A SURVEY ON SCHEDULING ALGORITHM

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Abstract: For optimum use of the resources the CPU scheduling is one of the important key concepts of any operating system. There are many scheduling algorithms available for a multi-programmed operating system like FCFS, SJF, Priority, Round Robin etc.[11,15]Round Robin scheduling is one of the efficient technique. Round robin has a limitation that time quantum in it is static and must be taken care to choose the time quantum time fairly. Scheduling is heart of any computer system since it contains decision of giving resources between possible processes[11]. To increase the efficiency dynamic quantum time can be calculated and average waiting time, average turnaround time and context switching can be decreased. Both Round Robin and Dynamic Round Robin are starvation free. Themost important issues with any OS is how the scheduler allocates CPU for the processes waiting in the ready queue for processing[23] Keywords: round robin scheduling, ready queue, average waiting time, average turnaround time, context switching, time quantum, dynamic time quantum.

I. INTRODUCTION

Central Processing Unit (CPU) is the core part for every computer system and it should be utilized efficiently.So CPU scheduling is an important concept of any Operating System(OS). Sharing of computer resources between multiple processes is known as scheduling[1]. In a uni-processor environment,all process one by one are allow to execute at a time and every process must have to wait in the queue to get chance for using the CPU. The responsibility of scheduler is to select a process for execution from the waiting queue, Reduce average waiting time, average turnaround time, context switches and response time is the core objective of scheduling algorithm.Real time system can be classified as 1. Hard Real Time System 2. Soft Real time System as discussed in [1].Rround robin scheduling comes under the soft real time system[1,12In Round Robin CPU scheduling, performance of the system depends onthe choice of the optimal time quantum[8].In this algorithm, a small amount of time called as time slice or time quantum is assigned to each process[1]. Based on scheduling activity, scheduling is broken three separate functions as shown in fig. 1. Long term scheduler, Medium term Scheduler, Short term scheduler.[1,6].The main component of kernel that creates the "selection" is called the scheduler[9]. Long term scheduler is also called as job scheduler. It determines which programs are going into the systems for processing. Medium term scheduler .The responsibility of Medium term scheduler is to temporarily removes a low priority processes or remove a process from the main

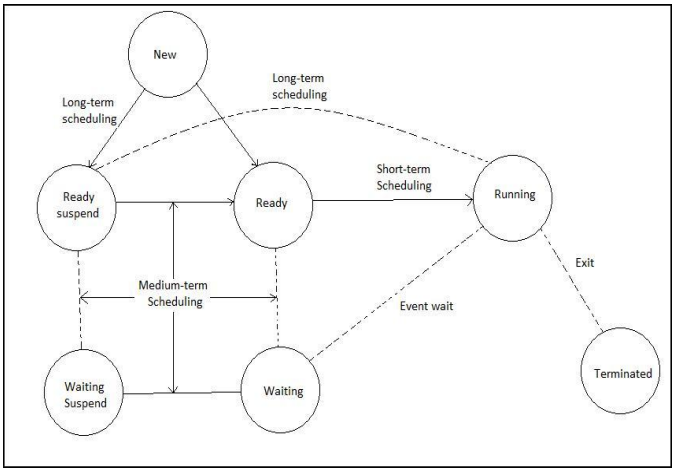

Fig. 1 Type of Schedulers[1]

memory which have longer time inactivity. Short term scheduler is also known as CPU schedule. The responsibility of this scheduler is to invoked when an event occurs that may lead to the blocking of the current process and may opportunity to preempt the currently executing process in favour of another. The scheduling algorithms may either be preemptive or non-preemptive[10]. Preemptive algorithms are those which have nature to switch to the other process in between the execution. The Shortest Remaining Time First (SRTF), Round Robin (RR) scheduling policies are of this type. Non-preemptive algorithms don't switch to the other process and continue to execute till the process has finished. The FCFS and SJF policies are of this type[10].

SCHEDULING CRITERIA

Different CPU scheduling algorithms have different properties, and the choice of a particular algorithm mayfavor one class of processes over another [6].

The criteria include the following[13][18]:

Utilization/Efficiency: CPU should be best utilized by allocating the significant tasks; so that it should not be ideal.

Throughput: Throughput is defined as number of processes completed in a period of time. Throughput is less in round robin scheduling. Throughput and context switching are inversely proportional to each other[14]. Turnaround time: Total time taken from submission of the process till the completion. Turnaround time should minimize the time of users who wait for the output. Waiting time: the time between thetask becomes available until the first time of its execution[3]. Response Time: Is the duration after submission till the response. It should be minimal in case of interactive users. Fairness: CPU should be unbiased and every process should get its fair time to execute.

