4470H Lab 7 Machine Shop Simulation

The following system diagram for the Machine Shop Model was discussed in the first week of the course:

Diagram, shape

Description automatically generated

Programs ssms.c or ssms.java simulate this system assuming there is only one technician at the service center. The failure times follow exponential distribution with mean 100, the service time is assumed to be uniformly distributed, and the service queue is FIFO.

Now assume that more than one tasks are needed to fix a machine. The number of tasks required to fix a machine is 1 (minimum) plus a random variate that follows Geometric distribution. Service time for each task is uniformly distributed between 10 and 20.

Modify programs ssms.c or ssms.java (or another language you like to use) under these assumptions. (You can find the programs in the source code folder of Blackboard. Reference lecture notes Week9, slide 20 for Geometric distribution.)

Let P be the probability of more than one tasks are needed, run your program to simulate 1000 failures. Give the output listed in the following tables.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Number of machines = 50 | | | Number of machines = 500 | | |
| P | Average delay time | Average service time | Server utilization | Average delay time | Average service time | Server utilization |
| 0.1 |  |  |  |  |  |  |
| 0.2 |  |  |  |  |  |  |
| 0.5 |  |  |  |  |  |  |
| 0.7 |  |  |  |  |  |  |
| 0.9 |  |  |  |  |  |  |