Assignment 3

| Task name | Task number | periodicity | Execution time | deadline | priority |
|---|---|---|---|---|---|
| Lcd touch | 1 | 100 | 2ms | 100 | 1 |
| Blood pressure | 2 | 10 | 3ms | 12.5 | 3 |
| Heart beat | 3 | 50 | 1.5ms | 50 | 2 |
| Temp sensor | 4 | 5 | 2.5ms | 5 | 4 |
| Alert siren | 5 | speriodic | 1ms | 5 | 5 |

No of tasks = 5
Systick = 5 ms
Hyperperiod = 100 ms
Cpu load = (2 + 3* 10 + 1.5 * 2 + 50 + 1) / 100 = 86%


Comments:
Touch input; so polling if it has a new input every 100 ms is fair enough
Blood pressure sensor sends new data every 25 ms so a task checks if it has new data every 10 ms
Heartbeat detector sends new data every 100 ms so a task checks if it has new data every 50ms
Temperature sensor  sends new data every 10 ms so a task checks if it has new data every 5 ms
Alert siren has too many possibilities.
Should it be periodic or Speriodic?
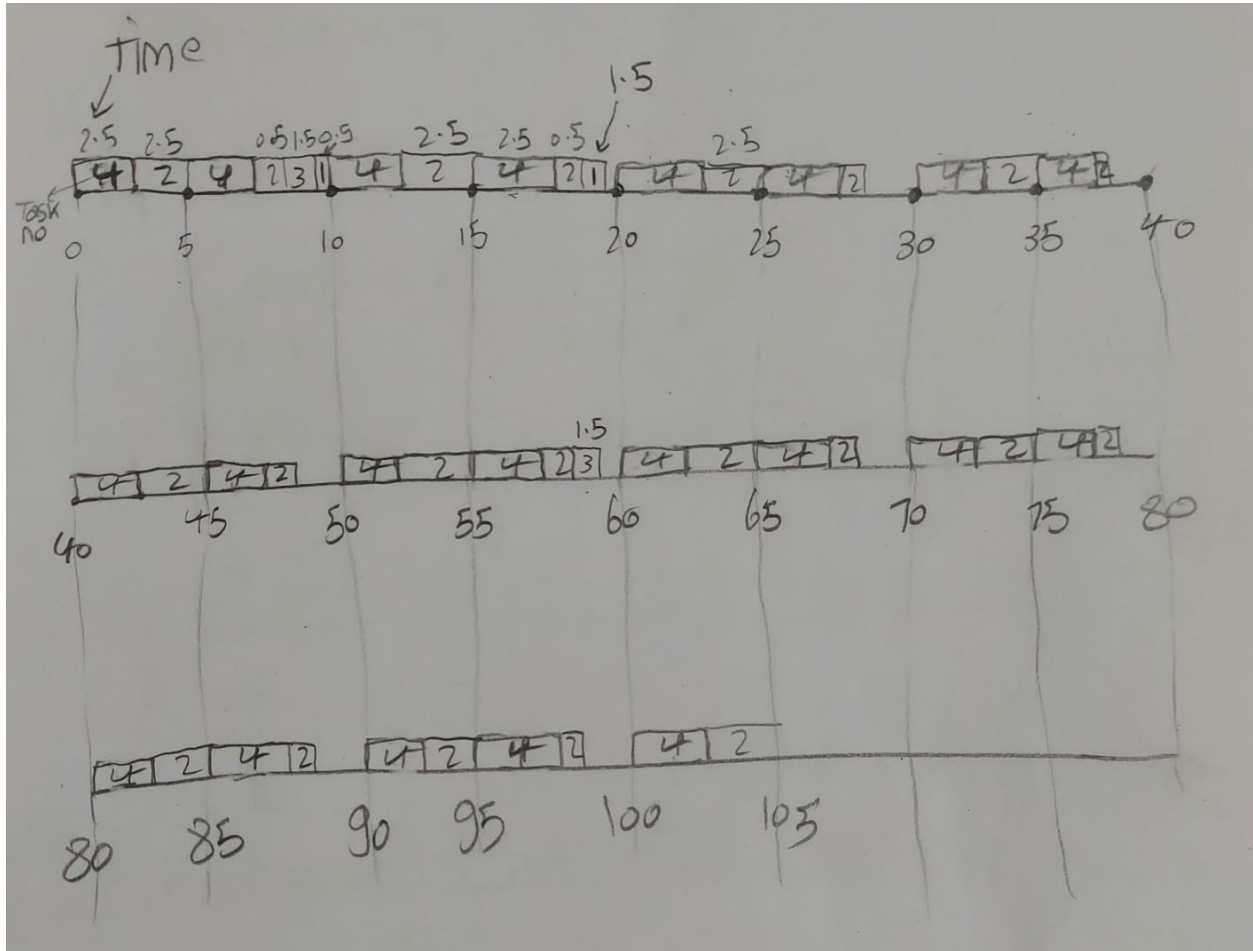If it's periodic (as a worst-case), What is the most suitable periodicity for it and for the system?

