Case Study Mechatronic System Simulation

Task-3: Bank Office Simulation Modelling with AnyLogic

Report by

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a) Basic Simulation for a Simple Bank Office

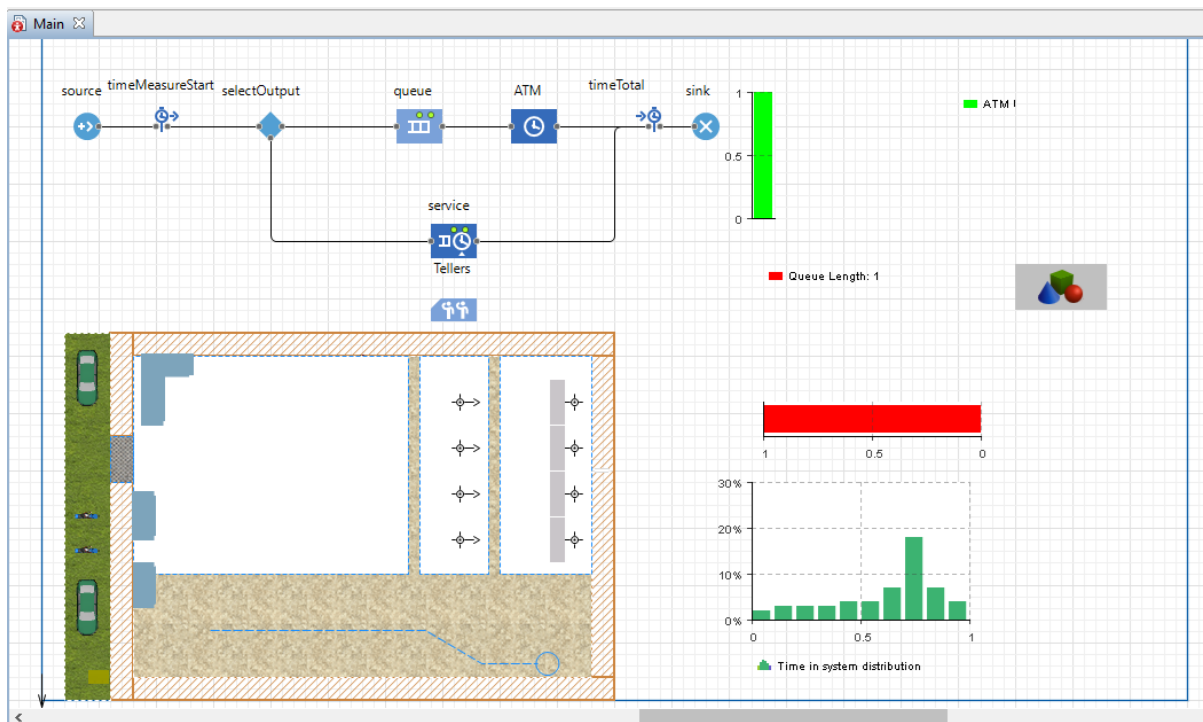The queueing system for the sample Bank system has been created with the given parameters and tested.

