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Operating Systems Fundamentals

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OPERATING SYSTEMS FUNDAMENTALS

Lecture - 1

Refer Chapter 1 and 2 of the SGC Book

3 Computer System Structure

Four components of a computer system

Source 1.2

1 HARDWARE

- Provides basic computing resources
- CPU • Memory • I/O devices

2 OPERATING SYSTEM

- Controls and coordinates use of hardware
- Among various applications and users

3 APPLICATION PROGRAMS

- Define how system resources solve users' computing problems
- e.g. word processors, compilers, browsers, databases, video games

4 USERS

- People
- Machines
- Other computers

KEY POINT — Difference between system software and application software

4 Abstract View of a Computer

How users, applications, the OS, and hardware relate

Source 1.3

USER

People, machines, and other computers

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APPLICATION PROGRAMS

Compilers, web browsers, development kits, etc.

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OPERATING SYSTEM

Coordinates hardware use across applications

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COMPUTER HARDWARE

CPU, memory, I/O devices

The OS sits between applications/users and the underlying hardware.

What Operating Systems Do

Resource allocation + control + execution

OPERATING SYSTEM

A resource allocator and control program that makes efficient use of hardware and manages the execution of user programs.

DEDICATED SYSTEMS

- Workstations have dedicated resources
- Frequently use shared resources from servers

MOBILE DEVICES

- Smartphones and similar devices
- Touch screens, voice recognition interfaces

EMBEDDED COMPUTERS

- Little or no user interface
- Found in devices and automobiles
- Runs without user intervention

Defining Operating Systems

Types and examples

TYPES

- Single user with multi-tasking and multi-programming
- Multi-user
- Multi-processor
- Distributed

EXAMPLES

- Real-Time Operating System — Unix, Linux, iOS, Android
- Embedded Operating System — Embedded Linux

NOTE: iOS/Android are soft real-time mobile OSes, not hard RTOSes. Unix/Linux are general-purpose, not real-time.