ASSIGNMENT 2

SCHEDULABILITY ANALYSIS REPORT

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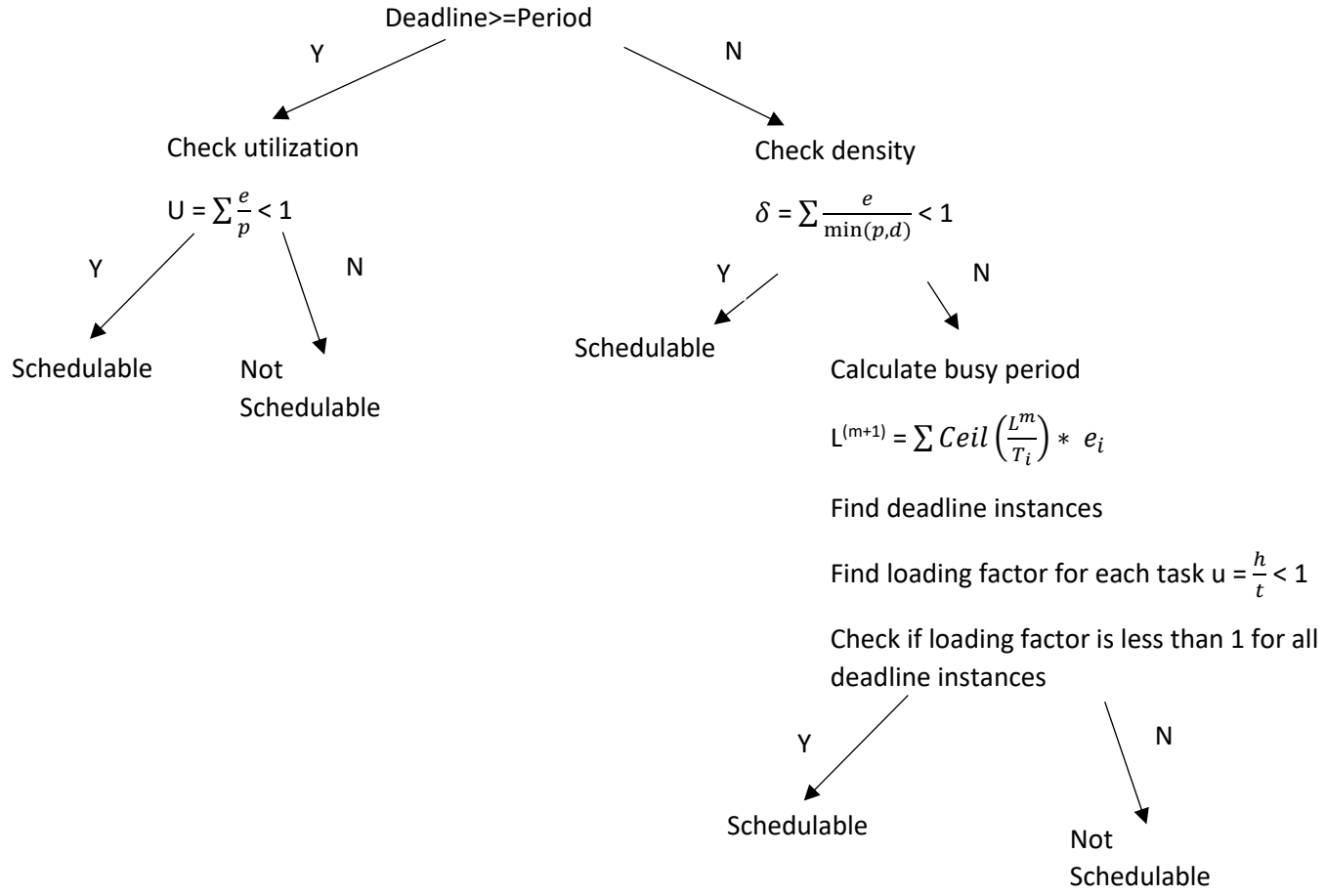
