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OPERATING SYSTEM

Assignment # 01

1- Explain the significance of the running state in an operating System. What Activities does a process typically perform when in a state , and how does Os manage the execution of multiple process concurrently?

The Running State in an Operating System refers to the state of process when the CPU is actively executing instructions associated with that process. When process is in running state it is Utilizing the CPU resources and performing its designated task or Computations.

→ Activity performed by a process in the running state include.

1- Executing Instructions:

The CPU execute the instructions of the process, performing calculations, data manipulation, or any other operation specified by the program associated with that process.

2- Access Resources:

The Process may access various resources such as memory, I/O devices or other system resources required for its executions.

3- Context Switching:

In multitasking Environment the process might temporarily allow other processes to execute. This involves saving the current state of the process so it can resume later.

(Qn02) What are different approach or structure employed in operating System and how do they impact the design and

functionality of Computer Operating System?

Operating Systems Utilize various approaches and structure to manage resources, facilitate communication between hardware and software components and provide an interface for users to interact with the computer. These approaches impact the design and functionality of operating systems significantly.

1- Monolithic Kernel:

Single Large Unit for all operating systems.

2 - Micro Kernel

Minimal Kernel other services in user space

3 - Hybrid Kernel

Mix of monolithic and micro kernel

4 - LAYERED Architecture:

Hierarchical layers for services.

5. Virtualization:

Allows multiples OS instances
on one hardware.

Qn03: Explain the role and significance
of system calls in operating system. How
do system call facilitate ... ?

System Calls acts as a crucial
interface between user-level application
and the operating system kernel. They provide
a way for applications to request services
or access resources that are only available in
kernel mode.

1- Access to Kernel Services

System call allow user-level
application to request specific functionalities
or services that are not available in user space.
These services can include I/O operations.

2- Protection and Security

System call help enforce security and protection mechanism by ensuring that user program cannot directly access critical system resources. The operating system validates and controls access to resource request by application through system calls.

3 - Isolation and Abstraction

They provide layer of abstraction; hiding the complex details of hardware and low-level operations from user-level programming.

Qno4

Comparative Study of Model
of Four Operating System.

1 - Unix

- Modular design with a variety of distributions.

- CLI-based with evolving GUI options
- Uses diverse file-systems like UFS etc
- Security features include permissions
- widely used in server environment

2- Windows:

- Monolithic kernel with a graphical interface.
- NTFS file system with advanced features
- Security measures like UAC, windows defender.
- Extensive Software compatibility and ecosystems

3- Solaris:

- Transitioned from monolithic to hybrid kernel
- Supports UFS and introduced ZFS for advanced features.

Known for robust security measures like RBAC and MAC

- Historically popular in enterprise setting now less prevalent.

4 - MAC OS

- Hybrid kernel based on Unix
- Uses APFS with features like Snapshot and encryption
- Security features like Gatekeeper and FileVault.
- widely used in creative industries and among Apple consumers.