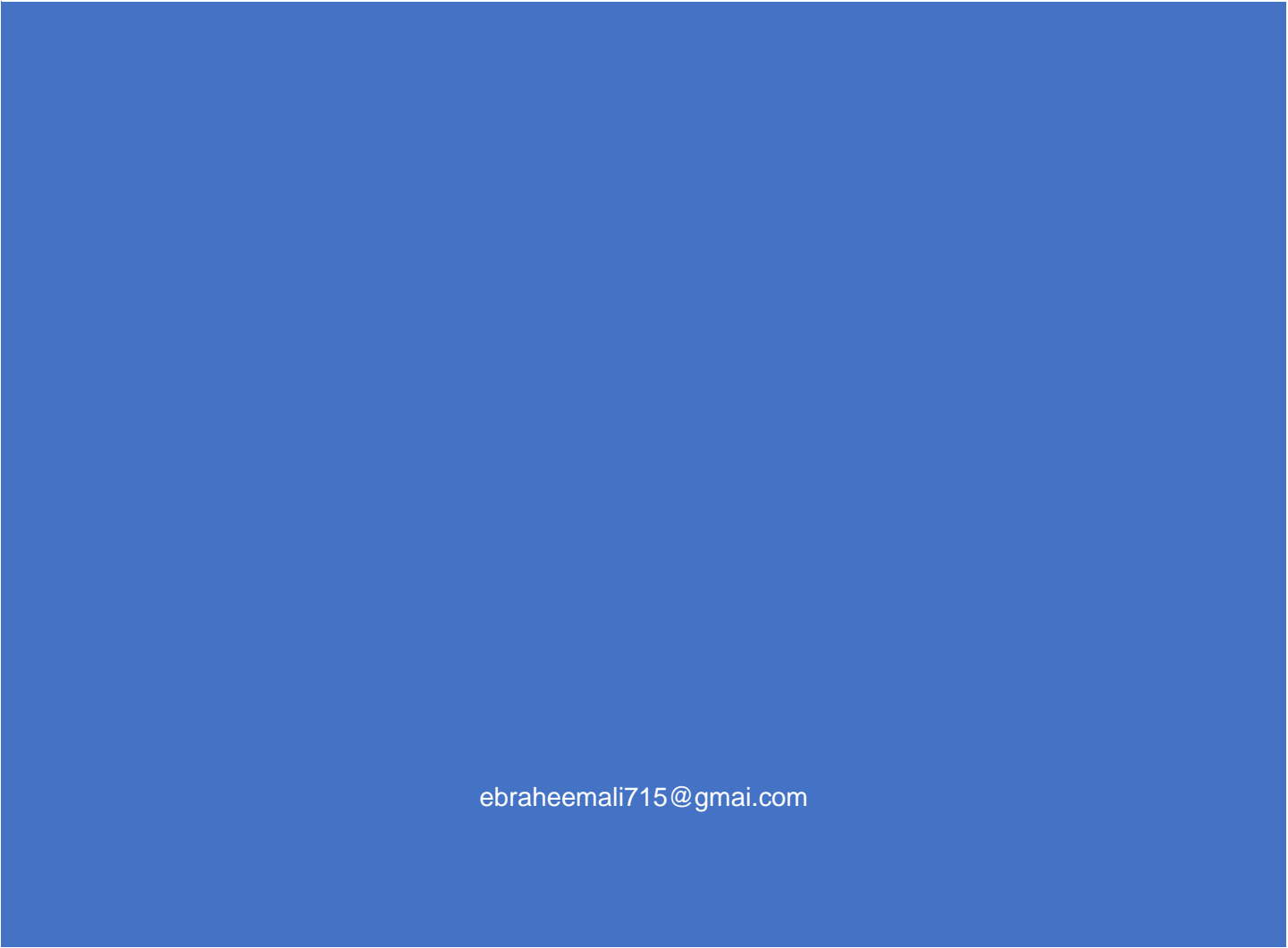




EDF SCHEDULER APPLICATION



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VERIFICATION OF SYSTEM IMPLEMENTATION

1) Calculating the Hyper-period:

$$\text{Hyper-period} = \text{LCM} (P_i) = 100$$

2) Calculating the CPU load:

- Load_1_Simulation Task = {P: 10, E: 5, D: 10}
- Load_2_Simulation Task = {P: 100, E: 12, D: 100}

$$U = \sum_i \frac{C_i}{P_i} = (5/10) + (12/100) = 0.62$$

3) Check system schedulability using URM:

$$URM = n (2^{1/n} - 1)$$

[n]: Is the number of tasks.

$$URM = 6 (2^{1/6} - 1) = 0.73$$

As, $(U < URM)$

So, *the system is guaranteed schedulable.*

4) Check system schedulability using Time Demand Analysis:

$$W(t) = e_i + \sum_{k=1}^{i-1} \left(\frac{t}{P_k} \right) * e_k$$

[W]: Worst response time.

[t]: Time instance.

[ei]: Execution time of current task.

[Pk]: Periodicity of previous task.

[ek]: Execution time of previous task.

