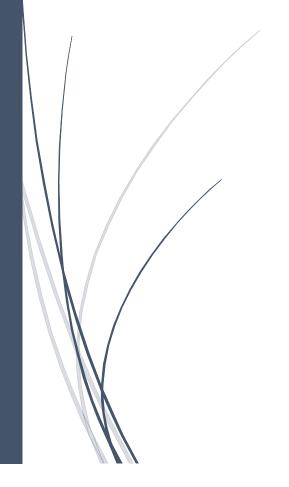
Scheduling analysis



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System Tasks:



Our system has three tasks

Task parameters

Task 1

{P:5, E:2.5, D:5, PRIORITY:1}

{P:5, E:2.5, D:5, PRIORITY:1}

Task 2

{P:15, E:4.5, D:15, PRIORITY:2}

{P:15, E:4.5, D:15, PRIORITY:2 }

Task 3

{P:20, E:3.5, D:20, PRIORITY:3}

(F.20, E.S.S, D.20, PNIONITIS)

URM calculation

$$U = \sum_{i=1}^{n} \frac{Ci}{Pi}$$

, Where

U=Total utilization

C=Execution time

P=Periodicity

N=Number of tasks

$$U = \frac{2.5}{5} + \frac{4.5}{15} + \frac{3.5}{20} = 0.975 \ ms$$

$$URM = n\left(2^{\frac{1}{n}} - 1\right)$$

$$URM = 3 * \left(2^{\frac{1}{3}} - 1\right) = 0.7797 \, ms$$

Comment:



The system need more tests because U > URM.

Time demand analysis:

$$Wi(t) = ei + \sum_{k=1}^{i-1} [t/P_k]$$
 ek for $0 < P \le Pi$

, Where

W=Worst response time

E=Execution time

P=Periodicity

T=Time instant

• Calculate the time demand for task 1:

$$W(1) = 2.5 + 0 = 2.5$$

$$W(2) = 2.5 + 0 = 2.5$$

$$W(3) = 2.5 + 0 = 2.5$$

$$W(4) = 2.5 + 0 = 2.5$$

$$W(5) = 2.5 + 0 = 2.5$$

Comment:

W(5) < deadline for task 1, so the task 1 is schedulable

• Calculate the time demand for task 2:



$$W(10) = 4.5 + \left[\frac{10}{5}\right] * 2.5 = 9.5$$

$$W(11) = 4.5 + \left[\frac{11}{5}\right] * 2.5 = 12$$

$$W(12) = 4.5 + \left[\frac{12}{5}\right] * 2.5 = 12$$

$$W(13) = 4.5 + \left[\frac{13}{5}\right] * 2.5 = 12$$

$$W(14) = 4.5 + \left[\frac{14}{5}\right] * 2.5 = 12$$

$$W(15) = 4.5 + \left[\frac{15}{5}\right] * 2.5 = 12$$

Comment:

W(15) < deadline for task 2, so the task 2 is schedulable

• Calculate the time demand for task 3:



$$W(15) = 3.5 + \left[\left[\frac{15}{5} \right] * 2.5 \right] + \left[\left[\frac{15}{15} \right] * 4.5 \right] = 15.5$$

$$W(16) = 3.5 + \left[\left[\frac{16}{5} \right] * 2.5 \right] + \left[\left[\frac{16}{15} \right] * 4.5 \right] = 22.5$$

$$W(17) = 3.5 + \left[\left[\frac{17}{5} \right] * 2.5 \right] + \left[\left[\frac{17}{15} \right] * 4.5 \right] = 22.5$$

$$W(18) = 3.5 + \left[\left[\frac{18}{5} \right] * 2.5 \right] + \left[\left[\frac{18}{15} \right] * 4.5 \right] = 22.5$$

$$W(19) = 3.5 + \left[\left[\frac{19}{5} \right] * 2.5 \right] + \left[\left[\frac{19}{15} \right] * 4.5 \right] = 22.5$$

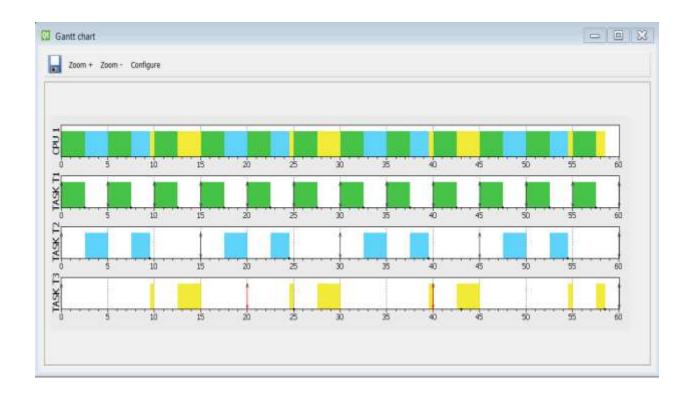
$$W(20) = 3.5 + \left[\left[\frac{20}{5} \right] * 2.5 \right] + \left[\left[\frac{20}{15} \right] * 4.5 \right] = 22.5$$

Comment:

W(20) > deadline for task 3, so the task 3 isn't schedulable

SIMSO Results:





Comment:

From above figure, Task 3 missed its deadline