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Sessional Assignment Spring 2020

OPERATING SYSTEMS CONCEPTS

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Question No 1 :

Explain the necessary conditions that may lead to a deadlock situation. 2 What are the various methods for handling deadlocks?

Answer :

A **deadlock situation (Necessary conditions)** on a resource can arise if and only if all of the following conditions hold simultaneously in a system: Mutual exclusion: At least one resource must be held in a non-share-able mode. Otherwise, the processes would not be prevented from using the resource when necessary.

Methods for handling deadlock

There are mainly four (4) methods for handling deadlock.Details about these are given as follows −

I. **Deadlock Detection :** Deadlock can be detected by the :resource scheduler" as it keeps track of all the resources that are allocated to different processes. After a deadlock is detected, it can be handed using the involved in the deadlock are terminated.

II. **Deadlock Prevention :** This is important to prevent a deadlock before it can occur. So, the system checks each transaction before it is executed to make sure it does not lead to deadlock. If there is even a slight possibility that a transaction may lead to deadlock, it is never allowed to execute.

III. Deadlock Avoidance : It is better to avoid a deadlock rather than take measures after the deadlock has occurred. The wait for graph can be used for deadlock avoidance. This is however only useful for smaller databases as it can get quite complex in larger databases.

IV. **Deadlock ignorance :** It is the most popular method and it acts as if no deadlock and the user will restart. As handling deadlock is expensive to be called of a lot of codes need to be altered which will decrease the performance so for less critical jobs deadlock are ignored. Ostrich algorithm is used in deadlock Ignorance. Used in windows, Linux etc.

End of the Question No 1

Question No 2 : Is it possible to have a deadlock involving only one single process? Explain your answer.

Answer:

It is not possible to have that a deadlock involved only one single process. The deadlock involves a circular “hold-and-wait” condition between two or more processes, so “one” process cannot hold a resource, so on waiting for another resource that it is holding.

End of the Question No 2

Question No 3 : Consider a system consisting of 4 resources of the same type that are shared by 3 processes, each of which needs at most 2 resources. Show that the system is deadlock free.

Answer:

If the system is deadlocked, it implies that each process is holding one(1) resource and is waiting for one more time . Since there are Three(3) processes and four (4) resources, one process must be able to obtain (two) 2 resources. This process requires no more resources and therefore it will return its resources when process done.

End of the Question No 3

Question No 4 : What is a resource allocation graph? How do you obtain a wait-for graph from it? Explain their uses.

Answer:

The resource allocation graph is the illustrated (pictorial) representation of the state of a system. As its name suggests, the resource allocation graph is the complete information about all the processes which are hold some resources or waiting for some resources.A resource that can be more than one instance. Each instance will be represented by a dot inside the rectangle shape.

Edges in **resource allocation graph** are also of two types, one represents assignment and other represents the wait of a process for a resource.

End of the Question No 4

Question No 5 : Can a system detect that some of its processes are starving? If you answer "yes," explain how it can. If you answer "no," explain how the system can deal with the starvation problem.

Answer:

Detection of starvation requires "future knowledge" since no amount of record-keeping statistics on processes can determine if it is making 'progress' or not. However, starvation can be prevented by 'aging' a process. This means maintaining a rollback of count for each process, and including this as part of the cost factor in the selection process for a victim for preemption and rollback.

End of the Question No 5

Question No 6 :On a disk with 1000 cylinders, number 0 to 999, compute the number of tracks the disk arm must move to satisfy all the requests in the disk queue. Assume the last request serviced was at track 345 and the head is moving toward track 0. The queue in FIFO order contains requests for the following tracks: 123, 847, 692, 475, 105, 376. Perform the computations for the following disk scheduling algorithms:

- **FCFS**
- **SSTF**

Solution

FCFS

The FIFO schedule is

345,123,847,692,475,105 and 376.

Total head movement =

(345-123) + (847-123) + (847-692) + (692-475) + (475-105) + (376-105)

Total **FCFS** head movement =1959

SSTF

The SSTF schedule is

345,376,475,692,847,123 and 105.

Total head movement =

(376-345) + (475-376) + (692-475) + (847-692) + (847-123) +(123-105)

Total **SSTF** head movement = 1244

End of the Assignment