MUSTAFA HATİPOĞLU

Crazy Market Simulator

In Crazy Market, there is one checkout and 2 queues named QServer and QLottery. The next customer who to be served is determined as follows:

- **In the QServer** queue, if the waiting time of the next customer is greater than or equal to the Wthreshold, the customer at beginning of the queue receives service. (customer is removed from queue)
- If it is small, the customer is added to QLottery queue. The next customer is determined by generating random number.

The java program simulates operation of this market.

Details

Definitions about MM1 queue

- **Service Time:** The time spent by customer at the checkout
- **Waiting Time:** The waiting time at the checkout until customer receives service
- **Arrival Time:** The arrival of the customer at the checkout or adding to the queue when the queue is full
    - **Arrival rate:** the number of arrivals per unit of time
    - **Inter-arrival time:** the time between each arrival into the system and the next

Calculation arrival time of the next customer (arrival time)

For the given customer arrival frequency (λ: lambda: arrival rate), the next customer's arrival time can be calculated as follows:

```
Random random = new Random();
double u = random.NextDouble();

double interArrivalTime =
                  -Math.log(u)/(Double.parseDouble(lambda));

customerNext.arrivalTime
            = customerLast.arrivalTime + interArrivalTime;
```

Calculation of the next customer service time (service time)

Service time can be calculated from the exponential distribution using the expected average customer service time as follows:

```
Random random = new Random();
double u = random.NextDouble();
customerX.serviceTime = -Math.log(u)/(Double.parseDouble(mu));
```

Time Progression in Simulation

- As the simulation time progresses, two different events can occur
    - Customer Arrival
    - Customer Departure