QUEUE SIMULATOR

Nadu Laura Andreea

Group 30421

# Assignment Objective

## Main Objective

Design and implement a simulation application aiming to analyse queuing based systems for determining and minimizing clients’ waiting time.

## Sub-Objectives

1. Analyse the problem and identify the requirements
2. Design the queue simulator
3. Implement the simulation process
4. Implement the User Interface
5. Test the queue simulator

# Problem analysis, modelling, scenarios, use cases

## Analysing the problem

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 queues in the system, but this approach increases the costs of the service supplier.

The application should simulate a series of N clients arriving for service, entering Q queues, waiting, being served and finally leaving the queues.

All clients are generated when the simulation is started, and are characterized by three parameters:

* ID (a number between 1 and N)
* 𝑡𝑎𝑟𝑟𝑖𝑣𝑎𝑙 (simulation time when they are ready to go to the queue)
* 𝑡𝑠𝑒𝑟𝑣𝑖𝑐𝑒 (time interval or duration needed to serve the client)

The application tracks the total time spent by every client in the queues and computes the average waiting time. Each client is added to the queue with minimum waiting time when its arrival time is greater than or equal to the simulation time.

Functional requirements:

* The queue simulator should allow the user to insert the simulation specifications like the number of queues or clients, the simulation time and the minimum or maximum times for service and arrival.
* The queue simulator should allow the user to start the simulation whenever he/she/they would like to start.