

System Organisation and Structure

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Overview

- 1 Computer Systems
 - Overview of the System Structure
 - Storage
 - I/O Structure
 - Architecture
 - OS Structure
 - Caching
 - Virtual machines

Literature

This lecture introduces operating systems and describes their general structure. It gives an overview of Chapter 1 “Introduction” and Chapter 2 “System Structures” in [SGG13].

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Overview of the System Structure

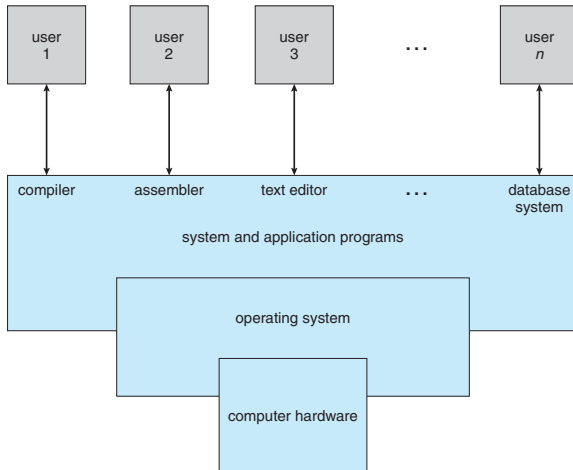


Figure: Abstract view of the components of a computer system. Image: [SGG09, p. 4].

Overview of the System Structure

User View

- Ease of use of a system.
- Resource utilization.
- Can be on different systems: workstation, server, mainframe.

Overview of the System Structure

System View

- Resource allocator.
- Control program.

Overview of the System Structure

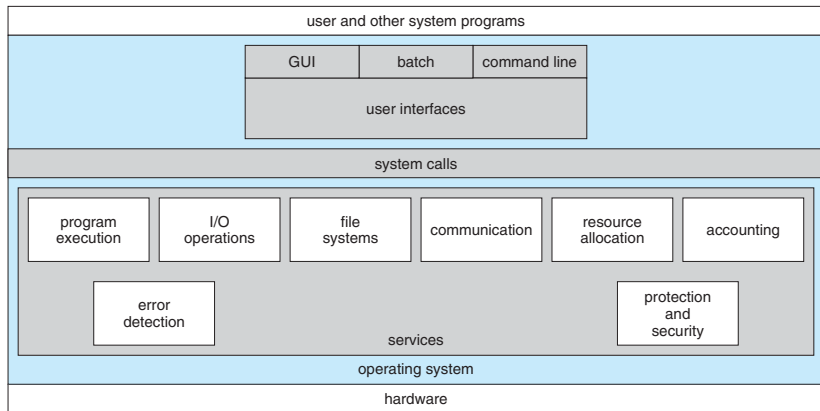


Figure: A detailed view of the operating system structure. Image: [SGG09, p. 50].

Overview of the System Structure

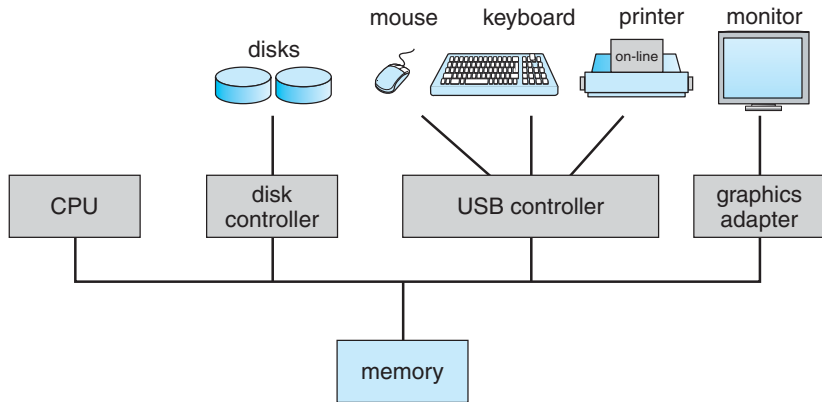


Figure: A systematic overview of a computer system. Image: [SGG09, p. 8].

Overview of the System Structure

- Bootstrap program.
- Interrupts.
- System calls.

