GALGOTIAS UNIVERSITY

Program: MCA

Course Code: MCAS-2120

Course Name: OPERATING SYSTEM

Course Outcomes :

CO NUMBER	TITLE
CO1	Understand functions and services of Operating system and identify the use of system calls.(Remembering)
CO2	Apply various process scheduling algorithms for any given problem by understanding the concepts of process.(Comprehension)
CO3	Compare different memory mgmt schemes & page replacement algorithms.(Analysis)
CO4	Apply different disk scheduling algorithms with the help of understanding file system organization.(Analysis)
CO5	Analysis of Operating system in dynamic environment.(Evaluation)
CO6	Understand about the research and indexed publications. (Understanding)

Syllabus

- Unit I: Introduction

Introduction – Types of Operating Systems – I/O structure – Dual–mode operation – Hardware protection – General system architecture.

- UNIT II: **Process Management**

Process Management: Process concept – Concurrent process scheduling concepts – CPU scheduling – Scheduling algorithms, Multiple processors Scheduling – Critical section – Synchronization hardware – Semaphores, classical problem of synchronization, Interprocesscommunication. Deadlocks: Characterization, Prevention, Avoidance and Detection

- ## UNIT III: Memory Management

Storage management – Swapping, single and multiple partition allocation – paging – segmentation – page segmentation, virtual memory – demand paging – page replacement and algorithms, thrashing. Secondary storage management – disk structure – free space management – allocation methods – disk scheduling – performance and reliability improvements – storage hierarchy

- **UNIT IV: Control and Information Management**

Files and protection – file system organisation – file operations – access methods – consistency semantics – directory structure organisation – file protection – implementation issues – security encryption.

- **UNIT V: Case Study**

UNIX , Linux and Windows XP operating systems

- **Unit VI: Applications**

Advances and the latest trends in Operating System, latest applications, latest research conducted in the areas, Discussion of some latest papers published in IEEE transactions and ACM transactions, Web of Science and SCOPUS indexed journals as well as high impact factor conferences as well as symposiums.

- **Text Book (s)**
- Silberschatz, Galvin and Gagne, "Operating Systems Concepts", Wiley
- D M Dhamdhere, "Operating Systems : A Concept based Approach", 2nd Edition
- **Reference Book (s)**
- Sibsankar Halder and Alex A Aravind, "Operating Systems", Pearson Education
- Harvey M Dietel, " An Introduction to Operating System", Pearson Education
- D M Dhamdhere, "Operating Systems : A Concept based Approach", 2nd Edition
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Introduction

- What Operating Systems Do
- Computer-System Organization
- Computer-System Architecture
- Operating-System Structure
- Operating-System Operations
- Process Management
- Memory Management
- Storage Management
- Protection and Security

Objective

- To describe the basic organization of computer systems
- To provide a grand tour of the major components of operating systems
- To give an overview of the many types of computing Environments
- To explore several open-source operating systems

What is an Operating System?

- A program that acts as an intermediary between a user of a
- computer and the computer hardware
- Operating system goals:
- Execute user programs and make solving user problems Easier
- Make the computer system convenient to use
- Use the computer hardware in an efficient manner

Computer System Structure

- Computer system can be divided into four components:
- Hardware – provides basic computing resources
- CPU, memory, I/O devices
- Operating system
- Controls and coordinates use of hardware among various
- applications and users
- Application programs – define the ways in which the system
- resources are used to solve the computing problems of the
- Users
- Word processors, compilers, web browsers, database
- systems, video games
- Users
- People, machines, other computers

Operating System Definition

- OS is a **resource allocator**
- Manages all resources
- Decides between conflicting requests for efficient and fair resource use
- OS is a **control program**
- Controls execution of programs to prevent errors and improper use of the computer

Computer Startup

- **bootstrap program is loaded at power-up or reboot**
- Typically stored in ROM or EPROM, generally known as **firmware**

