Università degli Studi di Torino

(a.a. 2017- 2018)

Laurea Magistrale
INFORMATICA
Corso di
Valutazione delle Prestazioni:
SIMULAZIONE e MODELLI
(Simulation and Modelling)

Master of Science
STOCHASTIC AND DATA SCIENCE
Course in
SIMULATION

Docente/Instructor
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November 21-th, 2017 **Homework Nr. 7** Due: November 27-th, 2017

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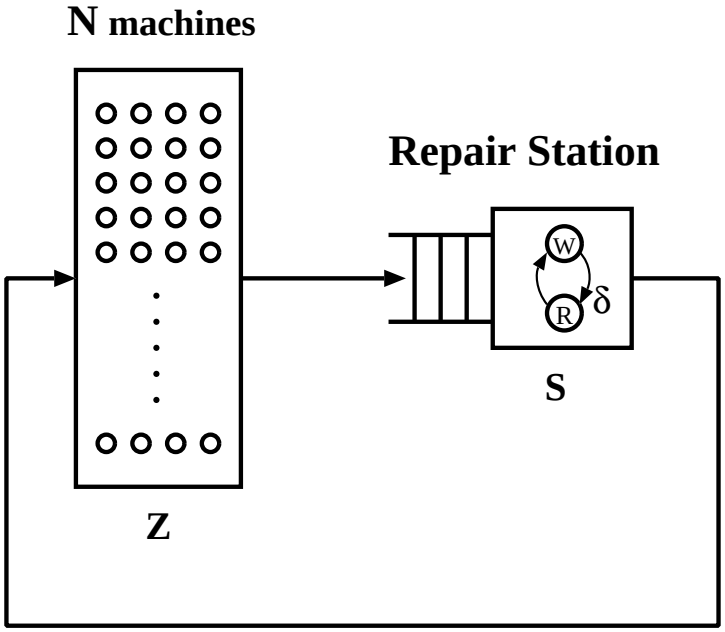
1) (30 points) Modify the Next Event Simulator developed for Homework Nr.6 to evaluate the performance of the following Machine_Repairman system:



Each machine operates for a certain amount of time and then breaks down needing the intervention of the repairman.
A queue of failed machines builds up in front of the repair_shop where the repairman works on them with a FCFS policy.
When the machines have been repaired, they return to their operational status working continuously for a certain amount of time until they break down again.
Occasionally, upon completion of a repair, the repairman rests for a short while before starting the repair of the next machine waiting in the queue. Machines that are actively working can be considered as clients receiving service within an Infinite Server station. Machines that are waiting to be repaired can be considered as clients asking service from a FCFS queueing station.

The model is specified assuming the following parameters:

- The number of machines in the system is $N = 10$
- Working periods between failures are random variables (X) with negative exponential distributions with parameter $Z = E[X] = 300\,min.$
- Repair times are instances of a random variable Y that has a negative exponential distribution with parameter $S = E[Y] = 40\,min$
- Resting times of the repairman are instances of a random variable V that has a negative exponential distribution with parameter $R = E[V] = 10\,min$
- The probability of deciding for a resting period of the repairman is δ.

In order to test whether the simulator works correctly, you can consider the following facts (derived from a numerical evaluation of the models):

1. With $\delta = 0$ (the repairman does not take any rest), the long-term performance of the system can be summarized with
   - throughput = 0.0225 repaired machines per min;
   - mean number of machines at the repair station = 3.25
2. With $\delta = 0.3$, the long-term performance of the system can be summarized with
   - throughput = 0.0216 repaired machines per min;
   - mean number of machines at the repair station = 3.52

In both cases, assume that the end of the simulation is fixed at time $T = 144,000.00\,min$ **(**300 **days at** 8 **hours/day)e**

GOOD LUCK WITH YOUR WORK!