

## Solutions for Assignment #6

KJC (11/08/04)

#1) Converting `mm1_csim.c` entail one change in `generate()`. The line of C code that is:

```
service_time = exponential(1.0 / mu);
```

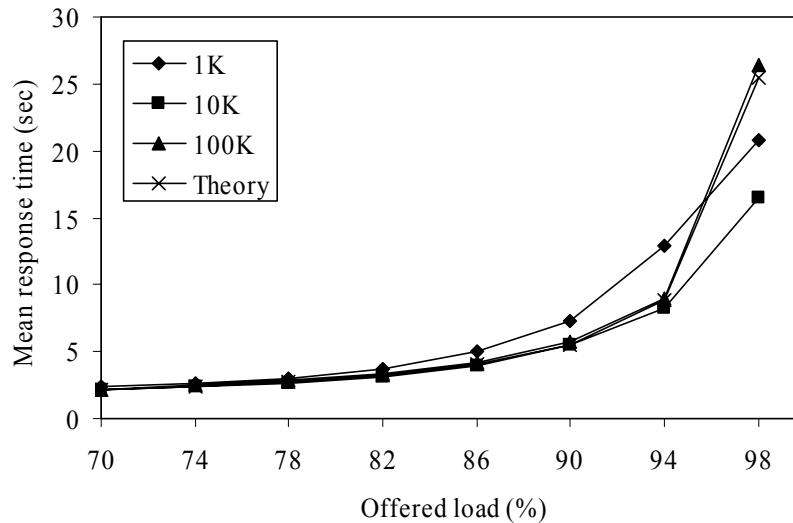
is changed to:

```
service_time = 1.0 / mu;
```

and the theoretical calculations for mean number in system and mean response time are now:

```
printf("= Mean num in system = %6.3f cust    \n",  
      lambda * (1.0 / (2.0 * mu)) * (lambda - 2.0 * mu) / (lambda - mu));  
printf("& Mean response time = %6.3f sec    \n",  
      (1.0 / (2.0 * mu)) * (lambda - 2.0 * mu) / (lambda - mu));
```

A plot of offered load versus mean response time for simulation times of 1000 (1K), 10,000 (series 10K), 100,000 (100K), and theoretical (theory) is shown in Figure 1. It can be seen that at low offered loads all simulation times give a result very close (within a few percent) to that of theoretical. At high offered loads, the 1000 and 10,000 second simulation times give very poor results, but the higher 100,000 second simulation time is close to theory.



**Figure 1.** M/D/1 simulation and theory means response time as a function of offered load and simulation time

#2) Graded individually.

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