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Subject: System Programming and Operating Systems

Topic: Assignment 4 (Theory)

Date :

Questions

1. List categories of system calls and explain Process System Call with an example.
2. Explain various scheduling criteria.

Answers:

1.

System Calls can be categorised into several groups based on their functionality. Here are some categories:

a. Process Control System Calls: These system calls deals with processes, including process creation, termination, and management. They are crucial for the control and coordination of processes in an operating system.

b. File Management System Calls: The system calls are used for file and directory operations, such as creating, reading, writing, deleting and manipulating files and directories.

c. Device Management System Calls: These calls handle devices like printers, keyboards, and other I/O devices They include functions to open, read, write and close devices.

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d. Information System Maintainance Calls: These calls provide information about the system such as date, time, system configuration, and user account details.

e. Communication System Calls: These system calls facilitate communication between processes either within the same system or over a network. They include functions for interprocess communication (IPC) and network communication.

- Process System Call:

- A common process system call is `fork()`. This call is used to create a new process by duplicating the current process.

- Eg:

```
int main() {
    pid_t child_pid;
    child_pid = fork().
    if (child_pid == 0) {
        printf("Child process is running!\n");
    } else if (child_pid > 0) {
        printf("Parent process is running!\n")
    } else {
        printf("Fork Failed")
    }
    return 0;
}
```

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- In the example, 'fork()' system call creates a new child process. If 'fork()' returns 0, then the code is running in the child process, and if its greater than 0, its the parent process. The child process inherits a copy of the parents' memory and continues execution from that point.

2.

Scheduling Criteria are used to determine the order in which processes are executed by the CPU. Different scheduling criteria are employed to achive various objectives, and they play a crucial role in process scheduling algorithms Here are somes of the key scheduling criteria:

a. CPU Utilization: Maximizing CPU utilization is common scheduling goal. This criterion aims to keep the CPU as busy as possible, ensuring that it is processing tasks efficiently. To achieve this, the scheduler attempts to minimize idle time.

b. Throughout: Throughput is a measure of the number of processes completed in a unit of time. Schedulers may aim to maximize important in batch processing systems.

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c. Turnaroud Time: Turnaround time is the total time taken to execute a process from the moment it's submitted until it completes.

d. Waiting Time: Waiting time is the time a process spends waiting in the ready queue before getting CPU time.

e. Response Time: Waiting Time is the time a process spends waiting in the ready queue before getting CPU time.

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