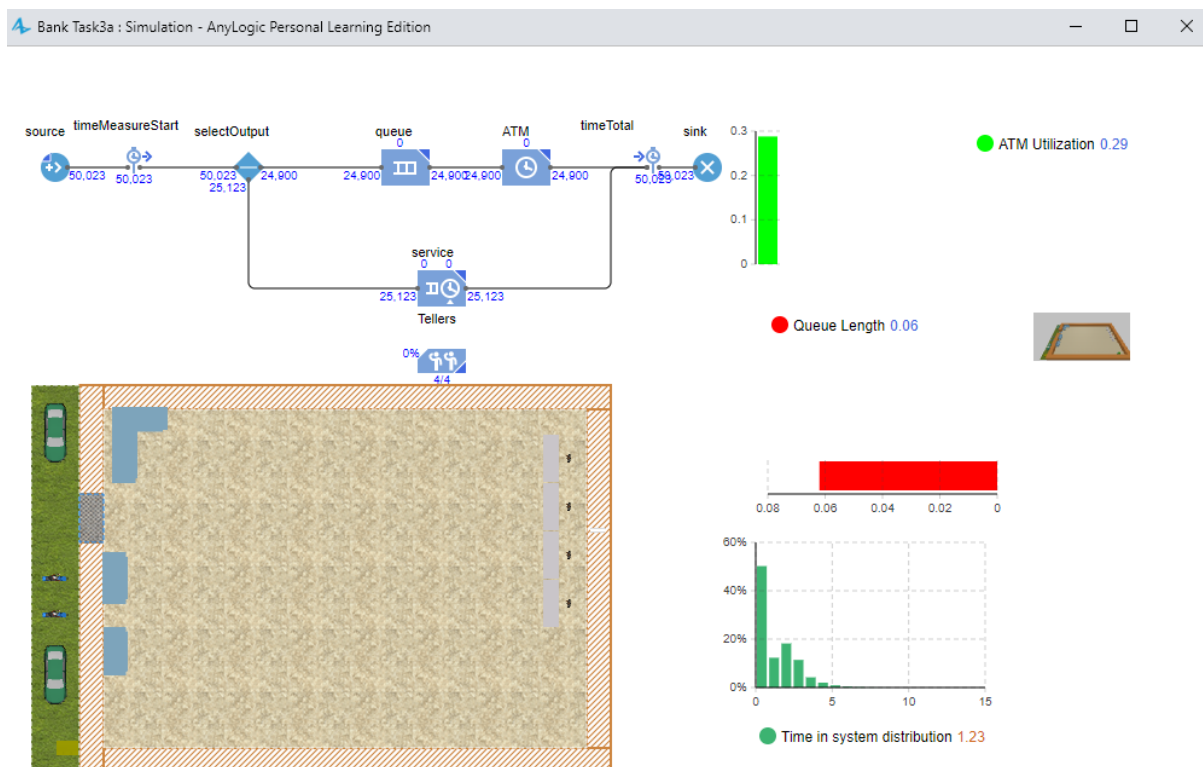**Fig 1: Main Window of Bank Office Simulation with AnyLogic**

Fig 2: Simulation Result with