

COMP 3511

Operating Systems

Review Questions

What we have discussed so far

- What Operating Systems Do
- Computer-System Organization and Architecture
- Operating-System Structure
- Operating System Services
- System Calls
- System Programs
- Operating System Design and Implementation
- Operating System Structure

Computing Environments – Distributed

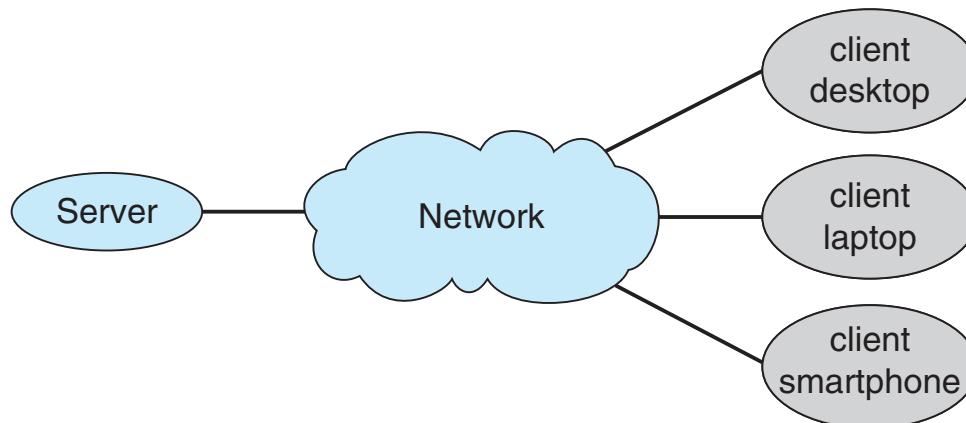
■ Distributed

- Collection of separate, possibly heterogeneous, systems networked together
 - **Network** is a communications path, **TCP/IP** most common
 - **Local Area Network (LAN)**
 - **Wide Area Network (WAN)**
 - **Metropolitan Area Network (MAN)**
 - **Personal Area Network (PAN)**
- **Network Operating System** provides features between systems across network
 - Communication scheme allows systems to exchange messages
 - Illusion of a single system

Computing Environments – Client-Server

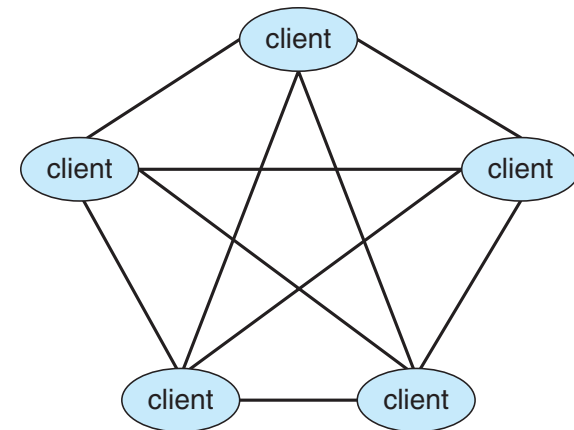
■ Client-Server Computing

- Dumb terminals supplanted by smart PCs
- Many systems now **servers**, responding to requests generated by **clients**
 - ▶ **Compute-server system** provides an interface to client to request services (i.e., database)
 - ▶ **File-server system** provides interface for clients to store and retrieve files



Computing Environments - Peer-to-Peer

- Another model of distributed system
- P2P does not distinguish clients and servers
 - Instead all nodes are considered peers
 - May each act as client, server or both
 - Node must join P2P network
 - Registers its service with central lookup service on network, or
 - Broadcast request for service and respond to requests for service via ***discovery protocol***
 - Examples include Napster and Gnutella, **Voice over IP (VoIP)** such as Skype



Q. 1

- What is the main purposes of an operating system?
 - User convenience: to provide an environment for a computer user to execute programs on computer hardware in a convenient and efficient manner
 - Resource allocation: to allocate the separate resources of the computer in a fair and efficient manner (CPU, main memory and etc.). You can also view an OS as a control program, which controls the program execution, prevent users from misusing the resources and handling I/O

Q. 2

■ What is an **interrupt** and what is a **trap**?

An interrupt is a hardware-generated change of flow within the system

An interrupt handler is invoked to deal with the interrupt when it occurs; control is then returned to the interrupted context and instruction

An interrupt can be used to signal the completion of an I/O operation

A trap is a software-generated interrupt.
A trap can be used to call the OS routines or to catch arithmetic errors

Q. 3

- List six **services** provided by an operating system that are designed to make it more convenient for users to use the computer system.

User interface

File-system
manipulation

Program execution

Communications

I/O operations

Error detection

Q. 4

- What is **multiprogramming**?

↙ ↘

A number of programs running

Program 1

Program 2

Program 3

Main memory

Cont.

- What is **multiprogramming**?

↙ ↘

A number of programs running

Main memory

Program 1

Program 2

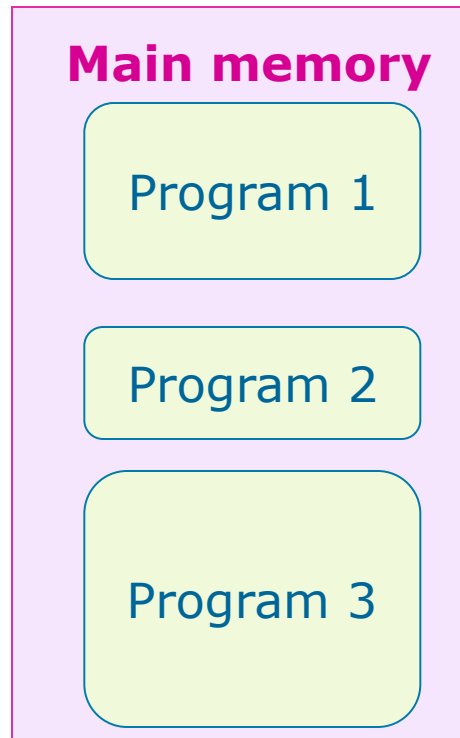
Program 3

Cont.

- What is **multiprogramming**?

↙ ↘

A number of programs running



➔ Increase
CPU utilization

Cont.

- What is the main advantage of multiprogramming?
 - It makes efficient use of the CPU by overlapping the demands for the CPU and its I/O devices from various users.
 - It attempts to increase CPU utilization by always having something for the CPU to execute.

Q. 5

- Why OS needs to distinct **kernel mode** and **user mode**?
 - Such dual-mode operation allows OS to protect itself and other system components
 - prevent users from misusing the resources

Q. 6

- What are the three general methods of parameter passing in an operating system?
 - Passing parameters in registers
 - Registers passing starting address of blocks of parameters
 - Parameters can be placed, or pushed onto a stack by a program, and popped off by the operating system

Q. 7

- What are the similarities and differences between iOS and Android systems?
- Similarities: (1) Both are based on existing kernels (Linux and Mac OS X). (2) Both have architecture that uses software stacks. (3) Both provide frameworks for developers.
- Differences (1) iOS is closed-source, and Android is open-source. (2) iOS applications are developed in Objective-C, Android in Java. (3) Android uses a virtual machine, and iOS executes code natively.

Q. 8

- What are the advantages and disadvantages of using a microkernel approach?
- Microkernel approach is ease of extending the operating system. All new services are added to user space and consequently do not require modification of the kernel. The microkernel also provides more security and reliability, since most services are running as user — rather than kernel — processes.
- Microkernels can suffer from performance decreases due to increased system function overhead.