Scheduling in Round Robin Using Dynamic Task Quantum

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DOI: 10.29322/IJSRP.9.09.2019.p93100
http://dx.doi.org/10.29322/IJSRP.9.09.2019.p93100

Abstract- Scheduling algorithms are accountable for arranging submitted jobs to available resources in cloud environment to get maximum utilization of resources and minimum response time and latency. The recommended algorithm mainly pivot on two basic factors first is variable task quantum which provide balanced waiting time among long and short tasks. Second is divide the Main Queue of ready tasks in to two sub queues accordingly value of task quantum. Simulation of algorithm is done by using cloudsim toolkit 3.0.3 opposed three different scheduling algorithms shortest job first, Round Robin and Time slice priority based round robin.

Index Terms- Dynamic Task Quantum, Turn Around Time, Waiting Time, Round Robin.

I. INTRODUCTION

Cloud Computing is a universal model to access network which provides a pool to share computing resources. Where resources are assigned to the clients after the verification by particular task scheduler. Most of the present task schedulers did not acquired the desired standards and requirements. Some of them fail to care starved process and only focus on reduction of waiting and response time. With the rising of modern computer system demand of efficient task scheduler become crucial to get best performance. Task Scheduling is major problem which is used to schedule tasks for desirable implementations of recourses by providing defined tasks to specific resources in specific time. Standard task scheduling algorithm as first come first serve, Shortest job first, Round Robin, Min-Min, Max-Min and Multilevel queue Scheduling had attained stupendous outcomes, but still experience difficulties like more waiting time and starvation problem. In this paper we present a novel untied task scheduling algorithm by integrating Round Robin and Shortest job first. In section II describe the related work with special importance on Functioning. In Section III present the proposed model. In section IV evaluate the proposed idea. In section V examine the results obtained from our examination. In section VI gives the closing comments.

II. RELATED WORK

The Round Robin Algorithm has shortcoming that it use fixed time quantum. Studies are done to enhance the execution of Round Robin Scheduling. Sections of undesirable works are recorded below:

Rami J. Matameh [3] reports SARR to enhance result of Round Robin. SARR utilize time quantum and compute the median from burst time of all procedures in every round.

H.S Behera et al. [4] further make practical of algorithm and continue the procedure at the time of execution. Algorithm first chooses procedures having least burst time then procedures having longest burst time and then procedures having second most least burst time.

Priyanka Sangwan proposed improved Round Robin by calculating time quantum as mean of burst time of all tasks.

III. PROPOSED WORK

In our proposed work we are attempting to beat starvation problem by recommending a new united scheduling method based upon Round Robin and Shortest job first named SRDQ. In this paper we give attention on calculating favorable quantum time in each round of algorithm by dividing the queue of ready tasks into two sub-queues Q1 and Q2 on the basis of mean value of burst time. Tasks having burst time longer than mean are inserted in Q2 and tasks having burst time shorter than mean are inserted into Q. Two short tasks from Q1 and a long task from Q2 are executed mutually. SRDQ having 6 main steps.

1. Set all the submitted tasks, Ti i= 1,2,3,…..n according to their burst time.
2. Calculate the mean q, by calculating average of burst time of all tasks.
3. If Burst time B(T) of task is less than mean q, then submit the task in sub queue Q1 else submit in sub queue Q2.
4. The quantum (q_{ij}) is calculated on the basis of current executed task source queue whether it is from Q1 or Q2 and the round to be executed as following:

$$\mathbf{q_{ij} = q + (q / (B_{ij} + (-1)^{1-\alpha} \cdot q_{i(j-1)})^2)}$$

Where q_{ij} is the quantum at iteration j, i=1, 2, . . . n and B_{ij} is burst time of task i at iteration j and $\propto$ is a binary selector $\propto$={0,1}, $\propto$ is either 0 or 1. In the first round j = 1 so $q_{i(j-1)}$ is set to zero as there is no previous rounds. The first two tasks of $Q1$ are assigned to the resources followed by the first task of $Q2$. Step 4 is continuously repeated till the $Q1$and $Q2$ become empty.

1. In case of arrival of new task or when previous task is completed q will be updated

T	$B_{ij} = B_{i(j-1)} - q_{i(j-1)}$	$(B_{ij} + q_{i(j-1)})^2$	$(B_{ij} - q_{i(j-1)})^2$	$q_{ij} = q + (q / (B_{ij} + (-1)^{1-\alpha} . q_{i(j-1)})^2)$
T5	25-0 =25	$(25+0)^2$ =625	----------	q_{ij} =45.07
T2	35-0 = 35	$(35+0)^2$ = 1225	----------	q_{ij} = 45.03
T1	40-0 = 40	$(40+0)^2$ = 1600	----------	q_{ij} = 45.02
T4	45-0 = 45	$(45+0)^2$ = 2025	----------	q_{ij} = 45.02
T3	80-0 = 80	---------	$(80-0)^2$ = 6400	q_{ij} = 45.00
	$\sum B_{ij}$ = 225			$\sum q_{ij}$ =225.14

2. In case of arrival of new task it will be inserted either in Q1 or in Q2 by comparing its burst time with mean value *q*. In this case *q* will be updated as:

$q = q + (q/B_{new})$

Where B_{new} is the burst time of new task.

