

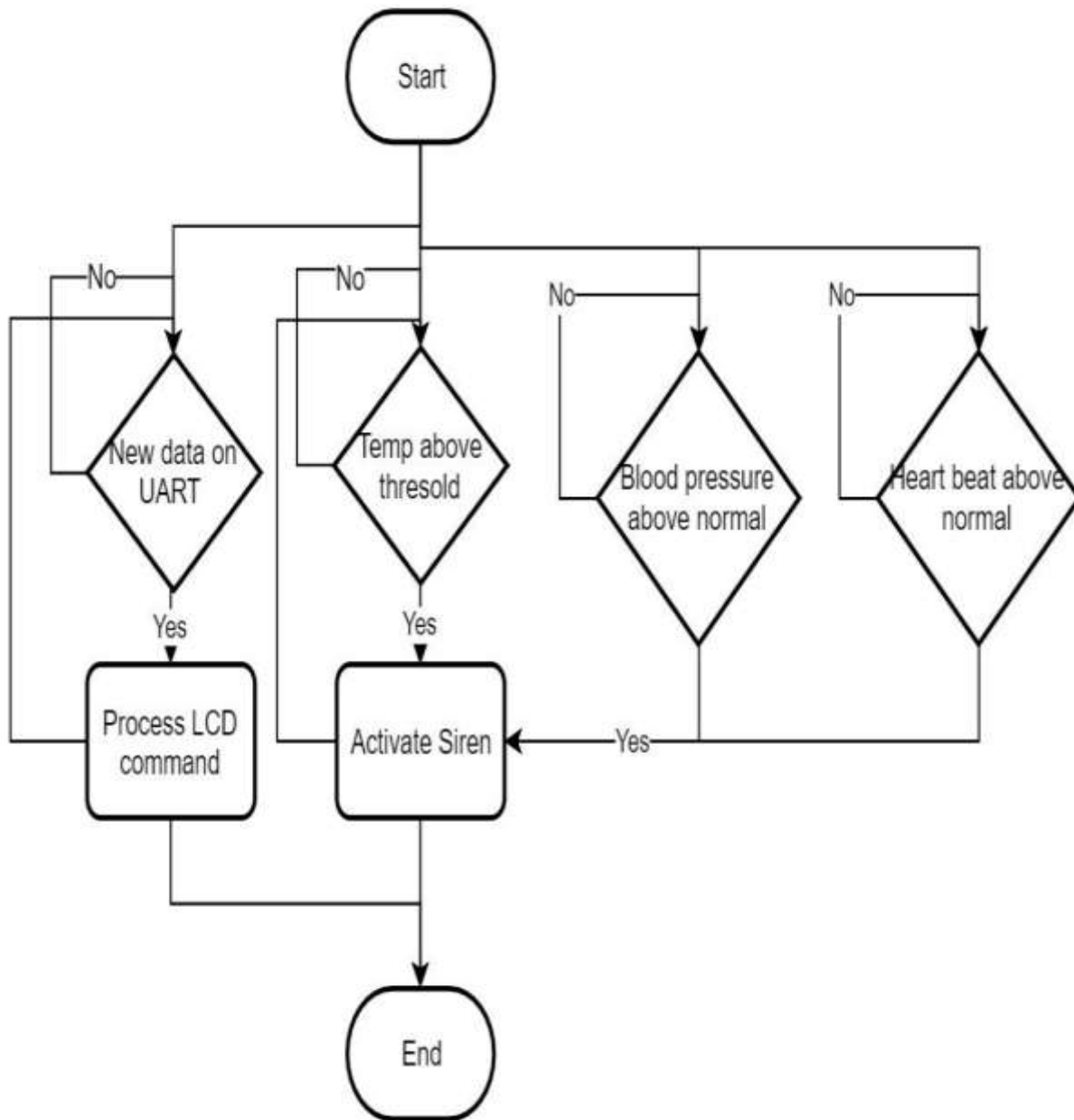


# Healthcare System

Design document

Mohamed Sayed  
SPRINTS

## System flowchart:



## System tasks

Our system needs five tasks

### Task parameters

#### **T1 : Display**

{P:100, E:5, D:100, PRIORITY:1 }

{P:100, E:5, D:100, PRIORITY:1 }

#### **T2 : blood pressure sensor**

{P:10, E:3, D:10, PRIORITY:3 }

{P:10, E:3, D:10, PRIORITY:3 }

#### **T3 : heart beat detector**

{P:50, E:1.5, D:50, PRIORITY:2 }

{P:50, E:1.5, D:50, PRIORITY:2 }

#### **T4 : Temperature sensor**

{P:5, E:2.5, D:5, PRIORITY:4 }

{P:5, E:2.5, D:5, PRIORITY:4 }

#### **T5 : Alert siren**

{P:50, E:1, D:50, PRIORITY:5 }

{P:50, E:1, D:50, PRIORITY:5 }

### Comment:

- Tasks have Fixed priorities
