Chapter 5
Design and Performance Evaluation of Smart Job First Multilevel Feedback Queue (SJFMLFQ) Scheduling Algorithm With Dynamic Smart Time Quantum

Amit Kumar Gupta
Suresh Gyan Vihar University, Jaipur, India

Narendra Singh Yadav
JECRC University, Jaipur, India

Dinesh Goyal
Suresh Gyan Vihar University, Jaipur, India

ABSTRACT

Multilevel feedback queue scheduling (MLFQ) algorithm is based on the concept of several queues in which a process moves. In earlier scenarios there are three queues defined for scheduling. The two higher level queues are running on Round Robin scheduling and last level queue is running on FCFS (First Come First Serve). A fix time quantum is defined for RR scheduling and scheduling of process depends upon the arrival time in ready queue. Previously a lot of work has been done in MLFQ. In our propose algorithm Smart Job First Multilevel feedback queue (SJFMLFQ) with smart time quantum (STQ), the processes are arranged in ascending order of their CPU execution time and calculate a Smart Priority Factor SPF on which processes are scheduled in queue. The process which has lowest SPF value will schedule first and the process which has highest SF value will schedule last in queue. Then a smart time quantum (STQ) is calculated for each queue. As a result, we found decreasing in turnaround time, average waiting time and increasing throughput as compared to the previous approaches and hence increase in the overall performance.

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INTRODUCTION

A multiprogramming system in which multiple programs can be execute simultaneously. So the scheduling algorithms which decide which process will acquire the CPU at particular instance have a very crucial role for effecting the performance and efficiency of computer system. The scheduling algorithm is basically installed in the short term schedulers who select the process from the ready queue as per the guideline of scheduling algorithm and allocate it to the CPU for execution. There are many CPU scheduling algorithms exist like First Come First Serve (FCFS), Shortest Job First (SJF), Shortest Remaining Time First (SRTF), Priority scheduling, Round Robin Scheduling, Multilevel Queue Scheduling (MLQ) and Multilevel Feedback Queue Scheduling. The multilevel feedback queue scheduling is implemented with several queues in which processes are switches among several queues. Previously it is working on two scheduling algorithms in which the higher level queue is working on RR scheduling and last level queue is working on FCFS scheduling. These scheduling Algorithms are used to optimize the turnaround time, response time, waiting time and no of context switching. There are some scheduling criteria exist, on the behalf of these criteria the researcher analysis and determine which scheduling algorithm is perform better in terms of optimizing the performance matrices (D.M. Dhamdhere, 2006; Silberchatz et al, 2003).

SCHEDULING CRITERIA

There are many CPU scheduling algorithm is defined in operating system. Now choose of particular scheduling algorithm is become very challenging task. So, which algorithm have the best property or best for schedule the process the researcher has consider the properties of scheduling algorithm. There are number of criteria are defined to judge which scheduling algorithm is best in operating system. These criteria basically characterize the scheduling algorithm for performances wise difference in the scheduling algorithm. Here the researcher has described each and every criterion in detail, which is followings: (D.M. Dhamdhere, 2006; Silberchatz et al, 2003)

- **Context Switch:** A context switch occur when a process interrupt the normal execution sequence of another process. The CPU stores all relevant information of interrupted process in Task Control Box (TCB). The context switch degrades the system performances due to scheduling overhead. So scheduling algorithm is designed in such way that it can minimize the number of context switches.
- **Throughput:** This term is defined as number of process finished their execution in per unit time. So scheduling algorithm is designed in such way that it can maximise the throughput.
- **CPU Utilization:** From the performance wise concern the CPU cannot be sit ideal. So, scheduling algorithm is designed in such way that it cans maximum use of CPU as achievable.
- **Turnaround Time:** It represents the duration of time from at which a particular process becomes ready for execution and at which it completed its whole execution time.
- **Waiting Time:** It represents the duration of time for which the process has wait for acquiring the CPU for completing its execution time.
- **Response Time:** It represents the instance of time at which the CPU is assigned to the process first time.