For task "Load_1_Simulation" {P:10, E:5, D:10}:

$$W(1) = 5 + 0 = 5$$

$$W(6) = 5 + 0 = 5$$

$$W(2) = 5 + 0 = 5$$

$$W(7) = 5 + 0 = 5$$

$$W(3) = 5 + 0 = 5$$

$$W(8) = 5 + 0 = 5$$

$$W(4) = 5 + 0 = 5$$

$$W(9) = 5 + 0 = 5$$

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

$$W(10) = 5 + 0 = 5$$

As, $W(10) < (D = 10)$.

So, *task "Load_1_Simulation" is schedulable.*

For task "Load_2_Simulation" {P:100, E:12, D:100}:

$$W(1) = 12 + (1/10)*5 = 17$$

$$W(6) = 12 + (6/10)*5 = 17$$

$$W(2) = 12 + (2/10)*5 = 17$$

$$W(7) = 12 + (7/10)*5 = 17$$

$$W(3) = 12 + (3/10)*5 = 17$$

$$W(8) = 12 + (8/10)*5 = 17$$

$$W(4) = 12 + (4/10)*5 = 17$$

$$W(9) = 12 + (9/10)*5 = 17$$

$$W(5) = 12 + (5/10)*5 = 17$$

$$W(10) = 12 + (10/10)*5 = 17$$

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$$W(99) = 12 + (99/10)*5 = 62$$

$$W(100) = 12 + (100/10)*5 = 62$$

As, $W(100) < (D = 100)$.