Choices came to my mind
1- speriodic: as it will only work in certain conditions and will work for only 1ms
2- periodic with periodicity 5ms to respond instantly after any task

In my opinion and from the flowchart, I think it's speriodic.

# Manual timeline



# Design and solution using simso

| id | Name | Task type | Abort on miss | Act. Date (ms) | Period (ms) | List of Act. dates (ms) | Deadline (ms) | WCET (ms) | Followed by | |
|----|------|-----------|---------------|----------------|-------------|-------------------------|---------------|-----------|-------------|---|
| 1 | TASK T1 | Periodic | No | 0 | 100.0 | - | 100.0 | 2.0 | | 1 |
| 2 | TASK T2 | Periodic | No | 0 | 10 | - | 10.0 | 3.0 | | 3 |
| 3 | TASK T3 | Periodic | No | 0 | 50.0 | - | 50.0 | 1.5 | | 2 |
| 4 | TASK T4 | Periodic | No | 0 | 5.0 | - | 5.0 | 2.5 | | 4 |
| 5 | TASK T5 | Sporadic | No | - | - | 60.0 | 5.0 | 1.0 | | 5 |

General  Scheduler  Processors  Tasks
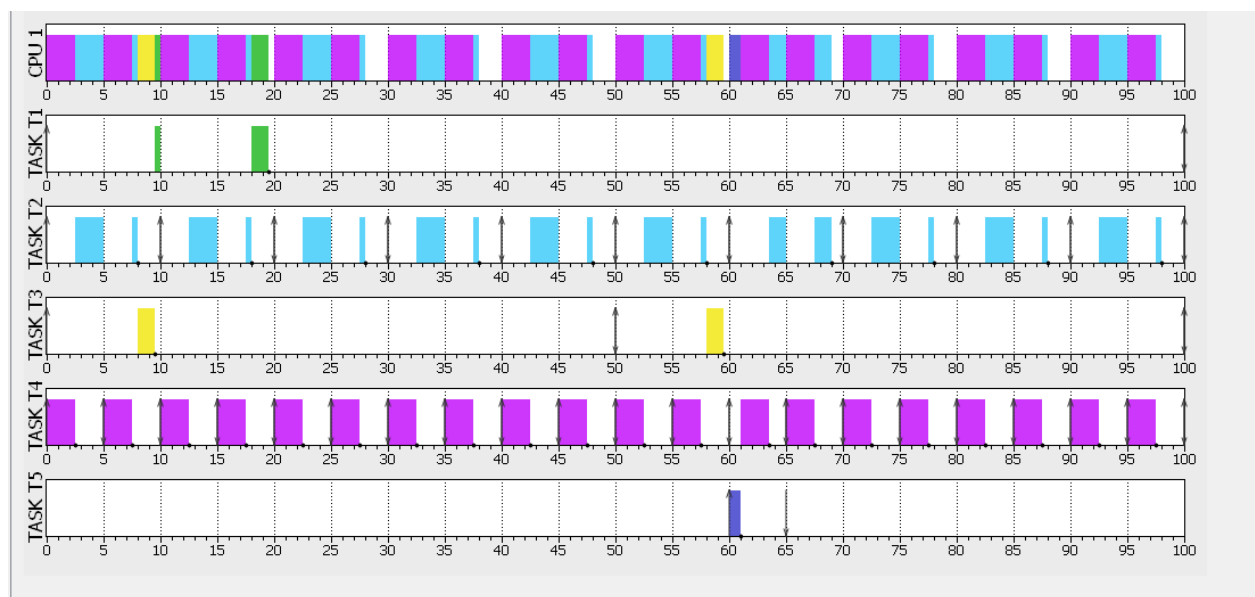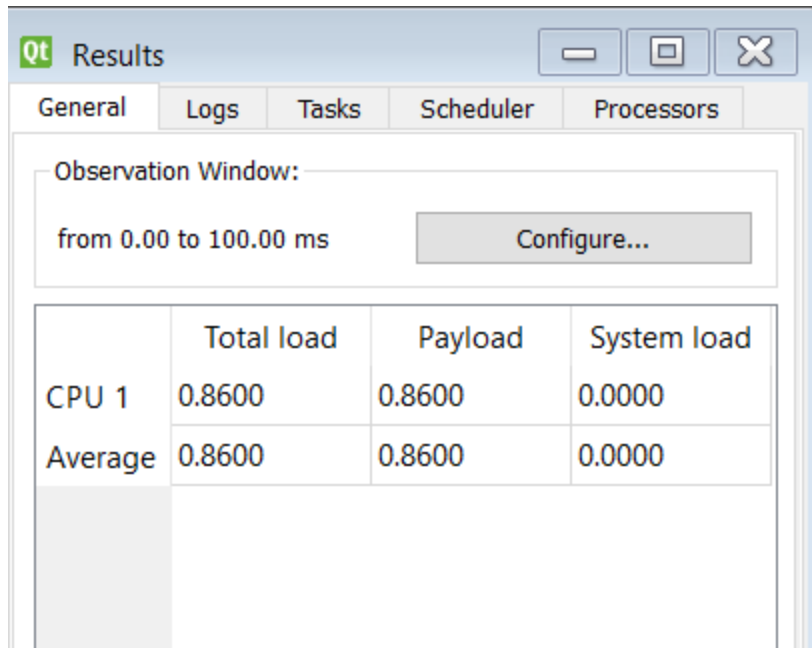
Comments:

The tasks meet their deadlines with priority

But if their priorities were the same they will miss their deadlines.

They are typical to the manual deadline

# What if Alert Siren task was periodic with periodicity of 5ms ?

SYSTICK = 2.5 MS

be cause of TASK 2
Periodicity

HYPerPeriod = 100 MS

CPU load = $\dfrac{2 + 3 \times 8 + 3 + 50 + 20}{100}$

= 99 %   ! !



Time ← 2.5 | 1.5

| 4 | 5 | 2 | 4 | 5 | 2 | 4 | 5 | 2 | 4 | 5 | 2 | 4 | 5 | 3 | 4 | 5 | 2 | 4 | 5 | 2 | 4 | 5 | 2 |

Task number
0   2.5   5   7.5   10   12.5   15   17.5   20   22.5   25   27.5   30   32.5   35   37.5   40

| 4 | 5 | 2 | 4 | 5 | 1 | 4 | 5 | 2 | 4 | 5 | 2 | 4 | 5 | 2 | 4 | 5 | 2 | 4 | 5 | 3 | 4 | 5 | 2 |

40   41.5   45   47.5   50   52.5   55   57.5   60   62.5   65   67.5   70   72.5   75   77.5   80

