IE3081.1 Homework-1 Report

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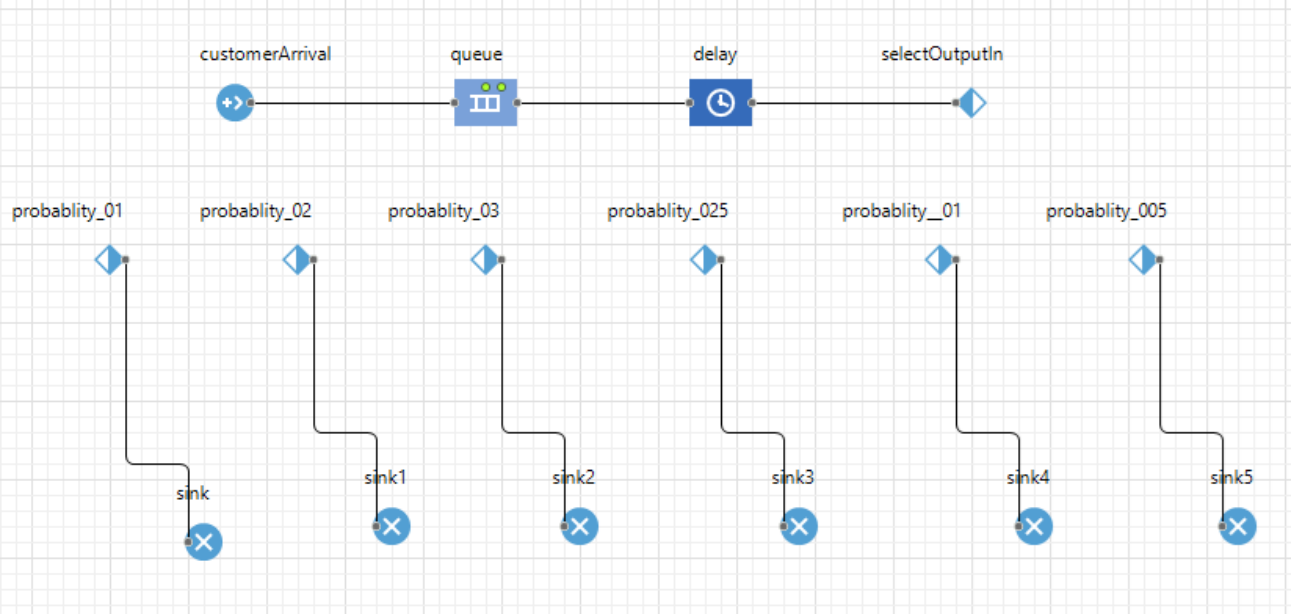
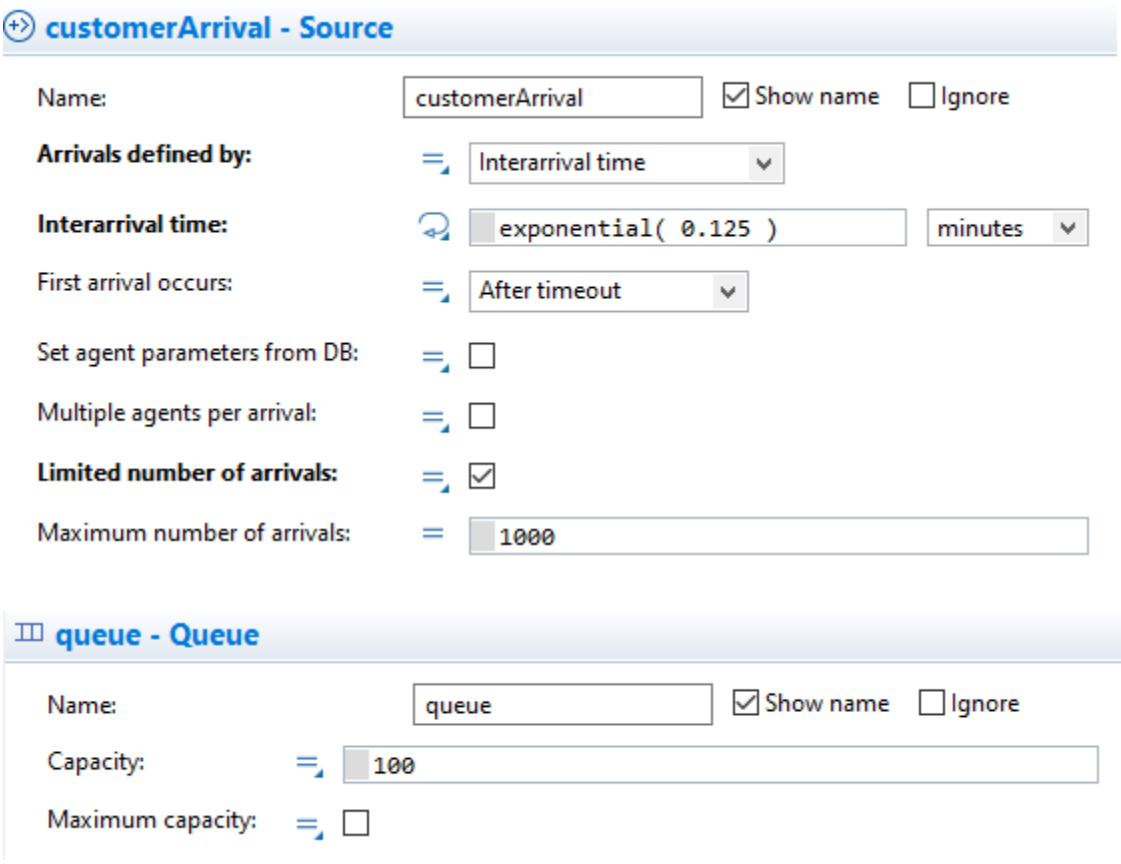
1. Purpose & AnyLogic

