# Chapter 3: Design

## Introduction

This is a third phase, which shows how the system looks, runs and perform a certain function that is used by customers. As it includes application, database, user interface, and system interface design.

In the Design phase, I am modeling design into five types which are Structural, Behavioral, Database, Architectural modeling, and Prototype design. Inside these different types of design, there will be sub-design also. As the design is important in every project. So, in my projects also design plays an important role by changing the SRS documents into a logical structure. That logical structure contains a detailed and complete set of description that can be implemented in a programming language and design ensure successful completing of the project. So, I am doing a design phase in my projects.

There are five types of design which are:

## 3.1 Structural Modelling

A system view that depicts the objects structure, with their relationship, attributes, operations, and classifiers. Structure of the system design is display and it is a static model.

Some of the diagrams that include structural modeling are:

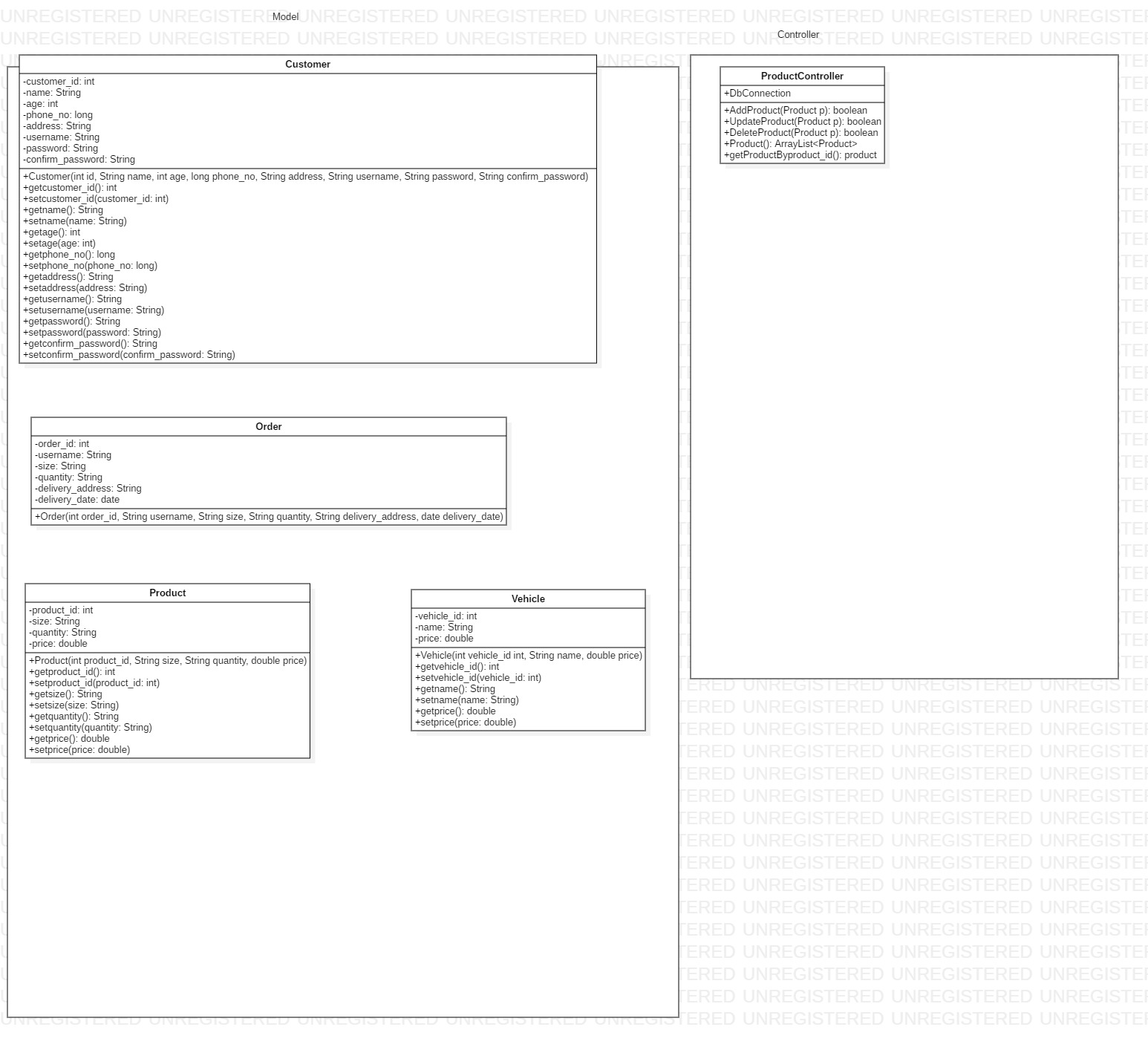
* Class diagram
* Object diagram
* Flow chart

### 3.1.1 Final Class Diagram

The class diagram is a static diagram that describes the system structure showing attribute and classes that include in system, operation, and relation among them.

Reason for making a final class diagram in my projects are:

* The final class diagram provides detailed of classes, attributes, operation, and relation.
* Object-oriented language can be directly mapped by a class diagram.



Screenshot: Class Diagram

### 3.1.2 Flow Chart

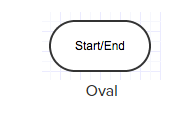
The flow chart is a symbolic or diagrammatic representation of a logic sequence. The flow chart is represented by using different symbols that contain information about the process steps and every symbol are linked with arrows to show flow direction of the process.

Reason for making a flow chart in my projects are:

* Provide graphical representation which helps in my project to identify the process of different elements.
* It shows activities involved in the projects and analyzed problems can be done in more effective ways that help in managing time, reducing costs.

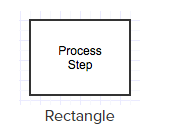
The basic symbols of the flowchart are:

1. The Oval: A Beginning or an End



Used to depicts the start and end of a process.

1. The Rectangle: A step in the flowchart process



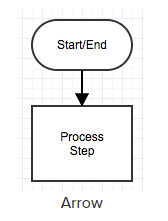
Used to show the process step

1. The Input/Output



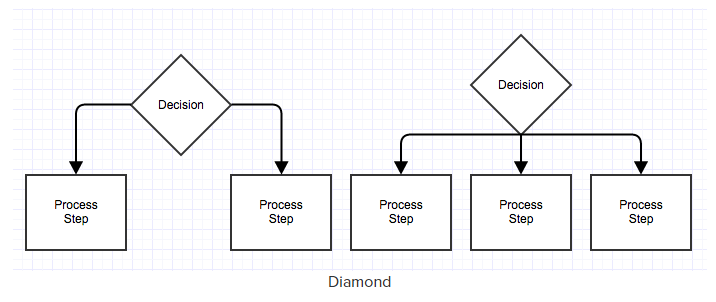
Used to represent data input/output to or by users.

1. The Arrows: Directional flow



Depicts the flow of steps.

1. The Diamond: Call for Decision



The diamond symbol used to make a decision.

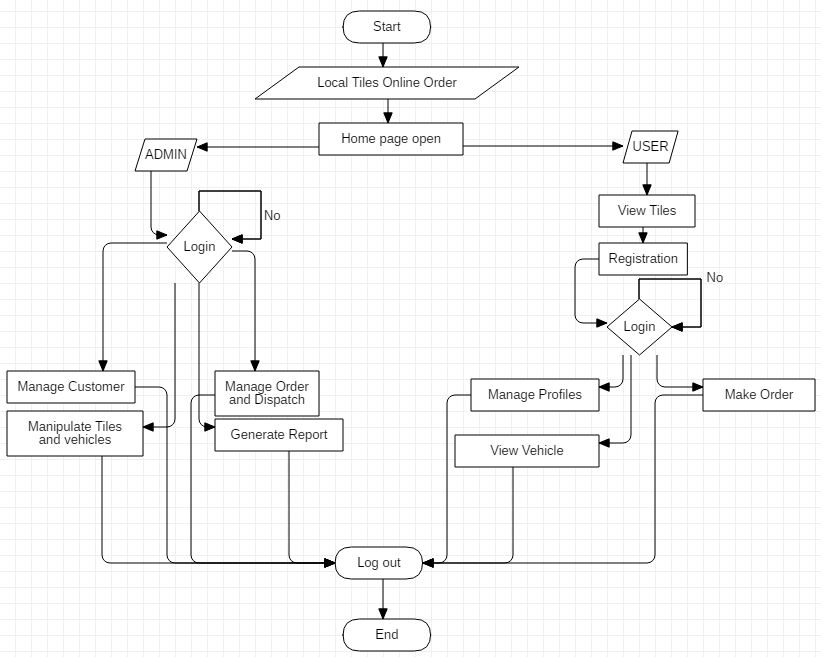


Figure: Screenshot Flow chart of Admin and user

The above flow chart diagram shows the overall functionality that a user and an admin does. First both user and admin open homepage of the company.

If it is an admin then it open login page and admin logged in to the system providing required login credentials. Once login success system show admin dashboard where admin can manage customer, manipulate tiles and vehicle, view order, dispatch order and generate reports. Else a user can view available tiles then if the user wants to make an order, manage profiles, and view vehicle user needs to register to the system and then logged in to perform that functionality. Once both user and admin finished performing their functionality they log out from the system.