So, *task "Load_2_Simulation" is schedulable.*

SCREEN-SHOTS FOR RESULTS IN LOGIC ANALYZER

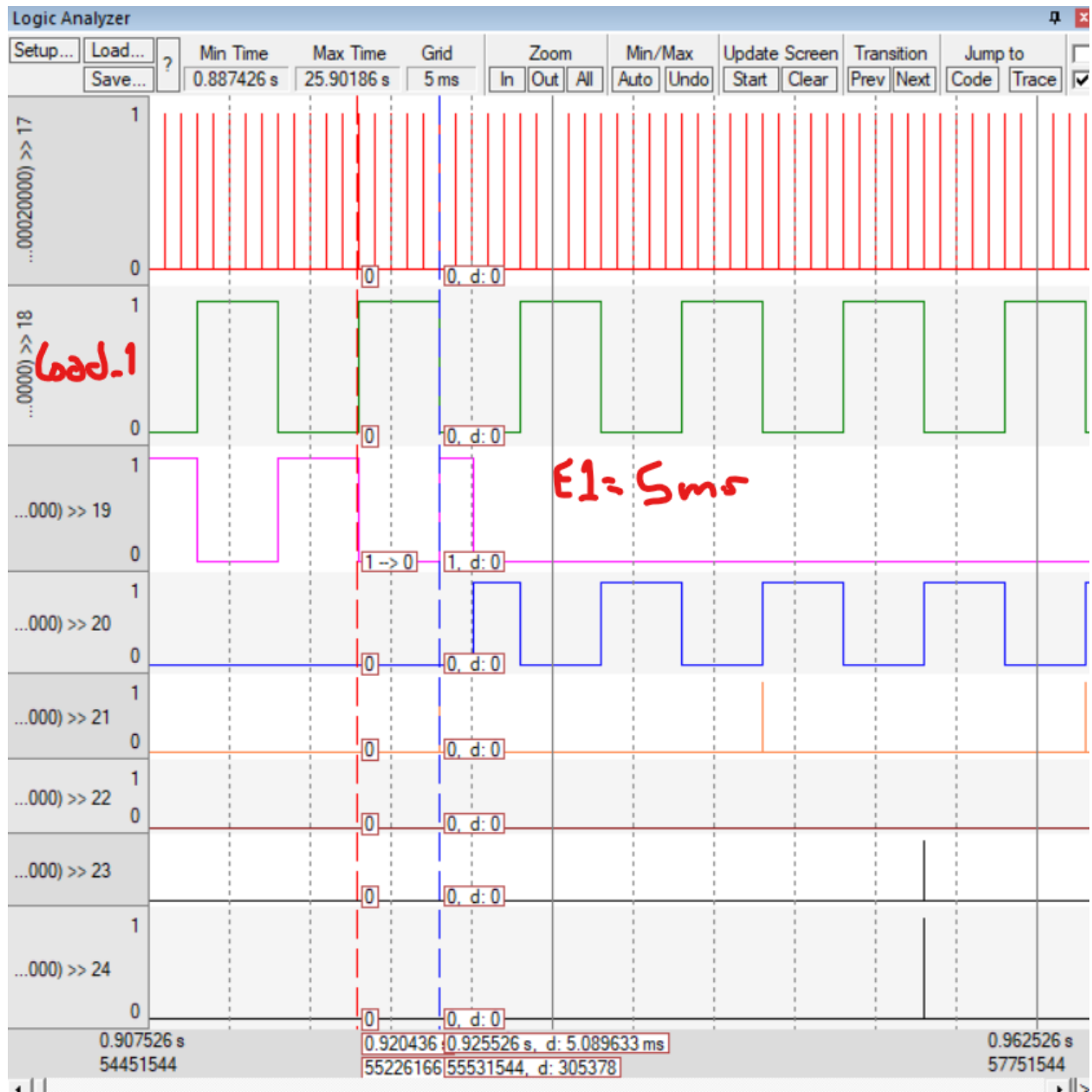


