OPERATING SYSTEMS

Operating System and Structures

S.Thenmozhi
Department of Computer Applications

OS Functions

- The major functionalities performed by an operating system are:
  - Process Management
  - Memory Management
  - Storage Management
  - Protection and Security

OS Functions

Process Management

- A program does nothing unless its instructions are executed by a CPU. A process is a unit of work in a system.
- A process needs resources – CPU time, memory, Files, I/O devices etc. The resources are allocated while it is running.
- Program is a ***passive entity***, process is an ***active entity***.

OS Functions

- The operating system is responsible for the following activities in connection with process management:
  - Creating and deleting both user and system processes
  - Suspending and resuming processes
  - Providing mechanisms for process synchronization
  - Providing mechanisms for process communication
  - Providing mechanisms for deadlock handling

Memory Management

- To execute a program all (or part) of the instructions must be in memory
- All (or part) of the data that is needed by the program must be in memory.
- Memory management determines what is in memory and when it is needed
- Memory management activities
  - Keeping track of which parts of memory are currently being used and by whom
  - Deciding which processes move data into and out of memory
  - Allocating and de-allocating memory space as needed

Storage Management

FS Management

- OS provides uniform, logical view of information storage
- Different devices, same view
- Abstracts physical properties to logical storage unit - file
- Each medium is controlled by device (i.e., disk drive, tape drive)
- Varying properties include access speed, capacity, data-transfer rate, access method (sequential or random)

OS Functions

- Files usually organized into directories
- Access control to determine who can access what
- OS activities include
  - Creating and deleting files and directories
  - Primitives to manipulate files and directories
  - Mapping files onto secondary storage
  - Backup files onto stable (non-volatile) storage media

Mass Storage Management

- Usually disks used to store
  - data that does not fit in main memory, or
  - data that must be kept for a “long” period of time
- Proper management is of central importance
- Entire speed of computer operation hinges on disk subsystem and its algorithms
  - Disk is slow, its I/O is often a bottleneck
- OS activities
  - Free-space management
  - Storage allocation
  - Disk scheduling

Protection and Security

- **Protection** – any mechanism for controlling access of processes or users to resources defined by the OS
- **Security** – defense of the system against internal and external attacks
  - includes denial-of-service, worms, viruses, identity theft, theft of service
- Systems generally first distinguish among users, to determine who can do what

OS Functions

- User identities (**user IDs**) include name and associated number, one per user
- User ID then associated with all files, processes of that user to determine access control
- Group identifier (**group ID**) allows set of users to be defined and controls managed, then also associated with each process, file
- **Privilege escalation** allows user to change to effective ID with more rights

THANK YOU

S. Thenmozhi

Department of Computer Applications

thenmozhis@pes.edu

+91 80 6666 3333 Extn 393