ATM Utilization, Queue Length and Time in System Distribution
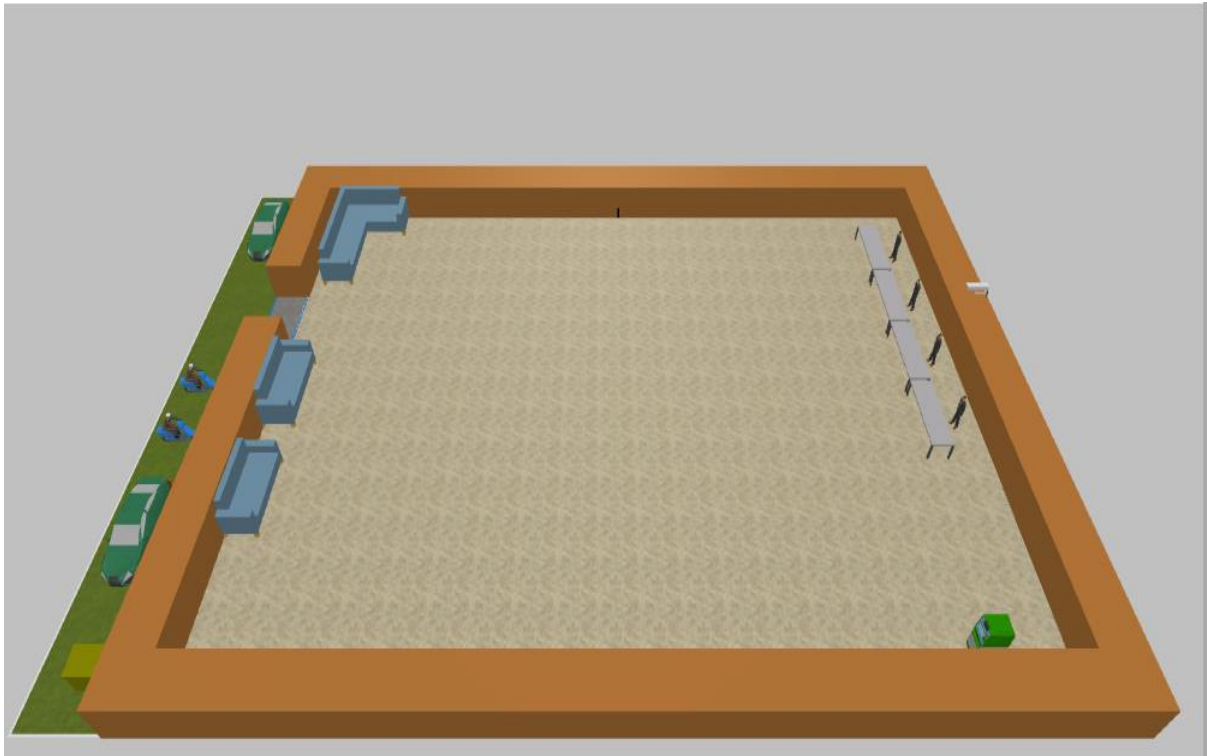
Fig 4: 3D View of the Bank

