

Determine which of the following strategies are successful for partitioned EDF scheduling using the given tasks on $m=4$ processors:

FFDU, FFIU, FFR, WFDU, WFIU, WFR, BFDU, BFIU, BFR

Task Name	C_i	T_i	U_i
A	50	100	0.5
B	12	20	0.6
C	2	5	0.4
D	5	20	0.25
E	7	10	0.7
F	51	100	0.51
G	20	40	0.5

Solution: There are three different orderings of the tasks as follows (utilization of a task is given in parenthesis):

Increasing Utilization: Task with the smallest utilization will be assigned first and task with the largest utilization will be assigned the last.

D (0.25) , C (0.4) , A (0.5) , G (0.5) , F (0.51) , B (0.6) , E (0.7)

Decreasing Utilization: Task with the largest utilization will be assigned first and task with the smallest utilization will be assigned the last.

E (0.7) , B (0.6) , F(0.51) , G (0.5) , A (0.5) , C (0.4) , D (0.25)

Random: We may consider any ordering of the tasks. For example, consider the following (random) order.

G (0.5), F(0.51), D (0.25) , E(0.7) , B (0.6) , A (0.5) , C (0.4)

The assignment for FFDU

Since we consider First Fit (FF) ordering of the processors, we always try to assign a task to a lowest indexed processor if the task meets its deadline (i.e., passes the uniprocessor EDF test). Let the four processors be M1, M2, M3 and M4.

The order of assigning the tasks to the processors is:

E (0.7) , B (0.6) , F(0.51) , G (0.5) , A (0.5) , C (0.4) , D (0.25)

The final FFDU assignment is

Processors	Assigned tasks	Total Utilization
M1	E, D	0.95
M2	B, C	1.0
M3	F	0.51
M4	G, A	1.0

Since all tasks are assigned, the FFDU partitioned scheduling **SUCCEEDS**.

The assignment for FFIU

The order of assigning the tasks to the processors is:

D (0.25) , C (0.4) , A (0.5) , G (0.5) , F (0.51) , B (0.6) , E (0.7)

The FFIU assignment is

Processors	Assigned tasks	Total Utilization
M1	D, C,	$0.25 + 0.4 = 0.65$
M2	A, G	1.0
M3	F	0.51
M4	B	0.6

Task E cannot be assigned to any processor. The FFIU partitioned scheduling FAILS.

The assignment for FFR

The order of assigning the tasks to the processors is:

G (0.5), F(0.51), D (0.25) , E(0.7) , B (0.6) , A (0.5) , C (0.4)

The FFR assignment is

Processors	Assigned tasks	Total Utilization
M1	G, D	0.75
M2	F	0.51
M3	E	0.7
M4	B	0.6

Task A cannot be assigned to any processor. The FFR partitioned scheduling FAILS.

The assignment for WFDU

Since we consider Worst Fit (FF) ordering of the processors, we will always try to assign a task to a processor having the maximum remaining capacity if the task meets its deadline (i.e., passes the uniprocessor EDF test).

The order of assigning the tasks to the processors is:

E (0.7) , B (0.6) , F(0.51) , G (0.5) , A (0.5) , C (0.4) , D (0.25)

The final WFDU assignment is

Processors	Assigned tasks	Total Utilization
M1	E	0.7
M2	B, D	0.85
M3	F, C	0.91
M4	G, A	1.0

Since all tasks are assigned, the WFDU partitioned scheduling SUCCEEDS.

The assignment for WFIU

The order of assigning the tasks to the processors is:

D (0.25) , C (0.4) , A (0.5) , G (0.5) , F (0.51) , B (0.6) , E (0.7)

The WFIU assignment is

Processors	Assigned tasks	Total Utilization
M1	D, F	
M2	C, B	
M3	A	
M4	G	

Task E cannot be assigned to any processor. The WFIU partitioned scheduling FAILS.

The assignment for WFR

The order of assigning the tasks to the processors is:

G (0.5), F(0.51), D (0.25) , E(0.7) , B (0.6) , A (0.5) , C (0.4)

The final FFR assignment is

Processors	Assigned tasks	Total Utilization
M1	G, A	0.5 + 0.5
M2	F, C	0.51 + 0.4
M3	D, B	0.25 + 0.6
M4	E	0.7

Since all tasks are assigned, the WFR partitioned scheduling SUCCEEDS.

The assignment for BFDU

Since we consider Best Fit (FF) ordering of the processors, we will always try to assign a task to a processor having the minimum remaining capacity if the task meets its deadline (i.e., passes the uniprocessor EDF test).

The order of assigning the tasks to the processors is:

E (0.7) , B (0.6) , F(0.51) , G (0.5) , A (0.5) , C (0.4) , D (0.25)

The final BFDU assignment is

Processors	Assigned tasks	Total Utilization
M1	E, D	0.95
M2	B	0.6
M3	F, C	0.91
M4	G, A	1.0

Since all tasks are assigned, the BFDU partitioned scheduling SUCCEEDS.

The assignment for BFIU

The order of assigning the tasks to the processors is:

D (0.25) , C (0.4) , A (0.5) , G (0.5) , F (0.51) , B (0.6) , E (0.7)

The BFIU assignment is

Processors	Assigned tasks	Total Utilization
M1	D, C,	0.65
M2	A, G	1.0
M3	F	0.51
M4	B	0.6

Task E cannot be assigned to any processor. The BFIU partitioned scheduling FAILS.

The assignment for BFR

The order of assigning the tasks to the processors is:

G (0.5), F(0.51), D (0.25) , E(0.7) , B (0.6) , A (0.5) , C (0.4)

The final BFR assignment is

Processors	Assigned tasks	Total Utilization
M1	G, A	1.0
M2	F, D	0.75
M3	E	0.7
M4	B, C	1.0

Since all tasks are assigned, the BFR partitioned scheduling SUCCEEDS.