Fig 1: Execution Time of Task Load_1_Simulation

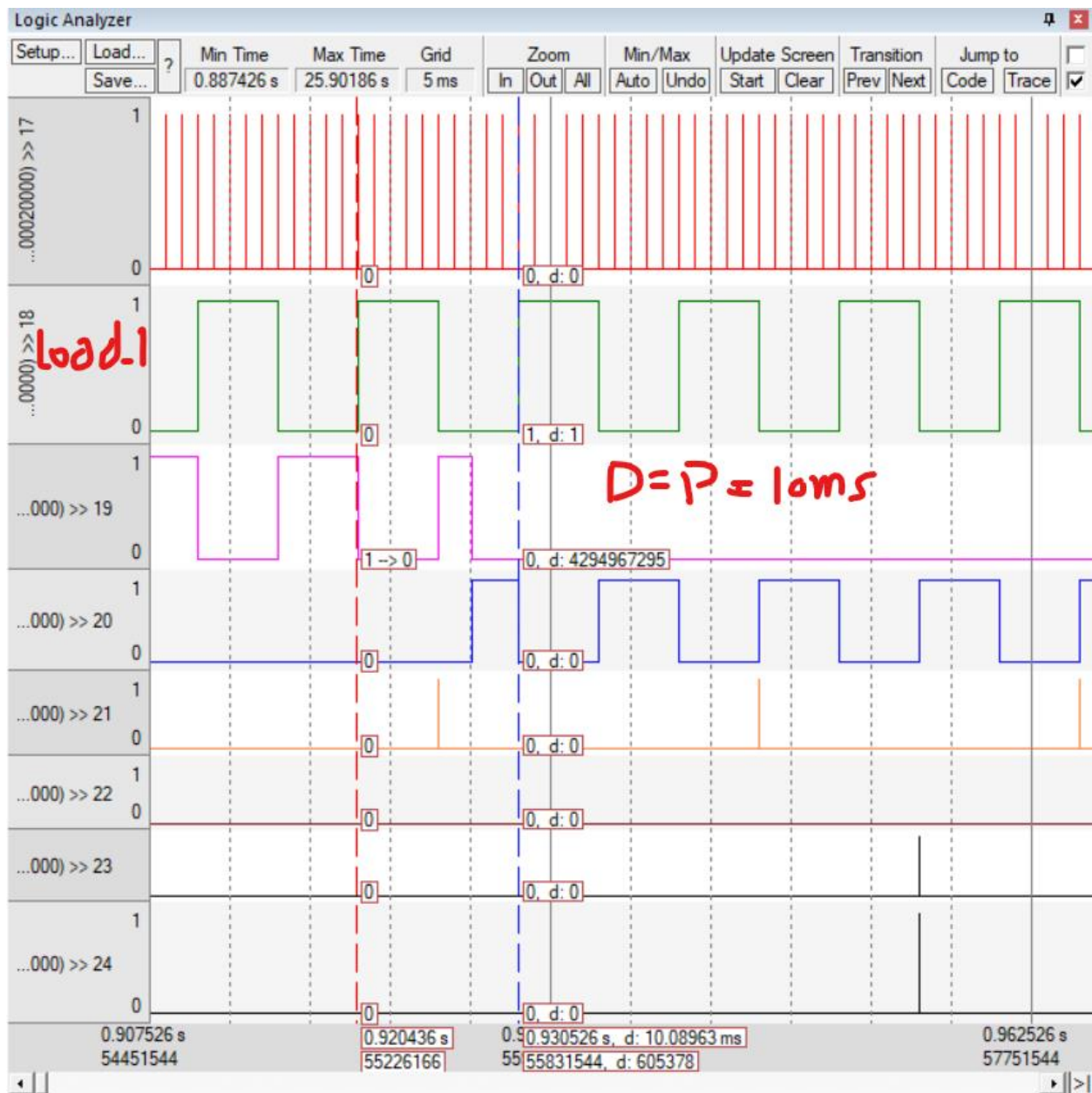


Fig 2: Period of Task Load_1_Simulation