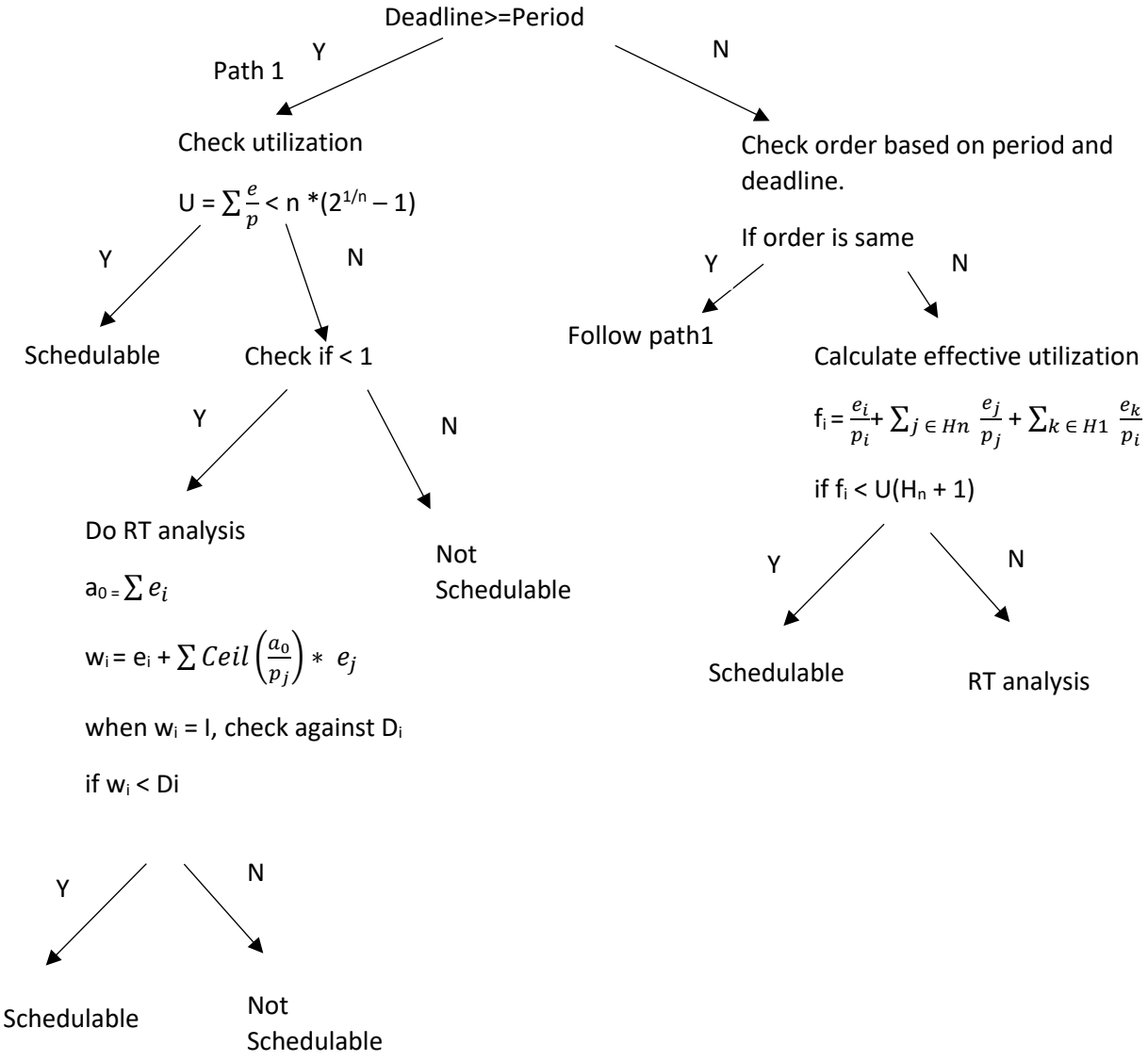
EDF ANALYSIS

The following method was used to implement EDF analysis.



