DESIGN SPECIFICATION REPORT

Course	BLG-411E Software Engineering
CRN	13330
Year/Semester	2017-2018 Fall
Project Name	Transportation Management Optimization
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Submission Date	28/11/2017

1. INTRODUCTION

Design specification document is a visual description of the software project named Transportation Management Optimization. This document has great importance and effective steps for reach successful result. This design document provides so many advantages to have good communication between the different roles of the project and early preventions against misunderstandings and miscommunication for all stakeholders.

1.1 Goal

This design document includes the relationships between database, desktop and website applications of the software project named Transportation Management Optimization. The user interface examples and software model are also given in this document to allow the customer to review the project. Other purpose is of the design specification is to be used as a reference for developers. The goal of this document is to provide more information to stakeholders of the project, is aimed to prevent the confusions.

1.2 Contents and Organization

1.2.1 Data Model

The process of creating a data model in software engineering is important for project flow. In this part, for starters, the Data Model of this project is introduced in this design document. The Data model was explained with the use of the Entity Relationship (ER) diagrams in which shows details and relationships between database tables. In next step, these important data considerations have been showed. With the Data Flow Diagrams, the operating paths of the project have been presented.

1.2.2 Software Model

The software model part of this design document has four parts. The first part is System Architecture which includes the structure of the project. The Component Diagram part presents the inputs, outputs and the relationships between components. For each component, Class diagram is created and explained in detail. In final part, the Sequence/Communication diagrams are drawn for all user stories written before in Requirements Specification document.

1.2.3 User Interface Model

Designs can be better presented to customers through drafts made with different techniques. Mockups are used for this purpose. The important screen mock-ups for website and desktop applications are given in the last part of this document. Each mock-up is considered as an example for a user interfaces of the components.

2. DATA MODEL
2.1   General Data Model

- ✓ The Entity relation diagram is as shown below.
- ✓ User entity has attributes such as id, full name, address, email, username, authority, user type.
- ✓ The User type represents different users, such as admin, distributor and company official.
- ✓ For example, the admin or company official can handle the shipping and shipping detail sections. Distributor can give order.
- ✓ Shipping detail includes a map for delivery. There are ways to use this map. In order to create the road, two pool points are needed.
- ✓ Also inside of shipping detail, contain order entity. The Order entity holds the id of the distributor that issued it and its id, date, and status variables.
- ✓ In the order detail, it keeps from what kind of product and what order in which these products are located.
- ✓ Product holds the id and name values of the products.