## 3.2 Behavioral Modelling

The behavioral diagram is a dynamic diagram and depicts the functionality of the system. It includes a diagram like a use-case, activity, collaboration and sequence diagram.

### 3.2.1 Activity Diagram

Activity diagram is used to depict system behavior. A graphical representation of a series of procedural system activities to another activity.

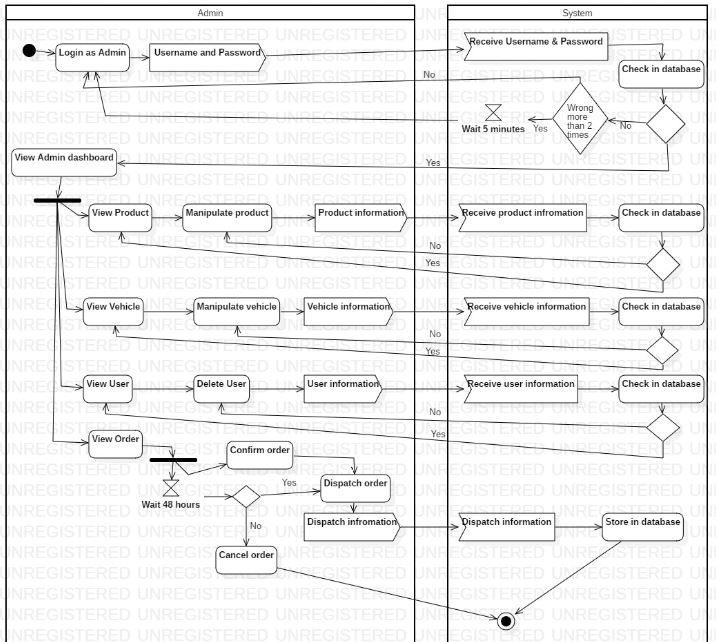
Reason for making activity diagram in my projects:

* It depicts action and activities of the system as well as outline workflow within/between use-cases.
* Models a high-level activity diagram in detail of complex activities.

Notation that is used in my project to make an activity diagram are:

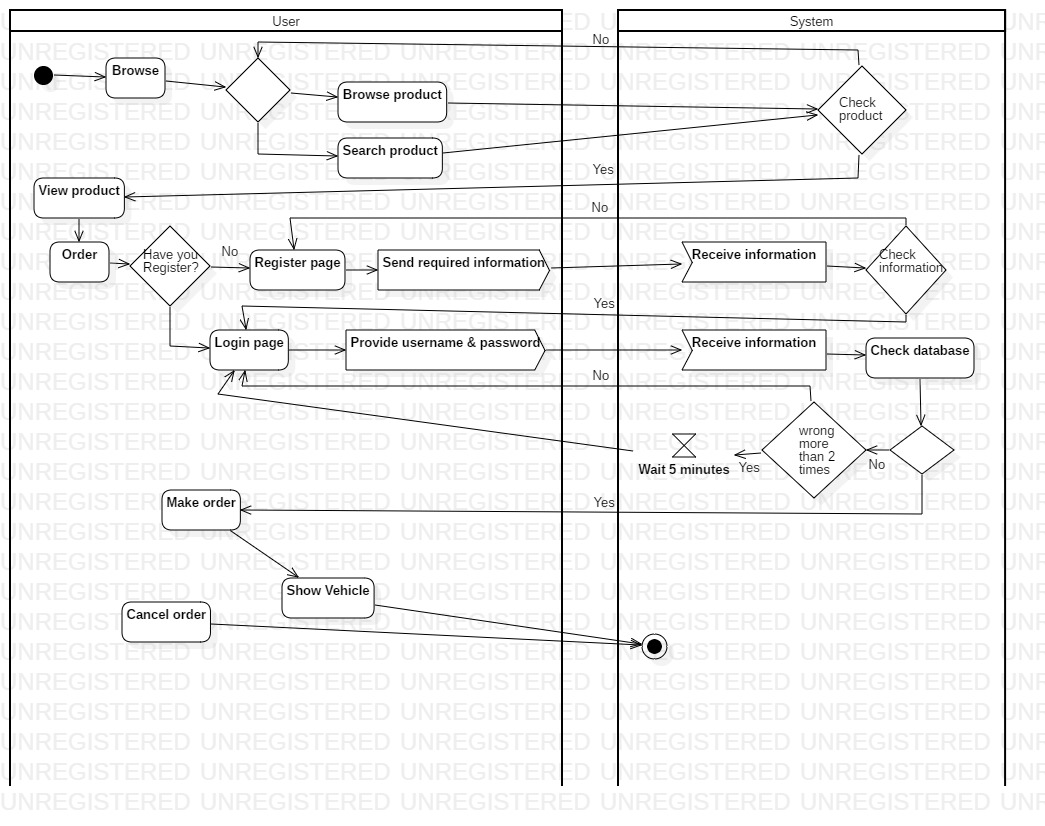
|  |  |  |
| --- | --- | --- |
| Notation | Name | Description |
|  | Initial | Represent the start of a flow or process of an activity. |
|  | Control flow | Depict the directional flow and connect two activity. |
|  | Action | Include a short process or activity that occurs within a system. |
|  | Decision | Represent decision and always merge at least with two conditions. |
|  | Fork | Show that a single activity is split into two or more concurrent activity. |
|  | Join | Represent that two or more concurrent activity are joined to form a single activity. |
|  | Send | Indicates the action of sending a signal. |
|  | Receive | Depicts a receipt of a request. |
|  | Final | Indicate the end of a flow of an activity. |

Activity diagram of Admin



This above figure shows the flow of activity that is performed by the admin. First admin provides login credentials and system check provided login credentials in the database if matched then it the open admin panel else it redirects to the login page with an error message. After the login is success admin can view and manipulate product, vehicle, and users. Admin views the order and confirms the order once before it dispatches and also cancel the order if the users do not confirm their order within the time frame of 24 hours. At last, retrieving all information report generation in done.

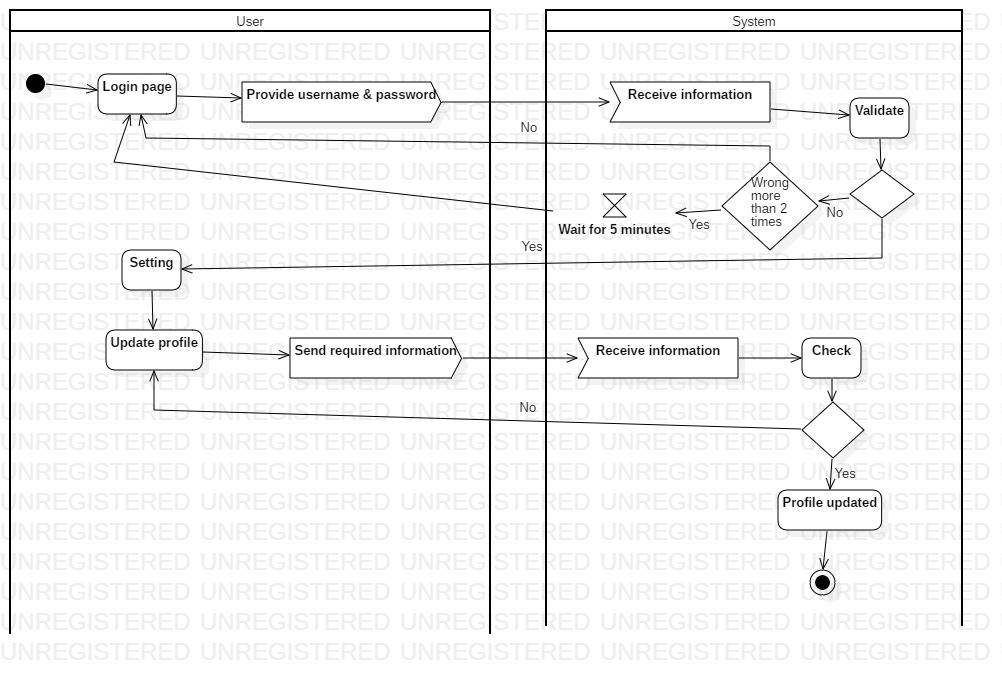
Activity diagram of Users Order



This activity diagram shows the flow of activity done by users during order. After the user browses to homepage user can view available products in the company else can search product as need. If the no product is available then it redirects to the homepage.

When a user wants to order and click on make order button then the system asked whether the user is register to the system. If no system open the registration page and user provide required information and system validates register credentials of users then redirect to the login page when success. Otherwise, if the user is registered system open login page so user logged in to the system and make an order. The user can cancel an order if they don’t want.

Activity diagram of User update profile



Above activity diagram is about both user and admin updating profiles. Firstly both user and an admin login to the system providing login credentials. If success then it shows setting where both user/admin can update their profile providing information that they want to update. If not the system redirects to the login page.

### 3.2.2 Sequence Diagram

An interaction diagram that depicts how operations are carried out in a time sequence -- what and when messages are sent. Messages passed among the objects within the use-case in a number of objects are shown.