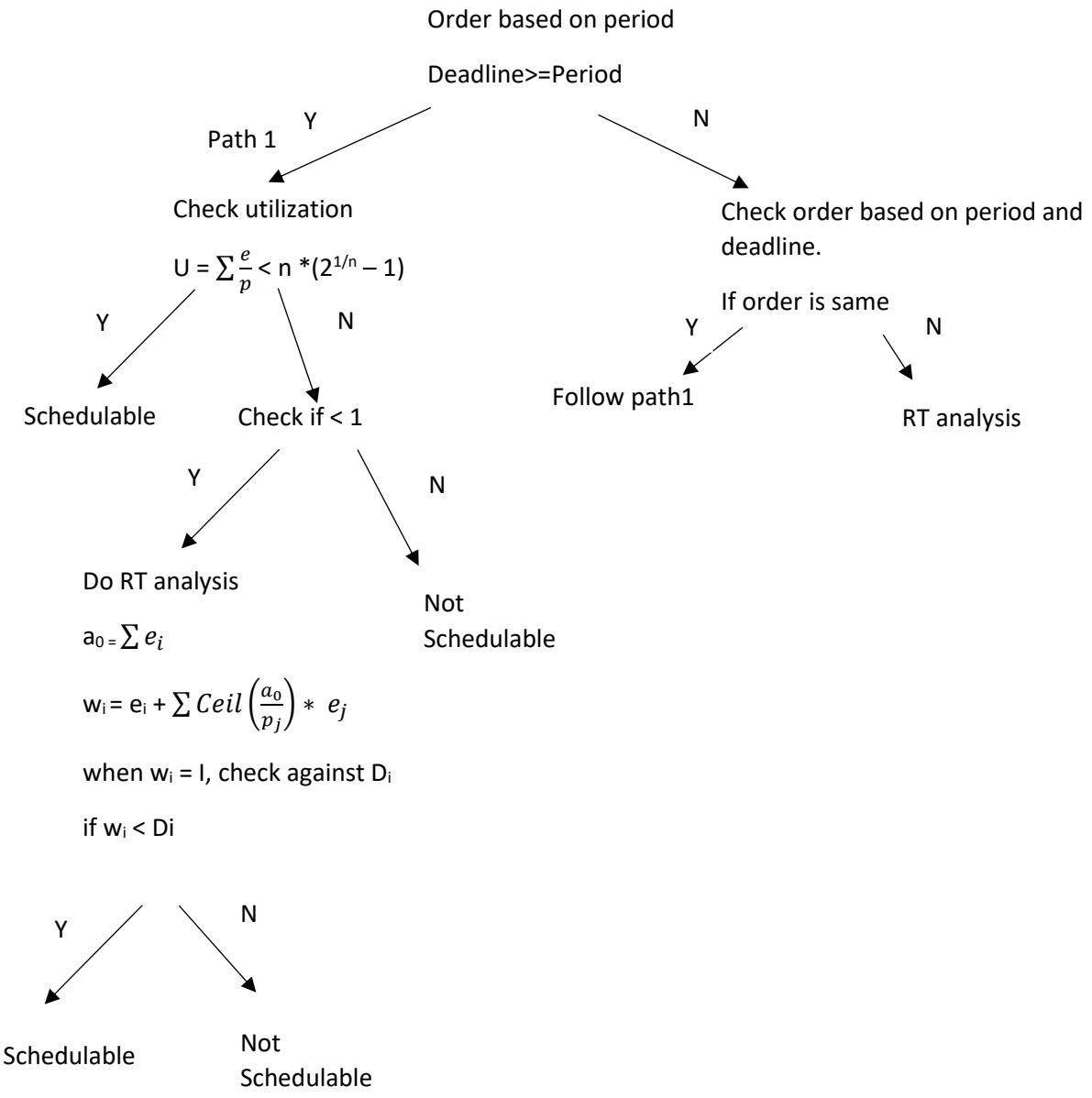
RM ANALYSIS

The following method was used to implement RM analysis.