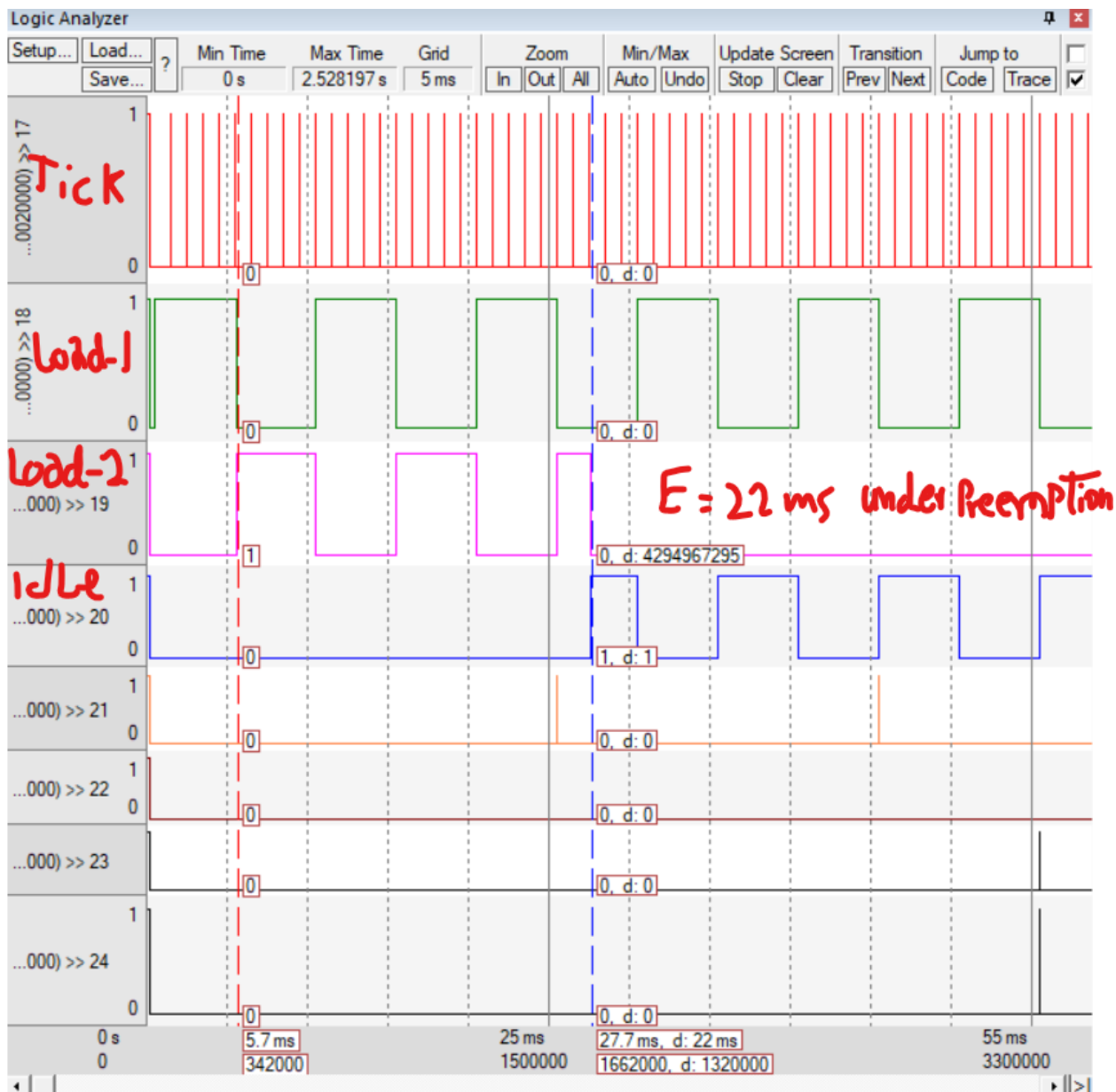


Fig 3: Execution Time of Task Load_2_Simulation

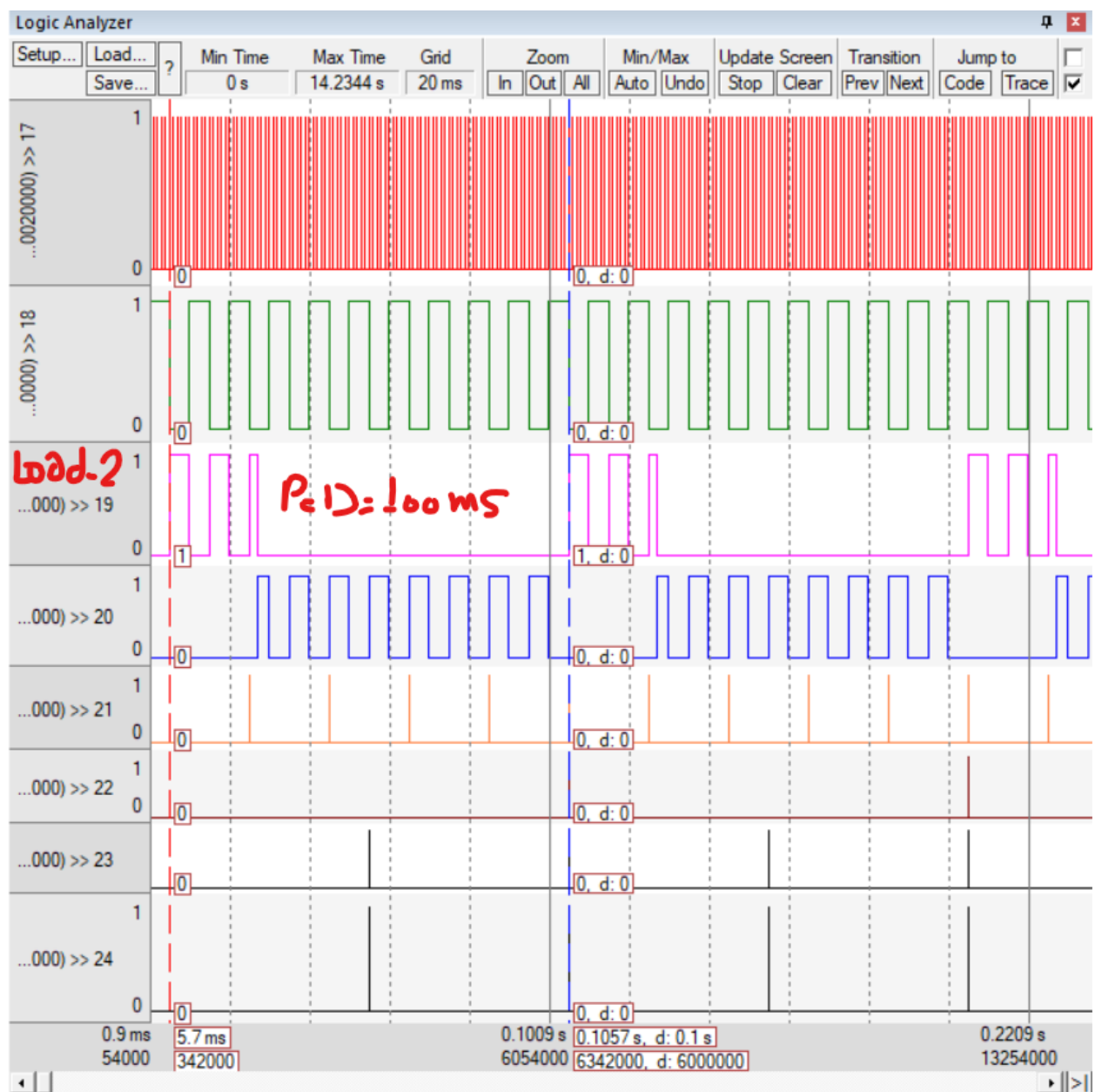