Entity Relationship Diagram - Transportation Management Optimization
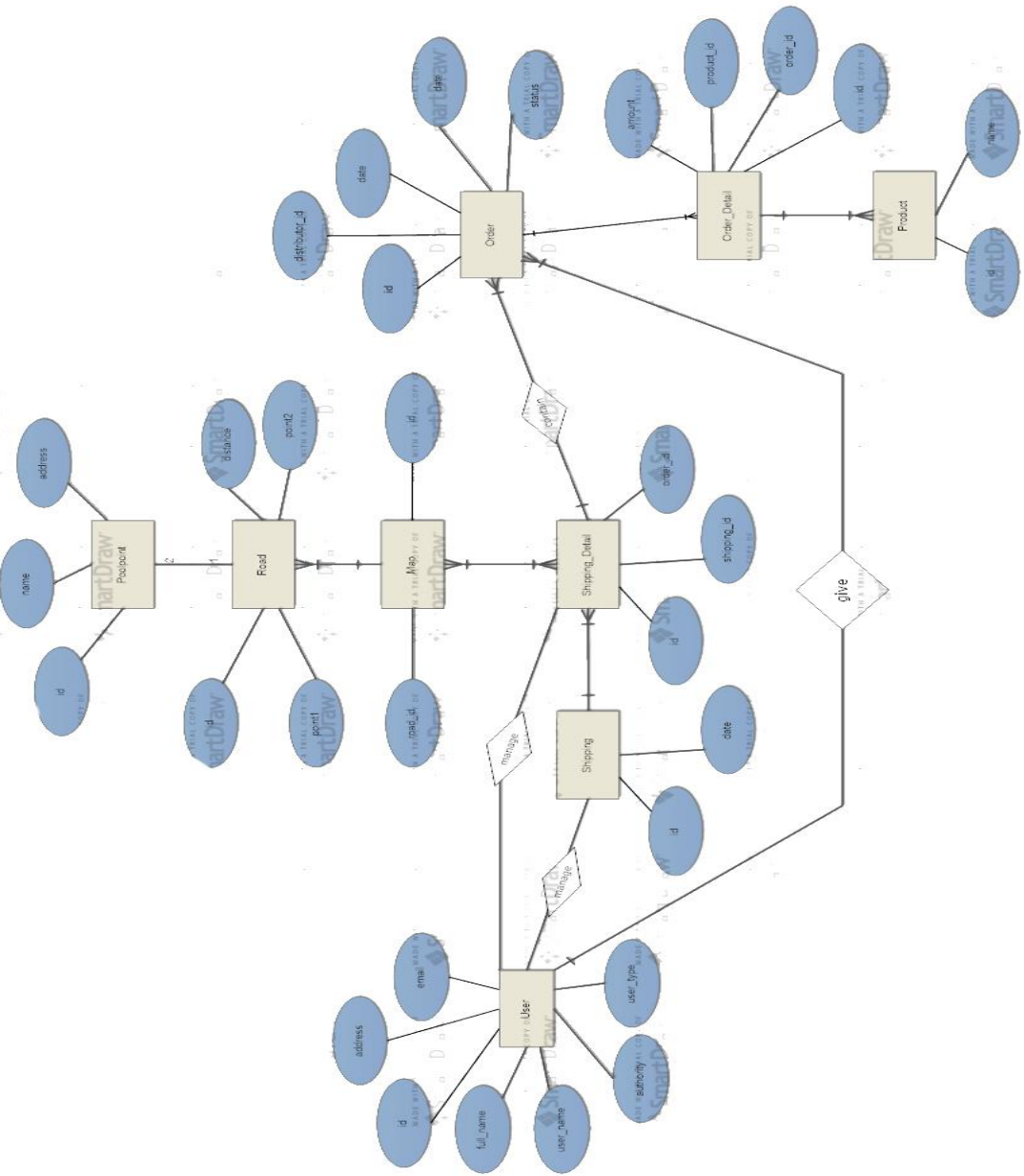
2.2 Important Data Considerations

Our application has two end point which is shown to the distributers on the web and company officials on the desktop. Both endpoints accesses the database remotely. As a database we use MYSQL and to transfer data we use JSON format. For our application we have User, Order, Product, Map etc. tables which are given on the ER diagrams in detailed. All ids are automatically created and values are assigned sequentially. Moreover, we put some constraints in terms of size, type etc. There are also triggers such as whenever user gives order, data about orders added automatically to Order Detail table.

For example User tables data transfer object is given below:

```
{
    "id": 321546,
    "full_name": "Fatih YILMAZ",
    "username": "fthylmz",
    "password": "***",
    "address": "Maslak, Sarıyer",
    "email": "yilmazfa16@itu.edu.tr"
    "type": 0
        …
}
```
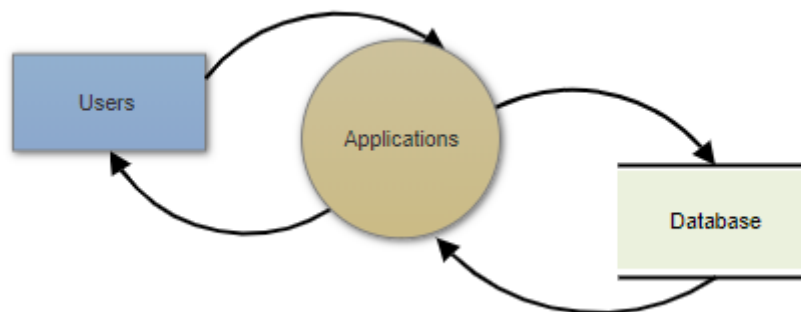
2.3   Data Flow

Data flow diagrams are given below from level 0 to 3.