DM ANALYSIS

The following method was used to implement DM analysis.



ANALYSIS BASED ON TASKSETS IN data.txt

TASKSET 1:

The taskset 1 has the following tasks

Task1: 2 4 8

Task2: 2 5 8

Task3: 3 7 9

EDF ANALYSIS:

Since D < P, we do density check first. Here the density is not less than 1. Hence we find the busy period. The busy period is found to be 16. Now we check if all the loading factors are less than 1. Since they are less than 1, the Taskset1 is schedulable

RM ANALYSIS:

Since D < P, we analyze if the order based on deadline and period are the same. Since they are the same, we perform utilization check. Here the utilization is calculated to be 1.328 and the bound for n=3 becomes 0.7797. Since the utilization is greater than 1, the taskset1 is not schedulable.

DM ANALYSIS:

Since D < P, we check if the order based on period and deadline is the same. Here since they are same, we perform utilization analysis where utilization is calculated to be greater than 1. Hence the taskset is not schedulable.

TASKSET 2:

Taskset2 has the following tasks

Task1: 40 80 100

Task2: 40 70 150

Task3: 100 200 350

EDF ANALYSIS:

Since D < P, we perform density check which is not less than 1. Hence we find the busy period which is calculated as 300. The loading factors for all the task is calculated where task 3 has a loading factor more than 1. Hence taskset 2 is not schedulable

RM ANALYSIS:

Since D < P, we analyze if the order based on deadline and period are the same. Since they are not the same effective utilization is calculated and is found to be 1.8 while the bound is calculated as 1.Since effective utilization is greater than bound we perform RT analysis where

the worst case execution time is found to be 280 and the deadline is 200. Hence the taskset2 is not schedulable.

DM ANALYSIS:

Since D < P, we check if the order for period and deadline is the same. Here since the order is not same, we perform RT analysis where the worst case execution time is found to be greater than deadline. Hence the taskset is not schedulable.

TASKSET 4:

Taskset4 has the following tasks

Task1: 40 100 100

Task2: 40 150 150

Task3: 100 350 350

EDF ANALYSIS:

Here since D = P, we check utilization first. Since the utilization is less than one Taskset4 is schedulable

RM ANALYSIS:

Here since D = P, we perform utilization analysis. The utilization is calculated as 0.95 and bound is 0.77. Since utilization is greater than bound, we do RT analysis and find that the worst case execution time for the taskset is 280 while the deadline for the taskset is 350. Hence the taskset is schedulable

DM ANALYSIS:

Here, since D = P, we perform utilization analysis. The utilization is calculated which is found to be greater than bound and less than 1. While performing RT analysis, we see that the worst case execution time is greater than the deadline and hence taskset 4 is not schedulable.

COMPARATIVE ANALYSIS

Plot1: 10 tasks in each task set and the deadline distribution of [Ci,Ti]

Plot2: 25 tasks in each task set and the deadline distribution of [Ci,Ti]

Plot3: 10 tasks in each task set and the deadline distribution of [Ci + (Ti-Ci)/2 ,Ti]

Plot4: 25 tasks in each task set and the dead line distribution of [Ci + (Ti-Ci)/2 ,Ti]

For each plot, the utilization ranges from 0.05 to 0.95 with 0.1 step. For each utilization of each graph, 5000 tasksets are generated.

