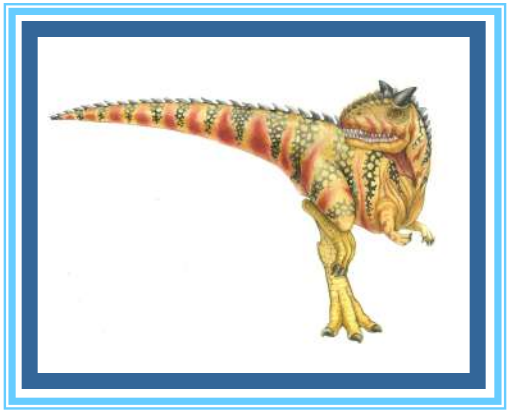
Introduction

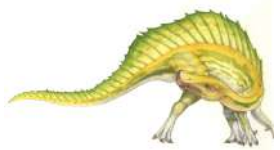


Outline

Overview Of Operating Systems	-Introduction to Operating Systems
	-Operating-System Structures
Process Management	- Processes & Threads
	- Central processing Unit (CPU)Scheduling
	- Synchronization
Test 1	
Deadlocks	- Resources, Detection
	- Deadlock Avoidance
	- Deadlock Prevention
Memory Management	- Main Memory
	- Virtual Memory
Test 2	
Storage and Device Management	- File-System Interface
	- File-System Implementation
	- Mass-Storage Structure
	- Input/ Output (I/O)
Protection and Security	Goals of Protection, Domain of Protection, Implementation

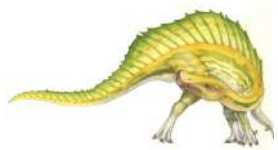
Books

1. Silberschatz, Galvin, and Gagne,2012, Operating Systems Concepts: Essentials, 9thEdition, Prentice-Hall.
2. Tanenbaum, A.S. and Bos, H., 2014, Modern Operating Systems, 4rdEdition,Pearson;



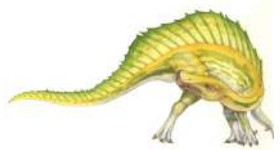
What is an Operating System?

- 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

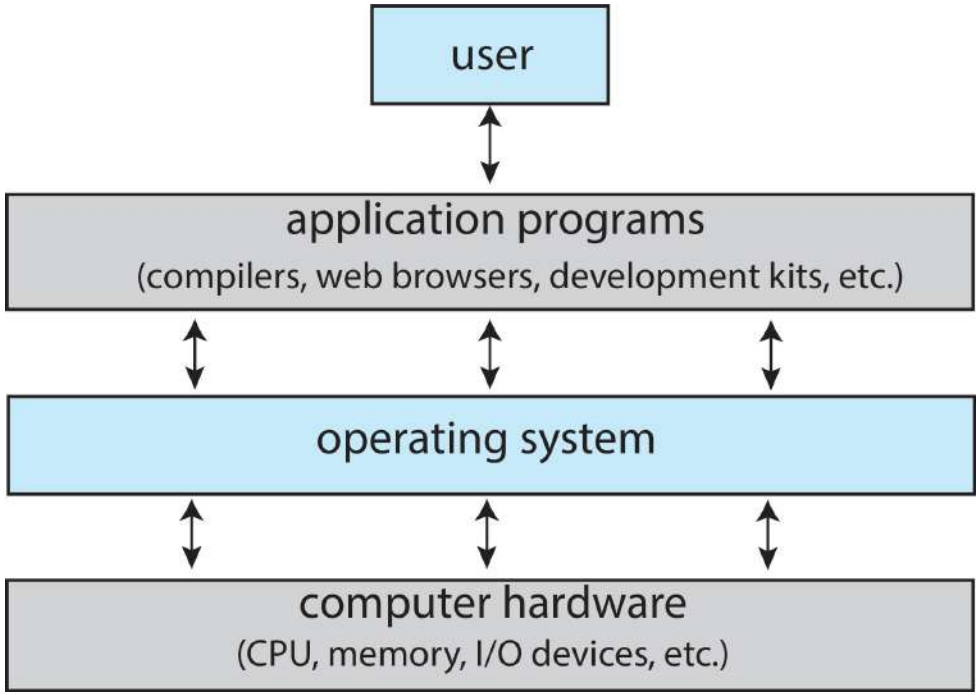


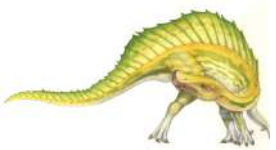
Computer System Structure

- 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



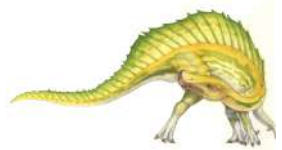
Abstract View of Components of Computer





What Operating Systems Do

- **From User View**
  - Users want convenience: user view of computer varies by the interface being used.
  - The operating systems are designed mostly for ease of use.
  - Don't care about **resource utilization**
- **From System View:** From the computer's point of view,
  - the OS is a **resource allocator:** Manages all resources and decides between conflicting requests for efficient and fair resource (HW) use.
  - **control program:** Controls execution of programs to prevent errors and improper use of the computer
    Users want convenience, **ease of use** and **good performance**
- Mobile devices like smartphones and tables are resource poor, optimized for usability and battery life
  - Mobile user interfaces such as touch screens, voice recognition
- Some computers have little or no user interface, such as embedded computers in devices and automobiles



Operating System Containing

- "The one program running at all times on the computer" is the **kernel,** part of the operating system
- Everything else is either
  - A ***system program*** (ships with the operating system, but not part of the kernel) , or
  - An ***application program***, all programs not associated with the operating system
- Today's OSes for general purpose and mobile computing also include ***middleware*** – a set of software frameworks that provide additional services to application developers such as databases, multimedia, graphics