2.3.1 Data Flow Diagram Level 0
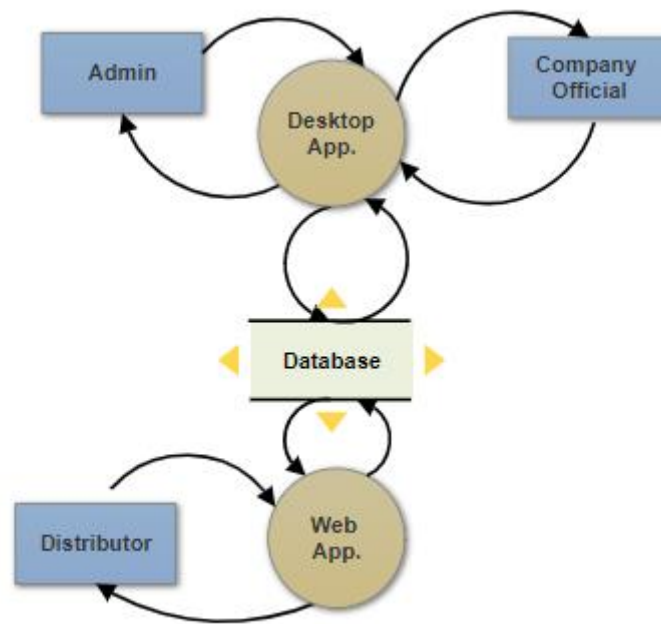
For Data Flow Diagram Level 0,

- ✓ Simply there are three component of the general system: Users, applications and database.
- ✓ User access database through applications and applications has both input and output for both users and database.

2.3.2 Data Flow Diagram Level 1

On the Data Flow Diagrams Level 1,

- ✓ Users types and applications are enhanced
- ✓ Admin and Company Official access database through Desktop Application
- ✓ Distributor access database through Web Applications
- ✓ Both Desk Application and Web Applications has relation and communication with database.
- ✓ Users gives input and takes output from the applications
- ✓ Applications gives and takes output from the database

### 2.3.3 Data Flow Diagram Level 2

For Data Flow Diagram Level 0,

- ✓ Desktop App. is enhanced to four services: User Manager, Login, Order Manager and Transportation Optimization Manager.
- ✓ Admin and Company Official can use Login, Order Manager and Transportation Optimization Manager services as users. Admin has an extra authority to use User Manager. User gives input ant takes output from the services.
- ✓ WEB app. is enhanced to four services Login, User Account Manager, Order Manager and Order History Manager.
- ✓ Distributor can use Login, User Account Manager, Order Manager and Order History Manager services.
- ✓ Database enhanced to its tables as seen below.
- ✓ Each services can access specified tables and can do add, delete and update operations. These services give input and takes output from the database.
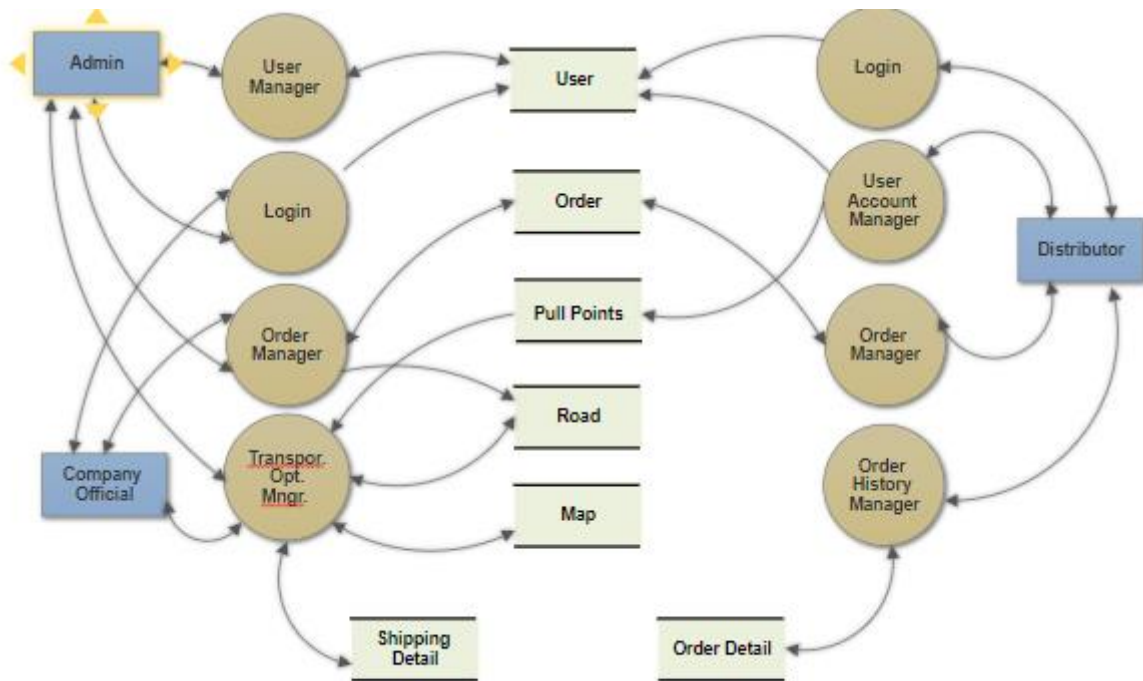
3. SOFTWARE MODEL
3.1   System Architecture

