

Simulate the following described system for 10000 customers:

- a) System has 3 servers, S1, S2 and S3.
- b) Each server has its own queue, Q1, Q2 and Q3.
- c) The Inter-arrival time of customers has Exponential distribution with mean of 5 minutes.
- d) Each customer when enters the system, chooses the shortest queue. If two or three queues has same length, chooses the queue with less No.
- e) Each customer in a queue may change its queue to the shortest queue with probability of 0.7.
- f) Each customer may leave the system with probability of 0.4, if its waiting time in queue be more than 3 minutes.
- g) Each customer may leave the system with probability of 0.8, if its waiting time in queue be more than 6 minutes.
- h) The service time of customers has Normal distribution, $N(10, 9)$ with probability of 0.4, and $N(6,4)$ with probability of 0.6.
- i) Each of the servers may be not accessible after ending service of any customer. S1 may be not accessible with probability of 0.1, S2 may be not accessible with probability of 0.2, and S3 may be not accessible with probability of 0.3. The out of service time of all servers has Exponential distribution with mean of 3 minutes.

Report:

- 1) L
- 2) L_{Q1} , L_{Q2} and L_{Q3}
- 3) W
- 4) W_{Q1} , W_{Q2} and W_{Q3}
- 5) ρ_1 , ρ_2 and ρ_3
- 6) Sum of out of service times for each of the servers.
- 7) Number of customers who leaved the system.

Sketch:

- 1) $L(t)$
- 2) $L_{Q1}(t)$, $L_{Q2}(t)$ and $L_{Q3}(t)$