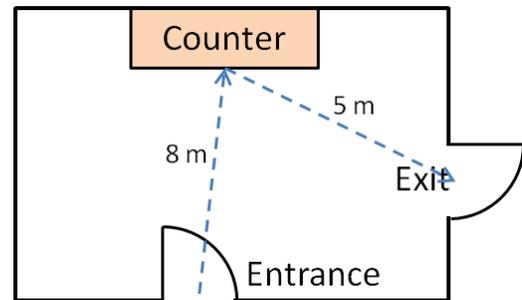


## Single-Server Model in Simio

This lab involves building a Simio model of a hot-dog shop. The hot-dog shop operates as a single-server queueing system where customers arrive at the entrance, walk to the counter, place, pay for, and receive their order, and walk out the exit (see the figure to the right). Customer arrivals are Poisson with a rate of 20 customers/hour. Service times are triangularly distributed with parameters (1.0, 2.5, 4) minutes. The queue is FIFO. Assume customers walk at the speed of 1 meter/second.



The hot-dog shop is open from 10:00 a.m. until 10:00 p.m. each day. We are interested in the utilization of the server, the average and maximum number of customers in the system, and the average, minimum and maximum time that customers spend in the system. Base your analysis on 200 replications of the model.

The videos will guide you through:

1. Building the initial model in Simio
2. Developing an initial experiment
3. Verifying the model
4. Adding customized animation features

## Assignments

1. Consider a manufacturing process that involves drilling holes in two different types of car engines. The manufacturing system operates from 8 a.m. until 11 p.m. in two shifts (you can ignore the turnaround time between the shifts). Due to recent increase in the demand for the parts, the managers are considering replacing the current equipment and have hired you to evaluate the following two options:
  - a. A drilling machine with a capacity of 2 (i.e., two engines can be processed at a time). The processing time is uniformly distributed between 1.6 and 3.2 minutes.
  - b. A fast drilling machine that has a capacity of 1 but the processing time is uniformly distributed between 0.8 and 1.6 minutes.

Your task is to evaluate the performance of the two machines and make a final recommendation as to which machine to purchase and why (note that both drilling machines have the same processing rate so you will need to explain what metrics you used to make that decision). Engines arrive at a rate of 40 per hour and inter-arrival times are exponentially distributed. Part transportation times are negligible. Run both models for 200 replications.

2. Animate your model(s) from Problem 1. Use Google 3D Warehouse to find appropriate symbols for different components of the model including entities, drilling machine, shop floor, etc.

## Submission Requirements

The deliverables for the lab include the following:

1. A single word document that includes the “solutions” to the assignment problems, i.e., tables/figures of simulation results, analysis of simulation outputs/recommendations, description of your verification analysis, etc. The report is the primary component of your submission that is graded and all other files (such as Excel or Simio models) are just supporting material so make sure your report document is complete by itself and do not simply refer the reader to other files in your submission.
2. All related Simio models developed as part of the assignment.

***All of the files should be zipped together and submitted via Canvas. Make sure you do not submit any other file types such as “.rar”.***

***If you work in a team of 2, make sure that you both submit the exact same zip file and indicate the name of your partner as a comment.***