

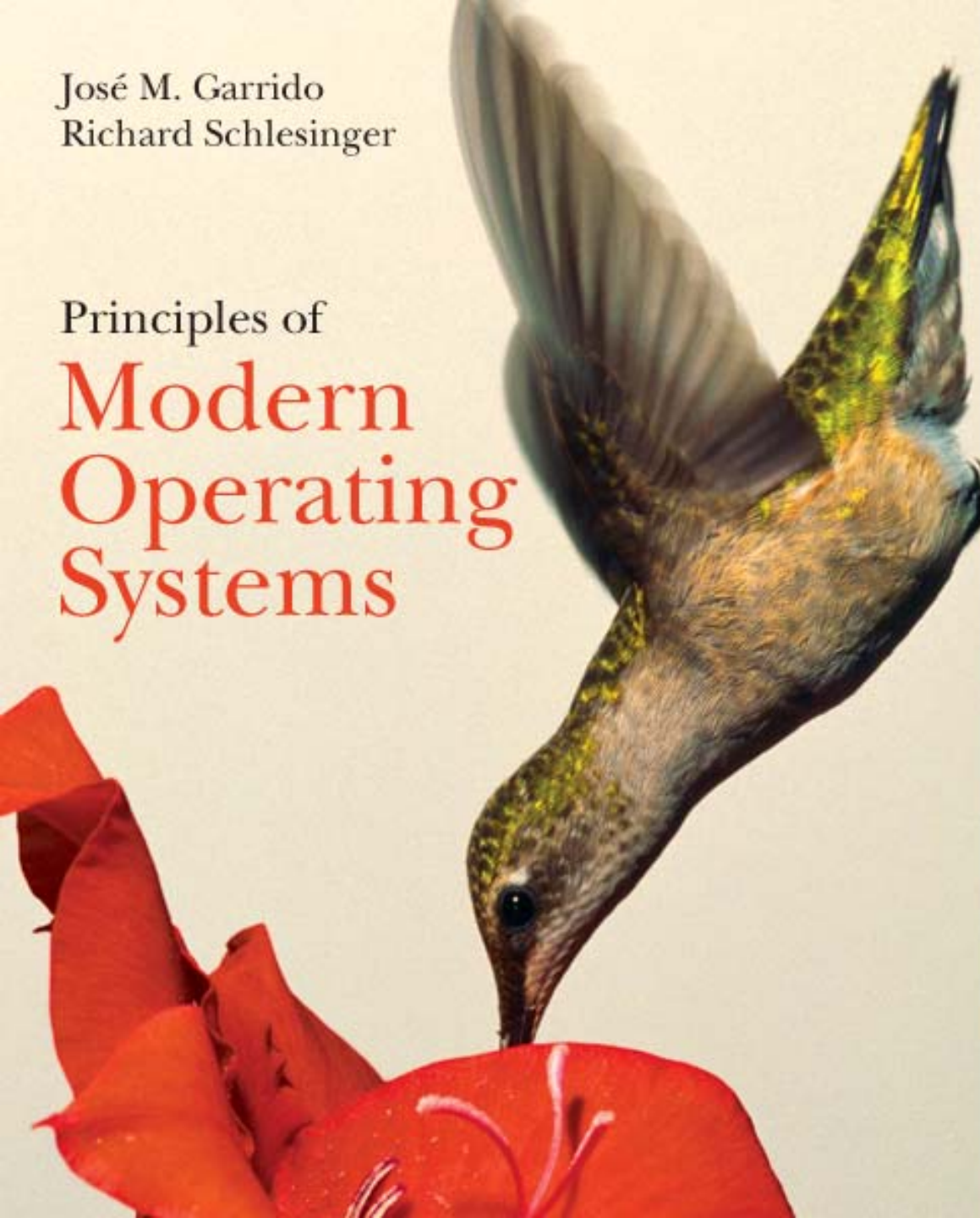
CS 3530 Operating Systems

L02 OS Intro Part 1

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Principles of
**Modern
Operating
Systems**



Chapter 1

Basic Concepts of Operating Systems

Computer Systems

A computer system consists of two basic types of components:

- Hardware components, which are the electronic devices and electromechanical devices, such as the processors, memory modules, disk units, keyboard, screen, and other devices.
- Software components, such as the application programs, operating system, utilities, and other programs.

