IE306.02 Assignment 1

Event in SimPy are very similar to deferred, future or promises in other languages and libraries.

Process is responsible for creating and yielding events in order to wait for them to be triggered.

Simulation Logic

We start our simulation by generating customers with the given interarrival times and the distribution. When a customer object is created, it automatically calls its “call” function to simulate the calling action.

When the call starts, the customer tries to get the front desk operator which is defined as a SimPy resource. The customer starts to talk with the front desk operator, in other words, this resource is hold by the customer if it is available which means no other customer uses the resource. If there is a customer who makes the resource busy, then all the incoming customers put in first in first out queue. Service time of the front desk operator is determined by the given distribution.

After the customer finishes talking with the front desk operator, s/he tries to get the expert operator. The customer starts talk with the expert operator, in other words, this resource is hold by the customer if it is available which means no other customer uses the resource. If there is a customer who make the resource busy, then all the incoming customer put in a first in first out queue. The behavior of customers is different than the previous queue. Now, customers renege after a certain amount of time which is determined by the given parameters and the distribution. When they renege, they leave the system without getting service by the expert operator. Again, service time of the expert operator is determined by the given parameters and the distribution.

The behavior of the expert operator is different that the behavior of the front desk operator. Expert operators take breaks randomly determined by the given parameters and the distribution in a shift which is 8 hours. When an expert operator decides to take a break, s/he give service to the customers who are already in the queue. After the operator serves all the people in the queue right before the decision, the operator takes 3 minutes break and no service given in this time interval even if a customer arrives.

We simulate the system until all the customers are served and the current shift of the expert operator is completed. To do that we keep count of the customers incoming and outgoing, when the last customer is served, we stop generating shifts. When the shift is no longer generated, the break process is interrupted. No more break is generated, and the simulation is completed. Even a shift has just started, if the last customer is served, we add this shift to the total system time for our calculations.

We keep track of the busyness of the front desk operator and the expert operator, waiting times of the customer both in the queue belongs to the front desk operator and the expert operator, total system times and the number of shifts. Then using this statistic obtained via simulation, we calculate the resource utilization and the average waiting time and queue lengths.