- Scheduler is non preemptive
- For task 1 the execution time is equal to reading and processing the LCD command (2ms) + UART time (3ms)
- For task 5 the periodicity equal to 50 to ensure that there are a new data from the sensors in the system

### System tick rate

Total execution time for all tasks =  $5+3+1.5+2.5+1= 13\text{ms}$

, so

The system tick time =  $20\text{ms}$

### Calculation

Hyperperiod (H) =  $100\text{ms}$

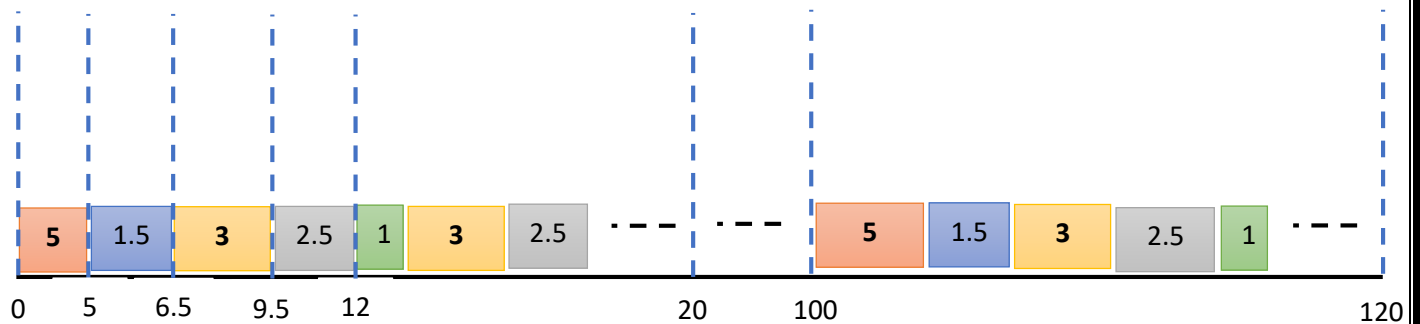
CPU load =  $\frac{E1+E2+E3+E4+E5}{H}$

$$= \frac{(5)+(3*10)+(1.5*2)+(2.5*20)+(1*2)}{100} * 100 = 90\%$$

### Comment:

The CPU load value isn't good, so we can improve this value by decreasing the execution time for the tasks.

