Study Set for Lecture 03: Processes

Due Sep 14 at 11:59pm   **Points** 10   **Questions** 7

Available Sep 8 at 12pm - Dec 8 at 8pm 3 months   **Time Limit** None

Allowed Attempts Unlimited

Instructions

Review lecture notes from **lect03_Processes.pdf**.

Then answer the questions from this study set and submit them to gain access to the further part of the course.

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Take the Quiz Again

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Attempt History

	Attempt	Time	Score
LATEST	**Attempt 1**	51 minutes	8 out of 10

⚠ Correct answers are hidden.

Score for this attempt: **8** out of 10
Submitted Sep 8 at 2:27pm
This attempt took 51 minutes.

| Question 1	0 / 0 pts

Describe what a PCB (Process Control Block) is and how it is used by the OS.
What information does it contain?

Your Answer:

Process Control Block is a data structure that contains information of the process related to it. The process control block is also known as a task control block, entry of the process table, etc.

It is very important for process management as the data structuring for processes is done in terms of the PCB. It also defines the current state of the operating system.
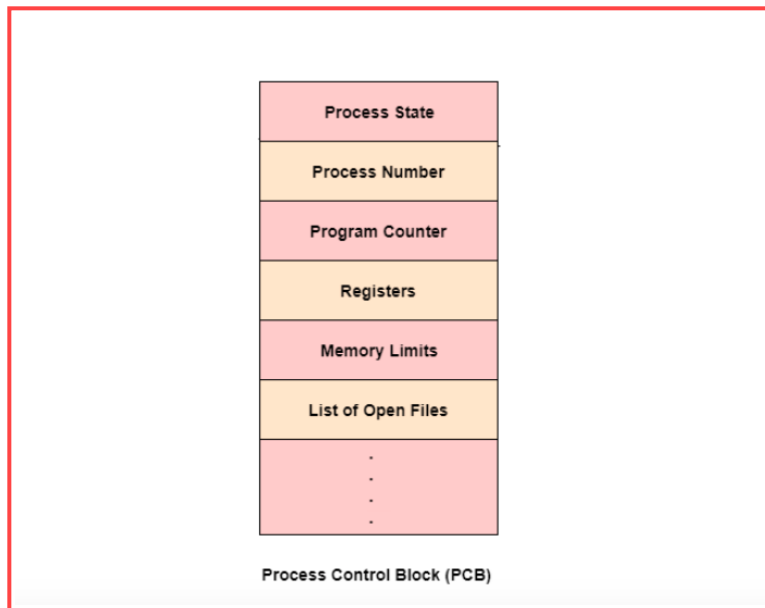
The following are the data items −

Process State

This specifies the process state i.e. new, ready, running, waiting or terminated.

Process Number

This shows the number of the particular process.

Program Counter

This contains the address of the next instruction that needs to be executed in the process.

Registers

This specifies the registers that are used by the process. They may include accumulators, index registers, stack pointers, general purpose registers etc.

List of Open Files

These are the different files that are associated with the process

CPU Scheduling Information

The process priority, pointers to scheduling queues etc. is the CPU scheduling information that is contained in the PCB. This may also include any other scheduling parameters.

Memory Management Information

The memory management information includes the page tables or the segment tables depending on the memory system used. It also contains the value of the base registers, limit registers etc.

I/O Status Information

This information includes the list of I/O devices used by the process, the list of files etc.

Accounting information

The time limits, account numbers, amount of CPU used, process numbers etc. are all a part of the PCB accounting information.

Location of the Process Control Block

The process control block is kept in a memory area that is protected from the normal user access. This is done because it contains important process information. Some of the operating systems place the PCB at the beginning of the kernel stack for the process as it is a safe location.

