



# 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 }

#### Task 2

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

#### Task 3

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

### URM calculation

$$U = \sum_{i=1}^n \frac{C_i}{P_i}$$

, Where

U=Total utilization

C=Execution time

P=Periodicity

N=Number of tasks

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

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

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

**Comment:**

The system need more tests because  $U > URM$ .

**Time demand analysis:**

$$Wi(t) = ei + \sum_k^{i-1} \lceil t/p_k \rceil ek \quad \text{for } 0 < P \leq Pi$$

, 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:**

$W(5) < \text{deadline for task 1}$  , so the task 1 is schedulable

- Calculate the time demand for task 2:

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

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

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

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

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

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

**Comment:**

$W(15) < \text{deadline for task 2}$  , so the task 2 is schedulable

- Calculate the time demand for task 3:

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

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

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

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

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

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

**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