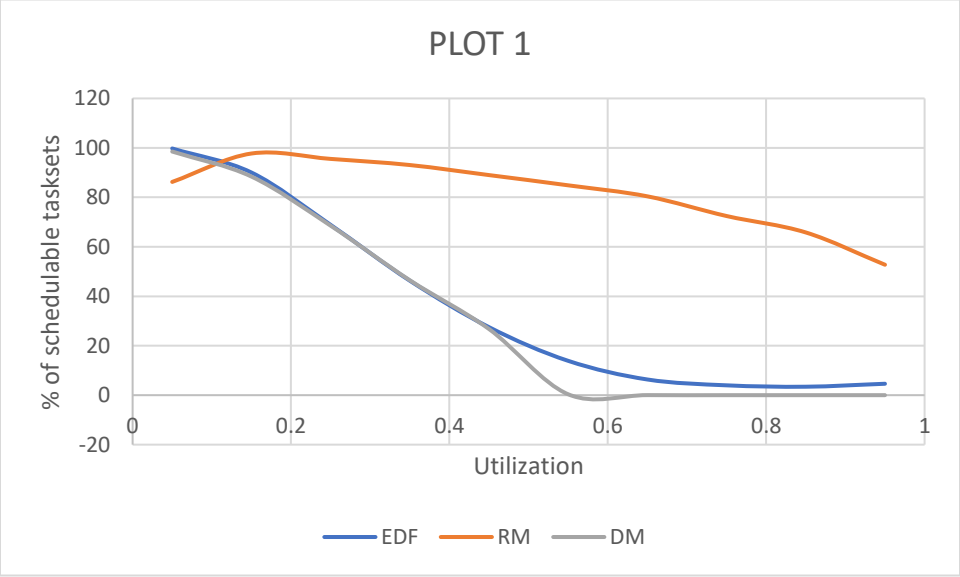
Periods of tasks for each task set are determined as shown in reference paper [1] with M=3.

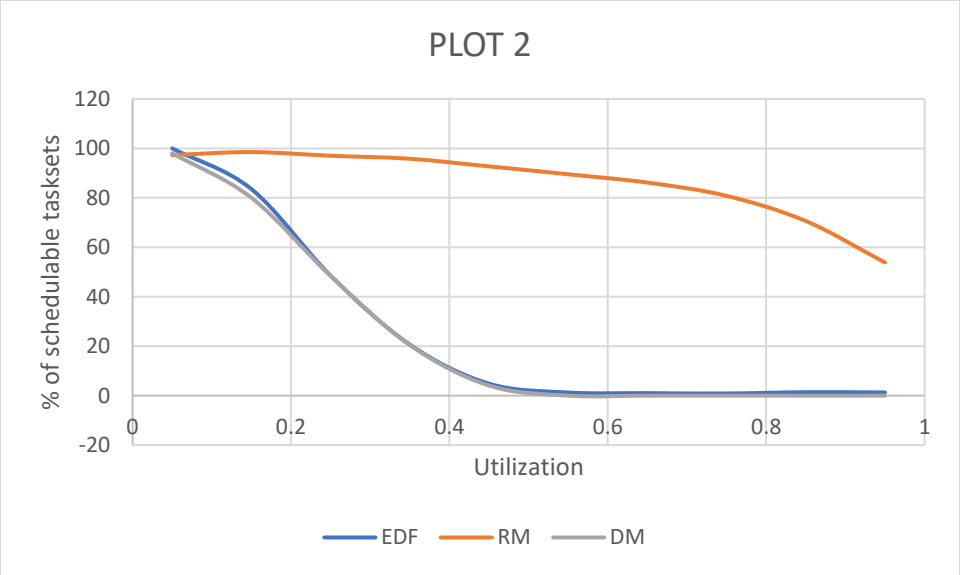
UUniFast algorithm is used to determine utilizations of tasks.