b) Parameter Investigation

In this part, the different parameters of the bank office are listed along with how they affect the office. Only the parameter value will be changed for modification. All the other values will be kept same as in the task 3a.

1. Customer Arrival Rate:

This is the rate of customers arriving at the bank. It would be different for different banks and also based on their locations. Through simulation in AnyLogic one can check the bank resource utilization and modify them accordingly to maximize the efficiency of the bank.

- If the customer arrival is too low for the system then the resources will be wasted.
- If it is too high then extra resources has to be added to give better service to the customers.

Changing customer arrival rate from 0.3 per minute to 0.1 per minute
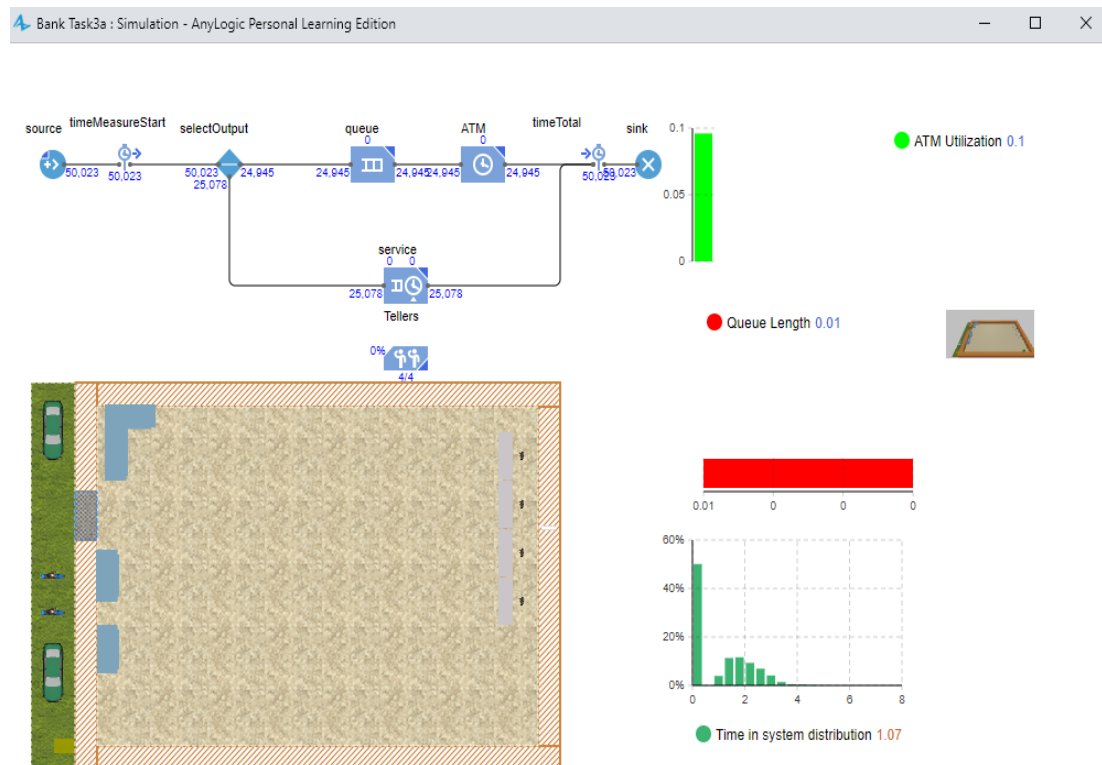
Result: This decreases the queue length and total time customer spends in the bank but also decreases the ATM utilization.

