National Conference on Recent Research in Engineering and Technology (NCRRET-2015) International Journal of Advance Engineering and Research Development (IJAERD)
e-ISSN: 2348 - 4470 , print-ISSN:2348-6406

Comparison of Dynamic Scheduling Algorithm for Real Time Operating System

HemangThakar
AssistantProfessor,CSEDepartment
DJMIT

Abstract—Real timesystem isdivided in to two algorithms static and dynamic. Both algorithmwant to complete his job in givendeadline or before deadline but no onealgorithmare successfullycompletehis jobin overloadedandunderloadedsituation. Dynamicalgorithmabletogive optimalresultinunder- loaded situationbut not abletogivesame resultinover-loaded situation.Staticalgorithmnotabletogiveoptimalresultinunder-loadedsituation butabletoperformwell inover-loaded situation. Sowethinknewalgorithmtogiveresultoptimuminunder-loaded situation andgivehigh resultin over-loadedsituation. We are serving dynamic scheduling algorithms like EDF (Earlierdead line first), MLF (Minimum Laxity First) and RM algorithms perform well in overloaded situation. Here servingthat EDF, MLFandRMalgorithms togivearesultinunder-loadedsituation and inoverloaded situation.

Keywords—EDF,MLF and RMScheduling Algorithms,Real-TimeOperatingSystems.

I. INTRODUCTION

Real-time systemshave well classify, fixedtime limit. Mainlytwotypesofreal-time systemavailable hardandsoft. Wherehardrealtimesystemworkonprincipal jobmust complete theirexecution beforedeadline. Itsusefulwhere missingdeadlinemaybeseriousconsideration. Softrealtime systemismore flexible whichallowjobtoexecutionbeyond thedeadline.Itsapplicablewherecostofjobis moreimportant thancansequencesofmissingdeadline.

A.Real-TimeScheduler

Generally itsworkedintwocategories staticanddynamic. Incaseofstaticalgorithm itsappliedprioritiesatinitial (design)levelandremainsamethroughout thetask.Incaseof dynamicalgorithmpriorityassignon runtimewhichdepended on parameters of task. We can make dynamic scheduling withstaticprioritywhereRateMonotonic (RM)andEarliest DeadlineFirst(EDF)andMinimumlaxitytimeFirst(MLF) are belongsto dynamicschedulingwithdynamicpriority.Here indynamicpriorityalgorithmareimplements incategories first.Inwhichjobtochangeprioritydaringitisactivation and inanother typejobcannotabletochangepriority. EDFisjob levelfixedpriorityalgorithmofthiscategory.Anothersidejob canchange priorityduringexecutioncalledjobleveldynamic-priorityalgorithm. Minimum laxitytimealgorithm belongsto it.Attimet,theslacktimeofajobis(d-t),wheredis thejobsdeadlineandtisitsremainingexecutionrequirement. Here,theslacktimeisthegreatestamountoftimeajobmay berequiredtowaitifitweretoperformonaprocessorandstill meetitsdeadline.TheMLFalgorithms givehigherpriorityto jobswithsmaller slacktime.Sincetheslacktimeofajobcan modifyovertime,thejobprioritiescanmodifydynamically.

II.THEDYNAMICSCHEDULINGALGORITHM

A.EDFSchedulingAlgorithm

EDF Scheduling Algorithm is called earliest dead line first ornearestdeadlinefirst SchedulingAlgorithm.EDFis dynamicSchedulingalgorithm.Thetaskwiththeearliestdead-linehasthemaximumpriority[1].EDFSchedulingAlgorithm gives100percenttaskutilization whensystemisinunder loadedsituationorU¡=1Butwhentaskutilization crossload factormorethen1orslightlyoverloaded processorutilization decreasesexponentially[4].

B.RMSchedulingAlgorithm

RMScheduling AlgorithmiscalledRateMonotonic Al-gorithm.RMisafixed orstaticpriorityschedulingalgorithm. RMassignspriorities totasksbasedontheirperiods[4]. Disadvantage ofthisalgorithmisthattheyarenotgive100 percentresultinunderloadedsituation [6].RMgivesbetter performance inoverloadedsituationascomparetodynamic scheduling.InRMalgorithmshortestperiodgivesfirstchances to execute but whenmorethanonetaskhaveSameperiodthen RMarbitrarilyselectsoneforcompletingafterthat[7].

C.MLFSchedulingAlgorithm

MLFScheduling AlgorithmiscalledMinimumlaxityfirst Algorithm. MLFalsoDynamicScheduling algorithm.Here differencebetweendeadline(d)andexecutiontime(c)iscalled laxity(l).InMLFalgorithmsmallestlaxitygiveshighestprior-ity[8][9].ButinMLF more thanonetaskhave same deadline atthattimeMLFselecttaskrandomly.MLFalgorithmgives 100percentresultinunderloadedsituation meanslessthan1 loadfactor.Butwhentaskutilization crossloadfactormore then1orslightlyoverloaded processorutilizationdecreases exponentially[4].