✓ In our system, we have three types of user as admin, company official and distributor.

✓ There are two applications and a database on the system.

✓ Desktop Application has four services: Login, Order Manager and Transportation Optimization. Admin and company official can use these services on applications.

✓ Admin has an extra authority to manage other users through User Manager service.

✓ Web Application has four services: services Login, User Account Manager, Order Manager and Order History Manager.Distributor can use these services on applications.

✓ Each application has relations and communications with database.

✓ Services in the applications, access specified tables in the database.

✓ Database is managed according to the Database rules.
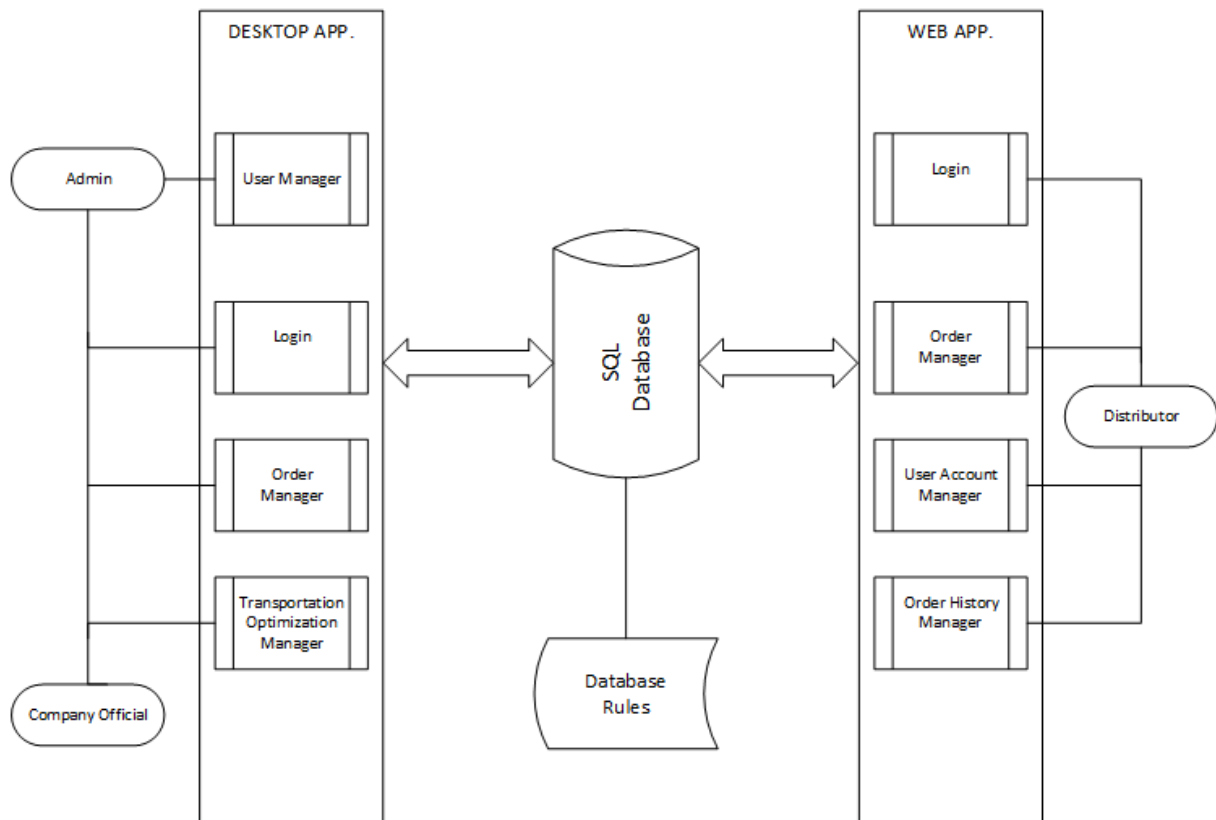
3.2 Component (Package) Diagram
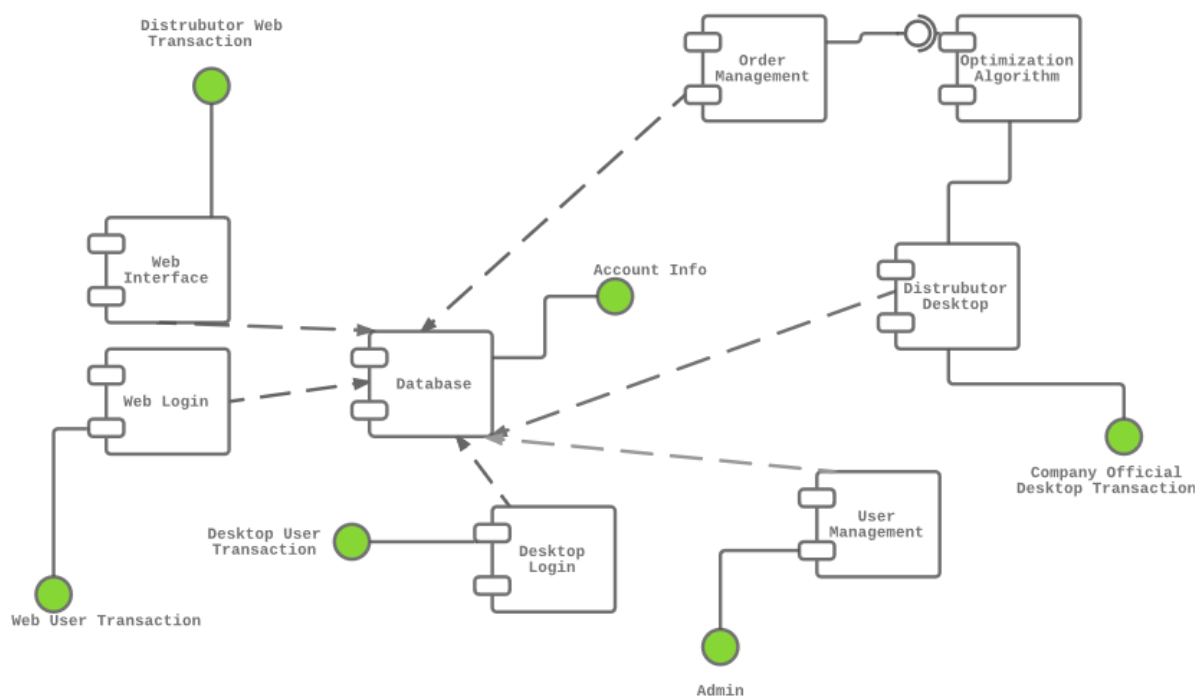
✓ Web interface, Web login, Database Desktop Login, User Management Order Management, Optimization Algorithm, Distributor Desktop, Desktop Login are our components.