In this assignment, we were asked to make a simulation model. I used Anylogic program to make this simulation. In the images below, there is information about how the simulation works.

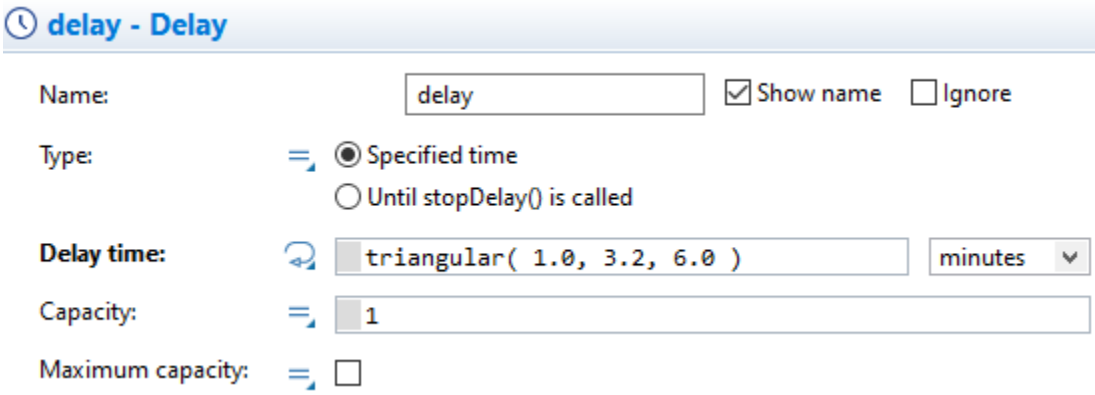
the main part of the project is as shown below.



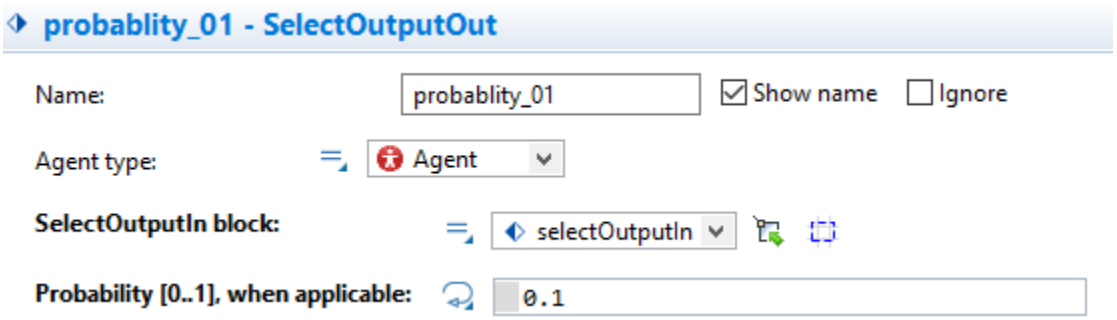
customers enter queue with equal probability between 1 and 8 minutes.