Computer Architecture

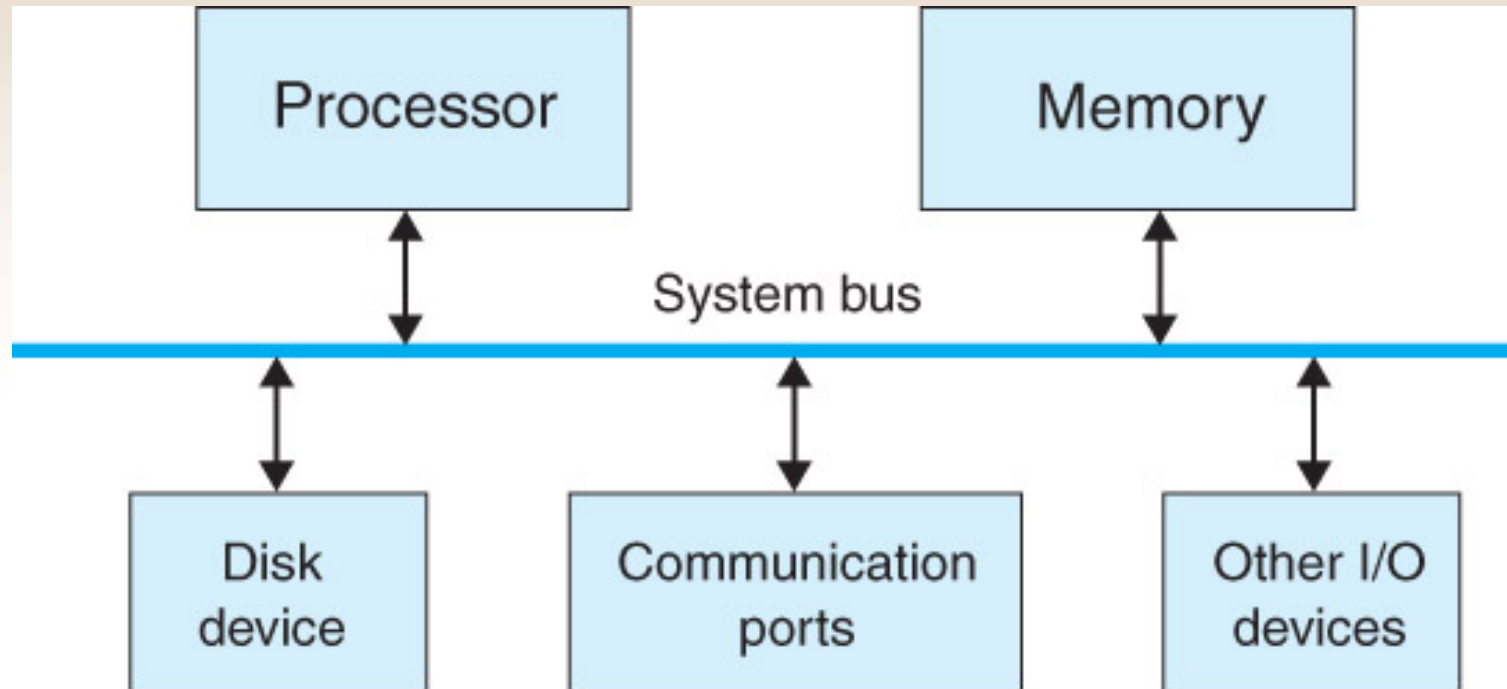
- The architecture of a computer system is the relationship among the various components.
- Computer systems have the following three fundamental functions: processing, input, and output.

Structure of a Computer System

The basic structure of a computer normally consists of one or more of the following hardware components:

- The CPU or the central processing unit, also called the processor
- RAM or random access memory, also known as main memory
- The massive storage devices, which store large amounts of data and programs in permanent form
- The I/O devices or input/output units
- The system bus, which provides interconnections for all components of the system

