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Assignment 3

Git: https://github.tamu.edu/agarwal-220196/FreeRTOS.git

Task set 1:

T1(15, 1, 14) T2(20, 2, 26) T3(22, 3) (Period, Execution time, Deadline)

Let f be the frame size.

Requirement 1: f >= 3 (max execution time)

Requirement 2: H = LCM (15, 20, 22) = 660
            Possible f candidates {22,20,15,12,11,10,6,5,4,3,2,1}

Requirement 3: $2f - gcd(p_i, f) <= D_i$

f	T1 (15, 1, 14)	T2 (20, 2, 26)	T3 (22, 3)
22	44 – 1 <= 14 (false)	NA	NA
20	40-5 <= 14 (false)	NA	NA
15	30-15<=14 (false)	NA	NA
12	24-3 <= 14 (false)	NA	NA
11	22 – 1<= 14 (false)	NA	NA
10	20 – 5 <=14 (false)	NA	NA
6	12 – 3<=14	12 – 2<=20	12-2<=22
5	10-5<=14	10-5<=26	10-1<=22

Since 6 satisfies all the three requirements above, the largest possible frame size is 6.

Task set 2:

T1(4, 1) T2(5, 2, 7) T3(20, 5) (Period, Execution time, Deadline)

Let f be the frame size.

Requirement 1: f>=5 (max execution time)

Requirement 2: H= LCM (4,5,20) = 20

                Possible f candidates = { 20, 10, 5, 4, 2, 1 }

Requirement 3: $2f - gcd(p_i, f) <= D_i$

f	T1 (4,1)	T2 (5,2,7)	T3(20,5)
20	40-4<=20 (false)		
10	20-2<=20 (false)		
5	10-1<=4 (false)		
4	8-4<=4	8-1<=5 (false)	
2	4 – 2 <= 4	4 – 1 <= 5	4 – 2 < =20

Largest frame of 2 violates requirement 2. It is possible only when T3 is split into parts.

Task set 3:

T1(5, 0.1) T2(7, 1) T3(12, 6) T4(45, 9) (Period, Execution time, Deadline)

Let f be the frame size.

Requirement 1: f>=9 (max execution time)

Requirement 2: H= LCM (5,7,12, 45) = 1260

Possible f candidates = { 45,42,36,35,30,28,21, 20, 18, 15,14,12,10,9, 7,6,5,4,3,2}

Requirement 3: $2f - gcd(p_i,f) <= D_i$

f	T1(5,0.1)	T2(7,1)	T3(12,6)	T4(45,9)
45	50-5<=5 (False)			
42	84-1<=5 (false)			
36	72-1<=5 (False)			
35	70-5<=5 (false)			
30	60-5<=5 (false)			
28	56-1<=5(false)			
21	42-1<=5 (false)			
20	40-5<=5 (false)			
18	36-1<=5 (false)			
15	30-5<=5 (false)			
14	28-1<=5 (false)			
12	24-1<=5 (false)			
10	20-5<=5 (false)			
9	18-1<=5 (false)			
7	14-1<=5 (false)			
6	12-1<=5 (false)			
5	10-5<=5 True	10- 1<=7 (false)		
4	8-1<=5 (false)			
3	6-1<=5 True	6-1<=7 True	6-3<=12 True	6-3<=45 True

To satisfy requirement 2, Task 3 and task 4 must be split up to accommodate largest possible frame size of 3