III. SIMULATION RESULTS

We are surveying all algorithms in same simulator. Here we are comparing for all this algorithms EDF, MLF and RM. EDF, MLF are Dynamic Priority Scheduling Algorithms and RM is Static Priority Scheduling Algorithm. We are generating One task set and task set has 5 periodic task also task set is compile for 100 clock cycle. To use this all algorithm we calculate success ratio (SR) and Effective Processor Utilisation (EPU).

1) In Real time every tasks should be meet the dead line. So Success Ratio means calculate how many task meet there deadline.

$$SR = \frac{\text{Number of jobes successfully scheduled}}{\text{Total number of arrived}}$$

2) In EPU is calculate how many task can Effectively Processor are used.

$$EPU = \sum_{i \in R} \frac{V_i}{T}$$

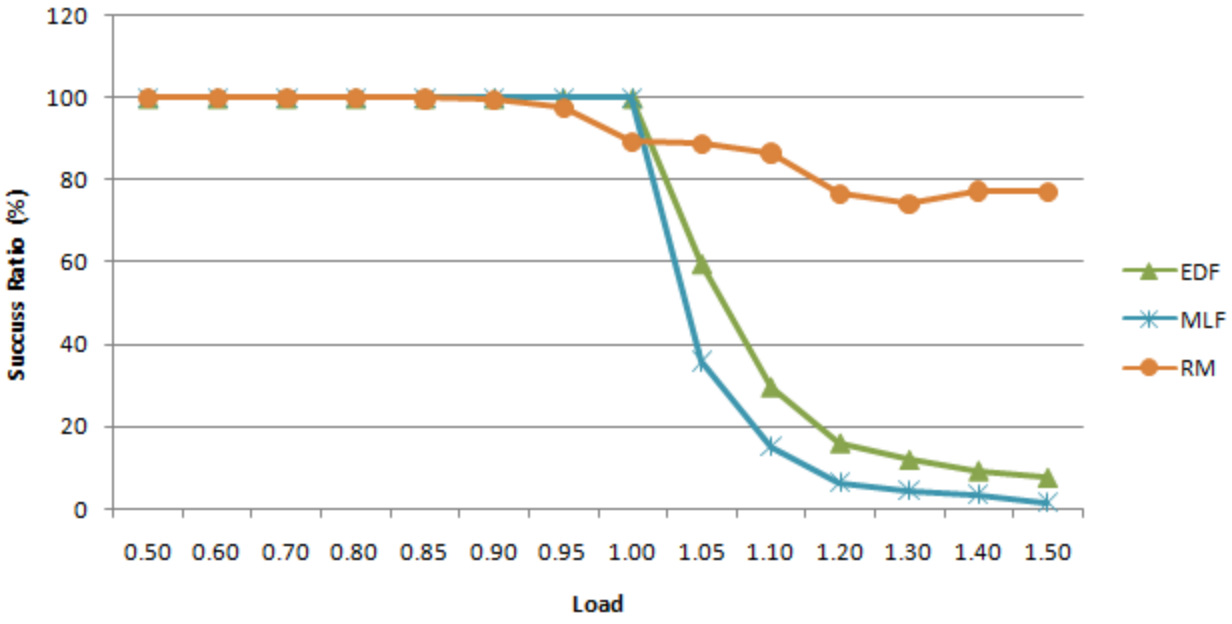
IV. FINAL RESULT

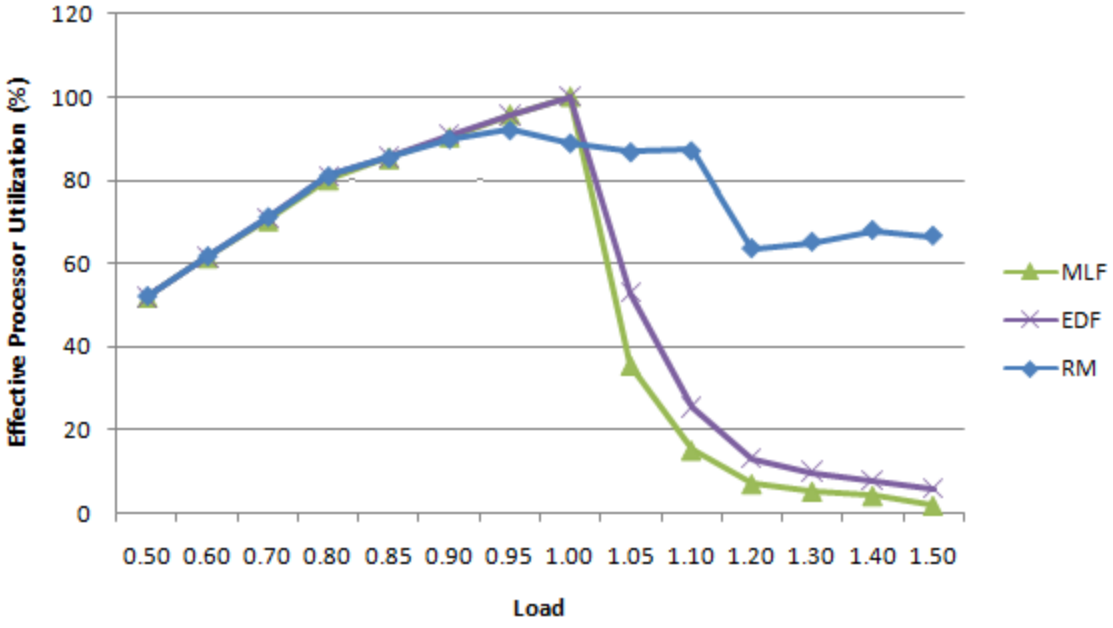
We have taken for all this algorithms result EDF, MLF and RM. Here task set starting 0.5 and ending 1.5 as shown in table 1. We calculate Success Ratio and Effective Processor Utilization for all this algorithm. We calculate result underload and overload condition. EDF and MLF gives 100 percentage results in underload condition but overloaded condition it gives poor result and RM dont give 100 percentage result in underloaded condition but it give better result in overloaded condition.