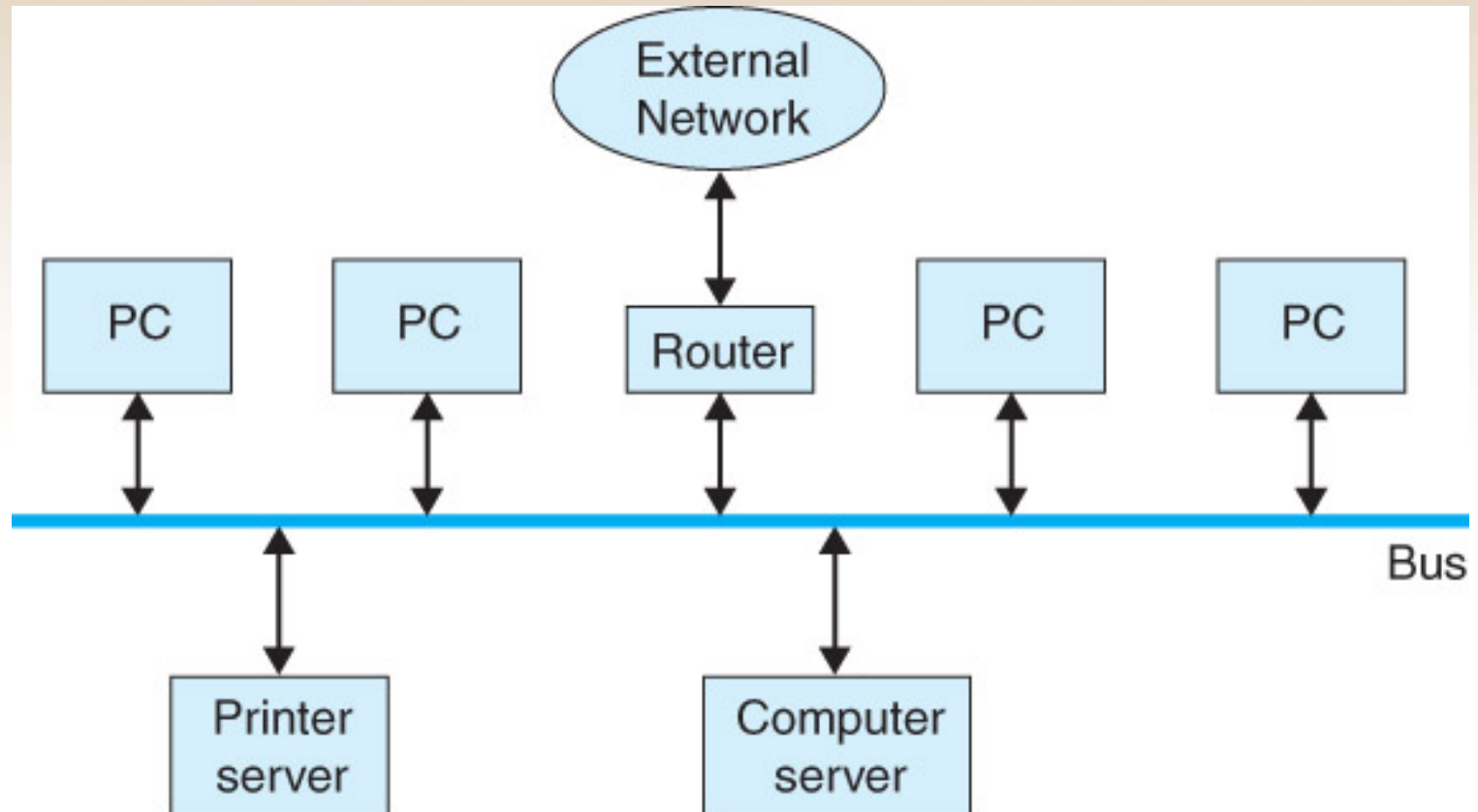
Hardware Structure of a Computer



Computer Networks

- On a local area network (LAN), several small computers are connected to a larger computer called a server, and depending on the network topology, the smaller computers may also be connected to each other.
- The server stores the global files or databases and may include one or more shared printers.
- A much larger type of network is known as a wide area network (WAN) and covers a large geographical region and connects local area networks located in various remote places.