Overview of the System Structure

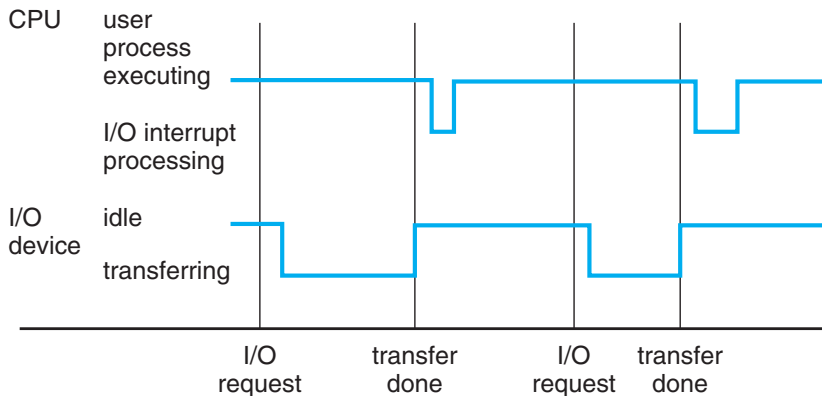


Figure: Timeline for interrupt processing and process execution. Image: [SGG09, p. 9].

Storage

- Random-access memory.
- von Neumann architecture.
- Instruction registers.

Storage

- Primary and secondary storage.
- Volatile and non-volatile storage.

Storage

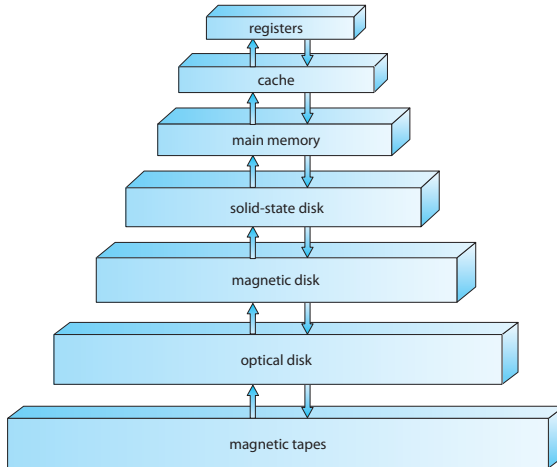


Figure: Storage-device hierarchy. Image: [SGG09, p. 11].

I/O Structure

- Controllers.
- Device driver.
- Direct-memory access (DMA).

Architecture

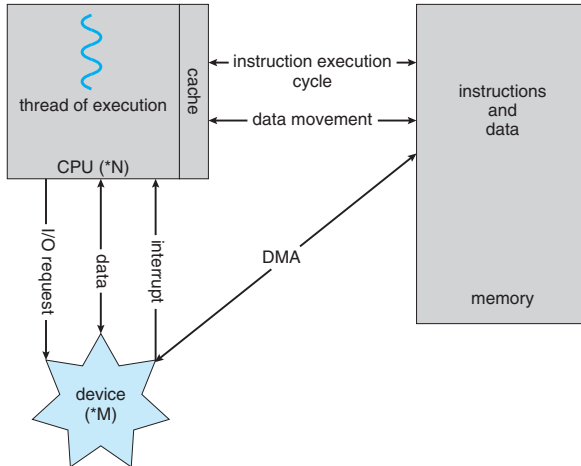


Figure: Overview of computer architecture. Image: [SGG09, p. 13].

Architecture

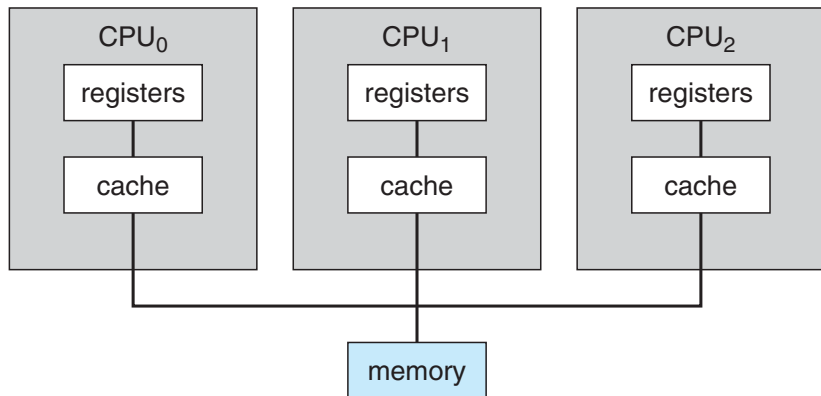


Figure: Symmetric multiprocessing architecture (SMP). Image: [SGG09, p. 15].