Changing the customer arrival rate to 1 per minute
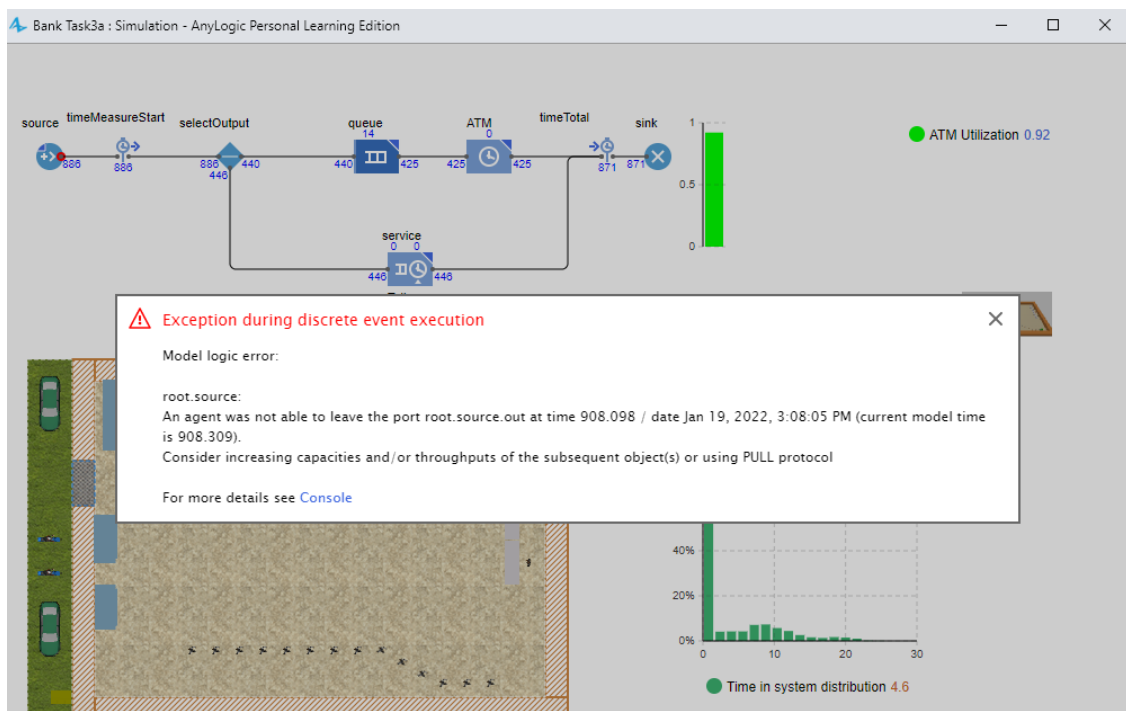
Result: AnyLogic gives an error. It shows that the 886th customer cannot enter the bank because it is already at maximum capacity. So, additional resources have to be added or open a new branch to service the customers.
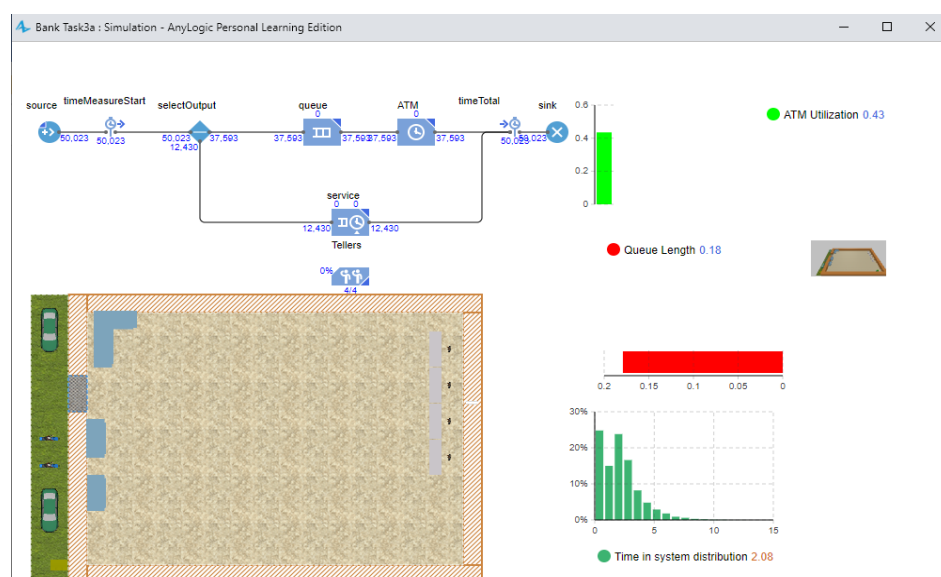
2. **Queue Length**
   It is the maximum number of customers who can wait in a queue. It depends on the area of the bank. So, it shouldn't be changed unless absolutely necessary.