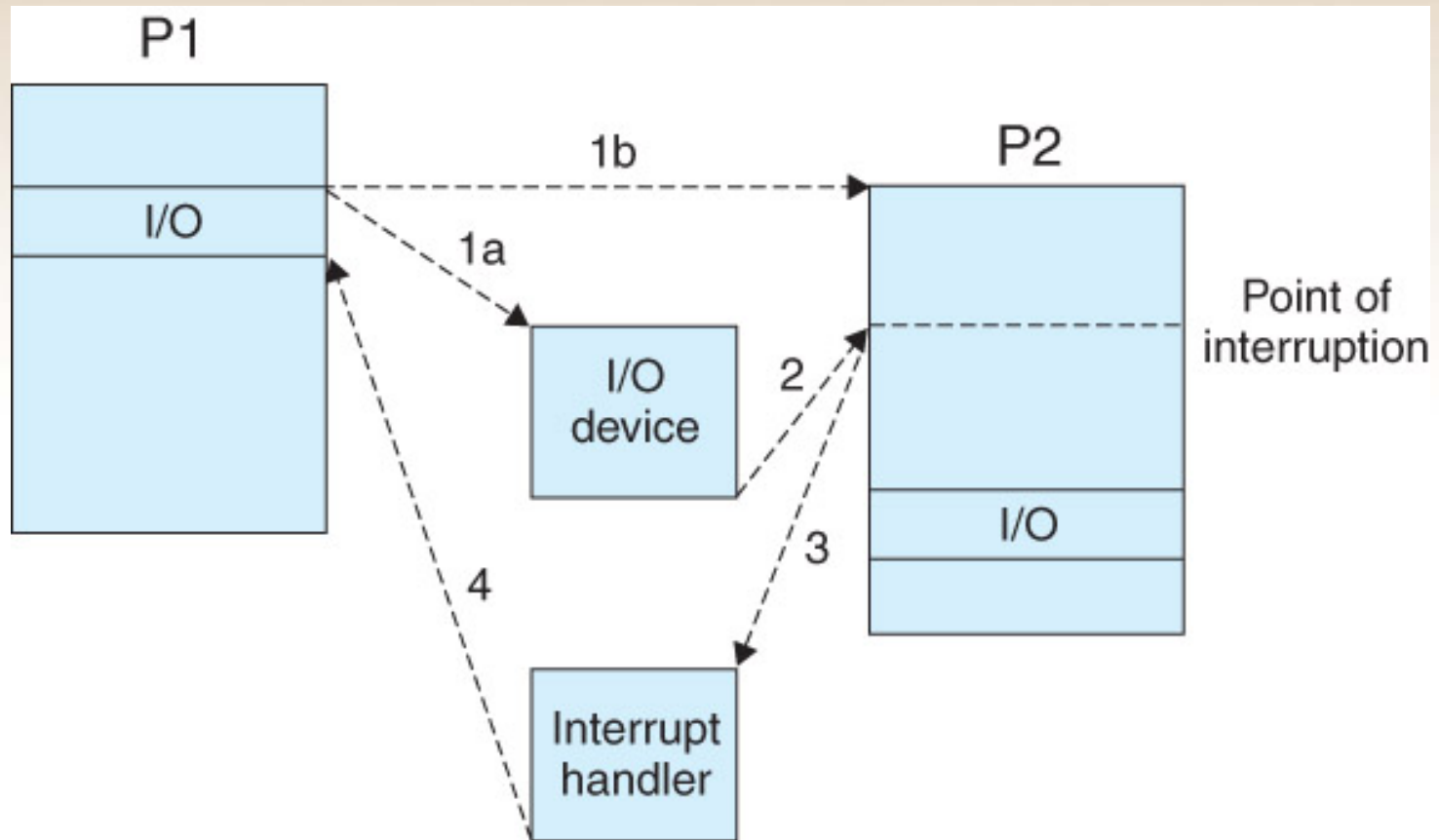
Computer Network



Hardware Interrupts

- An interrupt mechanism in which a hardware component (an I/O device) sends an interrupt request signal to the CPU.
- This interrupt signal causes a temporary stop of the normal execution of a program, and the CPU then starts to execute a special function called an interrupt service routine (ISR) that handles the interrupt.
- When the execution of this routine is complete, the CPU can resume the execution of the program that was interrupted.

Interrupt Processing



Interrupts

- An application requests an operating system to perform an operation by using a *Software Interrupt*.
- Interrupts are requests to the operating system to do something
- An operating system is *interrupt* driven

Software

- A program is a sequence of instructions to be executed in the computer for the purpose of carrying out some specific task.
- Before a program executes, it has to be translated from its original text form (source program) into a machine language program. Then, the program needs to be linked and loaded into memory.