Fig 4: Period of Task Load_2_Simulation

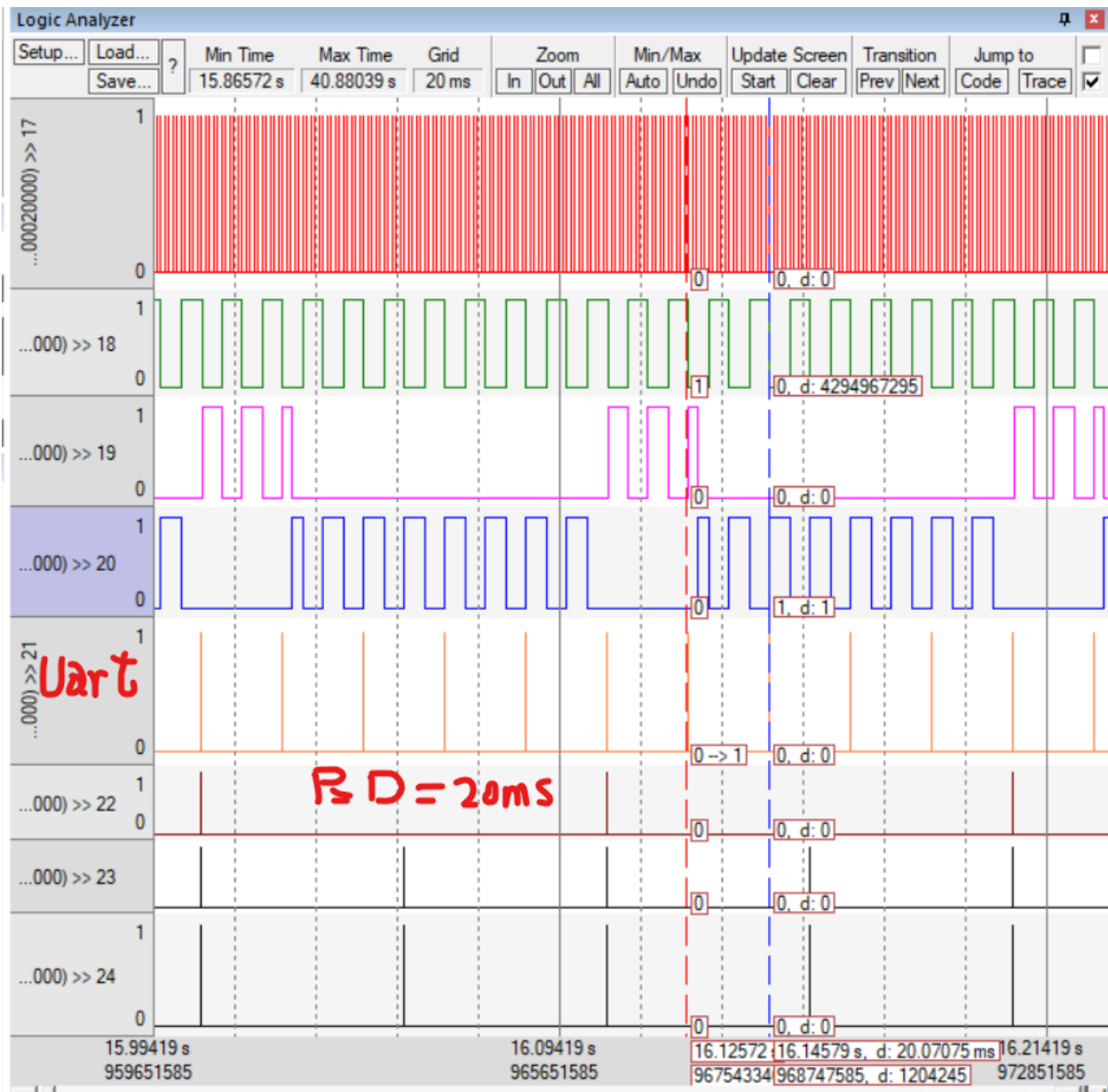


Fig 5: Period of Task Uart_Receiver

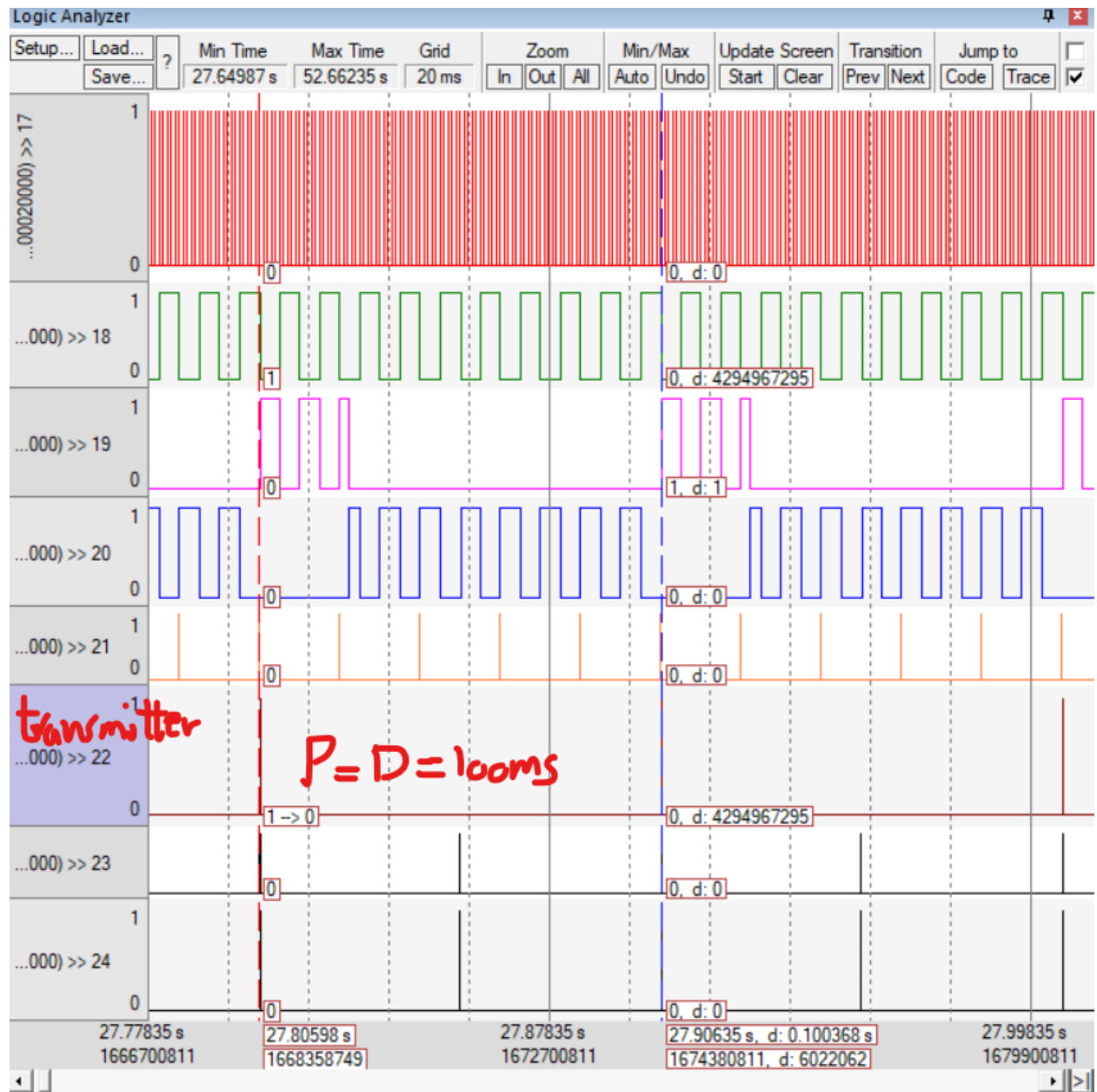


