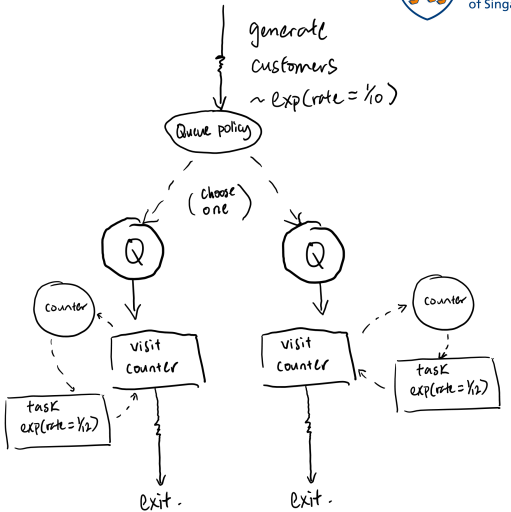
Complicated bank example



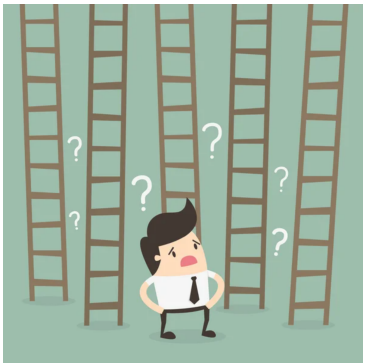
Outline

- Model simulations
  - Customers arrive at random, look around at random and then leave.
  - Customers arrive at random, join the main queue, spend a random simulated time and then leave.
  - Customers arrive at random, join the main queue to be served by the next available counter among for a random simulated time and then leaves.
  - Customers arrive at random, join an individual queue in front of a particular counter to be served for a random simulated time and then leaves.

Learning Objectives

1. Model complicated simulations.
   - Learn to draw an activity diagram before coding.
   - Learn build upon current model to improve

Model simulations



Model simulations

Consider the following scenarios: Many customers arriving at a random simulated time, then..

Scenario 1

They each look around for a random simulated time and then leave.

Scenario 2

They each join the main queue to be served by the only counter (server) for a random simulated time and then leave.

Scenario 3a

They each join the main queue to be served by the next available counter (there are two) for a random simulated time and then leaves.

Scenario 3b

They each join an individual queue in front of a particular counter (based on a chosen queue selection policy) to be served for a random simulated time and then leaves.

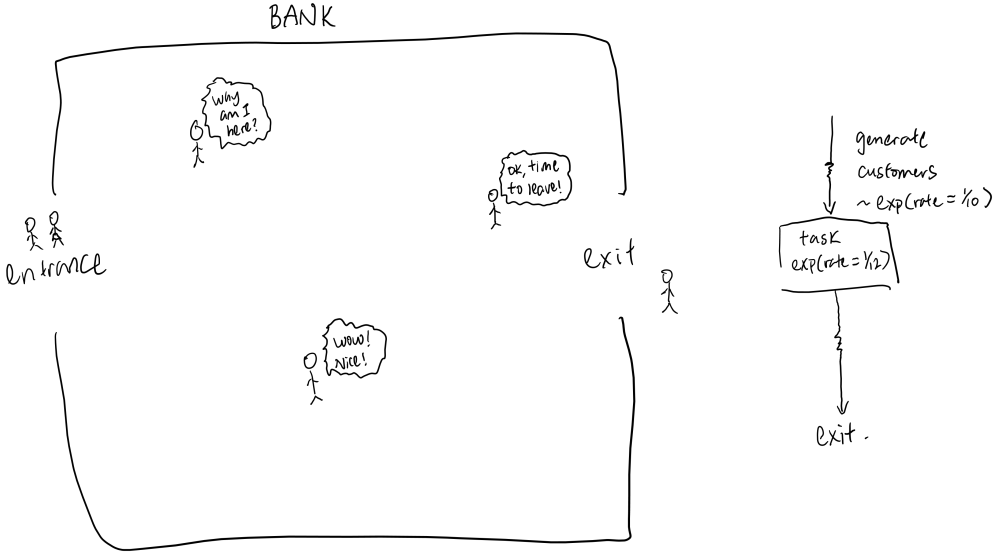
Scenario 1

Many customers arriving at a random simulated time, look around for a random simulated time and then leave.

- There is no queuing.

Scenario 1

cont'd



Scenario 2

Many customers arriving at a random simulated time, each joining the main queue to be served by the only server for a random simulated time and then leave.

- We cannot expect customers to just enter and leave.
- The customers are going to require service from the bank teller.
- We may extend the previous simulation to include a service counter (resource).

