Universitatea Tehnica din Cluj-Napoca
Departament Calculatoare

Programming Techniques, Undergraduate 2018/19
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TP Lab –Homework 2

Objective
Design and implement a simulation application aiming to analyze queuing based systems for determining and minimizing clients' waiting time.

Description
Queues are commonly used to model real world domains. The main objective of a queue is to provide a place for a "client" to wait before receiving a "service". The management of queue based systems is interested in minimizing the time amount their "clients" are waiting in queues before they are served. One way to minimize the waiting time is to add more servers, i.e. more queues in the system (each queue is considered as having an associated processor) but this approach increases the costs of the service supplier. When a new server is added the waiting customers will be evenly distributed to all current available queues.

The application should simulate a series of clients arriving for service, entering queues, waiting, being served and finally leaving the queue. It tracks the time the customers spend waiting in queues and outputs the average waiting time. To calculate waiting time we need to know the arrival time, finish time and service time. The arrival time and the service time depend on the individual clients – when they show up and how much service they need. The finish time depends on the number of queues, the number of clients in the queue and their service needs.

Input data:
- Minimum and maximum interval of arriving time between customers;
- Minimum and maximum service time;
- Number of queues;
- Simulation interval;
- Other information you may consider necessary;

Minimal output:
- The average of waiting time, service time and empty queue time for 1, 2 and 3 queues for the simulation interval and for a specified interval (other useful information may be also considered);
- Log of events and main system data;
- Queue evolution;
- Peak hour for the simulation interval;