Analytical Evaluation of Priority-Based Real-Time Scheduling Algorithms for Independent Periodic Tasks

A Dissertation

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Recommendation

I hereby recommend that the dissertation prepared under my supervision by **Mr. Rajesh Singh** entitled **"Analytical Evaluation of Priority-Based Real-Time Scheduling Algorithms for Independent Periodic Tasks "** be accepted as fulfilling in part requirements for the degree of masters of science. In my best knowledge this is an original work in computer science.

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We certify that we have read this dissertation work and in our opinion it is satisfactory in the scope and quality as a dissertation in the partial fulfillment for the requirement of Master of Science in Computer Science and Information Technology.

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To my parents

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Abstract

Scheduling is an inevitable part of any multitasking Real-Time Operating System. The real-time scheduling schemes must guarantee the execution of the tasks to complete in *real* time, i.e. a task may have some completion deadline. Real-time scheduling algorithms are different from general scheduling algorithms as they deal with the time constraints. Consequently, these real-time scheduling techniques need special attention to give.

This dissertation focuses on the study of the two priority-based real-time scheduling algorithms; Rate Monotonic Scheduling (RMS) and Earliest Deadline First (EDF). These algorithms are analyzed in terms of processor utilization, average turnaround time, context switches, average waiting time, of the tasks for particular *task set*.

Moreover, the general scheduling algorithms like First Come First Serve (FCFS), Shortest Remaining Time Next (SRT), Shortest Task Next (STN) and Round Robin (RR) are explored for evaluating the real-time scheduling algorithms. Though, they lack most important aspect of the real-time scheduling i.e. time constraints (e.g. deadlines), other statistics are analyzed to compensate with the real-time scheduling algorithms.

The results of this dissertation provide a foundation for inferring optimality and feasibility of priority-based real-time scheduling theory. It is expected that these results will aid the system designers in the development of predictable real-time systems.

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RTOS	Real-Time Operating System
RMS	Rate Monotonic Scheduling
EDF	Earliest Deadline First
CPU	Central Processing Unit
RR	Round Robin
RR1	Round Robin with quantum 1
RR4	Round Robin with quantum 4
FCFS	First Come First Serve
IO	Input Output
STN	Shortest Task Next
SRT	Shortest Remaining Time Next
TS	Task Set
FIFO	First In First Out