3. In case of a task is finished, q will be updated as:

$q = q - (q/B_{terminated})$

Where $B_{terminated}$ is the burst time of finished task.

IV. EXPERIMENTAL ANALYSIS

The proposed work is executed by using programming language Java (jdk 1.8) with simulation tool Cloudsim 3.0.3.
Case: Here 5 Tasks are taken into account for calculation where time quantum is mean of burst time of all Tasks.

Table 1: Problem of Base Paper

Task Name	Arrival Time	Burst Time
T1	0	40
T2	0	35
T3	0	80
T4	0	45
T5	0	25

According to improved Round Robin Method: Waiting Time : 94.0
Turn around Time: 139.0

Table 2: Proposed Method

T5	T2	T1	T4	T3

Spilt based on mean q=45

T5	T2	T1	T4

T3

Round 1: We apply step 4 of algorithm by selecting value of alpha and calculate the time quantum for individual task, then prepare Gant chart according to new time quantum.

Table 3: Round 1 of Proposed Method

T5	T2	T3	T1	T4

0 25 60 105 145

Round 2:
After finishing T5,
Bterminated = 25, q = 45- (45/25) = 43.2
After finishing T2,
Bterminated = 35, q = 43.2 - (43.2/35) = 41.96
After Finishing T1,
Bterminated= 40, q = 41.96 – (41.96/40) = 40.91
After Finishing T4,
Bterminated = 40, q = 41.96 – (41.96/40) = 40.91
As four Tasks are finished in same round, q is updated four times and we obtain q= 40.91 in this round (2)

Round 3:

After completion of tasks T5, T2, T1 and T4 we calculate new time quantum for task T3, quantum calculation in round 3 is shown in Table 4:

Table 4: Round 3 of Proposed Method

Task Name	Arrival Time	Burst Time
T1	0	40
T2	0	35
T3	0	80
T4	0	45
T5	0	25

T	**$B_{ij} = B_{i(j-1)} - q_{i(j-1)}$**	**$(B_{ij} + q_{i(j-1)})^2$**	**$(B_{ij} - q_{i(j-1)})^2$**	**$q_{ij} = q + (q / (B_{ij} + (-1)^{1-\alpha} . q_{i(j-1)})^2)$**
T5	----------	-------	----------	----------
T2	----------	-------	----------	----------
T1	----------	-------	----------	----------
T4	----------	-------	----------	----------
T3	**80-45=35**	-------	**$(35-45)^2$= 100**	**q_{ij} = 40.4**
	$\sum B_{ij}$ = 35			**$\sum q_{ij}$ =40.4**

T3

190 225

Table 5: Comparison of Average Waiting and Turn around time

Performance Attribute	IRR Method	Proposed Method	Remarks
Average Waiting Time (AWT)	94.0	84.0	10 units of time are saved
Average Turn Around Time (ATAT)	139.0	129.0	10 units of time are saved

We can say that recommend algorithm should bring a successfully reduction in starvation problem and reduction in waiting time of individual task as well as in waiting time, which is a important part of our goal.

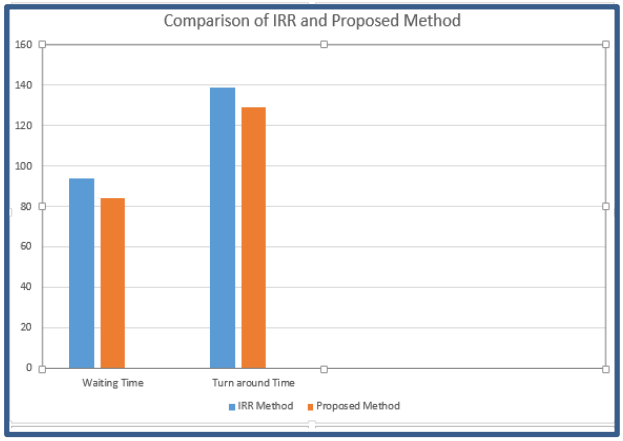

Figure 1: Performance of Comparison

V. CONCLUSION AND FUTURE SCOPE

Results of experiments had proved that variations in task quantum had a great impression in reduction of waiting and turnaround time as well as changing in task quantum in every round also had great effect in reduction of response time. So we conclude that proposed algorithm is a balancing point among reduction of waiting time, Turnaround Time and Starvation. It is stupendous for the tasks having long burst time. In the upcoming time researchers plan to advance their experiments to get a finer task quantum calculation technique that maintain a fair equilibrium between static and dynamic quantum.

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