Software Requirements Specification

for

## The last Mile Delivery

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# **INTRODUCTION**

* This delivery system simulation is being used. The purpose of this project is to develop a tool that can mimic a delivery system, allowing users to enter information such as the number of stores, the number of vehicles, their capacity, and whether or not they can transport ice-cold food. The simulation starts by creating a map with randomly placed nodes for each vehicle. The number of orders is also created at random, as are the orders placed by the clients.
* The goal of this project is to develop a simulation tool that will help with delivery process optimisation. Users can learn more about the effectiveness of the distribution system, spot possible bottlenecks, and make changes by modelling it.

# **System Features and Requirements**

## The Functional Requirements:

1. **Data Entry:**

The web app allows users to enter:

* Number of stores.
* Number of vehicles, for each vehicle the user must determine
  + - * Full capacity of vehicle.
      * Contains fridge [true or false], if vehicle contains fridge, the user will determine the capacity of fridge.
      * Type of vehicle.

### Store Location and Details:

The web app will show the location of each store and it’s information:

* The number of orders to be delivered.
* Type of each order (frozen or not).

### Vehicle Location and Details:

The web app will show the location of each vehicle and it’s information:

* Initial capacity of vehicle.
* Full capacity of vehicle.
* Current capacity of vehicle.
* Type of vehicle.
* Whether the vehicle has fridge or no.

If it has there will be shown:

* Initial fridge capacity.
* Current fridge capacity.
* Full fridge capacity.

1. Map and Route Generation: After entering the data and validate it the geographical map and delivery route will be generated based on the store and vehicle locations and other relevant information.

* The Non-Functional Requirements:
* Performance: The web app must be fast and responsive, with minimal lag time between user interactions and system responses. The website should be able to handle a large number of user requests simultaneously without slowing down.

## Use Cases

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ­­USE CASE NAME | Data Entry | | | |
| ID | Uc\_1 | | | |
| Importance level | High | | | |
| Actor: | User | | | |
| Description | Distribute stores and vehicles randomly in a specific geographical area, and loading the store goods to the appropriate vehicle | | | |
| Trigger | Pressing on “Start Simulation” button | | | |
| Type | External | | | |
| Pre-conditions | * The device of the user must be connected to internet and app is opened * The user entered a specific region from ​​the map * The user entered the number of stores * The user entered the number of available vehicles, for each vehicle, the user must enter the type of this vehicle, the maximum storage capacity for this vehicle, as well as it contains a fridge or not, and if vehicle contains fridge, the user will determine what capacity of fridge | | | |
| Main success  Scenario  (Normal course) | Using the simulation,  1- The stores will be randomly distributed in the specified area of ​​the map  2- Vehicles will be distributed randomly in the designated area of ​​the map  3- The store’s goods contain icy items or not, this value will also be random  4- The initial capacity of each vehicle, and it will be a random value from zero to the maximum storage capacity for this vehicle  5- The initial capacity of fridge of each vehicle, and it will be a random value from zero to the maximum capacity for this vehicle’s fridge  6- Each store will check the appropriate vehicle for it based on   1. Is the available storage capacity of the cart sufficient to carry its goods? 2. If the orders contain icy items, the vehicle must be able to carry these icy items (The cart contains fridge) | | | |
| Post- conditions | The specified range of the map contains stores and vehicles with some data attached  Such:  Each store   * Number of the store * Whether his goods need a cart with a fridge or not * Number of vehicles that contains store’s goods   Each vehicle   * Type of vehicle * Whether the vehicle has a fridge or not * Initial storage capacity * the current storage capacity * full storage capacity * Stores’ numbers that vehicle carries their goods. * If vehicle contains fridge:   + Initial fridge’s capacity   + Current fridge’s capacity   + Full fridge’s capacity | | | |
| Alternative course | * If the user entered the number of stores as zero, in this case the current storage capacity for each vehicle will be the same value as the initial storage capacity for this vehicle * If there is no suitable vehicle for a particular store, the value of “Number of vehicles that contains store’s goods “will be “Unfortunately, no suitable vehicle to carry my orders!". | | | |
| Exceptions | * if user did not fill any field <Number of stores, Number of vehicles, for each vehicle [ Type of vehicle, full Capacity, contains fridge (true of false)] >, an error message will be displayed “please fill in required fields” * if the “Number of stores” is invalid or negative number, an error message will be displayed” Number of stores positive integer number” * if the “Number of vehicles” is invalid or negative number, an error message will be displayed” Number of vehicles must be positive integer number” | | | |
|  | Summary inputs | Source | outputs | Destination |
| - Number of stores  - Number of vehicles  - Each vehicle [type, Contains fridge, full capacity] | -User | -Specified region from Map contain some stores and vehicles | - User |
|  |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| USE CASE NAME | Vehicle Location and Details: | | | |
| ID | Uc\_2 | | | |
| Importance level | High | | | |
| Actor: | User | | | |
| Description | Show specific vehicle’s information by clicking on the vehicle image | | | |
| Trigger | Pressing on vehicle node on the map | | | |
| Type | External | | | |
| Pre-conditions | The user press on “Start Simulation” button after he enters all required information to start simulation | | | |
| Main success  Scenario  (Normal course) | The current capacity of the vehicle will be calculated (the initial capacity of the vehicle + the capacity loaded from the stores) | | | |
| Post- conditions | Vehicle related information will be displayed in the box, such as:   * Type of vehicle * Whether the vehicle has a fridge or not   [ If vehicle contains fridge => Initial, Current, Full capacity of fridge]   * Initial capacity * Current capacity * Full capacity * Stores’ numbers that vehicle carries their orders. | | | |
| Alternative course | * If the vehicle didn’t load any goods from any store, the value of “**Number of the store that carries its goods "** will be none, and the value of “**The current capacity**” will be the same value of “**Initial capacity*”*** | | | |
| Exceptions |  | | | |
|  | Summary inputs | Source | Outputs | Destination |
|  |  | - Box contain information about vehicle that I clicked on | - User |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| USE CASE NAME | Store Location and Details | | | |
| ID | Uc\_3 | | | |
| Importance level | High | | | |
| Actor: | User | | | |
| Description | Show specific store ’s information by clicking on the stores’ nodes | | | |
| Trigger | Pressing on store node on the map | | | |
| Type | External | | | |
| Pre-conditions | * The user press on “Start Simulation” button after he enters all required information to start simulation | | | |
| Main success  Scenario  (Normal course) | The number of items that needs fridge and those that do not! | | | |
| Post- conditions | Store related information will be displayed in the box, such as:   * Number of stores * The number of items that needs fridge and those that do not * The number of the vehicle that carried the goods from the store | | | |
| Alternative course | * If any store did not find a suitable vehicle to carry its orders, the value of " **The number of the vehicle that carried store’s orders**" will be none | | | |
|  | Summary inputs | Source | Outputs | Destination |
|  |  | - Box contain information about store that I click on | - User |

# State Machine Diagrams

