Object-Oriented Programming Using C++

Course 605.604
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JOHNS HOPKINS UNIVERSITY
Whiting School of Engineering

Project #2
Due 08/09/21

Customers arrive at a COVID vaccination center and must wait in line at the check-in desk to have their credentials verified. Once they are verified by the check-in clerk a customer may enter the vaccination operations area where they will wait their turn until a vaccination station becomes available. The operations area contains 2 waiting lines…1 for senior citizens and 1 for non-seniors. The seniors are given priority for injections (so if there are any seniors waiting for injections they will be served before non-seniors). There are 3 vaccination stations in the operations area. After receiving an injection customers exit the vaccination center. Develop a simulation model of this system using the parameters below.

- Customers arrive at the vaccination center at an average rate of 30 per hour, with exponentially distributed interarrival times.
- It takes 1-4 minutes for a customer to be verified at the check-in desk, with service time uniformly distributed between 1 and 4 minutes.
- Each vaccination station can complete an average of 15 injections per hour, with exponentially distributed service times.
- The vaccination center accepts customers during a 12-hour period each day. At the end of a 12-hour period, any customers who are waiting to have their credentials verified are served, but any arrivals after the 12-hour period are turned away.

Simulate the vaccination center operations for 5 days, and compute the following metrics:

- The total number of customers serviced by the vaccination center
- The average number of customers serviced per day
- The average total time in the system for a customer (queue time + service time)
- The average customer wait time in the verification queue
- The average customer wait time in the vaccination area queues

Submit the following work products for this assignment:

- A class diagram of your design
- Source code
- A screen capture of the program output

You must use an object-oriented approach and implement good design and programming practices.