CEN 570 - Spring 1445

Project Two.

Due before final exam date.

1. Using the simulation program of the M/M/1 queue as a guide:

   (a) Test the simulation model by evaluating the average delay and the average queue size for the following sets of parameters: $m\lambda = \mu$ with $\lambda = 1, 2$ packets/sec and $m = 1, 2, 3, 4$.

   (b) Comment on your results.

2. Consider the following two variations of the previous model:

   - Upon the arrival of a customer for service, if the server is found busy, it checks the current queue size, and if it is greater or queue to a size Q_{max} it is dropped, otherwise it joins the queue.

   - Instead of having one server, assume that you have two independent and identical servers operating in parallel; so an arriving customer will join the queue only if both queues are busy, and if a customer arrives and finds both servers idle, he is served randomly by one server with equal probability.

   (a) Run the simulation model for the two previous systems. Gather the necessary statistics such as: average queue size, average queuing delay. Try to experiment with $m\lambda = \mu$ ($m = 1, 2, 3, 4$), and various parameter values of $Q_{max} = 10, 20, 30, 40, 50$. Consider the following units for Q_{max}:

      - packets;
      - kbytes with a transmission rate $R = 10$ Mbps.

   (b) Compare your results with those in (1), and give any comments. (Use tables and graphs to support your assertions).

3. In all previous cases:

   (a) use the average queue and system sizes, the average queueing and total delays, and server utilization as performance criteria.

   (b) give the expected analytical results (*optional*).

Important: *The report should be submitted electrinically and include all your programs.*