Software Components

- The software components are the collection of programs that execute in the computer.
- These programs perform computations, control, manage, and carry out other important tasks.
- Two general types of software components are:
 - System software
 - Application software

System Software

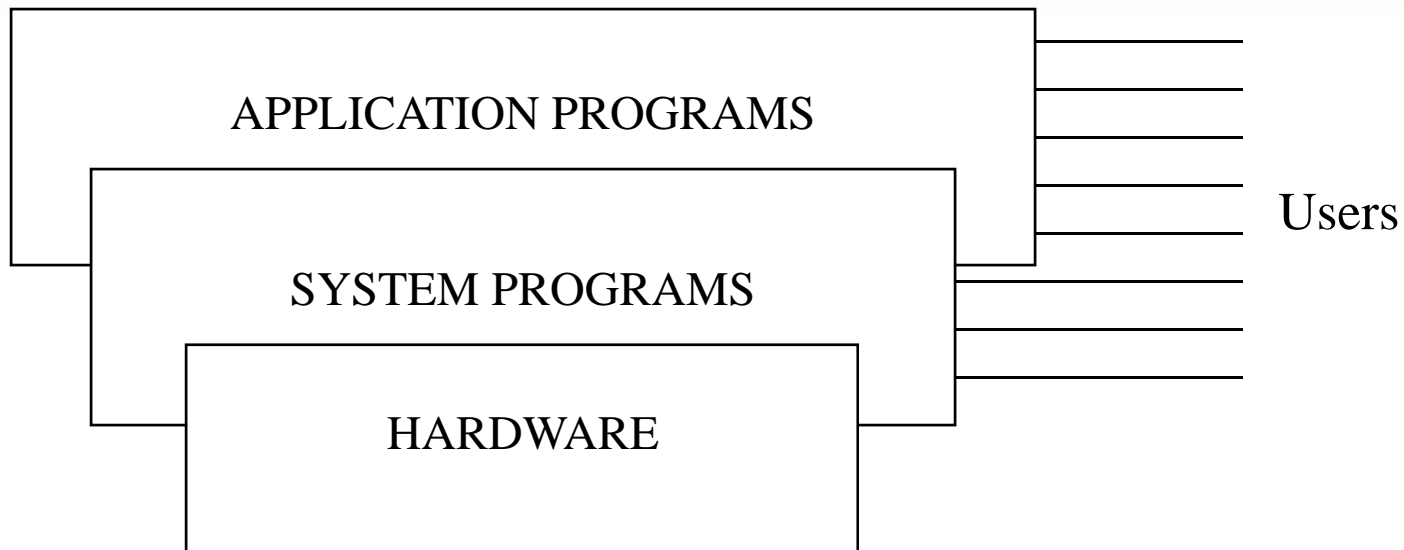
- The system software is the set of programs that control the activities and functions of the various hardware components, programming tools and abstractions, and other utilities to monitor the state of the computer system.
- The system software forms an environment for the programmers to develop and execute their programs (collectively known as application software).
- Three types of users can be identified: system programmers, application programmers and end-users.

Application Software

- Application software consists of those programs that solve specific problems for the users and execute under control of the operating system.
- Application programs are developed by individuals and organizations for solving specific problems.

Types of Software Systems

- System software - Operating System, Assemblers, Loaders, Linkers, Compilers, Editors, ...
- Application software - All User-Oriented Programs.



What is an Operating System?

- A large and complex software component for the operation and control of the computer system.
- It acts as an intermediary between a user and the computer system.
- Examples: Unix, MS Windows, MacOS, Linux, Sun Solaris, DEC VMS, etc.