| 4 | 5 | 2 | 4 | 5 | 2 | 4 | 5 | 2 | 4 | 5 | 1 | 4 | 5 | 2 |

80   82.5   85   87.5   90   92.5   95   97.5   (100)
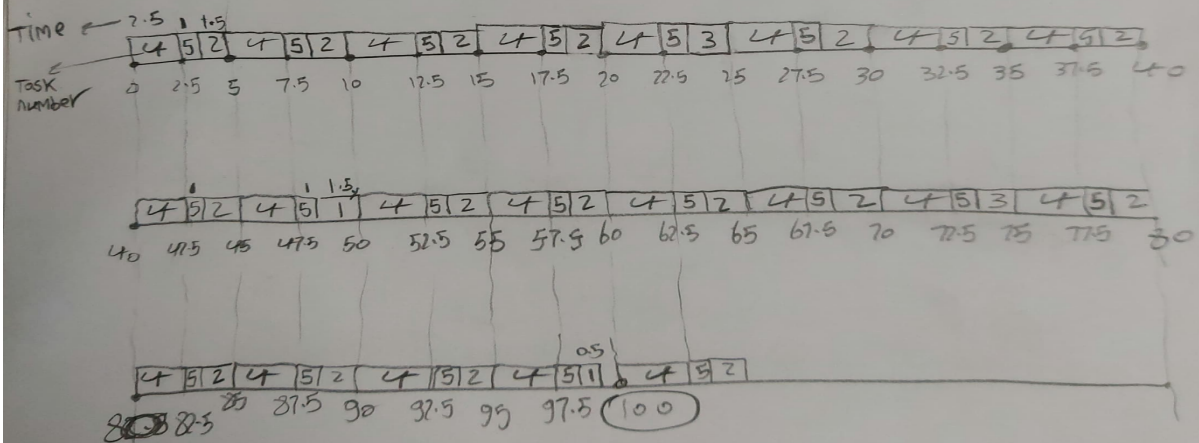
# Simso with different priorities



| id | Name | Task type | Abort on miss | Act. Date (ms) | Period (ms) | List of Act. dates (ms) | Deadline (ms) | WCET (ms) | Followed by | priority |
|----|------|-----------|---------------|----------------|-------------|-------------------------|---------------|-----------|-------------|----------|
| 1 | TASK T1 | Periodic | No | 0 | 100 | - | 100 | 2 | | 1 |
| 2 | TASK T2 | Periodic | No | 0 | 12.5 | - | 10 | 3 | | 3 |
| 3 | TASK T3 | Periodic | No | 0 | 50 | - | 50 | 1.5 | | 2 |
| 4 | TASK T4 | Periodic | No | 0 | 5 | - | 5 | 2.5 | | 5 |
| 5 | TASK T5 | Periodic | No | 0 | 5 | - | 5 | 1 | | 4 |

## Results

### General

**Observation Window:**

from 0.00 to 100.00 ms     Configure...

| | Total load | Payload | System load |
|--------|------------|---------|-------------|
| CPU 1 | 0.9900 | 0.9900 | 0.0000 |
| Average | 0.9900 | 0.9900 | 0.0000 |

# Simso with the same priorities



## Model data

| id | Name | Task type | | Abort on miss | Act. Date (ms) | Period (ms) | List of Act. dates (ms) | Deadline (ms) | WCET (ms) | Followed by | priority |
|----|------|-----------|---|---------------|----------------|-------------|------------------------|---------------|-----------|-------------|----------|
| 1 | TASK T1 | Periodic | ▼ | ☐ No | 0 | 100 | - | 100 | 2 | ▼ | 0 |
| 2 | TASK T2 | Periodic | ▼ | ☐ No | 0 | 12.5 | - | 10 | 3 | ▼ | 0 |
| 3 | TASK T3 | Periodic | ▼ | ☐ No | 0 | 50 | - | 50 | 1.5 | ▼ | 0 |
| 4 | TASK T4 | Periodic | ▼ | ☐ No | 0 | 5 | - | 5 | 2.5 | ▼ | 0 |
| 5 | TASK T5 | Periodic | ▼ | ☐ No | 0 | 5 | | 5 | 1 | ▼ | 0 |

Edit data fields...

Remove selected task(s)

Add task    Generate Task Set

## Results

General | Logs | Tasks | Scheduler | Processors

Observation Window:

from 0.00 to 100.00 ms    Configure...

| | Total load | Payload | System load |
|---|---|---|---|
| CPU 1 | 0.9900 | 0.9900 | 0.0000 |
| Average | 0.9900 | 0.9900 | 0.0000 |