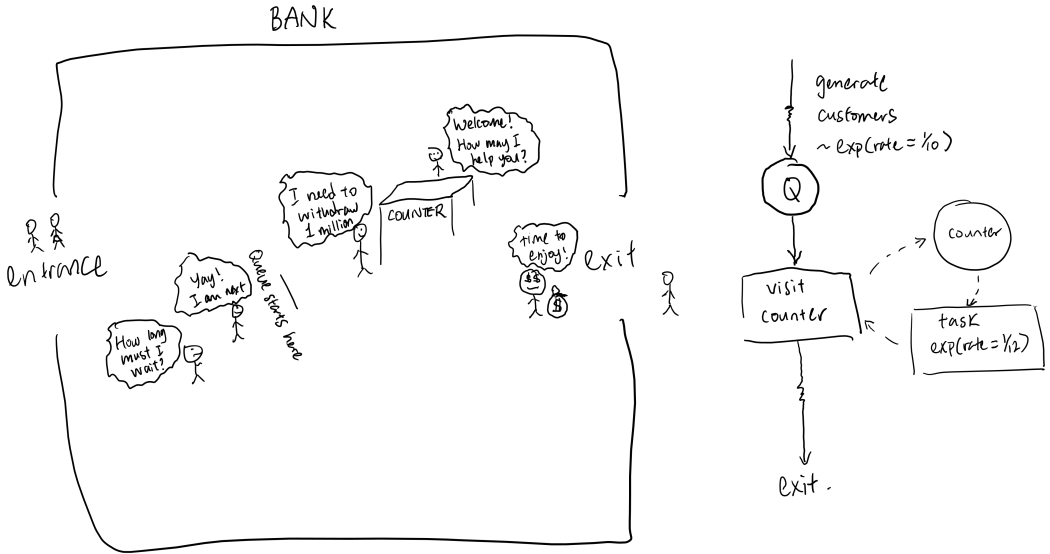
Scenario 2

cont'd

- The actions of a resource are simple: a customer requests a unit of the resource (a teller).
  - If one is free, then the customer gets service.
  - If there is no free teller, then the customer joins the queue managed by the resource object.
  - As each customer completes service and releases the resource, the teller can start serving the next in line.
- Of course, each teller will take a different amount of time to serve the customer, so we may model this random service time using yet another exponential distribution.

Scenario 2

cont'd



Scenario 3a

Many customers arriving at a random simulated time, each joining the main queue to be served by the next available counter (there are two) for a random simulated time and then leaves.

- More service counters so that customers may be managed more efficiently.
- Are customers going to make one queue or are they going to form separate queues in front of each counter?
- There is only ONE queue for the two counters.

Scenario 3a

cont'd

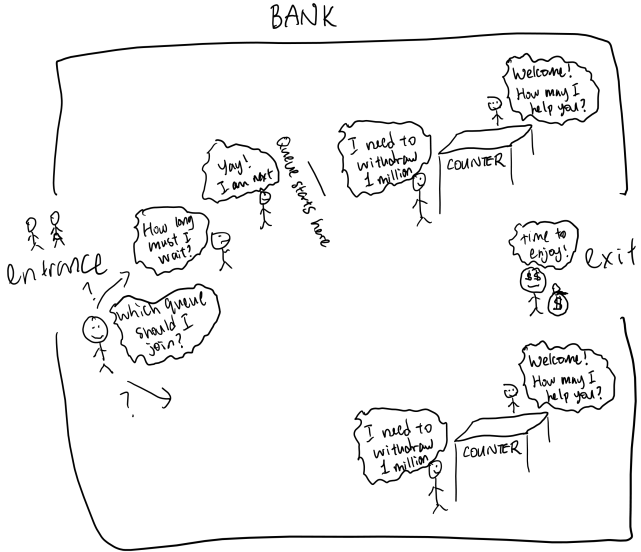
Scenario 3b

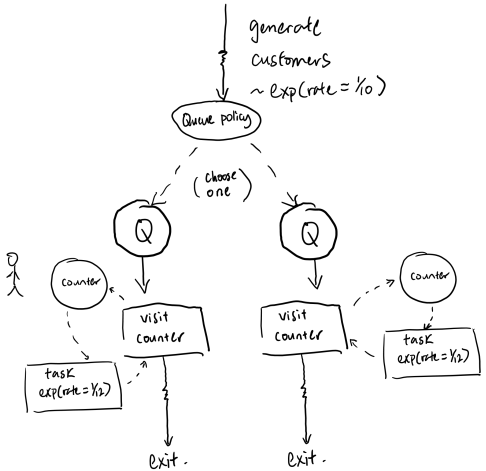
Many customers arriving at a random simulated time, each joining an individual queue in front of a particular counter (based on a chosen queue selection policy) to be served for a random simulated time and then leaves.

- In Scenario 3a, there is only ONE queue for the two counters.
- Consider having an individual queue per counter.
- How to assign customers into the separate queues?

Scenario 3b

cont'd





Summary

In this video, we have:

1. Modelled complicated simulations.
   - Learned to draw an activity diagram before coding.
   - Learned build upon current model to improve