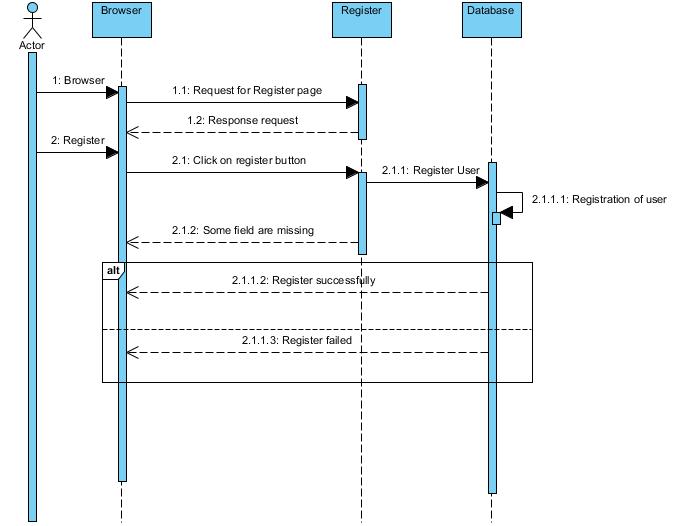
Reason for making sequence diagram in my projects are:

* It depicts logic interaction between the objects in sequential order.
* Show the interaction between objects within cooperation that understand the operation and use-cases.
* It depicts the use-case in a visual format.

Notation that is used in my project to make a sequence diagram are:

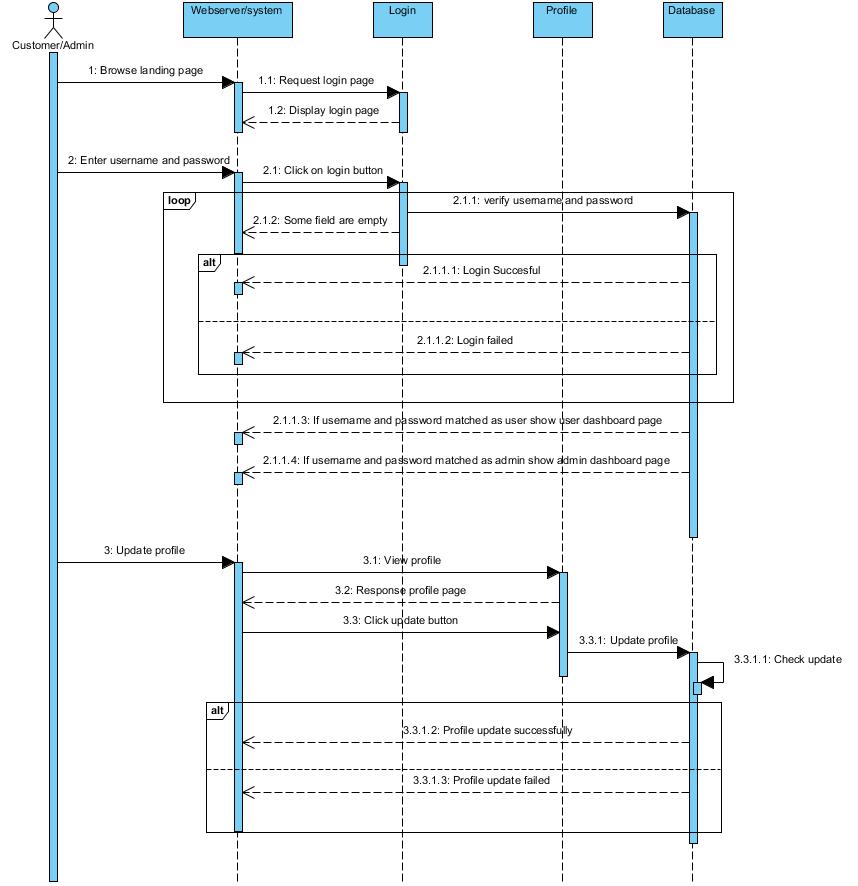
|  |  |  |
| --- | --- | --- |
| Notation | Name | Description |
|  | Actor | The actor is a user, external entity that interacts with the system. |
|  | Lifeline | A lifeline represents the participation of an individual in an interaction. |
|  | Activation | Shows time duration where an operation or task being performed. |
|  | Send message | Represent the flow of message to objects. |
|  | Return message | Show return back of message to the callers of the former corresponding message. |
|  | Recursive message | Represent the call of the message of the same lifeline. |
|  | Loop | Condition in which fragment will occur again and again until the condition is matched. |
|  | alt | A condition where two message sequence occurs. |

Sequence diagram of Register:



Above sequence diagram is about registration of the user to the system. First user browser the home page of Local Tiles Online Order then request for registration page and fill up all the required credentials then send to the system. The system checks the information provided by the user then if any fields are missing then it sends errors message otherwise it registers user and sends message to a user of successful registration.

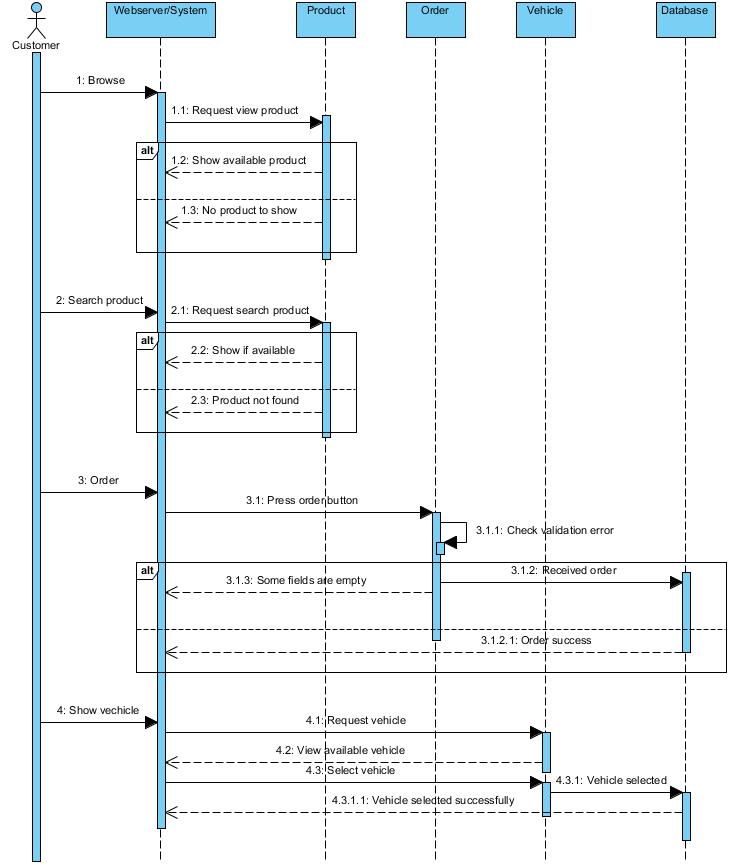
Sequence diagram of Login:



This a sequence diagram about the login of both users and admin. Here, user/admin open login page once they go to home page then provide login credentials to the system. The system check login credentials to the database. If login credentials are matched as admin then system opens admin panels or if matched as a user it opens user panel otherwise if there errors in username and password system display errors message to a user.

As for update profile, the user clicks on the update page and receive update form then they change their information that they want to update and click update buttons. The system receives information of the user if correct they send success message else errors message is sent to users.

