Assignment - 1

* Short Question :

Q:1 What is spooling ?

=> Spoiling refers to the act of revealing or giving away key details about a story, plot, or outcome of a movie, book game, or any other form of entertainment before the intended audience has had a chance to experience it themselves spoilers typically spoil the enjoyment or surprise by disclosing important elements, such as twists or endings, which can lessen the impact of the work spoiling is often considered inconsiderate if done without warning or consideration for other who want to discover the content on their own.

Q:2 Define shell and kernel

=> Shell :

The shell is a command - line interface or user interface that allows users to interact with the operating system it serves as a bridge between the user and the kernel, interpreting commands entered by the user and executing them by communicating with the kernel.

- Kernel :

The kernel is the core part of the operating system that manages the system's resources, such as the CPU, memory and hardware devices. It acts as an intermediary between the software and the hardware.

. Long Questions:

Q:1 Explain Time sharing system with its advantages and disadvantages

→ Advantages of Time-sharing systems:

1. Increased Efficiency:

multiple users can interact with the system at the same time, optimizing resource use, especially in environments where many tasks are waiting for CPU time.

2. Cost-Effective:

since many users share the same resources, it reduces the need for dedicated hardware for each user, which makes it more cost-efficient for organizations.

3. Interactive computing:

Time-sharing systems allow real-time interaction with the system, enabling users to get immediate responses from the computer, making it suitable for applications like word processing and database queries.

Fair Resource Allocation:

The system ensures that all users get a fair share of the computer's processing time, preventing any one user from monopolizing the system's resources.

5. Improved User Productivity:

Since many users can simultaneously perform tasks, it increases productivity, especially in research, educational institutions, and large organization.

Disadvantages of Time-sharing system:

1. Complexity in Implementation:

Time-sharing systems are more complex to design and manage compared to single-user systems. Handling multiple tasks efficiently and ensuring fairness can be challenging.

2. Security and Privacy Concerns:

Since multiple users access the same system, it can lead to security risks, such as unauthorized access to data or system resources.

3. Resource Contention:

If too many users are accessing the system at once resource contention may arise, leading to delays or performance degradation as each user's allocated time is limited.

4. Overhead:

The system requires significant overhead to manage task scheduling switching between tasks and context switching which can reduce overall system efficiency in certain cases.

5 Slower performance for individual users :

since CPU time is shared among many users, individual users may experience slower performance compared to systems that are dedicated to a single user or task.

Q:2 Explain multi-programming operating system.

⇒ How multi-programming works :

- memory management :

The OS loads multiple programs into memory and ensures that each program has its own allocated space. when one program is waiting for input/output, the CPU is assigned to another program.

- CPU scheduling :

The operating system uses scheduling algorithms to allocate CPU time to the different programs. The system ensures that the CPU switches between programs, allowing them to run in parallel, but not simultaneously.

- I/O management :

Programs that are waiting for I/O operations reading from a disk or waiting for do

not hold up the CPU, as other programs can be processed during these waits

Advantages of multi-programming

1. Better CPU utilization :

By keeping the CPU busy with one program while others wait for I/O operations, multi-programming reduces CPU idle time and increases overall system efficiency.

2. Increased ~~Then~~ Throughput :

More jobs are completed in a given time period because the system can continuously execute programs without unnecessary delays.

3. Faster Response Time :

With several programs loaded in memory, the system can switch between tasks quickly, improving the overall responsiveness of the system for the user.

4. Improved System Resource utilization :

The operating system ensures that system resources like CPU time and memory are being used effectively by running multiple tasks concurrently

Disadvantages of multi-programming:

1. complexity in management
2. Resource contention
3. overhead
4. Security and stability risks.

Q-1 write a short-note on Real-Time operating system.

=> key characteristics of RTOS:

1. Deterministic Behavior:

RTOSes guarantee that high-priority tasks are executed within a strict time limit, making the system highly predictable and reliable.

2. Task Scheduling:

The RTOS uses scheduling algorithms to ensure that time-critical tasks are given precedence over less important ones.

3. Real-Time Responsiveness:

RTOSes are optimized for low latency and quick task switching to ensure immediate or near-instantaneous response to external events.

4. Concurrency management:

RTOSes handle multiple tasks concurrently while ensuring that critical tasks are not delayed or interrupted.

Types of RTOS :

1. Hard Real - Times os :
   It has strict timing constraints, where missing a deadline could result in system failure.

2. soft Real - Times os :
   while it also Processes tasks within a time frame, missing a deadline is tolerable and doesn't cause system failure.

Advantages of RTOS :

1. Predictability
2. Efficient Resource Management

DisAdvantages of RTOS

1. Complexity
2. Limited Flexibility

Assignment - 2

* Short Question

Q:1 Define Absolute and Relative Path

- **Absolute Path:**

An absolute Path is the full Path to a file or directory starting from the root directory. It Provides the complete location of the file or directory, making it unique and independent of the current working directory Absolute Paths are used to specify files or directories without any reference to the current location

- **Relative Path :**

A relative path specifies the locations of a file or directory in relation to the current working directory It does not begin with the root directory but rather from the point where the user is currently working, making it shorter and more flexible.

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Q:2 Different operation that can be performed on file

=>1. Create:

This operation creates a new file in the file system. when a new file is created, it is typically empty, and a unique name is assigned to it

2. open:

To perform operations on an existing file, it needs to be opened opening a file establishes a connection between the file and the application, allowing it to be read or written.