II. RELATED WORK

The RR architecture is a pre-emptive version of the first come first-served scheduling algorithm [7].In a traditional round robin scheduling algorithm a time quantum is assigned to each process in equal portion. So that all processes are executed fairly. For soft real time application CPU scheduling is very efficient as it is starvation free and easy to implement. Many researchers had tried to overcome these problems in round robin in real by giving their own methodologies. The recent studies made from references have shown that if dynamic time quantum is adapted, waiting time, turnaround time, context switches and throughput will be reduced to some larger extent instead of having fixed time quantum. Using dynamic time quantum as stated by Neeraj kumar Rajput and Ashwani kumar [1] proposed algorithm that is adaptive one that selects the time quantum value based on the task set. It will definitely improve the average waiting time, average turnaround time and context switches. In this proposed scheduling algorithm, time quantum is not predefined actually it is adapted on the basis of newly created task sets. Thus this approach does not use traditional methodology and hence gives the better throughput than static round robin. Malhar Thombare, Rajiv Sukhwani, Priyam Shah, Sheetal Chaudhari, and Pooja Raundale. Roy [2]have used shortest burst in [2] for calculation of time slice. Ahmed Alsheikhyl, Reda Ammar1 and RaafatElfouly [3] has used a comparative analysis between several existing Round Robin algorithms based on the average time for waiting and turn-aroundand number of context switches.they propose an algorithm that they uses average of two highest burst times was computed and then theaverage of two lowest arrival times was taken from that estimated value for one time only; later, we subtract the average of arrival time for only lowest process. Rohaya Latip and ZulkhairiIdris[4] The scheduling algorithms of HRRN and FCFS implemented in this paper reorder jobs in the global queue based on the priority scheme variable. Based on the findings,it can be concluded that HRRN outperform FCFS scheduling algorithm by 5% onaverage in regards to total waiting time versus number of jobs submitted due to its fairaging priority scheme policy. BinNie, Jianqiang Du*, GuoliangXu, Hongning Liu, Riyue Yu, and Quan Wen[5] proposed an include FCFS, SJ (P) FHRRN, and put forward a new operating system scheduling algorithm, named mediantimeslice-Highest Response Ratio Next (MTSHRRN) ,the method was proved to be feasible and effective after tested the process sequence. Neetu Goel, Dr. R.B. Garg.[6]have studied many scheduling algorithm and states that to evaluate a scheduling algorithm to code it and has to put it in the operating system, only then a proper working capability of the algorithm can be measured in real time systems. The treatment of shortest process in SJF scheduling tends to result in increased waiting time for long processes.[6].Mahesh Kumar M.R, Renuka Rajendra.B, Niranjan C.K Sreenatha .M[8] proposed a new algorithm named as "," Prediction of Length of the Next CPU Burst in SJF Scheduling Algorithm using Dual Simplex Method "in which dual simplex optimization technique to overcome the problem of SJF scheduling by predicting / approximating the length of the next CPU burst. M.V. PandurangaRao , K.C. Shet[9] states that using MFQ simulator developed by us during the process. To run the simulator, CPU burst of a set of processes are to be entered and while doing so the system ignores the nature (CPU or I/O Bound)of each process. The dynamic time quantum for each queue is generated automatically by the simulator[10]. Through a number of experiments performed, we observed that the performance of MFQ improves by applying SJF selection prior to RR algorithm from second queue onwards using dynamically generated time quantum as compared to other algorithms and for static quantum. Sukumar Babu Bandarupall, Neelima Priyanka Nutulapati, Prof. Dr. P. Suresh Varma [11] make a study about comparison between preeptive and non preemptive scheduling algorithms. Performance Improvement Using CPU Scheduling Algorithm [24] developed a new algorithm with the help of round robin and SJF named as SRT algorithm and improves the functionality of round robin scheduling algorithm. Ayan Bhunia [21] developed an approach for jobs which starve in the lower priority queue for long time to get CPU cycle. As a result response time of those starved processes decreases eight to ten percent and over all turnaround time of the whole scheduling process decreases around eight to ten percents.

III. CONCLUSION

Traditional round robin also suffered some problems like starvation for late arriving less burst processes, may follow FCFS order if time quantum is too large and context switches are more if time quantum is too small comparative to burst time[4].A traditional SJF scheduling algorithm selects the process from the ready queue whose burst time is shorter compared to the previous ones. This can be continued until it reaches the last process in the ready queue. Once it reaches the end, this algorithm always requires the next process with their burst time to be executed by the CPU but this information is not available always because there is no way to know the length of the next CPU burst for short term scheduling.[8]Multilevel feedback queue scheduling algorithm also solves the problem of starvation and at same time improves the value of turnaround and average waiting time along-with high throughput value.[15]

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