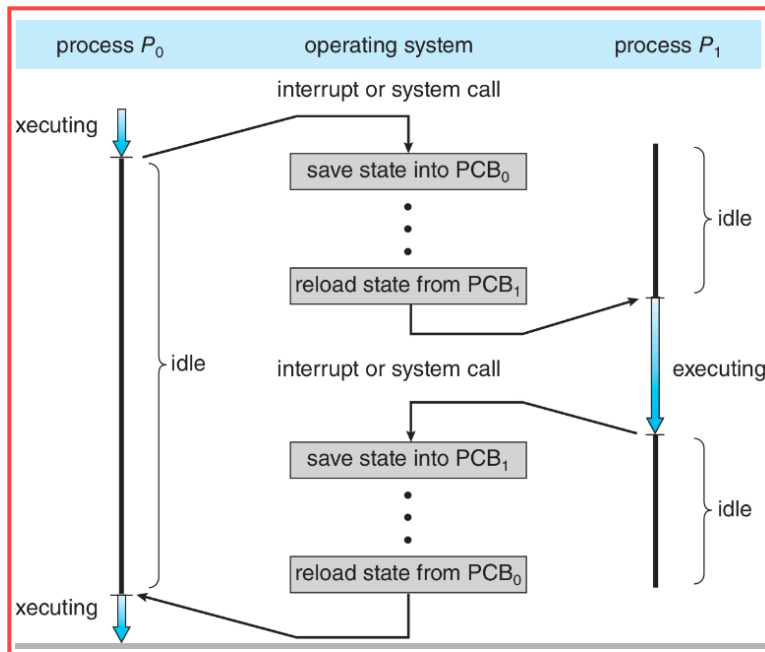**Question 2**   **0 / 0 pts**

Describe how processes migrate between a variety of OS queues.

Your Answer:

Processes migrate between a variety of OS queues with context switches. When a context switch occurs , the kernel saves the context of the old

<u>process in its PCB and loads the saved context of the new process</u>
<u>scheduled to run.</u>

Question 3

Describe how the state of a process changes and under which circumstances (that is, describe the Process State Diagram as a Finite State Machine, or an FSM).

In what state process instructions are being actively executed by the CPU?

How many processes can be in running state?

Your Answer:

Throughout its life in the system, a process changes states as follows

●new: The process is being created

●ready: The process is waiting to be assigned to a processor (CPU)

●running: Instructions are being executed

●waiting: The process is waiting for some event to occur

●terminated: The process has finished execution
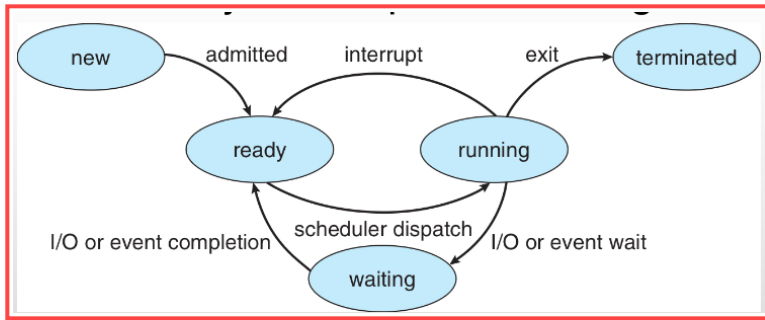
Question 4

0 / 0 pts

Describe how process creation and termination is handled by operating systems.

Your Answer:

Process Creation

A process may be created in the system for different operations. Some of the events that lead to process creation are as follows −

- User request for process creation
- System Initialization
- Batch job initialization
- Execution of a process creation system call by a running process

A process may be created by another process using fork(). The creating process is called the parent process and the created process is the child process. A child process can have only one parent but a parent process may have many children. Both the parent and child processes have the same memory image, open files and environment strings. However, they

have distinct address spaces.

Process Creation Using fork()
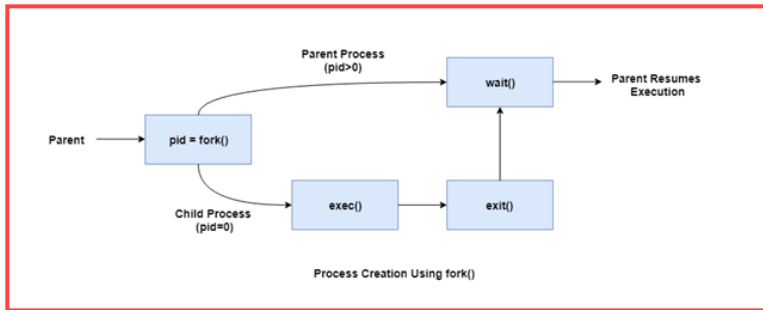
Process Termination

Process termination occurs when the process is terminated The exit() system call is used by most operating systems for process termination.

Some of the causes of process termination are as follows −

- A process may be terminated after its execution is naturally completed. This process leaves the processor and releases all its resources.
- A child process may be terminated if its parent process requests for its termination.
- A process can be terminated if it tries to use a resource that it is not allowed to. For example - A process can be terminated for trying to write into a read only file.
- If an I/O failure occurs for a process, it can be terminated. For example - If a process requires the printer and it is not working, then the process will be terminated.
- In most cases, if a parent process is terminated then its child processes are also terminated. This is done because the child process cannot exist without the parent process.
- If a process requires more memory than is currently available in the system, then it is terminated because of memory scarcity.