Fig 6: Period of Task Periodic_Transimtter

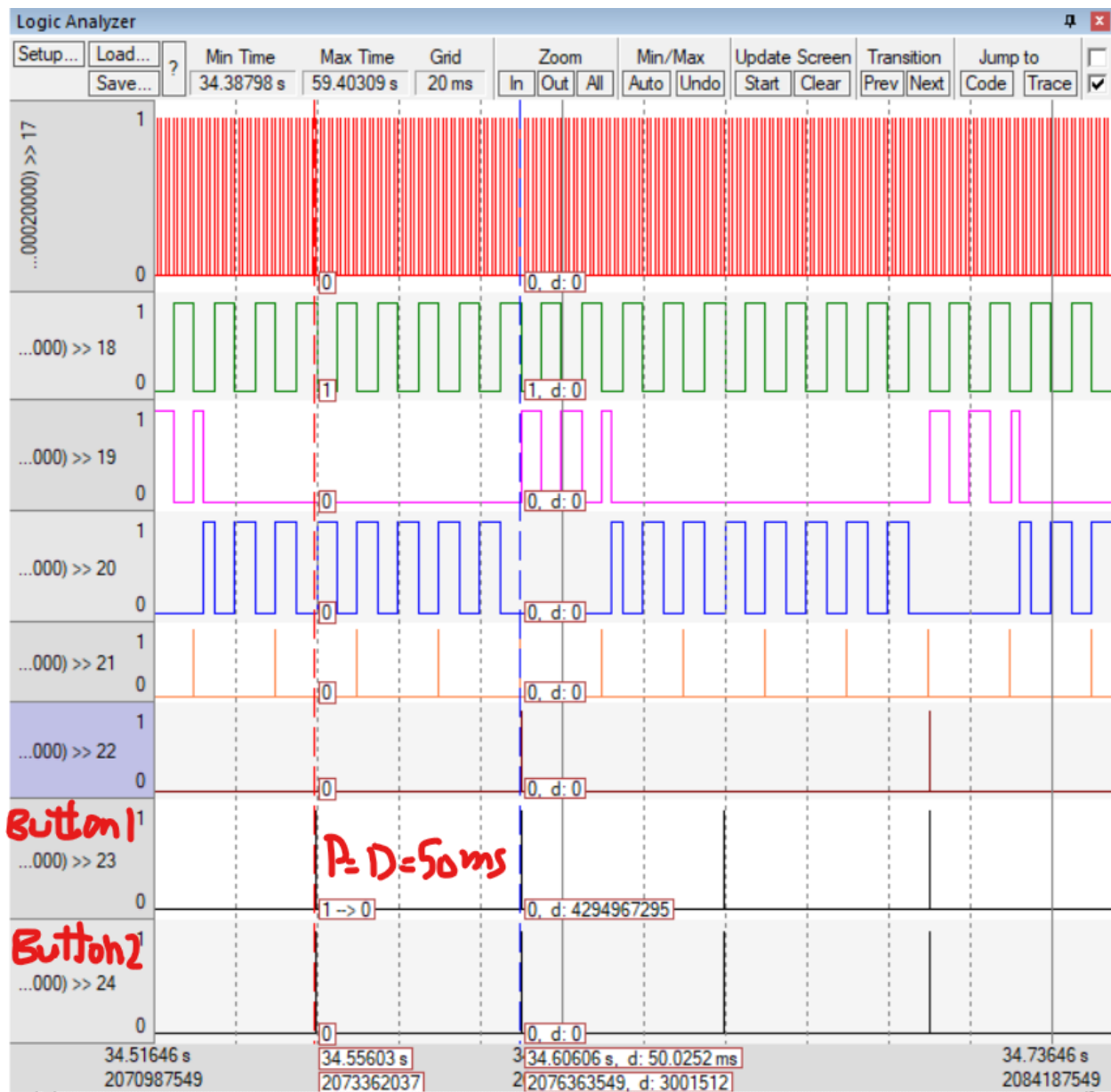
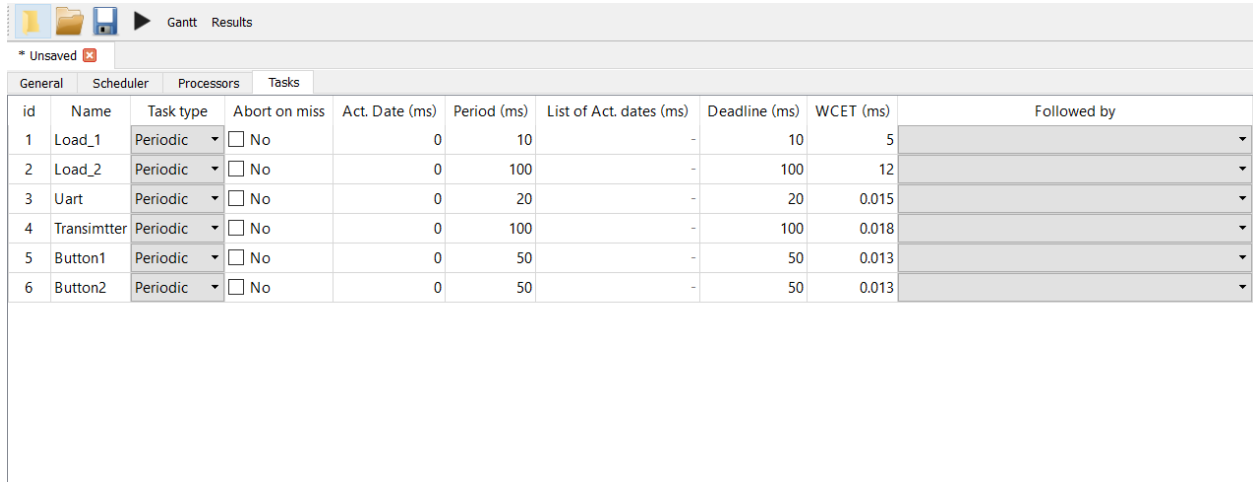


