OPERATING SYSTEMS
CS F372

Team Of Instructors

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Chamber consultation : Wednesday 4 to 5 PM

Evaluation Components

Component	**% weightage**	**Remark**
Test1,Test 2 & Test 3	45	Closed Book
Quiz / Assignment	20	Open Book
Comprehensive	35	Closed Book

What is System?

- A collection of components organized to accomplish a specific function or set of functions.

What Is Operating System ?

- A system that helps in operating the computing machine (computer)

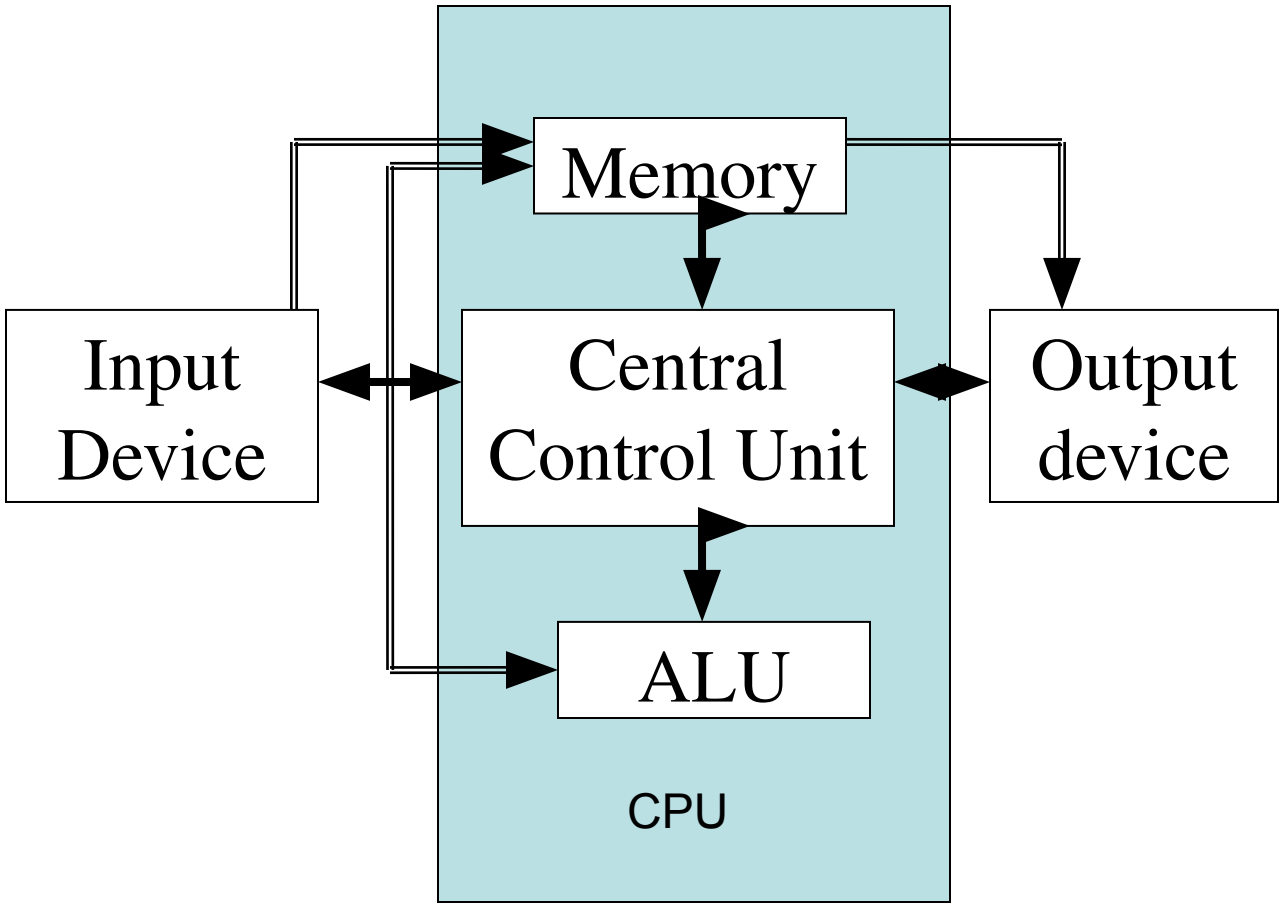
Goal

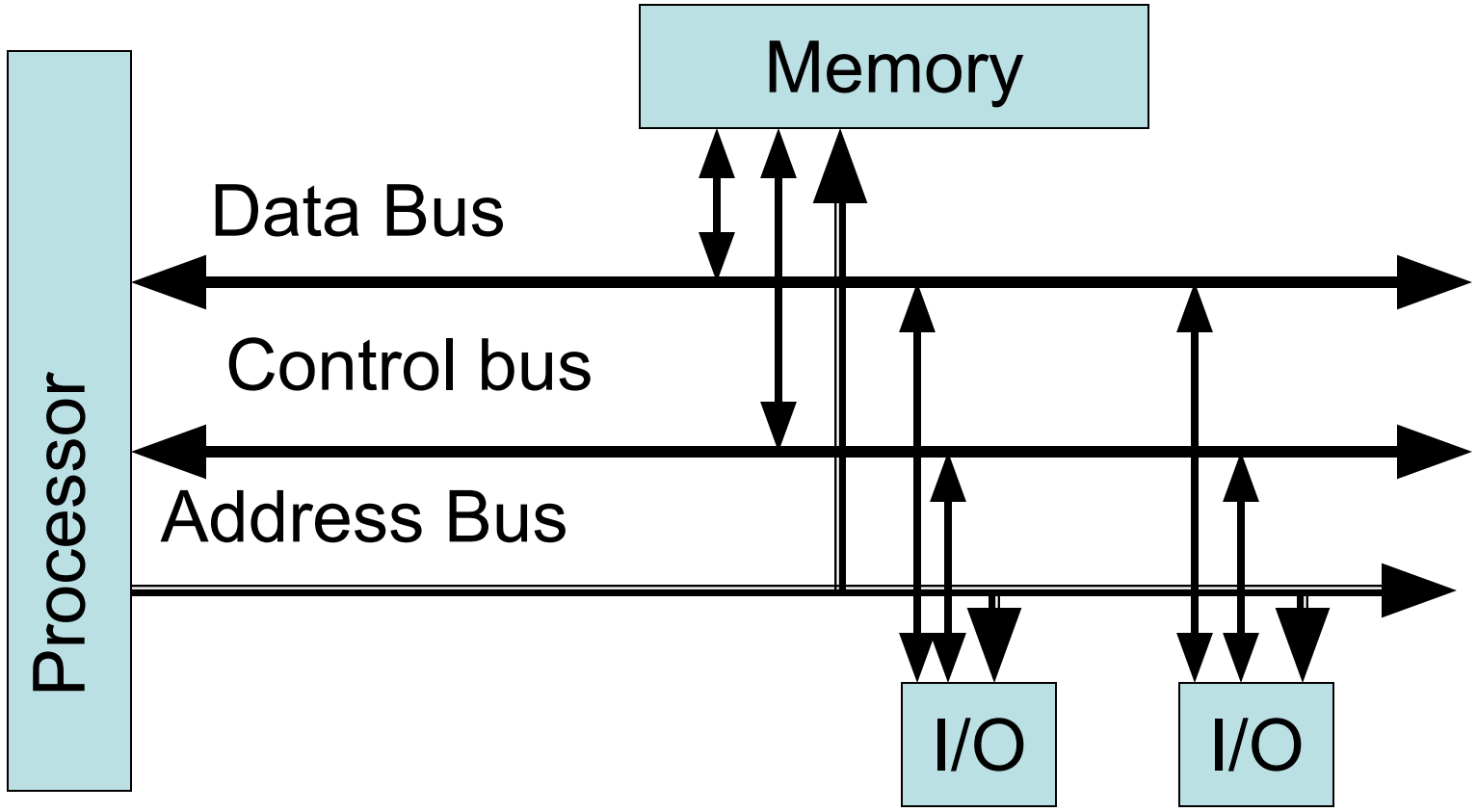
- Provide ease of operation
- Provide efficient resource management

Feature

- It is self loading and self executing code
- OS Kernel is the code which is running all the time