Question 5	0 / 0 pts

Describe short-term, medium-term, and long-term scheduling.
What are the differences between them?

Your Answer:

Process Scheduling handles the selection of a process for the processor on the basis of a scheduling algorithm and also the removal of a process from the processor. It is an important part of multiprogramming in operating system.

Process scheduling involves short-term scheduling, medium-term scheduling and long-term scheduling. Details about these are given as follows −

Long-Term Scheduling

- Long-term scheduling involves selecting the processes from the storage pool in the secondary memory and loading them into the ready queue in the main memory for execution. This is handled by the long-term scheduler or job scheduler.

  The long-term scheduler controls the degree of multiprogramming. It must select a careful mixture of I/O bound and CPU bound processes to yield optimum system throughput. If it selects too many CPU bound processes then the I/O devices are idle and if it selects too many I/O bound processes then the processor has nothing to do.

Short-Term Scheduling

- Short-term scheduling involves selecting one of the processes from the ready queue and scheduling them for execution. This is done by the short-term scheduler. A scheduling algorithm is used to decide which process will be scheduled for execution next by the short-term scheduler.

  The short-term scheduler executes much more frequently than the long-term scheduler as a process may execute only for a few milliseconds.

  The choices of the short term scheduler are very important. If it selects a process with a long burst time, then all the processes after that will have to wait for a long time in the ready queue. This is known as starvation and it may happen if a wrong decision is made by the short-term scheduler.

Representation of Short Term and Long Term Scheduler using a Queuing Diagram
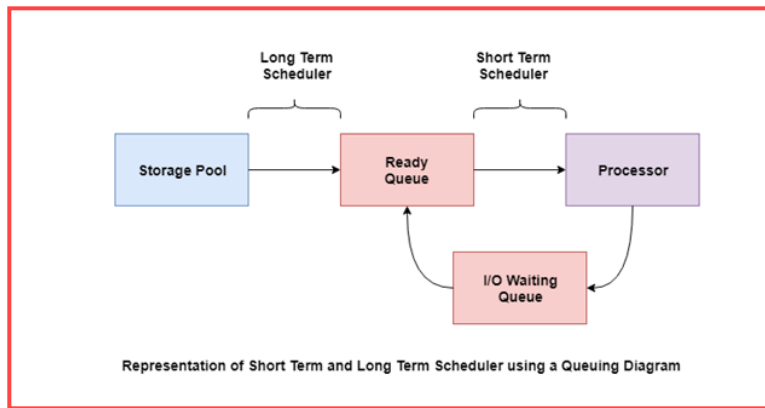
- **Medium-Term Scheduling**

- Medium-term scheduling involves swapping out a process from main memory. The process can be swapped in later from the point it stopped executing. This can also be called as suspending and resuming the process and is done by the medium-term scheduler.

  This is helpful in reducing the degree of multiprogramming. Swapping is also useful to improve the mix of I/O bound and CPU bound processes in the memory.

Representation of Medium-Term Scheduling using a Queuing Diagram
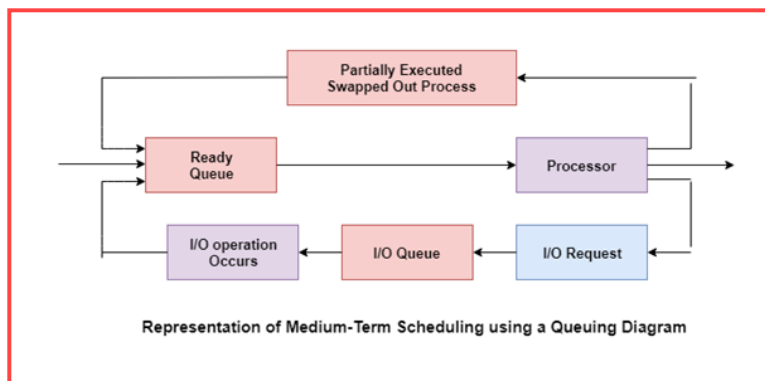
Unanswered

Question 6

0 / 0 pts

Describe the actions taken by a kernel to context-switch between processes.

Your Answer:

Unanswered

Question 7

8 / 10 pts

I have submitted answers to all questions in this study set.

○ True

○ False

Quiz Score: **8** out of 10

Unanswered