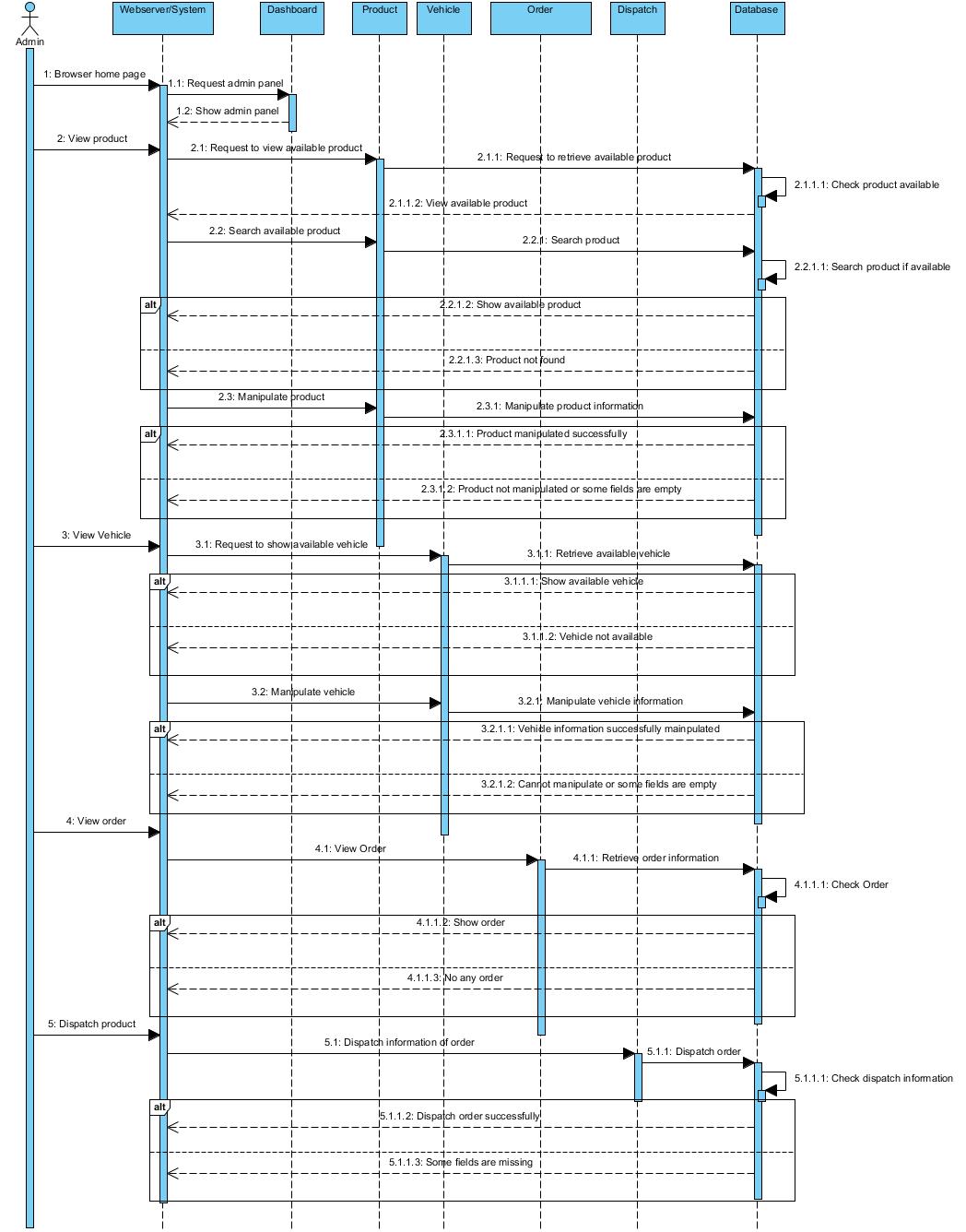
Sequence diagram of Order:



Above sequence diagram shows that sequence of order in the system. Once the user visits the home page then the user can view the available product or can search product. After they viewed product user can order by clicking the order button and providing the required information for the order. If all order credentials are correct then the user gets the message of successfully order otherwise user get errors message.

Then, the user can select the means of transportation to deliver their product if they like to use our means of transport after they order the products.

Sequence diagram of Admin:



Above sequence diagram is about admin panel representing the flow of a sequence of admin activities. After admin open homepage admin can view current product available in stock. Admin can do CRUD operation for vehicle, products. Admin can delete unnecessary users and orders. Admin views the orders and dispatches orders as per information provided by users.

## 3.3 Database Modelling

Database Modelling is a logical structure and representation of the database. It describes how the data can be stored, processed and manipulated within it. In my project database modeling helps me in designing blueprint of the database that will make me easier to develop a system.

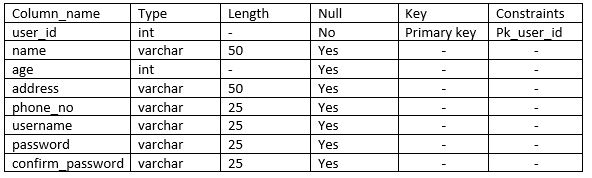
### 3.3.1 Data Dictionary

Data Dictionary is a set of information that contains database metadata. It describes the format, structure, and content like column name, data type, length, null, key and constraints of a database. Data dictionary also used to manipulate the database, to control access and shows the relationship between its different components.

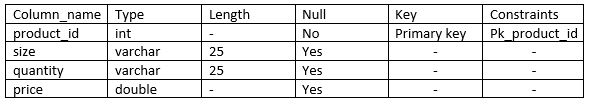
Importance of data modeling in my projects are:

* It gives clear and well-structured information about the database.
* Data dictionary provide details for any new DBA and administrator.
* It is very difficult to remember almost every database since it may be large and may consist of lots of views, tables, constraints, index, etc. So by providing all the details, it helps users.

1. Data dictionary of Customer



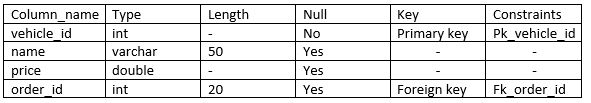
1. Data dictionary of Product



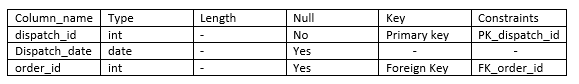
1. Data dictionary of Order



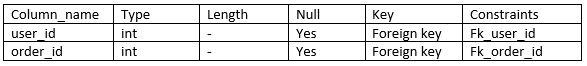
1. Data dictionary of Vehicle



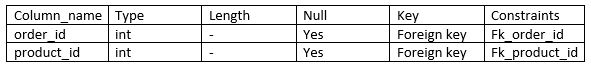
1. Data dictionary of Dispatch\_Order



1. Data dictionary of Customer\_Order



1. Data dictionary of Order\_Product



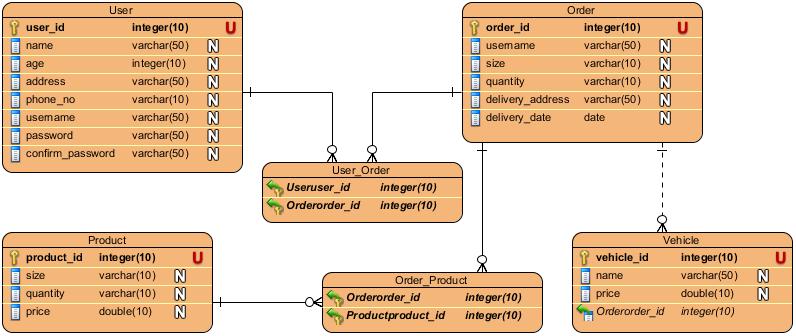
Each table has a column field name with six columns. First column column\_name define data name of the database, what type of data is defined by column type, length column defines the length of data, whether data can be null or not is defined by null column, key column define if the data is primary or foreign or neither of them and constraints.

### 3.3.2 ER Diagram

Entity Relationship(ER) diagram is a technique of data modeling that graphically depicts(represents) entities of an information system and relationship among those entities.

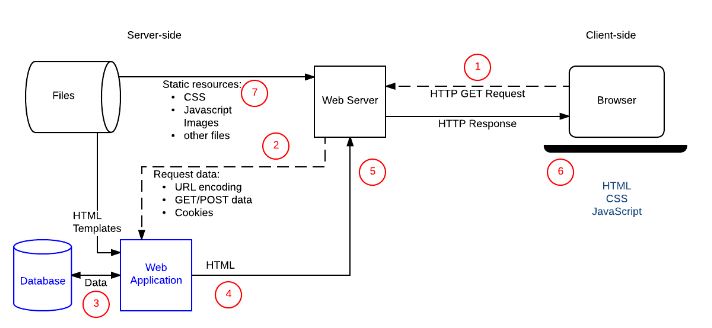
The components of the Entity-Relationship(ER) diagram are:

* Entities
* Relationships
* Attributes



### 3.4 Architectural Modelling

Since my system aims and focuses to provide easy services to the customer without any interruption. So, I will be using Client-server architecture. The client-server architecture is a shared architecture where loads of client-server are distributed. The server holds all the resource in a centralized resource system. The client-server gets numerous performance at its edge for sharing resources to its customers when requested. In this architecture, the client and server may be in a network or on the same. Client services will not be interrupted in this architecture since it is service oriented.



