

CSci 445
Fall, 2020
Programming Assignment #1
Due: Wednesday, Sept 16, 2020

Write a program to simulate the operation of the triage area of an emergency department in a small, rural hospital.

The emergency department has four areas to handle patients. The areas are Triage, Trauma Care, Acute Care, and Prompt Care. All patients initially visit the triage area so that their cases can be prioritized based on clinical need.

The program shall implement a discrete-event simulation with an M/M/1 queue. Inter-arrival times and service times shall be IID random variables based on exponential distributions. The means for the inter-arrival and service times shall be input to the program as command line parameters. For example, if the program is started with the following command line arguments

```
./triage-sim 1.0 0.5
```

In this case the mean for the inter arrival time is 1.0 minute, and the mean for the service time is 0.5 minute.

Your program should only start the simulation if the number of command line arguments is correct and the arguments are valid. If an incorrect number of command line arguments is given or if any of the arguments is less than zero, the program should print a message indicating how to correctly launch the program and then exit.

The simulation clock shall use the next-event time advance method. The simulation shall end after 10080 minutes (7 days).

At the end of the simulation output printed to the console should include the following.

- The average of inter-arrival times generated by your program
- The average of service times generated by your program
- Average wait time for patients in minutes (discrete)
- Average number of patients in the queue (continuous)
- The number of patients who completed triage
- Number of patients still in the queue at the end of the simulation

You can implement your assignment using Java, C++, or Python. If you create objects, create each object in its own file or files. Create a comment block at the top of your main source file that explains what the program is/does and how to compile (if necessary) and run your program.

Please do not use any platform specific libraries or techniques. Your program should run on two of the following platforms: MS Windows, macOS OS X, Linux.

Submit your source code files and any required build script using the directory structure below.

```
hw1/  
    [build script]  
    src/  
        [source files]
```

Upload your submission to Blackboard as a tarred or zipped file: lastname-firstname.hw1.tar.