

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.

Table of Contents

Details	Page No.
CHAPTER I	1-10
1. INTRODUCTION	1
1.1 Background	1
1.1.1 Characteristics of Real-Time systems	2
1.1.2 Real-Time Operating System (RTOS)	3
1.2 RTOS Scheduler	6
1.2.1 Schedulable Tasks	6
1.2.2 Multitasking	6
1.2.3 Context Switching	6
1.2.4 Dispatcher	6
1.3 Overview of Algorithmic Real-Time Scheduling	6
1.3.1 Uniprocessor scheduling	7
1.3.1.1 Off-line scheduling	8
1.3.1.2 On-line scheduling	8
1.3.2 Multiprocessor scheduling	9
1.4 Scheduling Goals	9
1.5 Motivation and Aims	9
1.6 Thesis Organization	10
CHAPTER II	11-17
2. METHODOLOGY	11
2.1 Literature Survey	12
2.1.1 Scheduling Problem	12
2.1.2 Schedulability Analysis	12
2.1.3 Implementation Complexity	14
2.1.4 Runtime Overhead	14

2.2 Statistics	14
2.2.1 CPU Utilization	14
2.2.2 Turnaround Time	15
2.2.3 Finish Time	15
2.2.4 Waiting Time	15
2.2.5 Context Switches	15
2.2.6 Completion Deadline	16
2.3 Algorithm Evaluation Method	16
2.4 Predictability	16
2.5 Related Works	16
2.6 Simulator	17
CHAPTER III	18-20
3. SPECIFICATION	18
3.1 Evaluation Model Characterization	18
3.2 Assumptions	19
3.3 Other Scheduling Algorithms	19
CHAPTER IV	21-32
4. DESIGN OF EVALUATION MODEL	21
4.1 Modules of Evaluation Model	21
4.1.1 graphCanvas	22
4.1.2 GUI (Graphics User Interface)	22
4.1.3 Packet	23
4.1.4 Algorithm Configuration	25
4.1.5 Process	29
4.1.6 Scheduler	30
4.1.7 runAlgorithm	30
4.2 Integrated Representation of Modules	31
4.3 A Deterministic Model	32

CHAPTER V	33-40
5. IMPLEMENTATION	33
5.1 Implementation Tools	33
5.1.1 javac	33
5.1.2 appletviewer	34
5.1.3 Data Structures	35
5.2 Evaluation Model Development	35
5.2.1 Phase 1 (Input Determination/ Schedulability)	35
5.2.2 Phase 2 (Algorithm Execution)	36
5.2.3 Phase 3 (Status Tracing)	38
5.2.4 Phase 4 (Timeline Coverage)	39
5.3 Inputs and Outputs	39
5.3.1 Rate Monotonic Scheduling Algorithm	39
5.3.2 Earliest Deadline First Scheduling Algorithm	40
5.3.3 Other Scheduling Algorithms	40
CHAPTER VI	41-66
6. ANALYSIS AND EXPERIMENTATION	41
6.1 Task Set Analysis	41
6.1.1 RMS Vs EDF	42
6.1.2 General Scheduling algorithms	53
6.2 Processor Utilization Analysis	60
6.3 Average Turnaround Time Analysis	60
6.4 Context Switches Analysis	63
6.5 Average Waiting Time Analysis	64
6.6 Results	66
CHAPTER VII	67-68
7. CONCLUSION AND FUTURE WORK	67
7.1 Summary	

7.2 Further Recommendation

68

REFERENCES

69-73

Appendices

74-86

Appendix A : graphCanvas

74

Appendix B : GUI

75

Appendix C : Packet

76

Appendix D : Scheduling algorithm

78

Appendix E : Process

81

Appendix F : runAlgorithm

83

Appendix G : Scheduler

84

Appendix H : Class Hierarchy

86

List of Tables

Details	Page No.
Table 6.1: Analysis of RMS for task set 1	42
Table 6.2: Analysis of RMS for task set 2	42
Table 6.3: Analysis of RMS for task set 3	43
Table 6.4: Analysis of RMS for task set 4	44
Table 6.5: Analysis of RMS for task set 5	45
Table 6.6: Analysis of RMS for task set 6	45
Table 6.7: Analysis of RMS for task set 7	46
Table 6.8: Analysis of EDF for task set 1	47
Table 6.9: Analysis of EDF for task set 2	48
Table 6.10: Analysis of EDF for task set 3	49
Table 6.11: Analysis of EDF for task set 4	49
Table 6.12: Analysis of EDF for task set 5	50
Table 6.13: Analysis of EDF for task set 6	51
Table 6.14: Analysis of EDF for task set 7	52
Table 6.15: Analysis of FCFS for task set 1	53
Table 6.16: Analysis of RR1 for task set 1	53
Table 6.17: Analysis of RR4 for task set 1	54
Table 6.18: Analysis of STN for task set 1	55
Table 6.19: Analysis of SRT for task set 1	55
Table 6.20: Analysis of FCFS for task set 8	56

Table 6.21: Analysis of RR1 for task set 8	57
Table 6.22: Analysis of RR4 for task set 8	58
Table 6.23: Analysis of STN for task set 1	58
Table 6.24: Analysis of SRT for task set 1	59

List of Figures

Details	Page No.
Figure 1.1: Classification of Scheduling Algorithms	7
Figure 2.1: Gantt chart representation for a schedule of five tasks	12
Figure 4.1: Pictorial representation the modules of the simulator	32
Figure 6.1: Execution of RMS for task set 1	42
Figure 6.2: Execution of RMS for task set 2	43
Figure 6.3: Execution of RMS for task set 3	44
Figure 6.4: Execution of RMS for task set 4	44
Figure 6.5: Execution of RMS for task set 6	46
Figure 6.6: Execution of RMS for task set 7	47
Figure 6.7: Execution of EDF for task set 1	47
Figure 6.8: Execution of EDF for task set 2	48
Figure 6.9: Execution of EDF for task set 3	49
Figure 6.10: Execution of EDF for task set 4	50
Figure 6.11: Execution of EDF for task set 5	51
Figure 6.12: Execution of EDF for task set 6	51
Figure 6.13: Execution of EDF for task set 7	52
Figure 6.14: Execution of FCFS for task set 1	53
Figure 6.15: Execution of RR1 for task set 1	54
Figure 6.16: Execution of RR4 for task set 1	54
Figure 6.17: Execution of STN for task set 1	55

Figure 6.18: Execution of SRT for task set 1	56
Figure 6.19: Execution of FCFS for task set 8	56
Figure 6.20: Execution of RR1 for task set 8	57
Figure 6.21: Execution of RR4 for task set 8	58
Figure 6.22: Execution of STN for task set 8	59
Figure 6.23: Execution of STN for task set 8	59

List of Listings

Details	Page No.
Listing 4.1: Algorithm for graphCanvas module	22
Listing 4.2: Algorithm for GUI module	23
Listing 4.3: Algorithm for Packet module	24
Listing 4.4.1: Algorithm for Rate Monotonic Scheduling	25
Listing 4.4.2: Algorithm for Earliest Deadline First	26
Listing 4.4.3: Algorithm for Round Robin scheduling	27
Listing 4.4.4: Algorithm for First Come First Serve	27
Listing 4.4.5: Algorithm for Shortest Task Next	28
Listing 4.4.6: Algorithm for Shortest Remaining Time Next	28
Listing 4.5: Algorithm for Process module	30
Listing 4.6: Algorithm for Scheduler module	30
Listing 4.7: Algorithm for runAlgorithm module	31

List of Abbreviations

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