Architecture

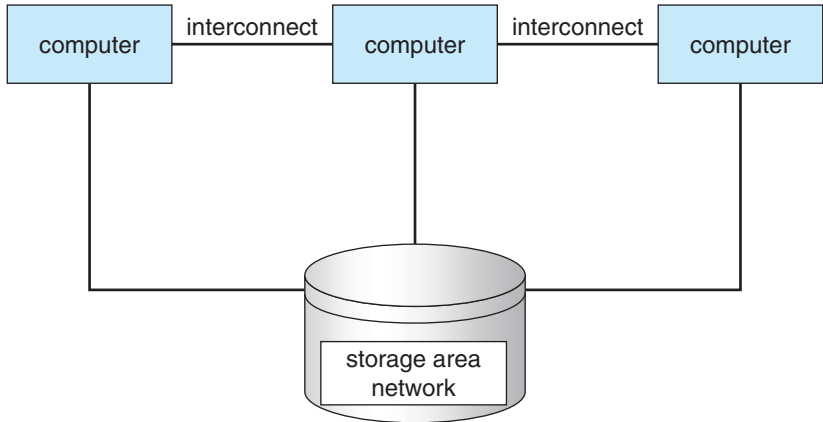


Figure: A clustered system. Image: [SGG09, p. 18].

OS Structure

- Multiprogramming.
- Time-sharing, multitasking.
- Interactive computer system.
- Batch processing.

OS Structure

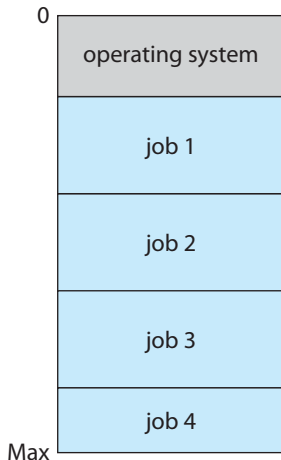


Figure: Memory layout for a multiprogramming system. Image: [SGG09, p. 19].

OS Structure

- User and kernel mode.
- Mode bit.
- Privileged instructions.

OS Structure

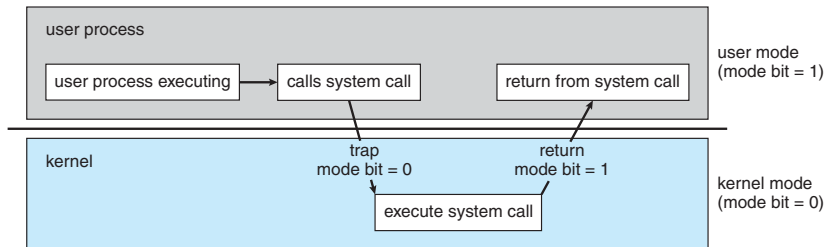


Figure: Example of transition from user to kernel mode. Image: [SGG09, p. 21].

Caching

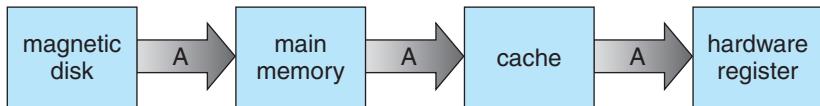


Figure: Transfer of *A* from disk to register. Image: [SGG09, p. 28].

Virtual machines

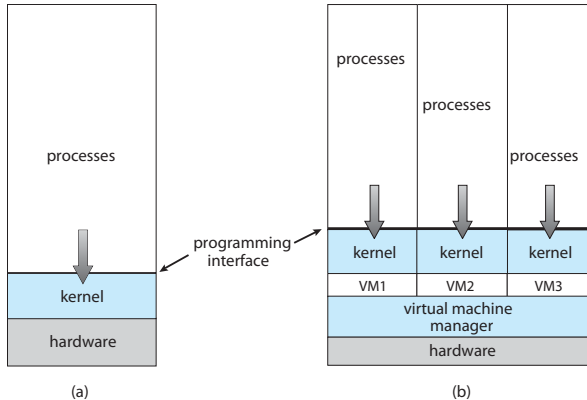


Figure: An illustration of virtual machines compared to non-virtual machines. Image: [SGG13].

Referenser I



Abraham Silberschatz, Peter Baer Galvin, and Greg Gagne. *Operating System Concepts*. 8th ed. International Student Version. Hoboken, N.J.: John Wiley & Sons Inc, 2009.



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