Initializes all aspects of system

- Daemons (system processes)
- – Not part of kernel but remain in memory all the time
- Loads operating system kernel and starts execution

Computer System Organization

- Computer-system operation
- One or more CPUs, device controllers connect through common
- bus providing access to shared memory
- Concurrent execution of CPUs and devices competing for
- memory cycles
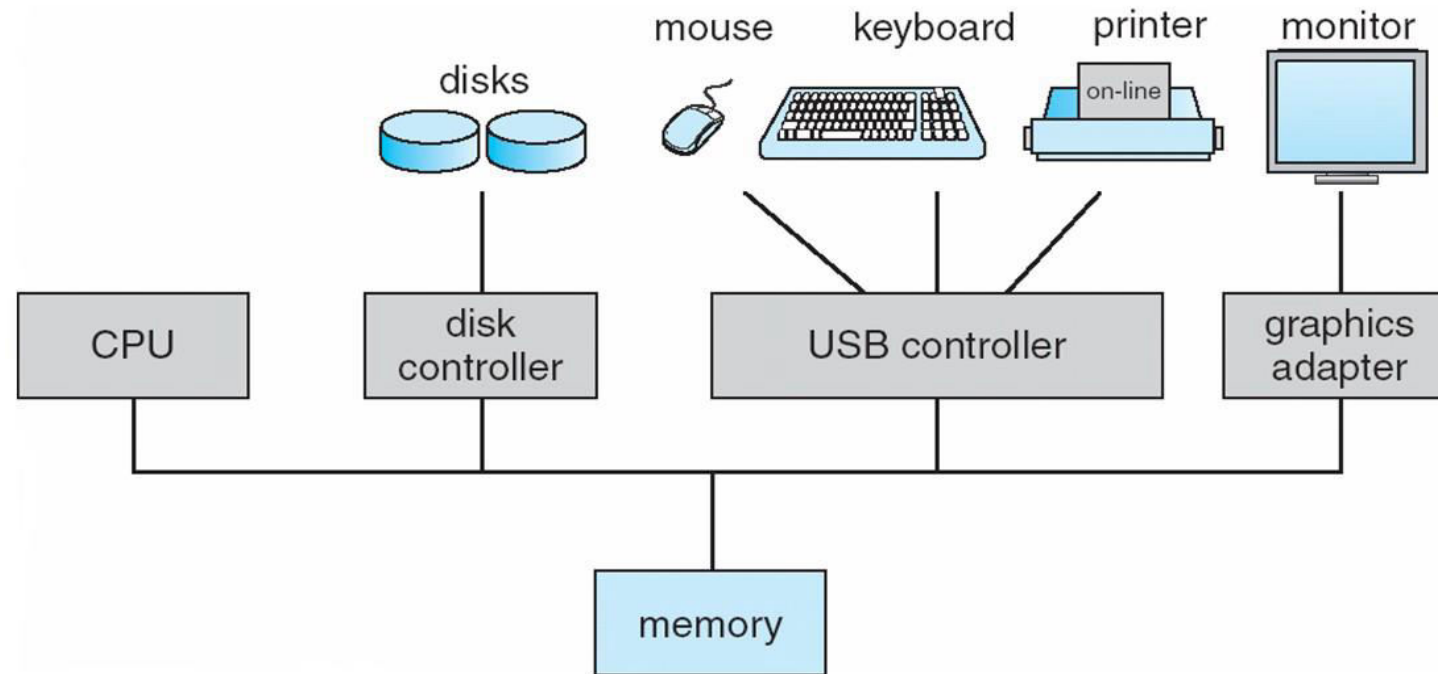
Common Functions of Interrupts

- Interrupt transfers control to the interrupt service routine generally,through the **interrupt vector, which contains the addresses of all** the service routines

 Interrupt architecture must save the address of the interrupted instruction

- A **trap or exception is a software-generated interrupt caused either** by an error or a user request

- An operating system is **interrupt driven**