Computer Block Diagram



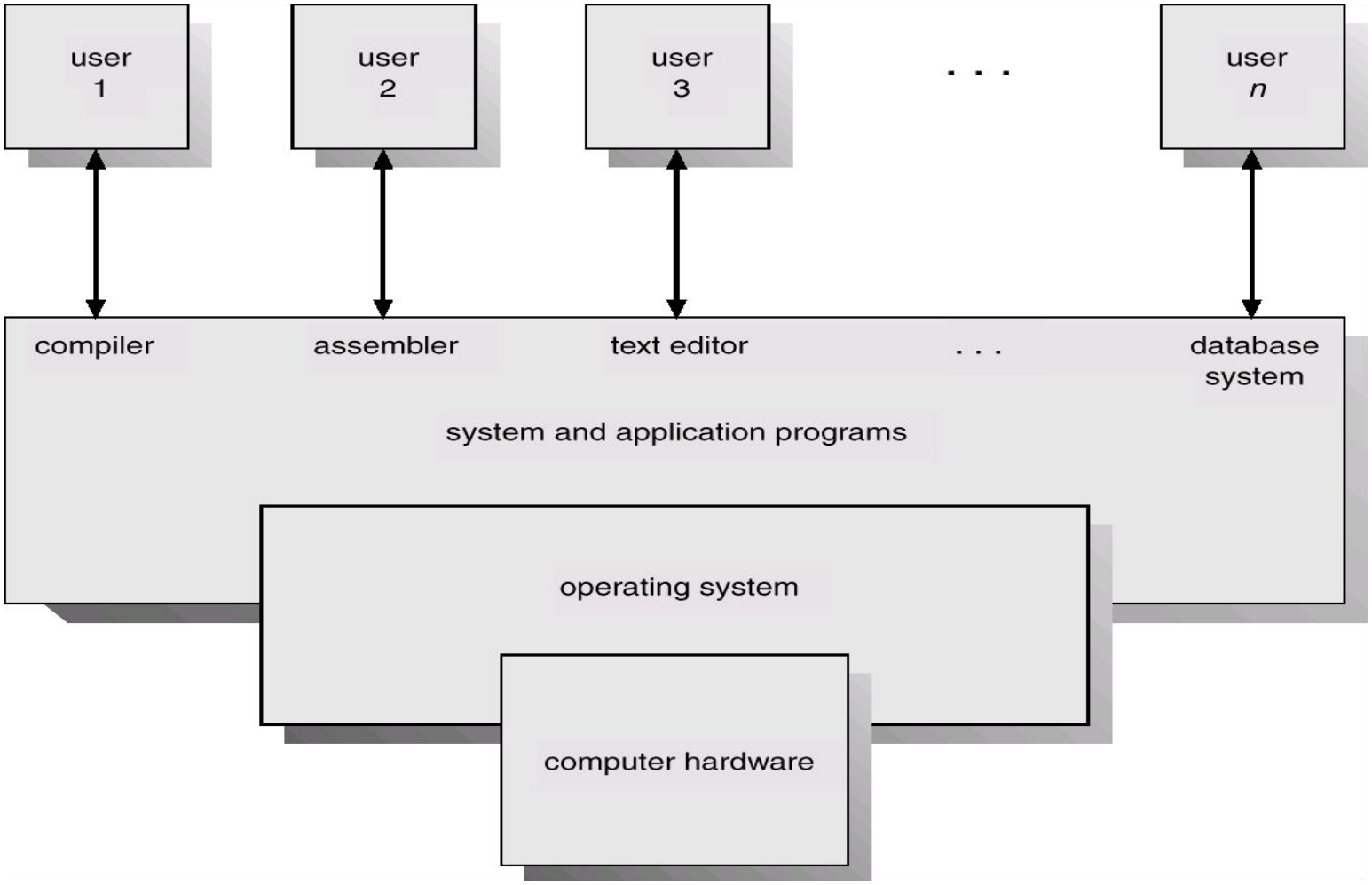

Memory
Data Bus
Control bus
Address Bus
Processor
I/O
I/O

Computer System Components

1. Hardware – provides basic computing resources (CPU, memory, I/O devices).
2. Operating system – controls and coordinates the use of the hardware for executing the various users applications.

3. Applications programs – define the ways in which the system resources are used to solve the computing problems of the users (compilers, database systems, video games, business programs).

