Running a simulation – Single queue

You are simulating an single queue.
You want to understand mean response time, $\mathbf{E}[T]$.
Interarrival times are i.i.d. instances of r.v. I.
Job sizes are i.i.d. instances of r.v. S.

Assume that you know how to generate instances of I and S.
You want to measure the mean response time across 10^6 jobs.

Question: How do you do this?

(Discussion)

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Question: In an event-driven simulation, the 4 variables you track are:

1. _____
2. _____
3. _____
4. _____

Question: When exactly do you generate a new instance of I?

Question: When exactly do you generate a new instance of S?

Getting Performance Metrics from your Simulation

Question: You want to get the mean response time, $\mathbf{E}[T]$.
What are 2 ways to get this?

Question: What are some benefits to Way 1? What are some benefits to Way 2?

Getting Performance Metrics from your Simulation

Question: How to you measure the mean number of jobs, $\mathbf{E}[N]$?

Question: What's the definition of mean number of jobs, $\mathbf{E}[N]$?

Question: Suppose $S \sim \text{Uniform}(1, 2)$ and $I = 1$.
What do your measurements show for $\mathbf{E}[N]$? What is the true $\mathbf{E}[N]$?

The power of PASTA

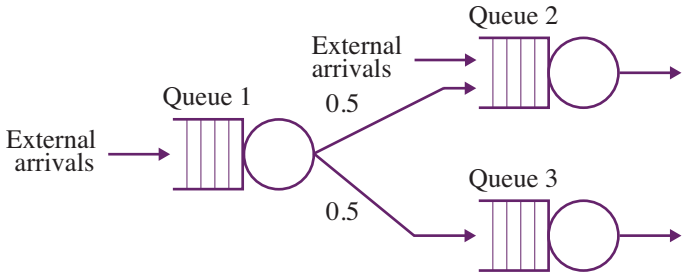
Question: What went wrong in the prior example?

Question: If the arrival process were a Poisson process, would this happen?

PASTA = _____ _____ _____ _____ _____

Simulating more complex queueing networks

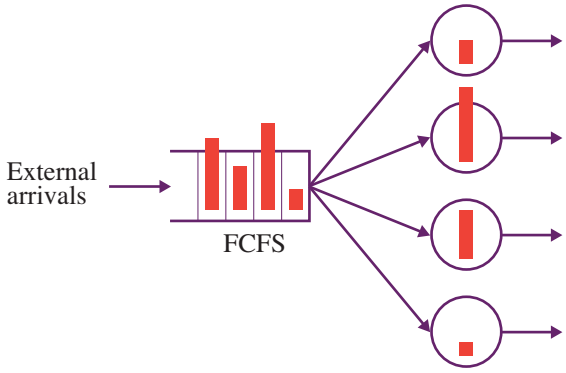
Question: How would you simulate this network?



Question: What is the state space?

Question: What events do we need to track?

Simulating more complex queueing networks



Assume k servers (operators ready to receive calls).

Job sizes are i.i.d $\sim S$. Interarrival times are denoted by r.v. I.

Jobs queue in a FCFS queue. When a server is free, it takes the next job off the queue.

Question: Do jobs leave in the order they arrive?

Question: What's the state space?

Question: What events do we need to track?