UG END SEM EXAM
Semester - Vth
Date : 21st December, 2021

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Subject : Operating System
Subject Code : CS303

Q.1.

Ans → Given, the kernel of a multiprogramming system classifies a program as CPU-bound or I/O bound and assigns an appropriate priority to it.

Throughput of a system is defined as the number of jobs processed per unit time. The turnaround time is the time between the submission of a job and its completion.

Consider the following scenario when a CPU-bound program is incorrectly classified as an I/O bound program:

i) The kernel would assign the program
ii) Consequently, when this program is scheduled, it would execute for a long time.
iii) As a result, it would hold the CPU for a long time and it would not let any other actual I/O-bound program execute.
iv) So, overall response time of all other programs will increase and the throughput of the system will decrease.

Hence, the throughput would not increase much with increase in the degree of multiprogramming.

Conversely when an I/O bound program is incorrectly classified as a CPU-bound program, the following scenarios occur:

i) It is assigned a low-priority by the kernel.

ii) Consequently the program's response time would increase.

Hence, as more programs are incorrectly classified as CPU-bound, the system's efficiency will suffer as the CPU may not have enough work to do.

Q.20

Ans→ When multilevel adaptive scheduling is used, the priority of processes is varied so that the process receives a timeslice which is consistent with the required CPU time.

The properties of resulting scheduling policies can be described as follows:

(a) when $\alpha > 0$, $\beta = 0$ and $\gamma = 0$; then the processes which are running state, their priorities are being changed. Here, the most completed process is serviced next by the operating system. In fact, the behaviour of this policy is similar to Shortest Time to Go (STG) scheduling policy.

(b) When $\alpha = 0$, $\beta > 0$ and $\gamma = 0$, The processes which are in ready state, their priorities are being changed.

Here, the processes that have spent the most time in the ready state waiting for scheduler to pick them up are serviced next.

Now, when the priority of a process is re-set to 0, each time it is scheduled, the scheduling policies have the following properties:

(a) when $\alpha > 0$, $\beta = 0$ and $\gamma = 0$; the scheduler obviously favours CPU-bound processes.

(b) when $\alpha = 0$, $\beta > 0$ and $\gamma = 0$; then the scheduler performs fcfs scheduling with the processes in the ready queue.

Q.32

Ans→ Consider a file which is frequently accessed by the users in the system:

(a) Set up links from every users'- home directory to data:

(i) The advantages of this approach is that the file does not become inconsisten t as everyone has linked access to the same file.

(ii) The drawback of this is dangling reference might arise when the owner of the file deletes. but doesnot delete the links to a file.

(b) Copy data into every user's home directory.

(i) The advantage of this approach is redundancy of information, accidental deletion of fileby owner does not remove the information forever.

(ii) The drawback of this approach is copies of file will become inconsistent in due course of time and older file will be used by users.

Conclusion: It is better to set up links from every home directory to data.

Q.4o

Ans→ Given, a system containing 4 processes uses a multiple resource Banker's algorithm for allocation. The system has been operating for some time.

(a) A new process arrives in the system. It is initially not allocated any resources.

→ Yes, the new resource allocation state of the system is safe. Since a multiple-resource Banker's algorithm is used, the state must have been safe before the new process arrived, i.e, the four processes in the system can complete in finite time. The newly arrived process can surely be allocated in all its required resources after the other processes complete and it too can complete.

(b) A process is aborted by the OS as it tries to access a file for which it lacks appropriate privileges.

→ Yes, the new resource allocation state of the system is safe. Aborting a process does not interfere with completion of other processes in the system.

Q.5.

Ans:- Thrashing is a situation when the system is spending a major portion of its time in servicing the page faults rather than CPU utilisation.

Thrashing occurs when there are too many pages in memory. Some of the causes of thrashing are:

i) When the CPU does not have enough frames, paging occurs more frequently, which results in lower CPU utilisation and thrashing takes place.

ii) If CPU utilisation is low, CPU scheduler starts to increase the degree of multiprogramming. The processes are still spending time in paging. This further increases thrashing.

Hence, the major reason of thrashing is lack of sufficient frames.

When system observes rapid decrease in CPU utilisation and increase in multiprogramming, thrashing is detected. This happens as when thrashing occurs, degree of multiprogramming increases. With increase in multi-programming, CPU utilisation remains low due to frequent page faults, CPU scheduler will add more processes. These processes further increase paging and reduced CPU utilisation.

Since the number of frames cannot be increased by the system, the system must reduce the level of multiprogramming to remove thrashing.