

EE249 Homework 3
Thanks to: Marco Di Natale
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Case 1

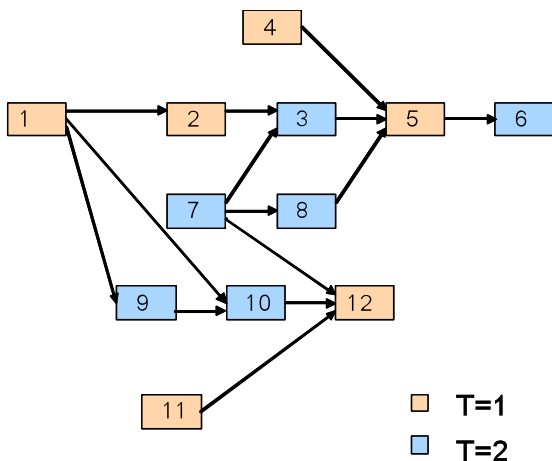
Given the following description of a system consisting of 15 tasks. (Highest index corresponds to highest priority)

Task	Period (msec)	Priority	C_i (μ sec)	NOP	NLPR	NHPR	Utilization (%)
0	1000	10	1500	4	0	0	0.15
1	1000	9	5002	4	3	0	0.50
2	10-60	13	148	4	0	0	1.48
3	5-30	16	208	4	0	1	4.16
4	10-60	12	100	3	0	2	1.00
5	1000	1	131100	3	2	0	13.11
6	1000	5	150000	3	2	1	15.00
7	10-60	15	330	4	1	12	3.30
8	10-60	11	10	6	1	1	1.00
9	1000	4	100000	3	14	2	10.00
10	1000	2	120000	3	13	2	12.00
11	4	14	39	2	4	18	0.98
12	12	7	820	2	10	6	6.83
13	50	8	1000	0	0	0	2.00
14	100	6	9850	1	11	6	9.85
15	1000	3	110000	0	29	4	11.00
Column	2	3	4	5	6	7	8

- Q1:** Compute the response times of tasks 5 and 10 and check their schedulability
Q2: If the worst-case execution time of task 5 (lowest priority) is increased to 211100 microseconds, define by how much the execution time of task 3 (highest priority) should be reduced to bring the system back into schedulability conditions.
Q3: (bonus) develop a program for the previous computations and perform the analysis of question Q1 for all tasks and of Q2 for all tasks with priority higher than 5.

Case 2.

Given the following functional model representing a network of Simulink blocks with their worst case execution times.



Block	γ_i	Block	γ_i
F_1	0.05	F_7	0.15
F_2	0.1	F_8	0.15
F_3	0.05	F_9	0.1
F_4	0.075	F_{10}	0.15
F_5	0.1	F_{11}	0.1
F_6	0.1	F_{12}	0.075

- Q4:** Define a mapping of the functional blocks into tasks and an assignment of priorities to tasks that produces a schedulable system and reduces as much as possible the need for Rate Transition blocks.