Universitatea Tehnica din Cluj-Napoca
Departament Calculatoare
Programming Techniques, 2014

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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 customers waiting time.

Description
Queues are commonly seen both in real world and in the models. The main objective of a queue is to provide a place for a "customer" to wait before receiving a "service". The management of queue based systems is interested in minimizing the time amount its "customers" are waiting in queues. 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 supplier. When a new server is added the waiting customers will be evenly distributed to all current available queues.

The system should simulate a series of customers 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 customers – when they show up and how much service they need. The finish time depends on the number of queues, the number of other customers in the queue and the service needs of those other customers.

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:
- 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;
- Log of events and main system data
- Queue evolution
- Peak hour for the simulation interval