CSE 522 RTES Assignment 3

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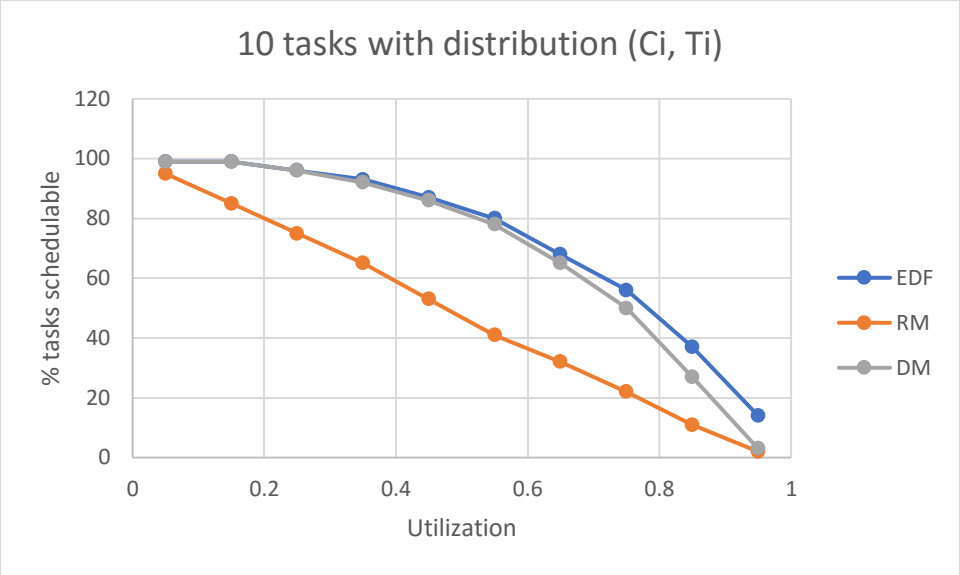
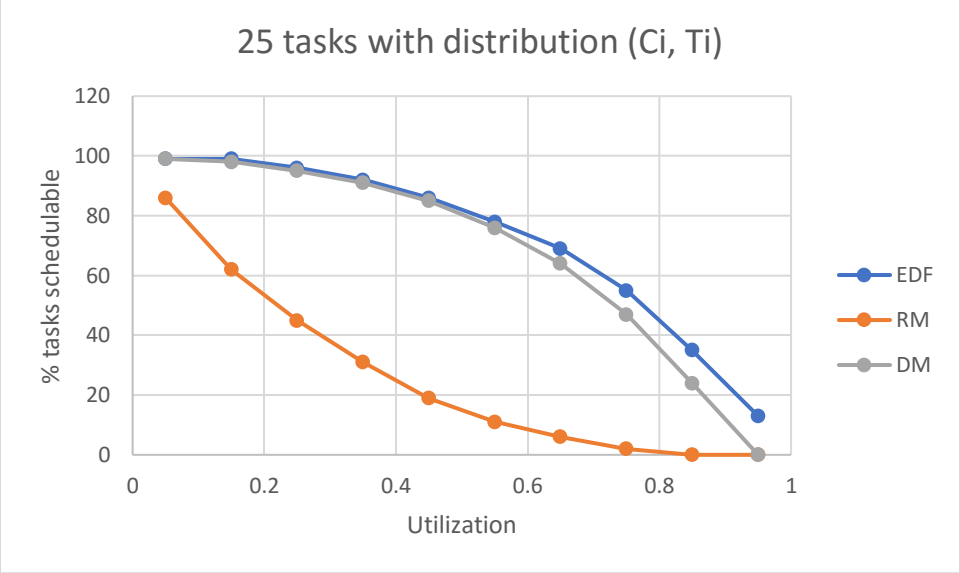
Part 1: The following algorithms were implemented to check schedulability for EDF, RM and DM

1) **EDF Algorithm**:
   For a given task set, the following steps were carried out
   i) Check utilization test
      If(Result of Utilization test)
      Task is schedulable
      Else
      If(Period = Deadline for all tasks)
      Task is not schedulable
      Else (Period < Deadline)
      Do Loading Factor analysis to decide if it's schedulable
2) **RM algorithm**:
   For a given task set, the following steps were carried out
   i) Sort according to period
      If (Period = Deadline for all tasks)
      Do Utilization test (UB and RT combination test) to decide if it's schedulable and if it fails, Do response-time analysis
      Else (Period < Deadline)
      Let task set have new period = deadline and check if the task set is still rate monotonic and if yes, repeat the above. If not, Do effective utilization test along with Response Time analysis
3) **DM algorithm**:
   For a given task set, the following steps were carried out
   ii) Sort according to period
      If (Period = Deadline for all tasks)
      Do Utilization test (UB and RT combination test) to decide if it's schedulable and if it fails, Do response-time analysis
      Else (Period < Deadline)
      Do effective utilization test with Response Time analysis

