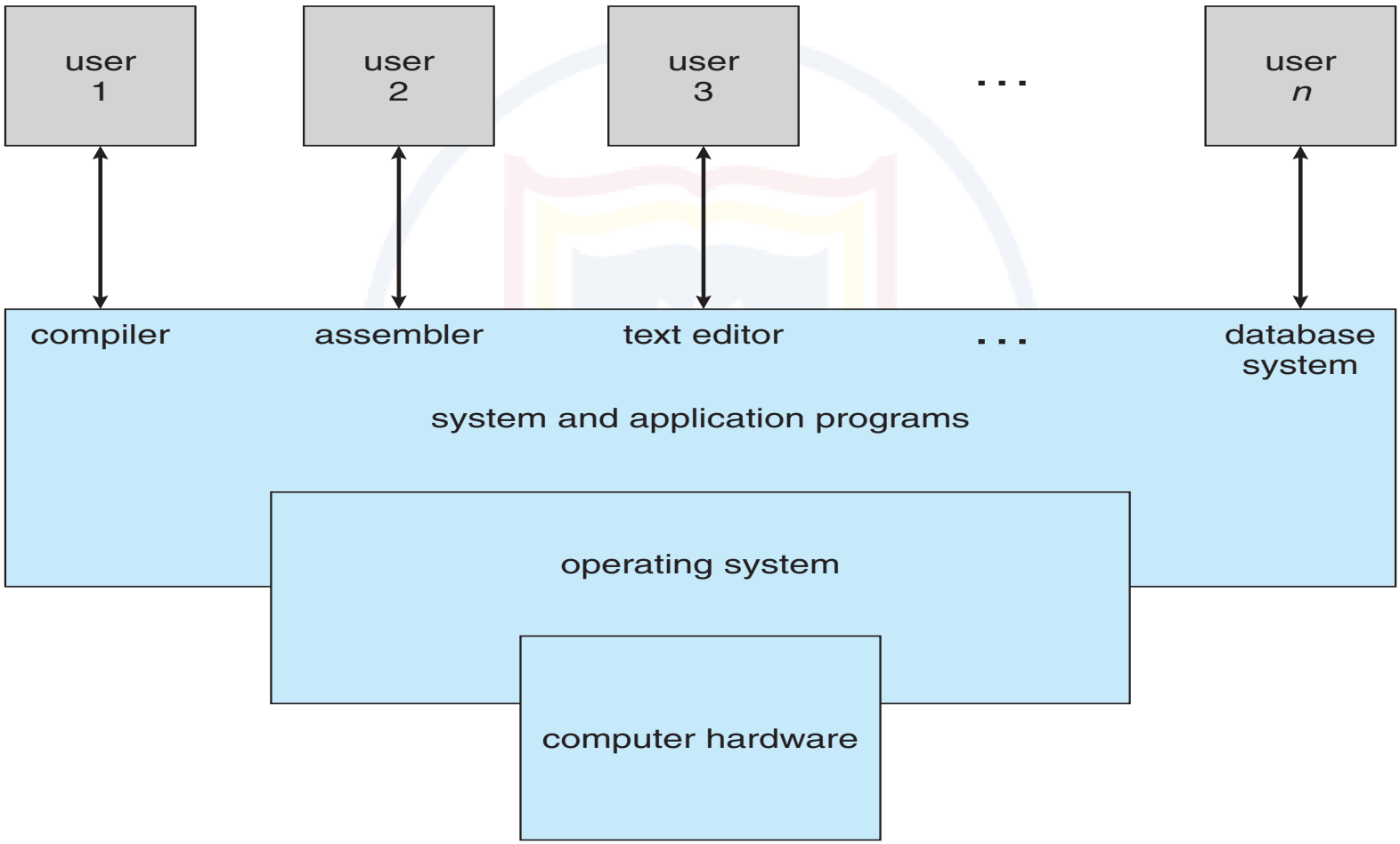
What is OS?

- Operating system is a **software** which acts as a:
  - **Bridge**:
    - Establishes links between hardware and software (application and system software).
  - **Coordinator**:
    - Coordinates all the activities among hardware devices.
  - **Abstractor**:
    - Hides details of complicated working procedure of hardware devices from user programs.
    - Provides interfaces through which user programs can access hardware safely for doing their jobs.
  - **Controller**:
    - Controls execution of programs to prevent errors and improper use of the computer.
  - **Resource Allocator**:
    - Manages all resources (both software and hardware).
    - Decides between conflicting requests for efficient and fair resource use.

Components of a Computer System

- Generally, a computer system is consisted of 5 components:
  1. Hardware: Central Processing Unit (CPU), memory, input/output (I/O) devices such as keyboard, mouse, monitor, printer, hard disk, etc.
  2. Operating System: UNIX, BSD UNIX, Linux, DOS, Microsoft Windows, Mac OS, etc.
  3. System Programs: Compiler, Interpreter, Assembler, Game Engine, etc.
  4. Application Programs: Word Processors, Spreadsheets, Web Browser, Video Player, Audio Player, etc.
  5. User: She/He, You and I (We)

Abstract View of the Components [1]



Tasks of OS I

The main tasks of an OS are:

1. Process Management
2. Memory Management
3. Storage Management
   - File Managemnet
   - Disk Management
   - I/O Management
4. Protection and Security Handling

Tasks of OS II

- Process Management
  - Scheduling process and threads.
  - Creating and deleting both user and system processes.
  - Suspending and resuming processes.
  - Providing mechanisms for process synchronization.
  - Providing mechanisms for process communication.
  - Providing mechanisms for deadlock handling.
- Memory Management
  - Keeping track of which parts of memory are currently being used and by whom.
  - Deciding which processes and data to move into and out of memory.
  - Allocating and deallocating memory space as needed.

Tasks of OS III

- File System Management
  - Creating and deleting files.
  - Supporting primitives for manipulating files.
  - Organizing files.
  - Backing up files on stable (nonvolatile) storage media.
- Disk Management
  - Free-space management.
  - Storage allocation.
  - Disk Scheduling.

Tasks of OS IV

- I/O Management
  - Handling buffering, caching and spooling.
  - Interacting with device controllers via device drivers.
- Protection and Security
  - controlling access to the resources in a multiprogrammed computer system with several users.
  - controlling access to resources in a network and in the Internet.
  - defending a system from internal and external attacks.

References


P. B. Galvin A. Silbeschatz and G. Gagne.
Operating System Concepts.
John Wiley & Sons, 9 edition, 2012.