Overview

In this assignment, we will focus a bit more on the theoretical side. We will have a look at verifying real-time system by using the cyclic structured construct handled in the course and a simulation environment to automatically schedule a full timeline. The main purpose of the assignment is to expose the student to several ways of planning and verifying a real-time system in practice.

Theory assignment

1. T1(15, 1, 14) T2(20, 2, 26) T3(22, 3)
2. T1(4, 1) T2(5, 2, 7) T3(20, 5)
3. T1(5, 0.1) T2(7, 1) T3(12, 6) T4(45, 9)

Calculations for each step for finding the frame size for each task set

Resulting frame size for each task set

Task 1: Largest frame size equal to 5

Task 2: Largest frame size equal to 4, splitting T3 into T3.1(e= 4) and T3.2(e=1)

Task 3: Largest frame size equal to 4, splitting T3 into T3.1(e= 4) and T3.2(e=1)3. T1(5, 0.1) T2(7, 1) T3(12, 6) T4(45, 9)Largest frame size equal to 3, splitting T3 into T3.1(e= 3) and T3.2(e=3) and T4 into T4.1(e= 3),T4.2(e=3) and T4.3(e=3)

Simulation assignment

Part 1

Input the tasks T1(2, 0.5), T2(3, 1.2), T3(6, 0.5) and the RM scheduler into the SimSo simulator

- What is the utilization factor of the system and what is the value for Urm(3)

U= 0.73333 and Urm(3)= 0.779, therefore 0.73333 <= 0.779 the system is feasible

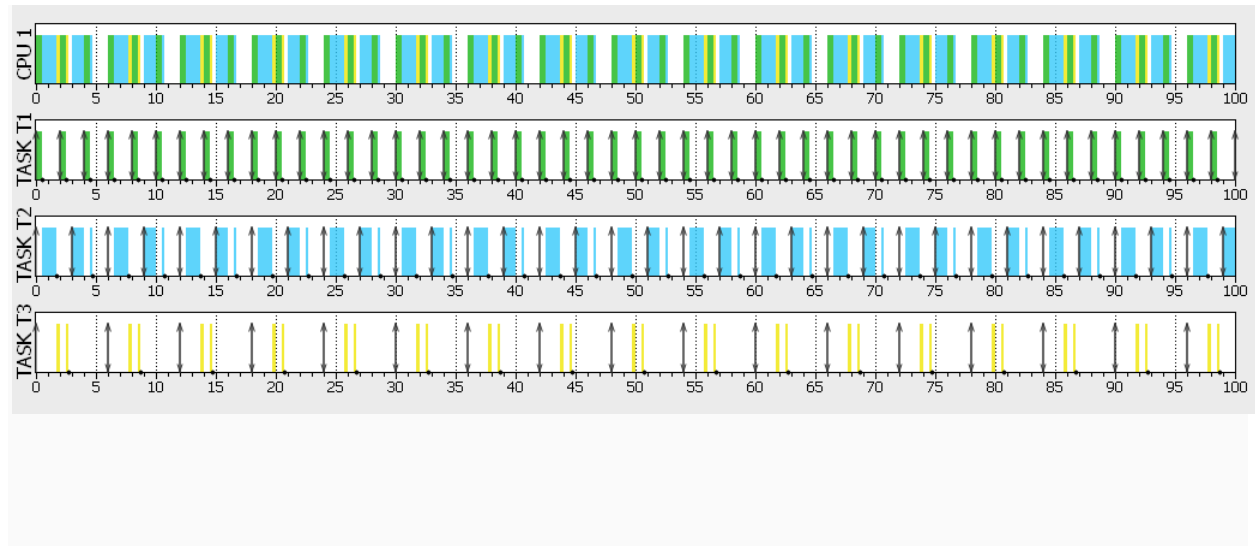- What is the minimum/maximum/average response time of all tasks?

Computation time:					
Task	min	avg	max	std dev	occupancy
TASK T1	0.500	0.500	0.500	0.000	0.250
TASK T2	1.200	1.200	1.200	0.000	0.406
TASK T3	0.500	0.500	0.500	0.000	0.085

- Is any task missing the deadline? Which task? Where?
  All deadlines are achieved, no change needed
- If a deadline is missed, could it be avoided by changing the scheduler?

All deadlines are achieved, no change needed

Part 2

Input the tasks T1(2, 0.5, 1.9) T2(5, 2) T3(1, 0.1, 0.5) T4(10, 5, 20) and the EDF scheduler into the SimSo simulator

- What is the utilization factor of the system and what is the value for Urm(4)

U = 1.25 and Urm(4) =0.7568, the system is not feasible due to U is greater than 1

- What is the minimum/maximum/average response time of all tasks?

Computation time:

Task	min	avg	max	std dev	occupancy
TASK T1	0.500	0.500	0.500	0.000	0.250
TASK T2	2.000	2.000	2.000	0.000	0.400
TASK T3	0.100	0.100	0.100	0.000	0.100
TASK T4	5.000	5.000	5.000	0.000	0.250

- Is any task missing the deadline? Which task? Where?

Yes, task 4 in time 30, 40 ,50, 60, 70 ,80,90, 100 ms based on log file

- If a deadline is missed, could it be avoided by changing the scheduler?

No the utilization is greater than 1system is not feasible