Screenshot: Client-server architecture

## 3.5 Prototype Design

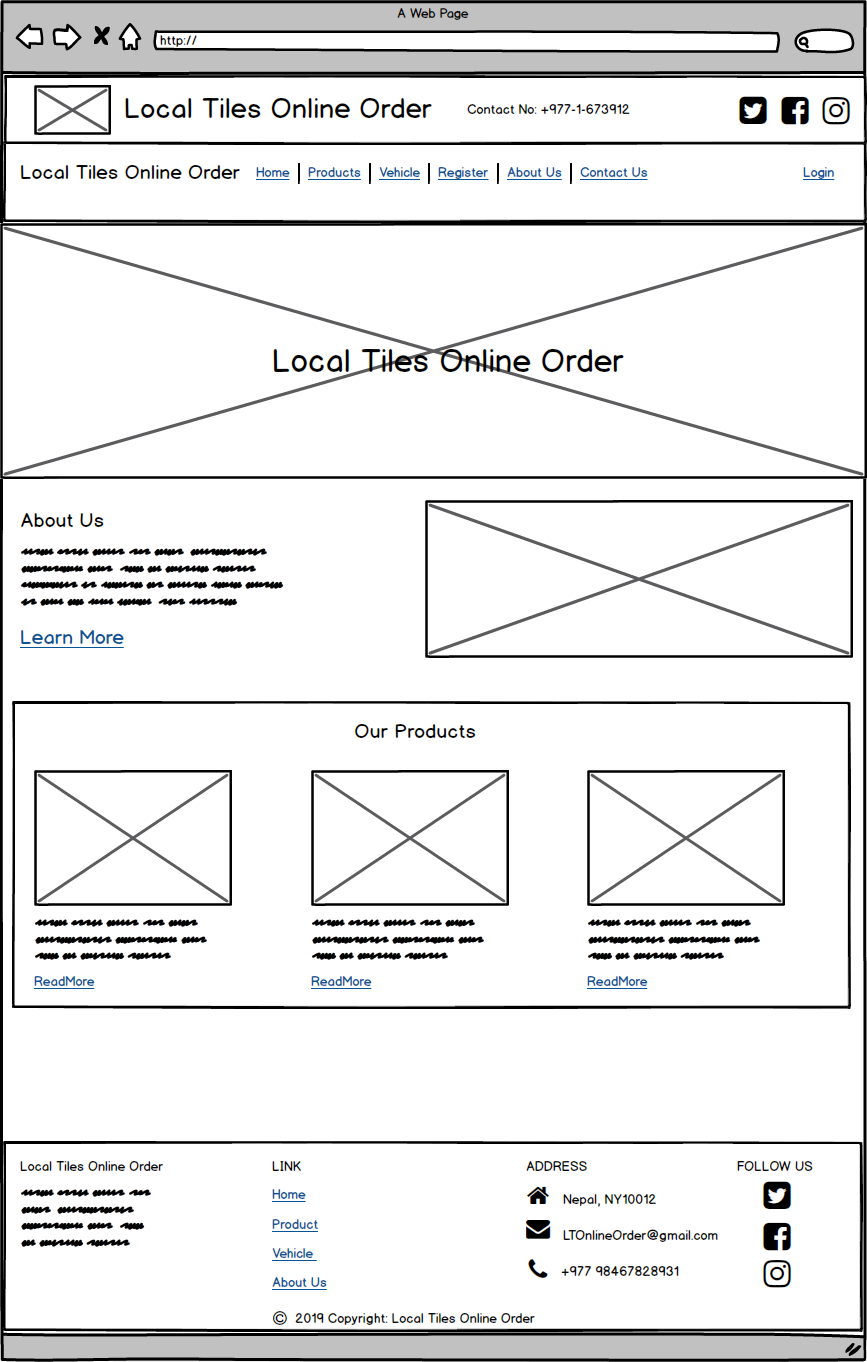


Figure 1: Home Page

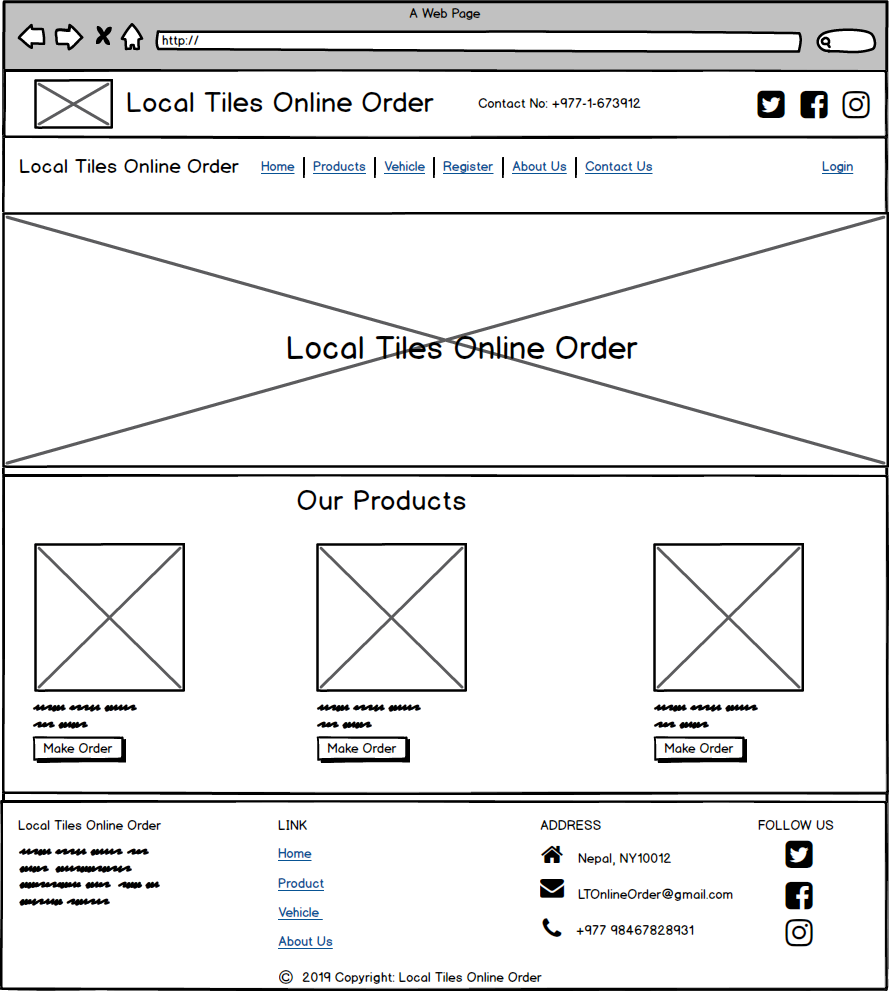


Figure 2: View product home page

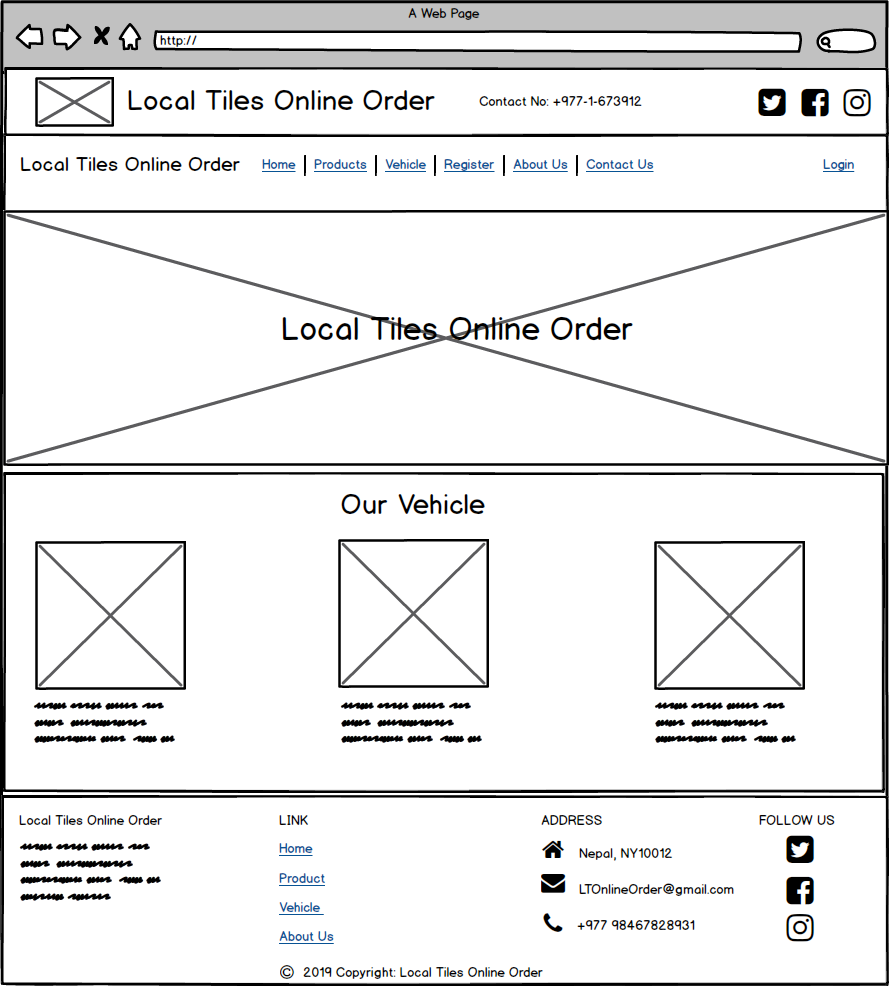


