CSC 841/641 COMPUTER PERFORMANCE EVALUATION Dr. Jozo Dujmovic

Single server queuing models

1. Write a G/G/1 simulator. Your program can be based on the simulator that is presented in the 841 Reader, pp. 340-345 (you may use that simulator). The simulator should provide uniform and exponential distributions of interarrival and service times, as well as constant values.

(a) The simulator should compute the average value and the standard deviation of the following parameters:
- interarrival time
- service time
- queue length
- server utilization
- response time

(b) [extra credit] Expand your simulator to present the distribution of response times and queue lengths.

2.

#	Distribution of interarrival time
1	Constant value: 2 sec
2	Exponential with mean value of 2 sec
3	Uniform from 1 to 3 seconds

#	Distribution of service time
1	Constant value: 1 sec
2	Exponential with mean value of 1 sec
3	Uniform from 1 to 2 seconds

A single server system has three different distributions of interarrival time and three different distributions of service time presented in the above tables. There are 3*3=9 different combinations of interarrival and service time distributions. For each of these combinations compute the following indicators
- Server utilization U
- Mean response time R
- Mean queue length Q
- Time spent waiting in queue (before the service) W

To reduce computations it is useful to write a short program that computes U,R,Q, and W.

Then use your G/G/1 simulator to compute the results in the following table:

a dist	s dist	Uan	Usim	E[%]	Qan	Qsim	E[%]	Ran	Rsim	E[%]
1	1									
1	2									
1	3									
2	1									
2	2									
2	3									
3	1									
3	2									
3	3									

a dist = distribution type # of interarrival time, s dist = distribution type # of service time, an = analytic result, sim = result obtained from simulator, E = relative error (E=100*(sim – an)/an)