## Tasks timeline:

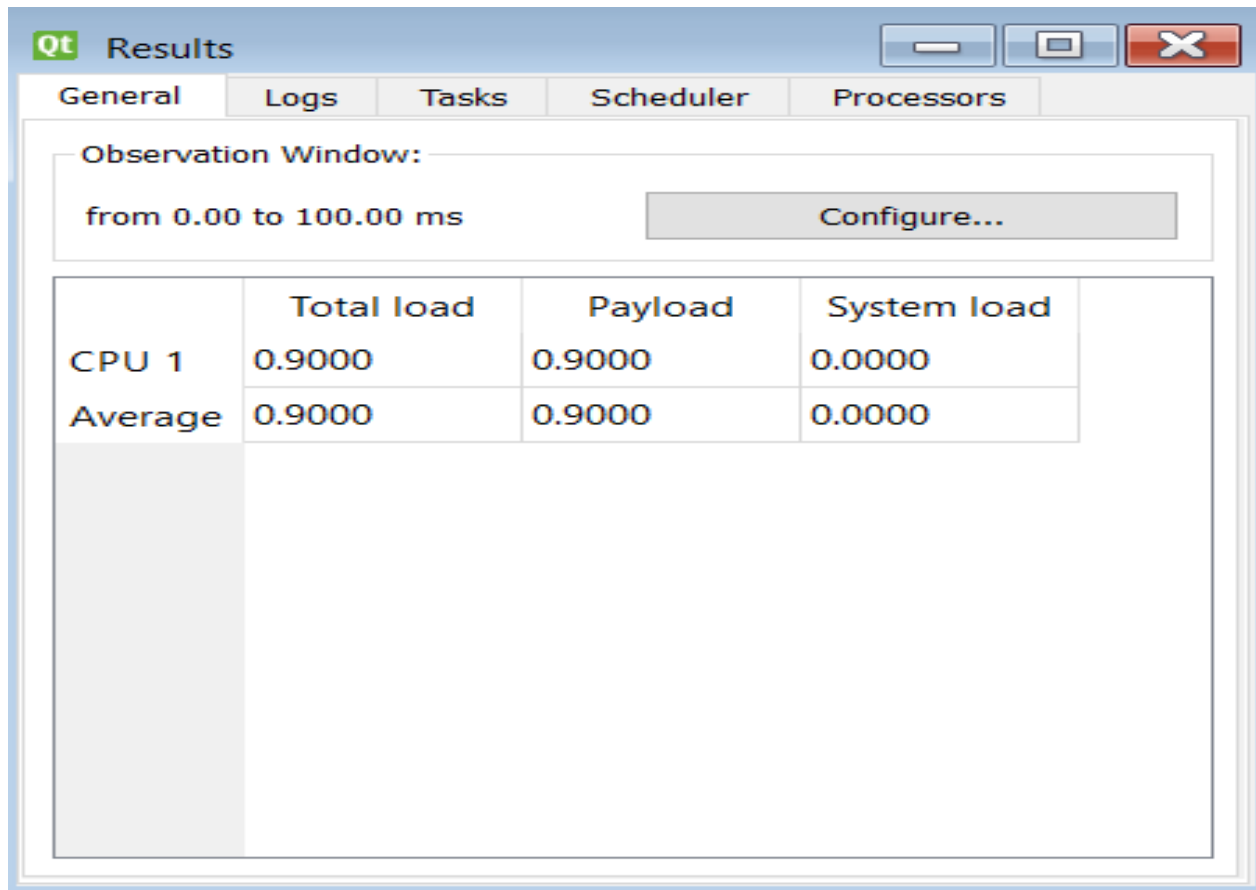


## SIMSO Results:



## Comment:

From the above figures, we see that all tasks execute without missing their deadline.



The screenshot shows a Qt application window titled "Results". It has a tabbed interface with tabs for "General", "Logs", "Tasks", "Scheduler", and "Processors". The "General" tab is selected. Inside the "General" tab, there is an "Observation Window:" section with a text field showing "from 0.00 to 100.00 ms" and a "Configure..." button. Below this is a table with the following data:

	Total load	Payload	System load
CPU 1	0.9000	0.9000	0.0000
Average	0.9000	0.9000	0.0000

**Comment:**

We already know from the given task set that the CPU load is (90%) using analytical approach. Also the simulation verifies the same output.