Figure 3: Our vehicle home page

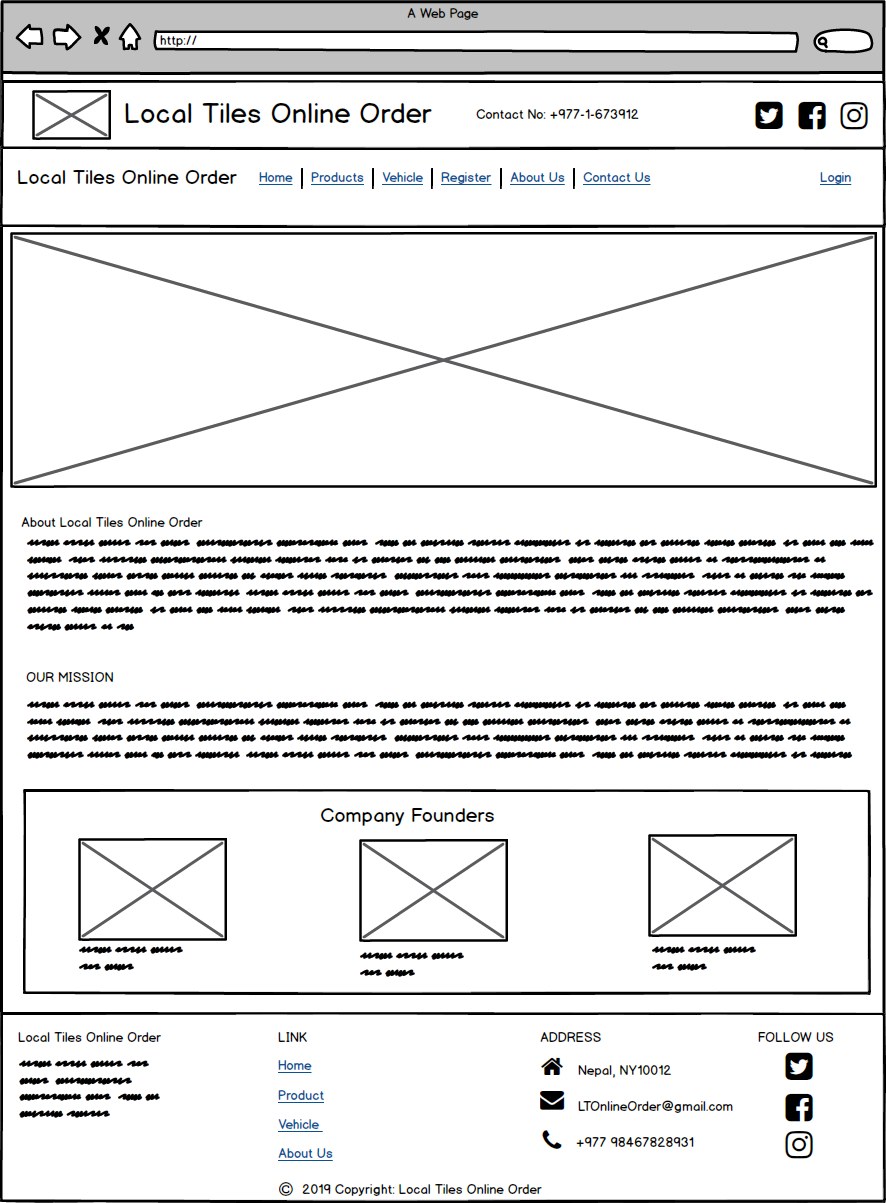


Figure 4: About us home page

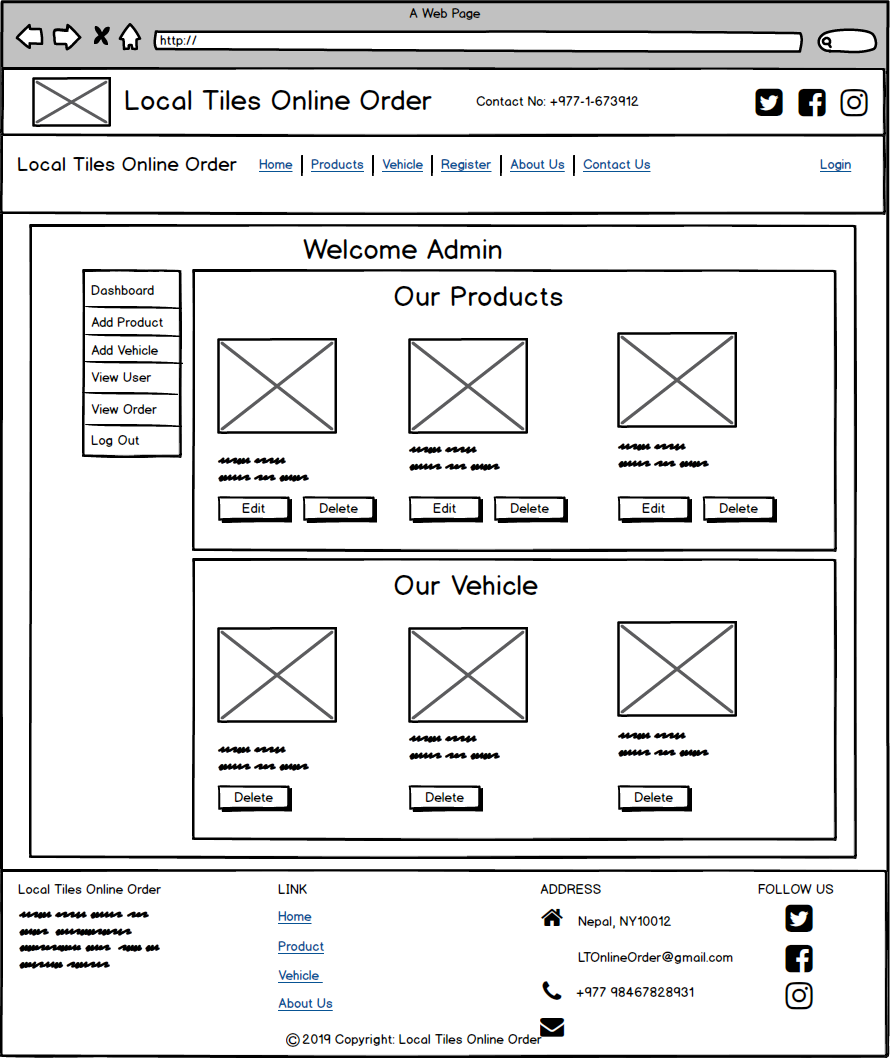


Figure 5: Admin home page

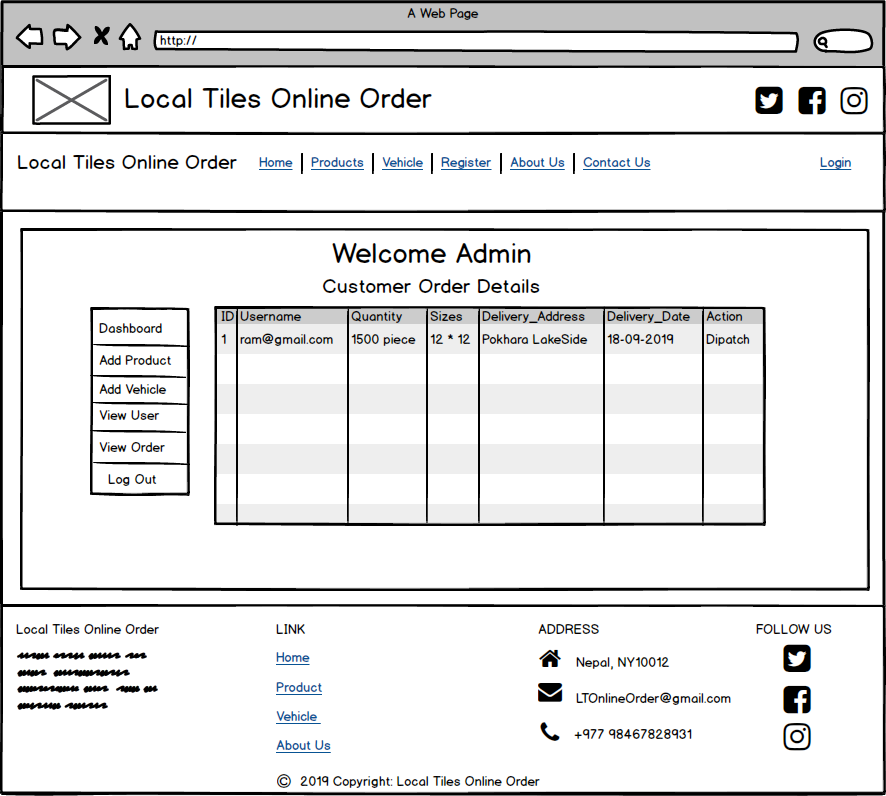


Figure 6: Admin view order

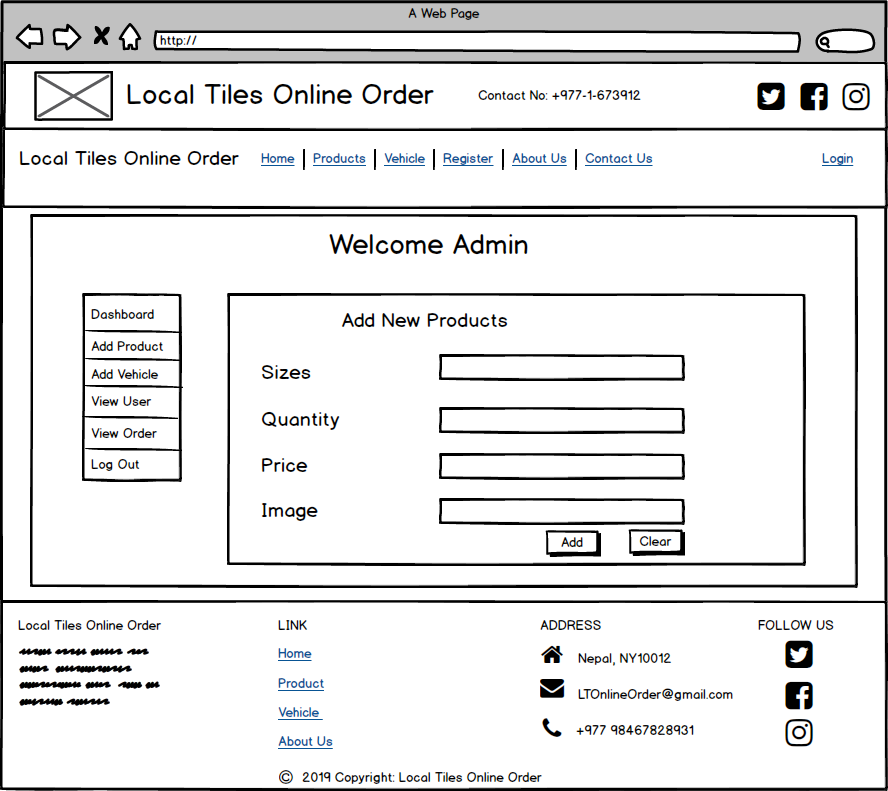


