1.19 Storage Systems Ranking (Slowest to Fastest)

Magnetic tapes → Optical disk → Hard-disk drives → Nonvolatile memory →
Main memory → Cache → Registers

1.20 Cache Inconsistency in an SMP System

In an SMP system, each processor has its own local cache.
If Processor 1 modifies a shared variable in its cache, Processor 2 may still
have the old value in its cache, leading to different values of the same data.

1.21 Cache Coherence Issues

a. Single-processor systems:
Coherence issues are minimal since only one cache is active.

b. Multiprocessor systems:
Each processor has its own cache, so updates by one processor may not be
immediately visible to others.

c. Distributed systems:
Each machine has its own memory, so maintaining consistency requires
message passing or synchronization protocols.

1.22 Memory Protection Mechanism

Memory protection is enforced using base and limit registers or page tables.
The operating system ensures that a program can access only its allocated
memory region, preventing modification of other programs' memory.

1.23 LAN vs WAN Configurations

a. Campus student union → LAN
b. Statewide university system → WAN
c. Neighborhood → LAN

1.24 Challenges in Mobile OS Design

Mobile operating systems must manage limited battery life, lower processing
power, small screen sizes, and varying network connectivity, unlike
traditional PC operating systems.

1.25 Advantages of Peer-to-Peer Systems

• No single point of failure
• Better scalability
• Reduced server costs

1.26 Distributed Applications for P2P Systems

• File sharing systems
• Distributed backup systems
• Cryptocurrency networks

1.27 Open-Source Operating Systems

Advantages:
• Free and customizable
• Transparent and secure
• Community-driven innovation

Disadvantages:
• Limited official support
• Steep learning curve
• Compatibility issues

Advantages appeal to developers and researchers.
Disadvantages affect non-technical users and enterprises.