



# IN2311:Operating systems

Roshani Wijesuriya

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# Course logistics and details

## Textbook:

- Operating System Concepts –Eighth Edition Silberschatz and Galvin, Addison-Wesley Inc.

## Alternate Book

- Principles of Operating Systems, L.F. Bic and A.C. Shaw, PrenticeHall/Pearson Education, 2003. ISBN 0130266116.

# Course logistics and details

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Assignments (40%)

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Tests (60%)

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# Course Outline

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Chapter 1: Operating-System Structures

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Chapter 2: Processes

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Chapter 3: Threads

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Chapter 4: CPU Scheduling

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Chapter 5: Process Synchronization

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Chapter 6: Deadlocks

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Chapter 7: Memory Management

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Chapter 8: File Systems and Storage Management

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Chapter 9: Protection and Security



# Introduction to Operating Systems

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# Content

- What is an operating System?
- Functionalities of an Operating System
- Characteristics of an Operating System
- Evolution of Operating Systems
- Hardware Concepts Related to OS
- OS Interaction with Hardware and Applications
- Examples of Operating Systems

# What is an Operating System?

- Definition: An Operating System (OS) is system software that manages computer hardware and software resources and provides common services for computer programs.
- Purpose: Acts as an interface between the user and the computer hardware.

# Functionalities of an Operating System

- **Process Management** – Handling creation, scheduling, and termination of processes.
- **Memory Management** – Allocating and managing memory space.
- **File System Management** – Organizing, storing, retrieving, and securing data.
- **Device Management** – Controlling input/output devices.
- **Security and Protection** – Safeguarding system resources and data.
- **User Interface** – Command-line or graphical interface for user interaction.



# Characteristics of an Operating System

- **Multi-user capability** – Supports multiple users simultaneously.
- **Multitasking** – Executes multiple tasks at the same time.
- **Portability** – Adaptable to different hardware.
- **Security** – Protects data and processes.
- **Efficiency** – Manages resources to optimize performance.
- **Scalability** – Handles increasing workloads smoothly.

# Evolution of Operating Systems

- **1st Generation (1940s-50s):** No OS, manual operation.
- **2nd Generation (1950s-60s):** Batch processing systems.
- **3rd Generation (1960s-80s):** Multiprogramming and time-sharing.
- **4th Generation (1980s-Present):** GUI-based, networked, and mobile OS.
- **Current Trends:** Cloud-based OS, IoT operating systems.

# Hardware Concepts Related to OS

- **CPU:** Executes instructions and runs processes.
- **Memory Hierarchy:** Registers, cache, RAM, and secondary storage.
- **Input/Output Devices:** Managed by device drivers.
- **System Bus:** Facilitates communication between CPU, memory, and devices.
- **Interrupts:** Signals to the CPU for immediate attention.

# OS Interaction with Hardware and Applications

- OS acts as a **mediator** between hardware and applications.
- **Example Flow:** User application → System call → OS → Hardware execution → Output to user.
- Example: (*Opening a photo → OS uses system call to fetch from disk → CPU processes image → displayed on monitor*)
- **Benefits:** Simplifies application development and hardware management.

# Examples of Operating Systems

- **Desktop:** Windows, macOS, Linux.
- **Mobile:** Android, iOS.
- **Server:** Unix, Windows Server.
- **Embedded:** FreeRTOS, VxWorks.

# Conclusion

- An OS is crucial for managing hardware, software, and user interaction.
- Key functions: process, memory, file, device, and security management.
- Evolution from batch systems to modern networked and mobile OS.
- Hardware concepts like CPU, memory, and interrupts are tightly integrated with OS operations.

Thank you

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