Figure 7: Admin add product

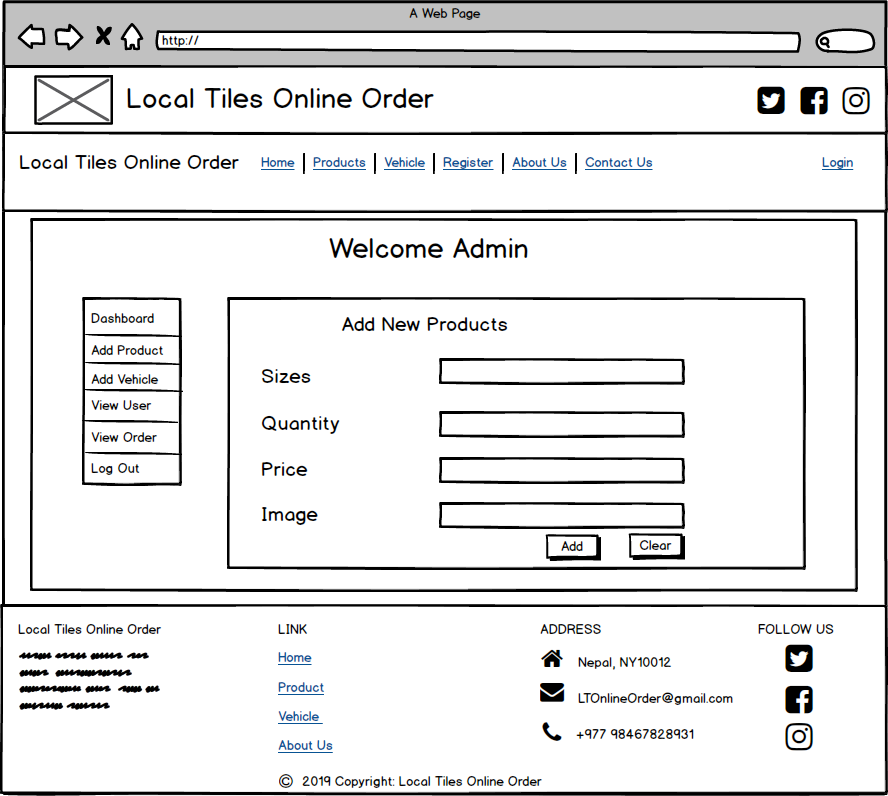


Figure 8: Admin add vehicle

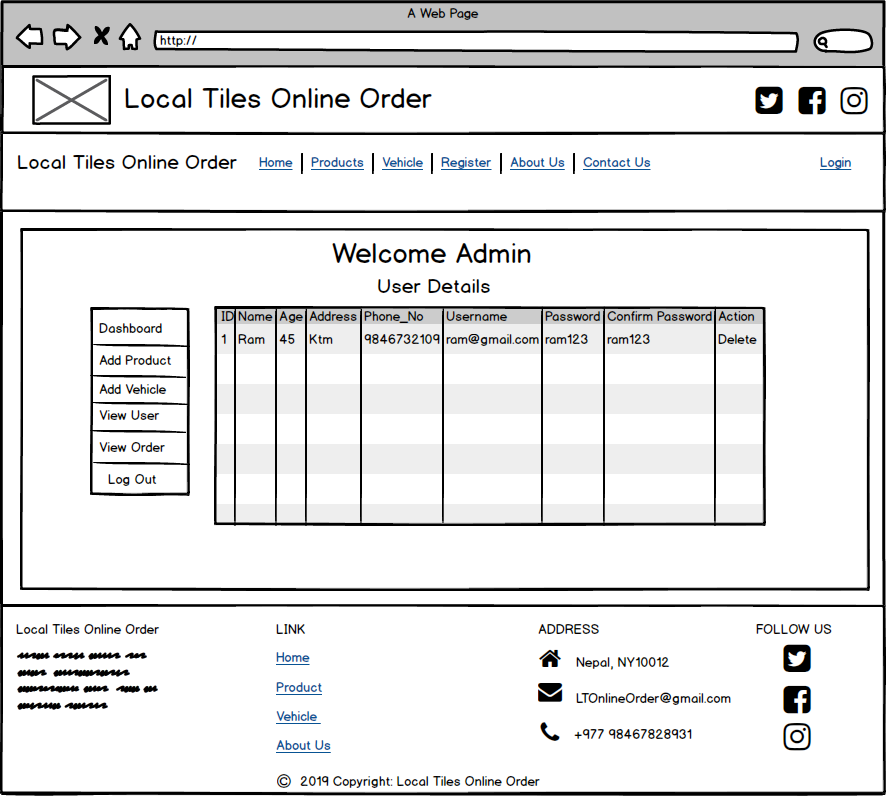


Figure 9: Admin view user details

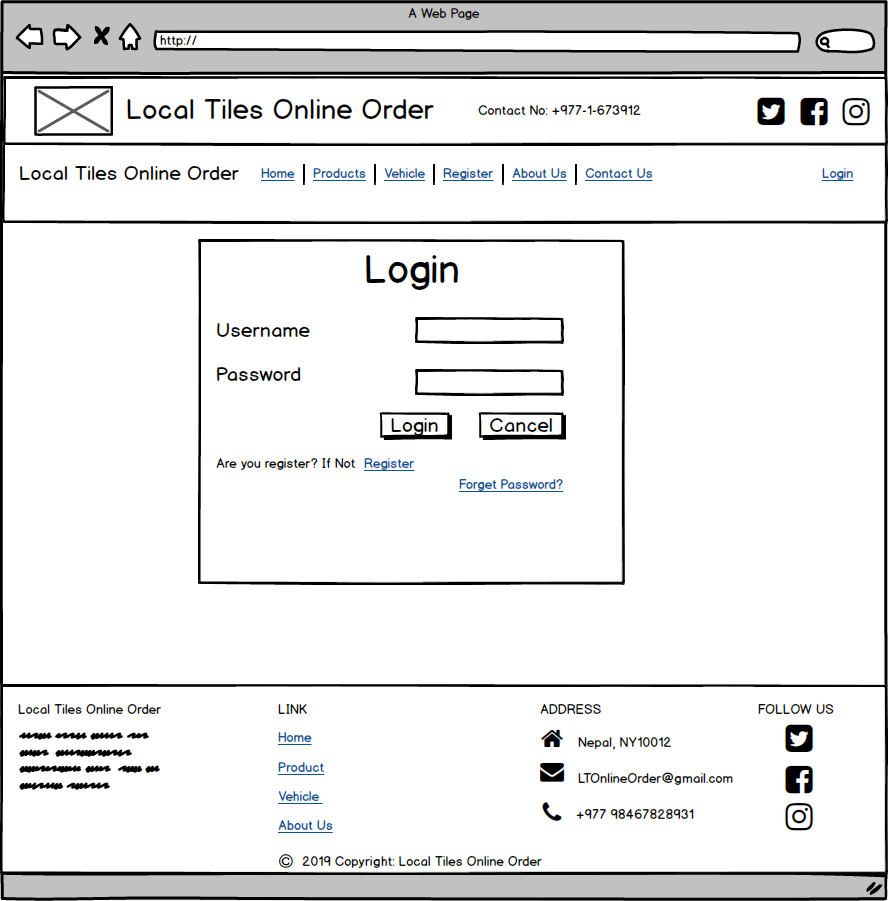


Figure 10: Login page

