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QUANTUM TIME LENGHTH ESTIMATION FOR ROUND-ROBIN SCHEDULING ALGORITHM USING NEURAL NETWORKS

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In Round Robin (RR) scheduling algorithm that used for CPU scheduling is considered the fairness compromise algorithm among different mechanisms and disciplines that deals with sharing the CPU time between processes that resides in the ready queue. RR, First come first served, high priority, shortest job first and other algorithms have several disadvantages when dealing with real-time systems and deadline limitations. In real-world of time-sharing systems, RR service (behavior) is widely used. Many publications discussed the RR scheduling algorithm, its efficiency, reliability, and its consistency if it was apart of a general system. Ramabhadran et al presented analytical and simulation results based on RR algorithm in a manner of a stratified RR scheduler. Jorge R. et al showed a modified RR algorithm that predicts potential job departures and schedules them in advance. John Tsiligaridis et al discussed a very important algorithm that constitutes an alternative way of defining the most suitable size of the quantum in RR scheduling algorithm using gradual or direct weight increase mechanisms, and in the same paper the author strongly stated that this kind of algorithms can be applied for next generation internet routers. Seungmin Baek et al in described a packet filtering-based RR scheduling scheme for tightly coupled clusters in terms of throughput and reliability.

Rahul Garg et al in described a scheduling algorithm named recursive round robin scheduler (RRR), based on the concept of the construction of scheduling tree, and showed that the work conserving scheduler is fair. While Salil et al used a technique to analytically derive the latency bound of pre-ordered DDR. Many other publications describes, discussed, and proved many scheduling algorithms, almost in all publications, authors selected different criteria, like fairness, bounded delay, low complexity, deadline and other criteria.

It is evident that the performance of the RR scheduling algorithm is highly interrelated to the length of the quantum time. Therefore, the impact of contributing variables on the length of the quantum time is uncertain and complex. Under such circumstances, artificial intelligence techniques such as neural networks are known as an outstanding prediction tools. The major objective of this study is to develop a handy formula for estimating the length of the quantum time that should be used on the RR scheduling algorithm when dealing with different types of jobs (mix job problem) instead of taking the quantum time length as a fixed value in almost all applications that uses RR. Two techniques are used in preparing the prediction formula, namely linear regression (LR) and neural networks (NNT). The data that was used in this paper includes 10,000 data sets, each data set includes 10 random numbers which are the expected service time, each data set was observed 50 times, when the quanta were 0.1, 0.2, 0.3, …, 4.8, 4.9, 5.0 units of time. After each run, the average turnaround time and the average waiting time were moved into appropriated cell in the output excel data sheet. It was shown that it efficient to use the neural networks to estimate the quantum time length for Round Robin scheduling algorithms instead of considering it as fixed value.