3. **Select True Output Parameter**
   This parameter is kept *randomTrue(0.5)* to indicate the customers coming to use ATM service and the teller service are almost equal. But now-a-days, many would want to use ATM than teller service
   **Changing the condition to *randomTrue(0.75)* to increase ATM customers**

Result: ATM utilization increases and the queue length decreases.

4. **Number of ATMs**
   Based on the number of ATM customers bank can choose to install more ATMs. This will decrease utilization of individual ATM but will decrease queue length and waiting times.

c) **Adding another ATM to the Bank**

The second ATM has been installed to the bank and the decision for the queueing system is done by the selectOutput with giving condition *randomTrue(0.5)*. This ensures that both the ATM's would be utilized equally.
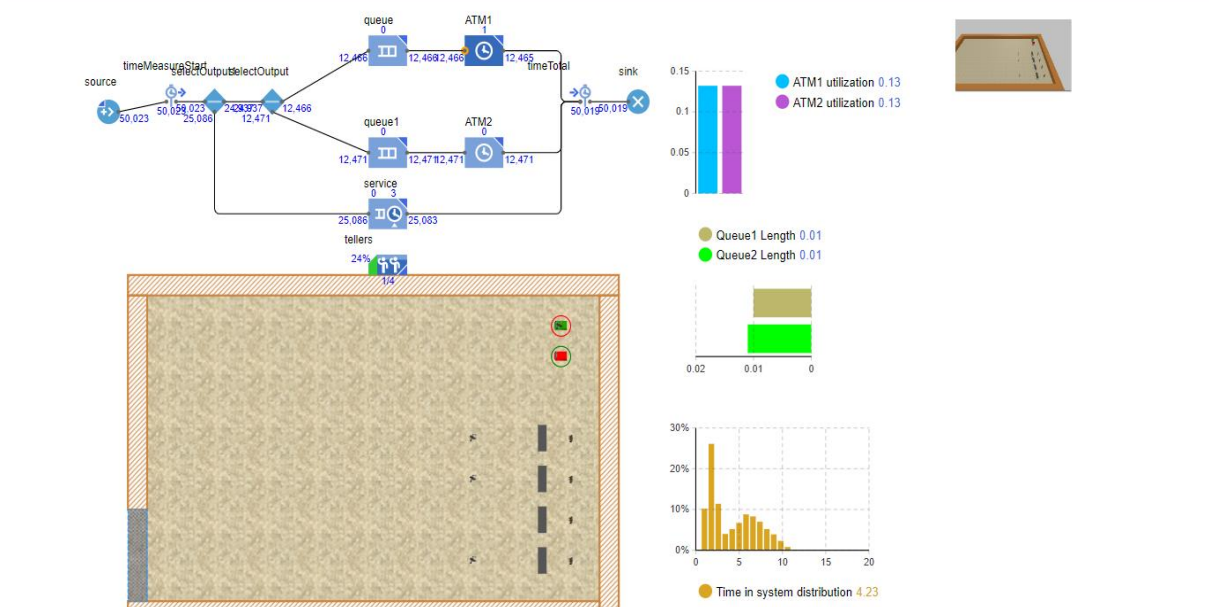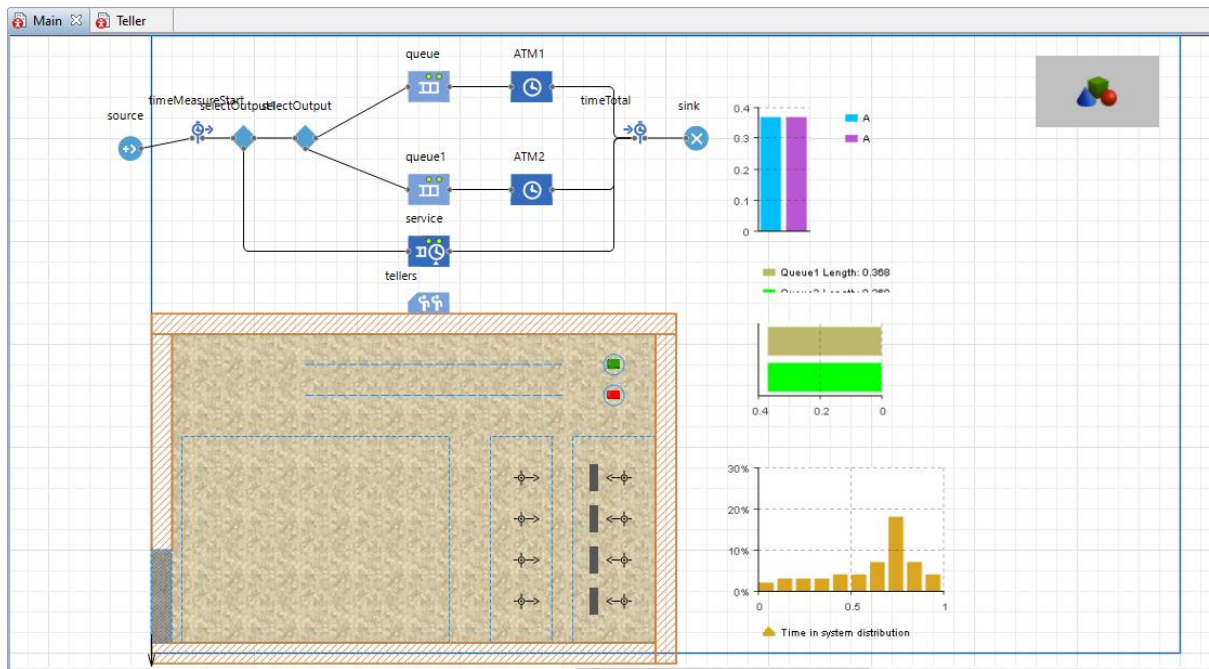
Result: ATM utilizations, Queue Lengths and total time customer spends in the bank has been decreased.