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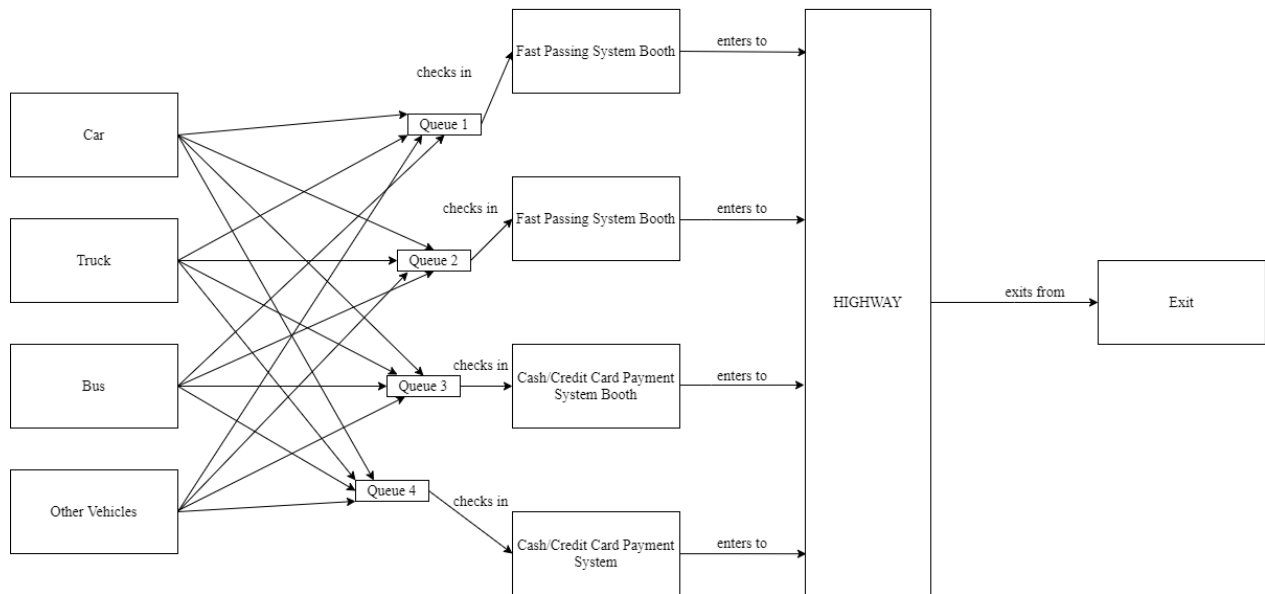
FACULTY OF ENGINEERING
COMPUTER SCIENCE & ENGINEERING
DEPARTMENT

IE3081
MODELING AND DISCRETE SIMULATION
Homework #2

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Conceptual Model of Highway Booth Simulation System

Objection & Goal

In this simulation, we are aiming to simulate a Highway Booth System that includes various payment options for vehicles. Main goal of this simulation is to show the waiting time difference among fast and relatively slow payment options.

Entities

- Vehicle
- Booth

Attributes

- Vehicle: A vehicle may be a car, truck or a bus. These vehicles will pass booth in order to continue their routes. So, their main attribute is being movable objects. Also, they have to have a barcode on their plates in order to make payment at "Fast Passing System" booths.
- Booth: Booths will have different attributes named as "Fast Passing System" and "Cash/Credit Card Payment System".

Activities

- Duration that has passed during the payment process at booth is main activity of our simulation.

Events

- In our simulation, the main event is the arrival of the vehicles to the booth. Then, their departure from the booth.
- In addition, transition from busy to available or available to busy is also an event for our booths.

State Variables

- The state variables for our vehicles are "moving" and "stopped at booth".
- For booths, state variables are "busy" and "available".

Performance Metrics

- From the perspective of performance and also efficiency, we can say that the minimum time spent on this process is 10 seconds if we assume that the vehicle is using "Fast Passing System" and there is no queue in front of the booth. On the contrary, maximum time limit occurs when vehicle is using "Cash Payment System" and there is a huge queue in front of the booth.

Alternative System Design(s)

- To verify and validate our simulation, we will model alternative system designs by changing the input parameters of our simulation. We can shortly summarize our inputs as follows, optimization of waiting time depends on the count of booths, car count and of course the chosen booth.