Reading Assignment - 4

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1 States of Process

1.1 Discussed in Class

- **New :** It is the state when the process has not been completely created but is going to be picked by the OS on the main memory to be created.
- **Ready :** It is the state when the process is ready on the main memory and is waiting to get assigned the CPU time to be executed.
- **Running :** It is the state when the process is by the CPU for execution and it's instructions are being executed by one of the available CPU cores.
- **Block / Waiting :** It is the state when the process requests access to I/O from the user or need access to any region. The process continues to wait in the main memory and does not require CPU. Once it is completed it goes back to the ready sate.
- **Termination :** In this state the process is removed from the main memory as it's execution is over and it's process control block is deleted.

1.2 Others

- **Suspend ready :** It is the state when the process, which was initially in ready state, has placed in the secondary memory due to lack of memory. And will transition back to ready state whenever the process is brought again on main memory.
- **Suspend Wait / Suspend Blocked :** Similar to the Suspend Ready state, process which was initially in the Block state waiting for some event to happen got swapped to the secondary memory due to lack of memory. When the work is done the process may go to Suspend Ready state.

2 Scheduling Algorithm

2.1 Highest Response Ratio Next Algorithm

Highest Response Ratio Next Scheduling is a Non-Preemptive Scheduling algorithm. In this algorithm scheduling is done on the basis of an extra parameter called **Response Ratio**. Given n processes with their Arrival times and Burst times, the task is to find average waiting time and average turn around time. The process with the highest Response Ratio is given priority over the others.

Response Ratio = (W+S)/S where W is waiting time, S is Service Time

Advantages

- The Performance of HRRN Scheduling is better than the shortest job first Scheduling
- HRRN Scheduling reduces the longer job waiting time and also encourages shorter jobs
- Increase throughput

Disadvantages

- Practical implementation is not possible in HRRN Scheduling because we cannot know the burst time of every process in advance
- In HRRN Scheduling, overhead on processors may occur

2.2 Multilevel Feedback Queue Scheduling

In a multilevel queue-scheduling algorithm, processes are permanently assigned to a queue on entry to the system. Processes do not move between queues. This setup has the advantage of low scheduling overhead, but the disadvantage of being inflexible. It keep analyzing the behavior of processes and according to which it changes its priority. If a process uses too much CPU time, it will be moved to a lower-priority queue. Similarly, a process that waits too long in a lower-priority queue may be moved to a higher-priority queue.

A multilevel feedback queue scheduler is defined by the following parameters:

- Number of queues
- Scheduling algorithm for each queue
- Method used to determine when to upgrade a process to a higher-priority queue
- Method used to determine when to demote a process to a lower-priority queue
- Method used to determine which queue a process will enter when that process needs service

Advantages

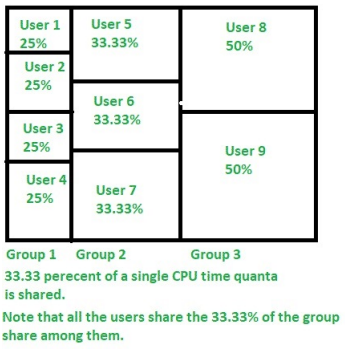
- It is more flexible
- It allows different processes to move between different queues
- It prevents starvation by moving a process that waits too long for lower priority queue to the higher priority queue

Disadvantages

- It is most complex algorithm
- It produces more CPU overheads
- For the selection of the best scheduler, it require some other means to select the values

2.3 Fair-share CPU scheduling

Fair-share scheduling is a scheduling algorithm in which the CPU usage is equally distributed among system users or groups, as opposed to equal distribution among processes. The scheduler logically divides an equal amount even though, another layer of partition is added, for example, if there were 3 groups present with different number of people in each group, the algorithm would still divide the same time for those groups, 100%/3= 33.33%, this 33.33% would be shared equally in the respective group depending on the number of users present in the group.



Advantages

- It increases response time for each process as each processor get the resources for reasonable amount of time
- It ensures that all resources of the machine are well utilized
- It also increases the system performance even during peak load time

Disadvantages

- Might cause waiting for some users more than expected

References

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