Figure 1 shows evaluation of the result of Success Ratio (SR) for EDF, MLF and RM algorithms. The results are taken fro munder-loaded situation to the overloaded situation.

Figure 2 shows evaluation of the result of Effective Processor Utilization (EPU) for EDF, MLF and RM algorithms. The results are taken from under-loaded situation to the overloaded situation.

	Success Ratio			Effective Processor Utilization		
Load	**EDF**	**MLF**	**RM**	**EDF**	**MLF**	**RM**
0.50	100	100	100	51.98	52	51.98
0.60	100	100	100	61.62	61.6	61.65
0.70	100	100	100	71.2	70.49	71.15
0.80	100	100	100	81.11	80.33	81.07
0.85	100	100	99.79	85.54	85.43	85.42
0.90	100	100	99.52	90.78	90.24	90.01
0.95	100	100	97.65	95.53	95.71	92.17
1.00	100	100	89.42	100	100	89.05
1.05	59.7	35.85	88.9	53.12	35.7	86.86
1.10	29.7	15.25	86.67	25.36	15.27	87.2
1.20	16.02	6.24	76.6	13	7.18	63.6
1.30	12	4.38	74.36	9.87	5.35	65.16
1.40	9.3	3.63	77.37	7.82	4.31	68.03
1.50	7.6	1.59	77.28	5.87	1.92	66.65




120
100
80
60
40
20
0
Effective Processor Utilization (%)
0.50 0.60 0.70 0.80 0.85 0.90 0.95 1.00 1.05 1.10 1.20 1.30 1.40 1.50
Load
MLF
EDF
RM

V. CONCLUSION

Thealgorithm talksaboutinthischapteraredynamic scheduling algorithms with dynamic and staticpriority for real-time singleprocessor systems. EDF and MLF are dynamicscheduling algorithms with dynamic priority, whileRM isdynamicschedulingalgorithmwithstaticpriority.

Wecanterminatefollowingfromtheresultsgainedthrough imitation

- Inunder-loadedsituation.
  - EDFandMLFshowbestperformance.
  - PerformanceofRMstarttodegradeafterload 0.85slightly.
- Inoverloadedsituation.
  - PerformanceofEDFandMLFstartstode-gradedrastically asasystemgoestowards overloadedsituation.
  - While RMalgorithm perform well still in overloadedsituation.

REFERENCES

[1] AMShah,DynamicScheduling forReal-Time OperatingSystems,Ph. D.Thesis,InformationTechnologyDepartment,SardarPatelUniversity, India,2010.

[2] FunkS.H.,EDFschedulingonheterogeneousmultiprocessors,Ph. D. Thesis,UniversityofNorthCarolina,2004.

[3] FunkS.H.,GoossensJ., BaruahS.,On-lineschedulingonuniform multiprocessors,IEEEReal-TimeSystemsSymposium,pp.183-192, 2001

[4] HaritsaJ.,CareyM.,LivnyM.,OnBeingOptimisticaboutReal-Time Constraints,PODS,331-343,2009.

[5] LiuJ.W.S.,Real-TimeSystems,PearsonEducation,India,2001.

[6] LockeC.D.,BestEffortDecisionMakingforReal-TimeScheduling, Ph.D.Thesis,ComputerScienceDepartment,Carnegie-MellonUniver-sity,USA,2004.

[7] PaoliD.D.,GoscinskiA.,HobbsM.,JoyceP.,Performancecompar-isonofprocessmigrationwithremoteprocesscreationmechanism n RHODOS,Proc.ofSixteenthICDCS,pp.554-561,2003.

[8] ApurvaM.Shah,DynamicSchedulingforReal-TimeOperatingSys-tems,Ph.D.Thesis,InformationTechnologyDepartment,SardarPatel University,India.

[9] AModifiedMaximumUrgencyFirstSchedulingAlgorithmforReal-TimeTasksVahidSalmani, SamanTaghaviZargar,andMahmoud Naghibzadeh.WorldAcademyofScience,EngineeringandTechnology International JournalofComputer, Information, SystemsandControl EngineeringVol:1No:9,2007.

[10] k. K. Sahu, SouravMishra, Satya S. Sahoo. Upgraded Maximum UrgencyFirstAlgorithmForRealTimeSystems.International Journal ofScientificTechnologyResearchVolume2,Issie1,January2013.