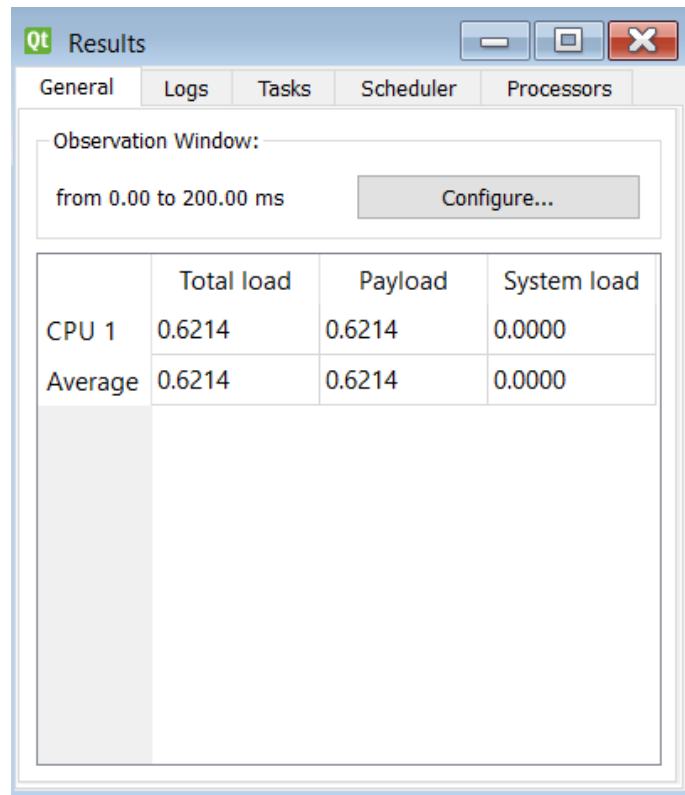
Fig 7: Period of Button_1_Monitor and Button_2_Monitor

SCREEN-SHOTS FOR SIMSO RESULTS USING RATE MOMOTONIC



The screenshot shows the 'Results' window of the SIMSO software. It features a menu bar with 'Gantt' and 'Results'. Below the menu bar is a status bar indicating '* Unsaved'. The main content area is a table with the following columns: 'id', 'Name', 'Task type', 'Abort on miss', 'Act. Date (ms)', 'Period (ms)', 'List of Act. dates (ms)', 'Deadline (ms)', 'WCET (ms)', and 'Followed by'. The table contains six rows of task data.

| id | Name | Task type | Abort on miss | Act. Date (ms) | Period (ms) | List of Act. dates (ms) | Deadline (ms) | WCET (ms) | Followed by |
|----|-------------|-----------|-----------------------------|----------------|-------------|-------------------------|---------------|-----------|-------------|
| 1 | Load_1 | Periodic | <input type="checkbox"/> No | 0 | 10 | - | 10 | 5 | |
| 2 | Load_2 | Periodic | <input type="checkbox"/> No | 0 | 100 | - | 100 | 12 | |
| 3 | Uart | Periodic | <input type="checkbox"/> No | 0 | 20 | - | 20 | 0.015 | |
| 4 | Transmitter | Periodic | <input type="checkbox"/> No | 0 | 100 | - | 100 | 0.018 | |
| 5 | Button1 | Periodic | <input type="checkbox"/> No | 0 | 50 | - | 50 | 0.013 | |
| 6 | Button2 | Periodic | <input type="checkbox"/> No | 0 | 50 | - | 50 | 0.013 | |



The screenshot shows the 'Qt Results' window. It has a menu bar with 'General', 'Logs', 'Tasks', 'Scheduler', and 'Processors'. The 'General' tab is selected. The window displays an 'Observation Window' from 0.00 to 200.00 ms. Below this is a table showing system load data for CPU 1 and the average.

| | Total load | Payload | System load |
|---------|------------|---------|-------------|
| CPU 1 | 0.6214 | 0.6214 | 0.0000 |
| Average | 0.6214 | 0.6214 | 0.0000 |