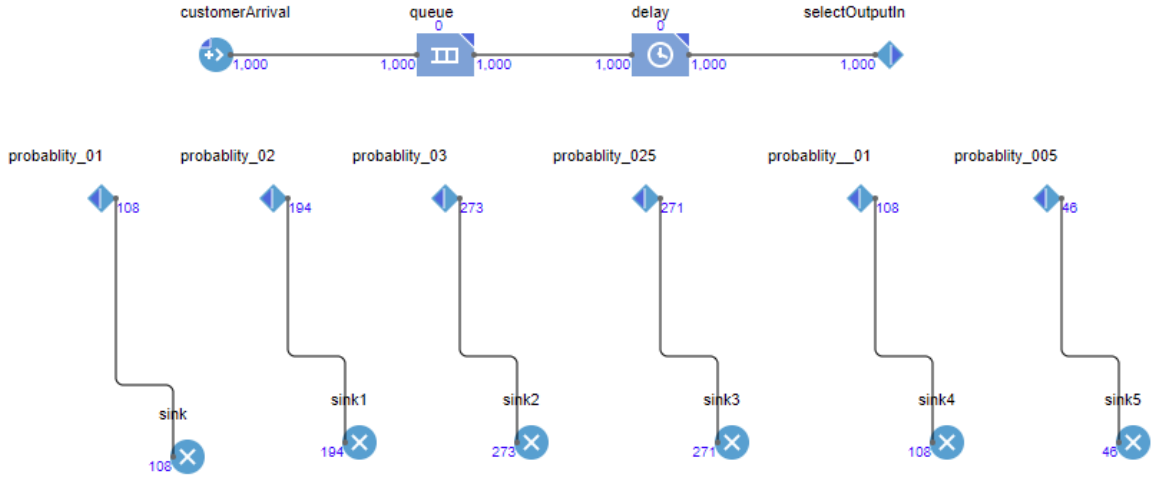
then the service starts, and they are served with an interval of 1-6 minutes and an average of 3.2 minutes. Average minimum and maximum values are shown in the delay properties.



Probability was used to show which occurred at what interval for 6 different minutes. Each probability was registered with selectOutputIn. For example, our first probability is 0.1. So, the probability of being a customer traded for 1 minute is 0.1.



and finally, we see our outputs according to the possibilities. It is written in the sinks how many of the 1000 customers and how many minutes are traded.



2. Questions

1. What is the average waiting time for one customer

Average waiting time = (total waiting time in queue) / (numbers of customer)

1708/1000=**1.708** minutes

2. Whats is the probability that a customer waits in the queue

Probablility= (waiting customers) / (total customers)

481/1000= **0.481**

3. How much the service is idle?

$$\text{Probability of idle server} = \frac{\text{total idle time of server (minutes)}}{\text{total run time of simulation (minutes)}}$$

3/10=**0.33**

4. What is the avregae service time?

$$\text{Average service time (minutes)} = \frac{\text{total service time (minutes)}}{\text{total number of customers}}$$

3200/1000 = **3.2** minutes

(we can find the result by multipling the probabilities with service times)

5. What is the average time between arrivals?

$$\text{Average time between arrivals (minutes)} = \frac{\text{sum of all times between arrivals (minutes)}}{\text{number of arrivals} - 1}$$

= 412/999=**0.412**

6. what is the average waiting time of those who wait?

$$\text{Average waiting time of those who wait (minutes)} = \frac{\text{total time customers wait in queue (minutes)}}{\text{total number of customers who wait}} =$$

1708/481=**3.551** minutes

7. What is the average time that customers spends in the system?

$$\text{Average time customer spends in the system (minutes)} = \frac{\text{total time customers spend in the system (minutes)}}{\text{total number of customers}}$$

We can find it with the sum of average time in the queue and the average time in the service so;

1.708+3.2=**4.908** minutes

3. Conclusion

We observed with our own simulation that if the number of data and inputs increases, the results will also increase. In the example given to us, results were obtained based on 100 customers, while we used 1000 customers to further adapt our simulation to real life and get closer to real data. The results were similar because the probabilities were the same, but since the number of customers was more than the sample, our simulation was closer to the real values and more punctual. If these trials and the number of inputs increase, we can apply this simulation to real life.