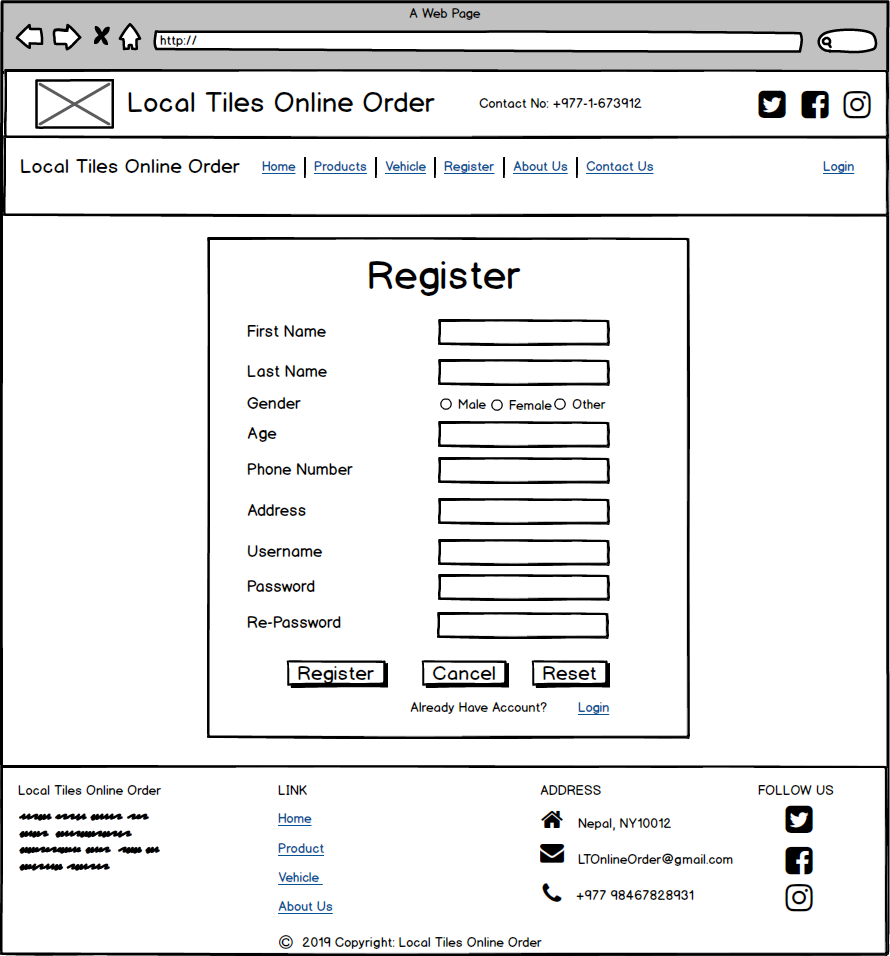


Figure 11: Register page

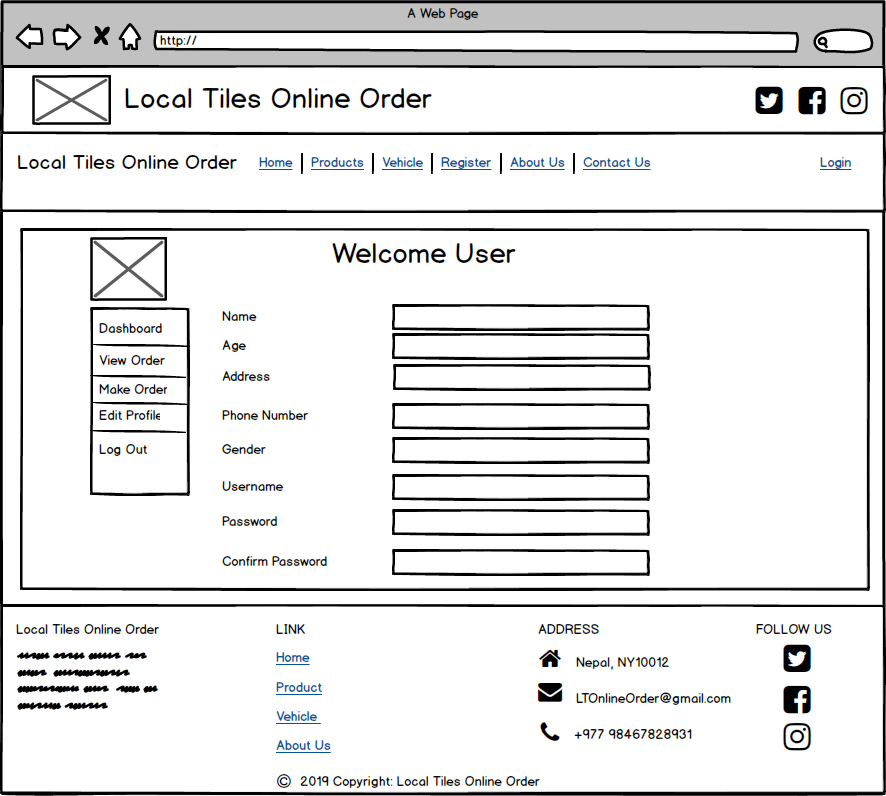


Figure 12: User dashboard

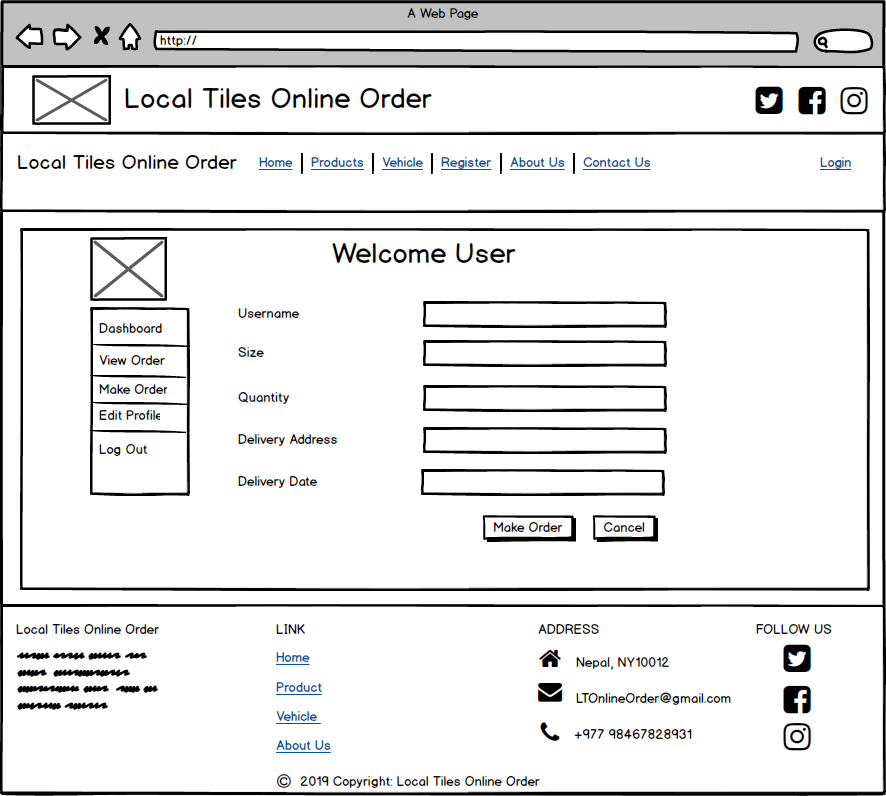


Figure 13: User Order

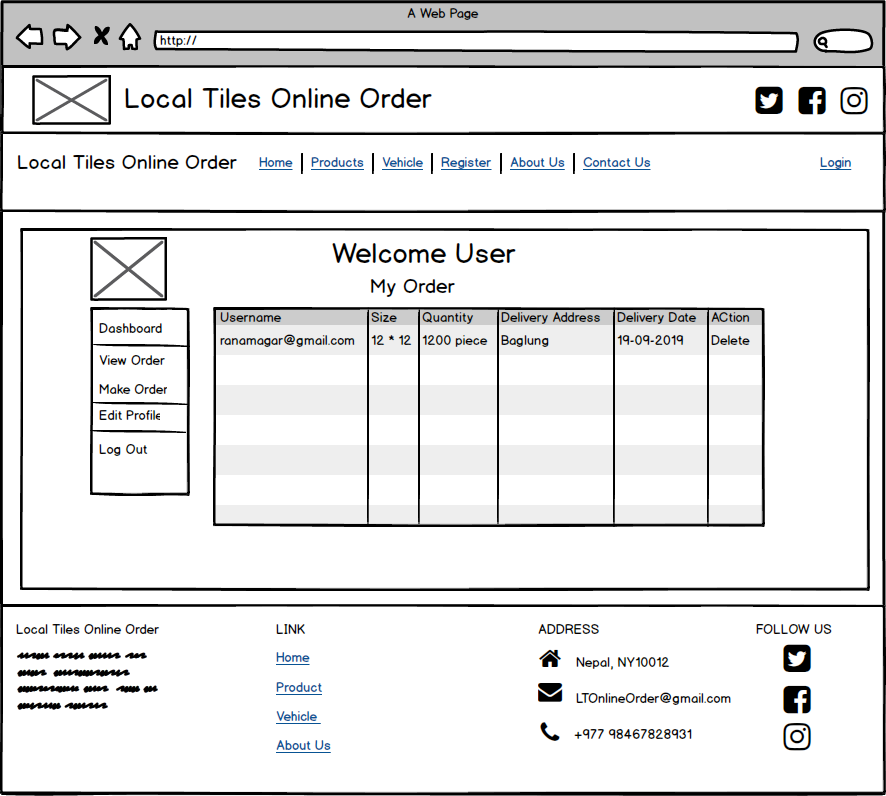


Figure 14: User view Order