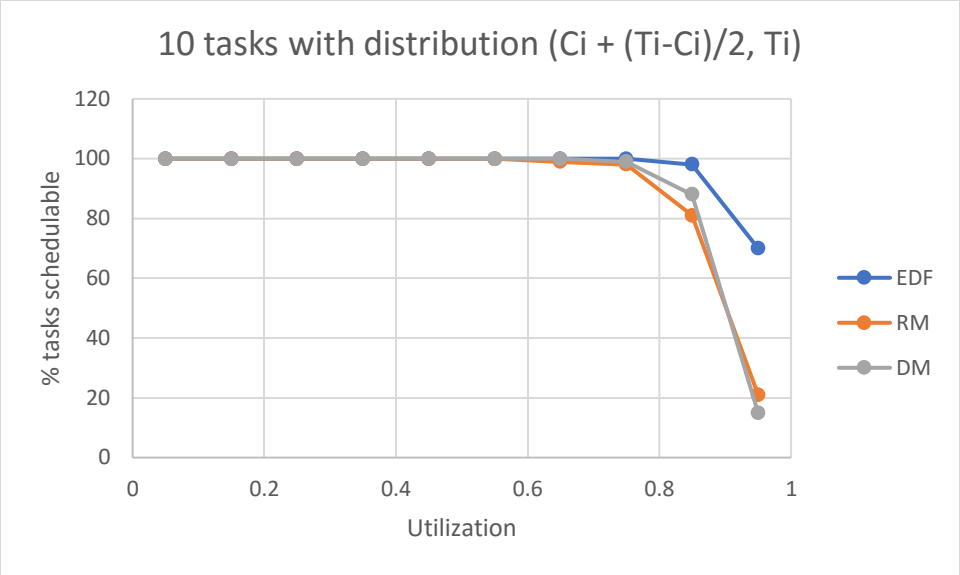
Part 2: The required synthetic task sets [1][2] were generated and the above algorithms were tested. The four required plots are as follows. We observed that EDF performed best due to its dynamic priority assignment while DM performed better than RM. Among all types, the % of tasks schedulable decreased with increase in utilization.


10 tasks with distribution (Ci, Ti)
% tasks schedulable
120
100
80
60
40
20
0
0
0.2
0.4
0.6
0.8
1
Utilization
EDF
RM
DM

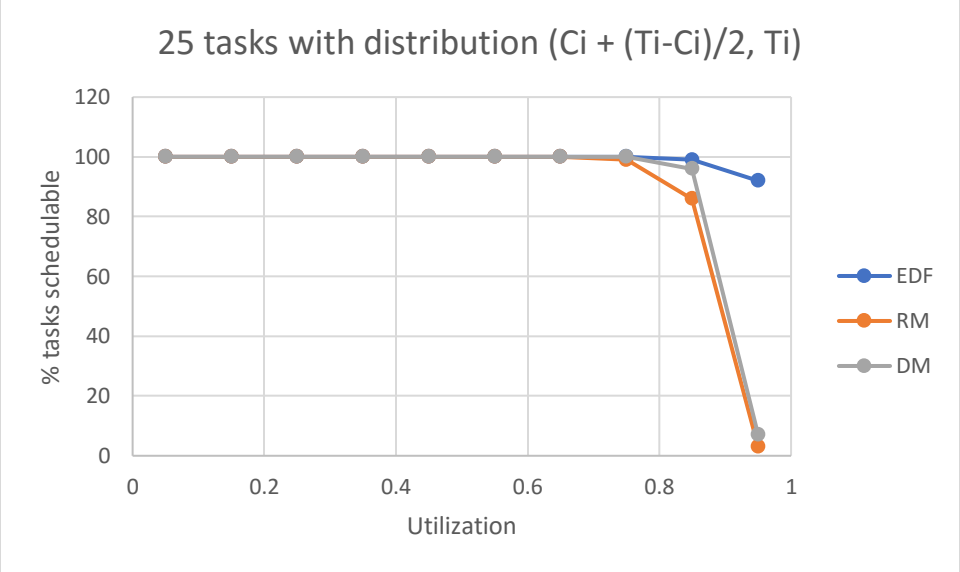
Plot 1


25 tasks with distribution (Ci, Ti)
% tasks schedulable
120
100
80
60
40
20
0
0
0.2
0.4
0.6
0.8
1
Utilization
EDF
RM
DM

Plot 2



Plot 3



Plot 4

Reference

1. [1] Robert I. Davis, Attila Zabos, Alan Burns, "Efficient Exact Schedulability Tests for Fixed Priority Real- Time Systems," IEEE Transactions on Computers, vol. 57, no. 9, pp. 1261-1276, September, 2008.
2. [2] E. Bini and G.C. Buttazzo. “Measuring the Performance of Schedulability tests”. *Real-Time Systems*, vol. 30, no. 1–2, pp. 129–154, May 2005.