

Web Development – Mr. Turner

Project – Toll Plaza Simulation

Project Overview

The city is planning on converting its cash toll lanes to pay-by-plate (pbp) lanes in order to ease the flow of traffic. There is some concern about the technology and about the disposition and payment of fines for people who do not follow the rules. They have hired you to construct a simulation whereby they can track the data and determine probable results.

Display

The display for this page will break out into 2 sections.

- The first section will be a running log of the vehicles passing through the plaza and how they pay.
- The second section will be a table of relevant data that will be updated in real time as the simulation progresses.
- There should be a panel of buttons that allow the user to speed up, slow down, pause, or reset the simulation.

Functionality

The simulation will run on a clock where the base time will take 24 minutes (each minute counting as an hour and each second counting as a minute).

The clock will start and end at midnight.

With the buttons on the control panel, the user will be able to adjust the clock speed.

- The user can pause the clock. Store the current program time and shut down the timer and all updates.
- The user can increase the speed to twice as fast or 4 times as fast.
- The user can decrease the speed to half or quarter speed.

The number and type of vehicles arriving at the toll plaza will be randomized and vary by simulation time. Remember that a second is a minute and that ratio may change based on the user preference.

Time of Day	Car	Truck	Motorcycle	Bus	Vehicles per Minute
12am - 5am	30%	65%	5%	0%	2 to 10

5:01am - 9am	50%	25%	5%	20%	20 to 40
9:01am - 2pm	40%	40%	10%	10%	5 to 20
2:01pm - 4pm	45%	30%	10%	15%	10 to 30
4:01pm - 6pm	60%	15%	5%	20%	20 to 40
6:01pm - 8pm	60%	25%	5%	10%	10 to 30
8:01pm - 11:59pm	50%	40%	5%	5%	5 to 15

After figuring out which vehicles are arriving, the program will determine whether or not the vehicle has an EZ-Pass or is pay by plate.

Each vehicle pays a different toll price and will get a discount for having an EZ-Pass. All EZ-Pass holders receive a 10% discount.

In addition, a car or motorcycle may be a resident. A resident with EZ-Pass receives a 40% discount.

If a vehicle does not have an EZ-Pass it is automatically considered to be a non-resident.

- A bus always has EZ-Pass and the toll for the bus is \$0.
- A car or motorcycle will have an EZ-Pass 70% of the time and gets a residential discount 60% of the time.
 - The toll for a car is \$12.
 - The toll for a motorcycle is \$8.
- A truck will have an EZ-Pass 90% of the time. The toll for a truck is \$18.

The log should list every vehicle and its information that passes through the toll plaza and what time.

A typical line of the log might look like:

3:46pm - A car with EZ-Pass paid \$10.80.

If the car was a resident, the line would indicate it.

3:46pm - A residential car with EZ-Pass paid \$7.20.

As each car passes through, the table of totals should show the following information:

- How many of each type of vehicle passed through the plaza.
 - Break up trucks by number of axles.
- How many of each type of vehicle had an EZ-Pass.
- How many of each type of vehicle was residential.
- The total money collected via EZ-Pass.
- The total money collected via pay by plate.
- The percentages of all of the totals.

Enhancements

- Hourly breakdowns on the totals table.
 - Keep track of hourly totals and put them into the table.
 - The user should be able to open and collapse the individual hours on the table.
- Trucks are normally charged a toll by the number of axles they have. Implement that in the following way.
 - All trucks are charged \$6 per axle.
 - All trucks have at least 2 axles.
 - There is a 50% chance that a truck will have 3 axles.
 - If a truck has 3 axles, there is a 20% chance the truck will have 4 axles.
 - If a truck has 4 axles, there is a 10% chance it will have 5 axles.