4. Users (people, machines, other computers).



Abstract View of Computing System Components

Hardware Components

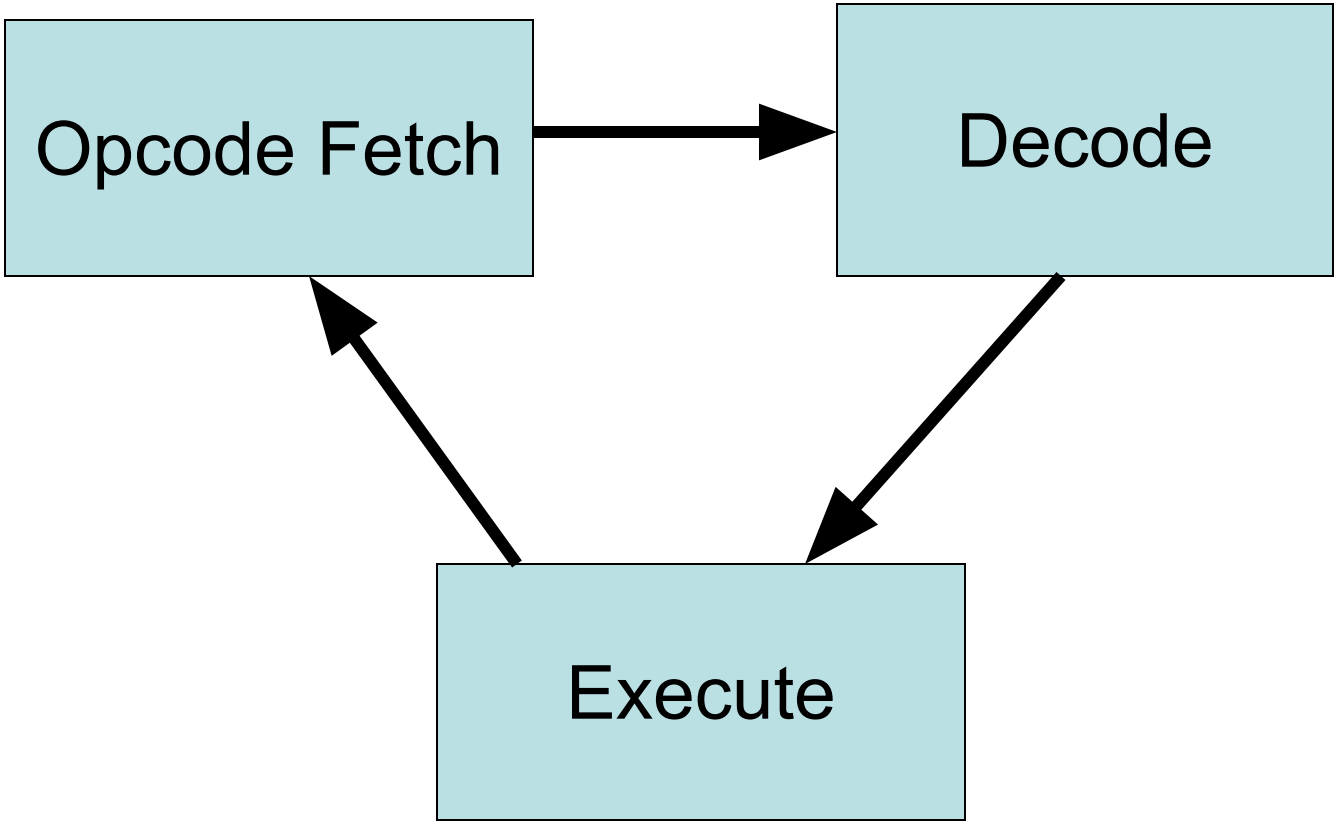
- Processor
- Memory
  - Cache Memory (Static RAM)
  - Primary Memory (RAM, ROM)
  - Secondary Memory (Hard Disk)
- I/O Devices
- System Bus eg. PCI, IDE, USB, etc.

Processor

- It is the heart of computing machine.
- We have verity of processors
- 32 bit , 64 bit , application specific processor
- Each processor type supports specific instruction set
- Intel i-5, I-7, Xeon etc

Memory

Fetch-Decode & Execute Cycle



Program can execute only if it is loaded in Primary memory

- Who loads it in memory ?
- Who decides how much memory is required by a program?
- Who decides where the program is loaded in memory?
- After loading how and when the execution begins?
- How do I get/put data from/to hard disk or any other device?

Some more questions

- Can there be more than one program loaded in memory at the same time ? If Yes -
  - who will guarantee territorial integrity?
  - Which particular program will run first and for how long?
  - How much memory should be allocated to each program?

Solution

- Bare Hardware is not enough. We need a component which will act as hardware resource manager

  Definition
- Operating system is a resource manager

Operating System is a resource manager and resources are

- Processor
- Memory
- I/O devices
- Busses
- File system
- Network

User View of OS

- Provides ease of operation
- Supports resource sharing
  - Sequential sharing : A resource is allocated for exclusive use of program eg. CPU
  - Concurrent sharing: Two or more program concurrently use same resource eg. Files, memory, disk array etc.

Systems View of OS

- OS acts as Resource allocator and is responsible for handling resource request, resource allocation and optimal utilization of system resources.
- Acts as control program that manages the execution of user program and prevents error and improper use of computer system.

What OS Does?

- Maintain a list of authorized users
- Construct list of all resources in the system
- Initiate execution of programs
- Maintain resource usage information by programs and current status of programs
- Maintain current status of all resources and allocate resources to programs when requested
- Perform scheduling
- Maintain information for protection

Goals Of Operating System

- Provide user interface for ***ease of operation***
  - Command line interface (CLI) eg. Unix, DOS
  - Graphical User Interface (GUI) eg. Windows
- ***Efficient*** use of hardware & software resources (system)
- Maximize ***System performance***
- Protection and access control
- Ability to evolve and offer new services
- Footprint of OS should be small !!!

Can we measure System Efficiency, Performance and user convenience ?

- Efficiency---- CPU efficiency
- System performance ----- Throughput
- User services ---- Turn around time ,
  Response time

Operating System and Computer Architecture are tightly bonded together.

- Change in architecture usually leads to change in OS.
- The requirements of OS have led to several architectural changes.