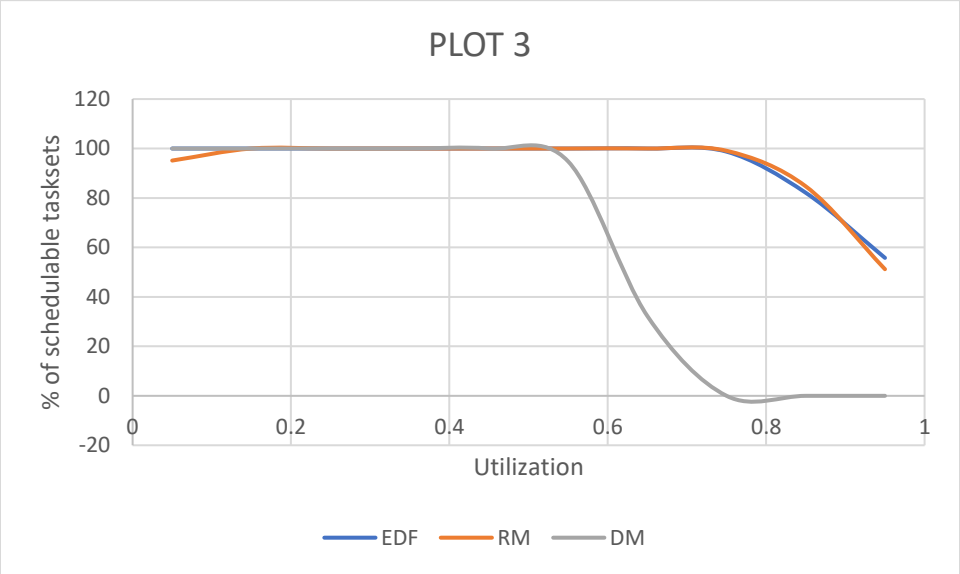
WCET of each task is calculated with equation WCET = Utilization*Period.

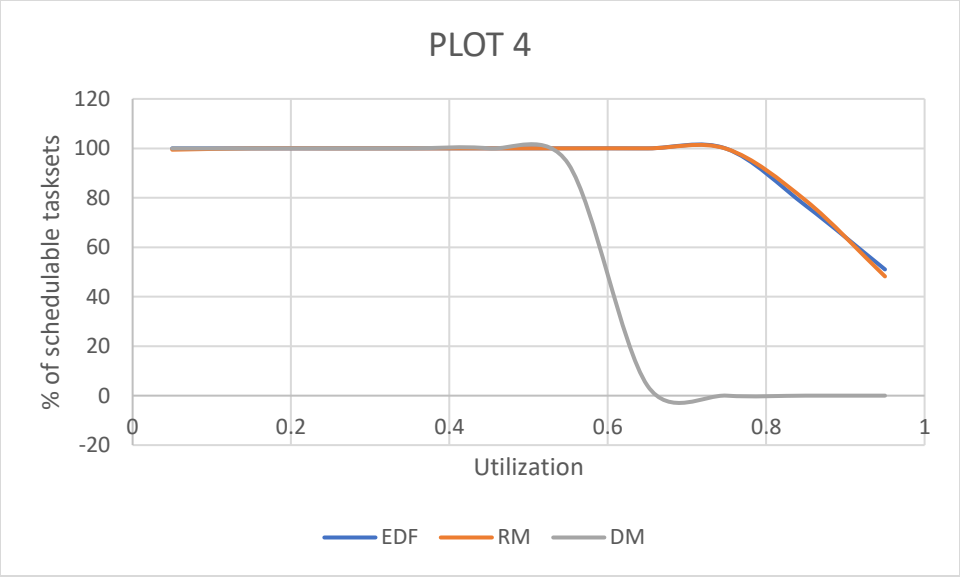
Now, the schedulability of each task set is determined by using the analysis program containing EDF, RM and DM analysis from the first part of the assignment.

We then analyze the data and the graphs are plotted as shown below.




PLOT 2
% of schedulable tasksets
120
100
80
60
40
20
0
-20
0
0.2
0.4
0.6
0.8
1
Utilization
EDF
RM
DM


PLOT 3
% of schedulable tasksets
120
100
80
60
40
20
0
-20
0
0.2
0.4
0.6
0.8
1
Utilization
EDF
RM
DM


PLOT 4
% of schedulable tasksets
120
100
80
60
40
20
0
-20
0
0.2
0.4
0.6
0.8
1
Utilization
EDF
RM
DM