

**Earlist Deadline First**  
**Project**

Calculating CPU Utilization for the following Tasks to Prove Schedulability:

*Button\_1(P: 50, D: 50, E: 2.5)*

*Button\_2(P: 50, D: 50, E: 2.5)*

*Period\_Transmission(P: 100, D: 100, E: 5)*

*Uart\_Receive(P: 20, D: 20, E: 2)*

$$U = \sum_{i=1}^n \frac{C_i}{P_i} \leq n \left( 2^{\frac{1}{n}} - 1 \right) \quad U = \text{Total Utilization},$$

*n = number of Tasks, C = Execution time,  
P = hyper Period*

$$U = \left( \frac{2 * 2.5}{100} \right) + \left( \frac{2 * 2.5}{100} \right) + \left( \frac{5}{100} \right) + \left( \frac{5 * 2}{100} \right) = 0.25$$

$$URM = 4 * \left( 2^{\frac{1}{4}} - 1 \right) = 0.76 \quad URM = \text{Rate Monotonic Utilization}$$

$$\therefore U \leq URM$$

*$\therefore$  The System is Schedulable for Fixed Priority Task with Only 4 Tasks*

Now to add 2 more Load Tasks and re-calculate the CPU utilization and Rate monotonic utilization:

*Load\_1(P: 10, D: 10, E: 5)*

*Load\_2(P: 100, D: 100, E: 12)*

$$U = \left( \frac{2 * 2.5}{100} \right) + \left( \frac{2 * 2.5}{100} \right) + \left( \frac{5}{100} \right) + \left( \frac{5 * 2}{100} \right) + \left( \frac{10 * 5}{100} \right) + \left( \frac{12}{100} \right) = 0.87$$

$$URM = 6 * \left( 2^{\frac{1}{6}} - 1 \right) = 0.735$$

$$\therefore U > URM$$

*$\therefore$  The system is not going to be Schedulable*

Figure (1) shows the Schedulable System, while Figure (2) will show the System is going to be not Schedulable when it comes to Fixed Priority.

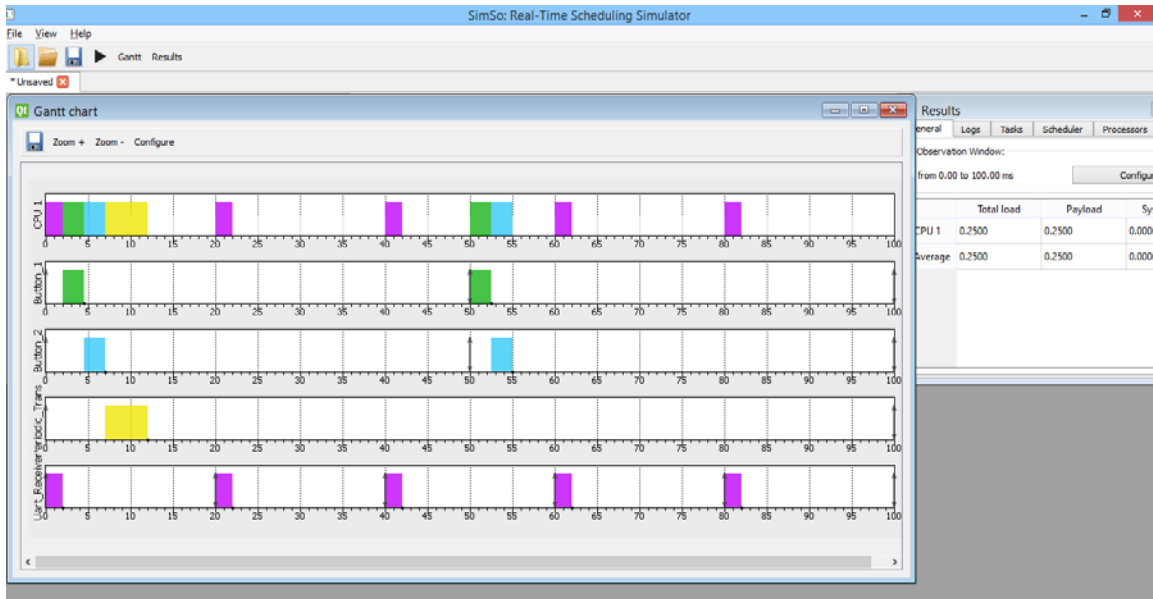


Figure (1) Rate Monotonic Schedulability for the 4 Main Tasks

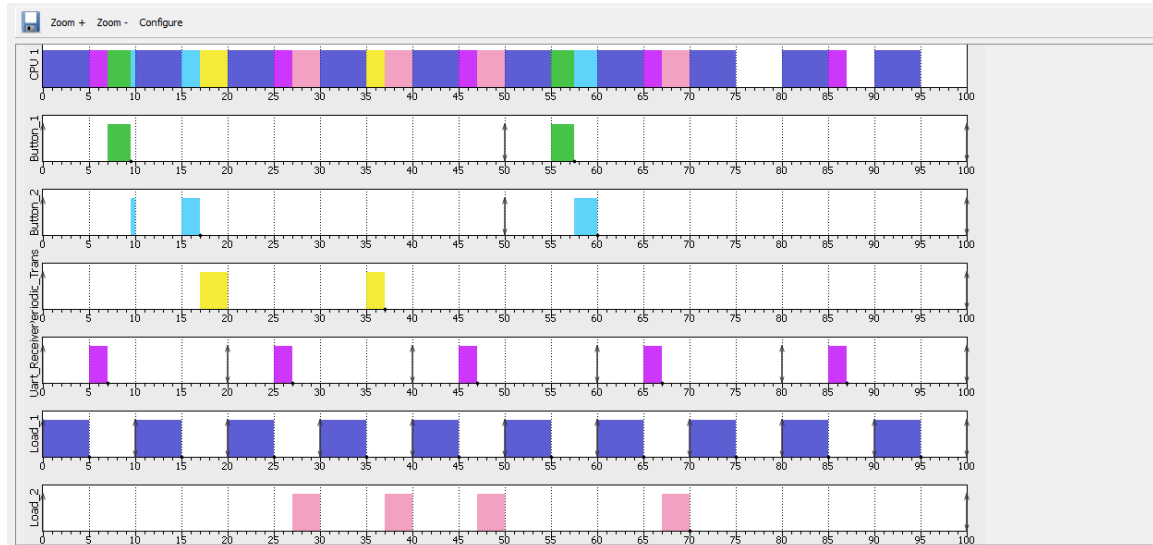


Figure (2) Rate-monotonic with all 6 Tasks added to CPU Load