Web Development – Mr. Goldman

Level 5 Project – Toll Plaza Simulation

**Project Overview**

Create a toll plaza simulation where vehicles pass through the toll plaza, pay the toll, and move on their way.

**The Pages**

Your toll plaza should include 8 Toll Lanes. Each lane will have a line of vehicles that will shrink and grow as cars arrive and pass through the lane.

There are 4 types of vehicles including Motorcycle, Car, Bus, and Truck.

A motorcycle or a car may or may not be a resident.

Buses and trucks are commercial vehicles.

You will keep track of a 24 hour period using simulated milliseconds. In order to simulate the milliseconds, you will use a loop or a series of nested loops where each cycle of the innermost loop is a single millisecond. Your loop or loops should run 24 \* 60 \* 60 \* 1000 iterations.

Start your loop at “midnight”.

As vehicles arrive at the toll plaza, they will be placed onto the end of one of the lanes. This will not necessarily be the shortest lane. It should be determined randomly.

Vehicles arrive at the toll plaza in the following frequencies.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Time of Day | Car | Truck | Motorcycle | Bus | Vehicles per Second |
| 12 am - 5 am | 30% | 65% | 5% | 0% | 2 |
| 5 am - 10 am | 50% | 25% | 5% | 20% | 20 |
| 10 am - 2:30 pm | 40% | 40% | 10% | 10% | 13 |
| 2:30 pm - 4:30 pm | 45% | 30% | 10% | 15% | 18 |
| 4:30 pm - 7:30 pm | 60% | 15% | 5% | 20% | 25 |
| 7:30 pm - 10 pm | 60% | 25% | 5% | 10% | 13 |
| 10 pm - 11:59 pm | 50% | 40% | 5% | 5% | 6 |

Using the percentages in the chart above, create the specified number of vehicles per second and randomly assign them to toll lanes. Use the percentages in the chart below to determine the specifics of the vehicle.

|  |  |  |  |
| --- | --- | --- | --- |
| Vehicle | Resident | EZ-Pass | # of Axles |
| Car | 80% | 75% | NA |
| Motorcycle | 90% | 60% | NA |
| Truck | 0% | 50% | 100% for 2 axles  50% for 3 axles  20% for 4 axles  10% for 5 axles |
| Bus | 0% | 100% | NA |

For the axles of a truck, use the percentages above to determine the size of the truck. A truck’s axles will be determined on a cumulative scale. If a truck has 3 axles there is a 20% chance it will have 4 axles. If it has 4 axles, there is a 10% chance it will have 5 axles.

The price of the toll is the following.

* Cars: $8
* Motorcycle: $6
* Bus: $0
* Truck: $4 per axle (5 axles maximum).

Vehicles can have EZ-pass. A resident car or motorcycle with EZ-pass receives a 40% discount while non-residents receive a 10% discount. Trucks with EZ-pass receive a 20% discount.

A vehicle with EZ-pass takes 20 milliseconds to pay the toll.

A car or motorcycle without EZ-pass takes between 500 milliseconds and 30 seconds to pay the toll.

A truck takes between 3 and 120 seconds to pay the toll.

**Record the following data for each lane:**

* The number of vehicles that passed through.
* The number of individual cars, buses, trucks, and motorcycles that passed through.
* The number of each truck, by number of axles, that passed through.
* The number of residents that passed through.
* The number of EZ-pass customers that passed through.
* The number of cash customers that passed through.
* The total of the tolls collected.

If there are any vehicles left over in the lanes when the day ends, ignore them. When the simulation reaches the end, all of the data should be shown in a table on screen.

The user should have the opportunity to run the simulation as many times as (s)he likes.

**Enhancements**

Save all of the data from each running of the simulation so that the user can compare the different results for different “days” of toll collection.

**Programming Requirements**

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| * You must code your own HTML and CSS. Use of a drag and drop interface or the usage of code downloaded from the internet is not permitted. |
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| * Use of deprecated code is not permitted. Use an HTML 5 reference as your guide. |
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| * Your home page must be named *index.html*. |
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| * You must comment your name into the top of every page. |
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| * Your code must be structured in a consistent and legible manner |
|  |
| * Your text must be organized through the use of sectioning tags (div, span, p, h1 – h6). Tables are acceptable for data but not for page design. |
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| * Your interface must be smooth and easy to figure out for a client. |
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| * Your pages must be formatted using CSS. |
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|  |

*You project is to be submitted via Moodle. Compress all of the necessary files into a zip or rar file.*