3. Read:

This operation allows data to be retrieved from a file. It reads the content of the file into memory. so that it can be processed or displayed by the program.

4. Write:

writing to a file modifies or adds data to the file. The file can be updated by appending new data, modifying existing content, or overwriting it completely.

5. Append:

This operation adds data to

the end of a file without modifying or overwriting the existing content. It's commonly used to add logs or new entries to a file.

6. Close :

After a file has been opened for reading or writing, the close operation is used to terminate the connection between the application and the file. It ensures that all changes are saved and resources are released.

7. Delete :

The delete operation removes a file from the file system, freeing up the space it occupied. The file is no longer accessible after deletion.

8. Rename :

This operation changes the name of an existing file. It does not alter the content of the file but modifies its identifier in the file system.

9. Copy :

Copying a file creates a duplicate of the file with the same content.

10. Move :

The move operation transfers of a file from one location to another it removes the file from its original location and places it in a new one.

11. Change Permissions :

This operations modifies the access permissions of a file, such as read, write and execute permissions, to control who can access and modify the file.

12. check file status :

This operation retrieves information about the file, such as its size, creation date, last modified data, and other metadata.

* Long question

Q:1 Explain File management in brief. // Explain operation on file.

=> File management refers to the process of storing, organizing, retrieving and manipulating files in a computer system. It involves managing file operations such as creating, reading, writing, updating, and deleting files. File management systems ensure data is stored efficiently and can be easily accessed by users or applications.

Operations on files:

1. Create:
   The process of creating a new file in the storage system.

2. Read:
   Accessing the content of a file for viewing or processing.

3. Write:
   Modifying or adding data to an existing file.

4. Update:
   Changing specific parts of the file without altering its entire content

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5. Delete :

Removing a file from the storage system.

6. Rename :

changing the name of an existing file.

7. Copy :

et creating a duplicate of a file

8. Move :

Transferring a file from the one location to another.

Q:2 Explain Directory structure in detail.

=> key components of Directory structure.

1. Root directory :

The top-most directory in a hierarchical file system it is the starting point of the directory structure and all other files and directories are contained within it.

2. Subdirectories :

These are directories within the root directory or other directories. subdirectories help organize files into logical groups for example, a directory for work files might contain subdirectories for each project.

3. Files :

The actual data or documents stored within directories files are contained in directories, and they can have extensions such as .txt, .jpg, .pdf, etc.,

Types of Directory Structures :

1. Single - level Directory:

In this structure, all files are stored in one central directory. It's simple but can become disorganized and difficult to manage as the number of files increases.

2. Two - level Directory :

This structure adds a second level to the organization by dividing files into separate directories. typically one for each user. Each user has their own directory containing their files, making file management more organized.

3. Hierarchical Directory :

This is the most common structure, where directories and subdirectories are arranged in a tree - like structure, allowing for a complex and scalable organization.

4. Network File system Directory :
used in networked environment where directories are shared over a network. This allows multiple systems to access the same files and directories

Details on Directory operations

1. Crete Directory :
This operation creates a new directory in the file system.

2. Delete Directory :
Removes a directory from a the system, typically after ensuring that it is empty.

3. Rename Directory :
Allows you to change the name of an existing directory.

4. List Directory :
Displays the contents of a directory.

5. Change Directory :
moves the user into a different directory, allowing

Q.i) File access method

=> 1. Sequential Access :

In sequential access, data is read or written in a linear order one record after another, from the beginning of the file to the end.

2. Direct Access :

In direct access, data can be read or written in any order, meaning that specific data can be accessed without having to go through the preceding data.

3. Indexed Access :

In indexed access, a special index is maintained that maps file locations to specific records. The index is used to quickly locate the data within the file.

4. Hashed Access :

In hashed access, a hashing algorithm is used to convert a record's key into a hash value, which is then used to find the location of the data in the file.

Q.ii) Explain

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Q11 Explain various types of file protection mechanism used by OS.

→ 1. Access control lists (ACLs)

- ACLs are lists associated with files or directories that define which users or groups have access to the file and what type of operations they can perform. Each file can have its own ACL specifying permission for different users.

2. File Permissions.

- Read (r), write (w), and Execute (x) permission define the allowed operations on files. These permissions can be granted or restricted for the file owner, group, and others.

3. User Authentication.

- OS typically requires users to authenticate themselves before gaining access to files the system uses the identity of the user to enforce the correct permission.

4. File Encryption.

- Files can be encrypted to prevent unauthorized access Encryption algorithm s convert the file contents into a format that can only be read or decrypted with the proper decryption key.

5. Audit logs
- OS maintain logs of file access events. These logs help in tracking unauthorized access or suspicious activities, providing accountability for file access.

6. Mandatory Access control
- In MAC systems, access to files is restricted by the operating system based on predefined policies, often set by system administrators. This differs from discretionary access control where users can control access to their own files.

7. file system level security
- some file systems provide built-in mechanisms for file protection for instance, NTFS, supports features like file encryption, permissions, and auditing.

8. Integrity checking
- Integrity mechanisms ensure that the file data has not been tampered with. Any unauthorized modification of the file triggers an alert or blocks access.

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9. File locking

- File locking prevents multiple users or processes from simultaneously modifying a file, which can lead to system are mounted in a read only mode, preventing accidental or malicious modification.

10. Physical security

- Ensuring that the hardware on which files are stored is secure is also a key part of file protection. Physical access restrictions, like locked servers or disk encryption, can prevent unauthorized users from accessing data stored on the system.