Universidade de Aveiro

Mestrado em Engenharia Informática

Simulação e Otimização

Lesson 1: Simple Server Simulation in Python

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Consider a simple environment in which a single server provides a service to several costumers. The server can only serve a single costumer at each time. If a costumer arrives and the server is idle, the costumer can start being server immediately, otherwise it should get into a queue of waiting costumers and be served by arrival order. The probability distribution functions of the service time and inter arrival times between costumers are known. The program `sim1.py` provides an implementation of this environment that is based on an example of [1].

1. Read the program `sim1.py` carefully and make sure you understand how it works.

2. Run the program several times and check that, given the order of events, the number of waiting costumers that is reported is correct.

3. The program `sim1.py` includes very little accounting for this simulation. In general, simulations are performed to get insights into significant performance metrics of the environment. Enhance the program `sim1.py` by making it provide the metrics:

   3.1. Delay in the waiting queue of each costumer

   3.2. Average delay for all costumers

   3.3. Mean size of the waiting queue

   3.4. Server utilization frequency

4. Run the program several times and save the values of the performance metrics. Compute the average, standard deviation and median for each metric.

5. Change the values of the probability distributions of service times and interarrival time of costumers and determine the new values of performance metrics

6. Add another server to this environment and check the values of the performance metrics for the new configuration for several different probability distributions of service times and inter arrival times.

Bibliography

[1] “Simulation Modeling and Analysis”, Averyl M. Law, 5th Edition, McGraw-Hill