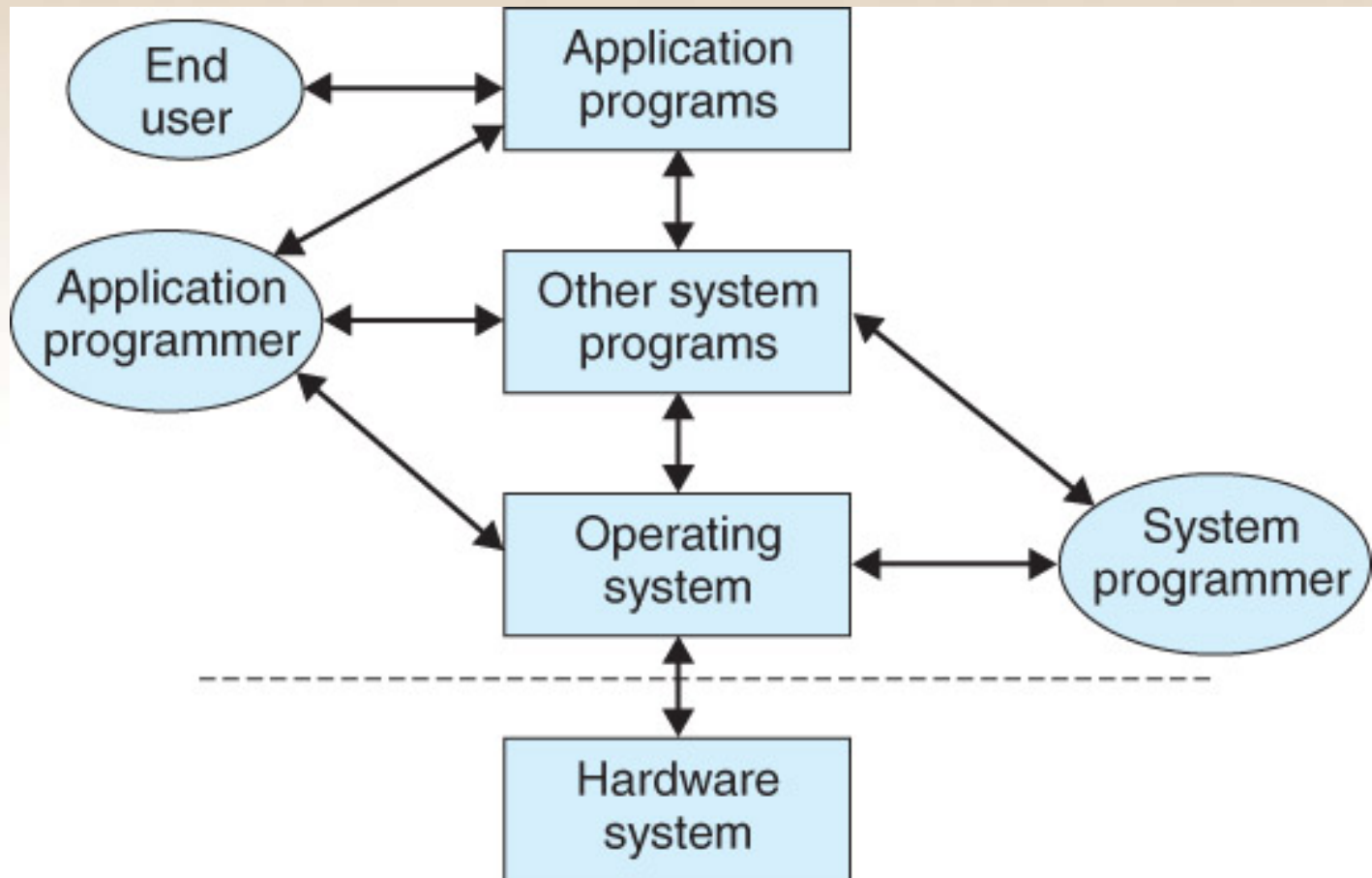
The Operating System

- A provider of services to user programs
- A huge resource manager

Design Goals

- User goals – operating system should be convenient to use, easy to learn, reliable, safe, and fast.
- System goals – operating system should be easy to design, implement, and maintain, as well as flexible, reliable, error-free, and efficient.

External View of a Computer



Operating Systems User Interfaces

Three levels of interface:

1. Graphics GUI (windows oriented)
2. Command level (shell). At login time, the shell starts computing
3. System calls
Invoked from user programs

The Shell

- The program that handles user interaction with the system is called:
 - Shell
 - Command-line interpreter
- Two types of Shells
 - Graphical
 - Character oriented

System Calls

- This is also known as the Application Programming Interface (API)
- Programs use the API to ask the OS to perform some function

End of Lecture

End

Of

Today's

Lecture.