✓ Web interface waits input from Distributor Web Transaction.

✓ Web login waits input from Web User Transaction

✓ Desktop Login waits input from Desktop User Transaction

✓ User Management waits input from Admin

✓ Distributor waits input from Company Official Desktop Transaction

✓ Optimization Algorithm takes from Order Management component

✓ Database waits input from account info

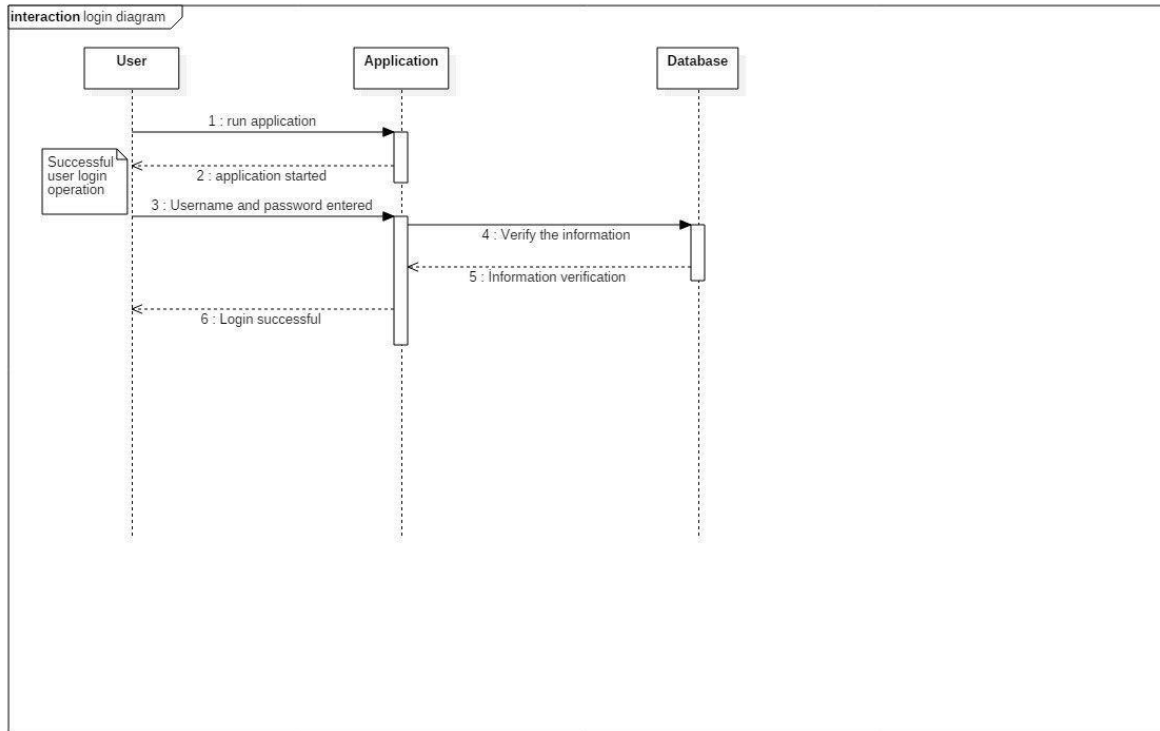✓ All outputs from the components return to Database.

3.3   Class Diagrams

✓ Below there is a class diagram showing the relation of the classes in the project to each other.

✓ The Admin, company Official and Distributor classes are inherited from the user class. As described in the ER diagram, these classes are related to each other in the form of N to N, 1 to N, or 1 to 1.

✓ The order and shipping classes are associated with a separate class, which is itself a detail.

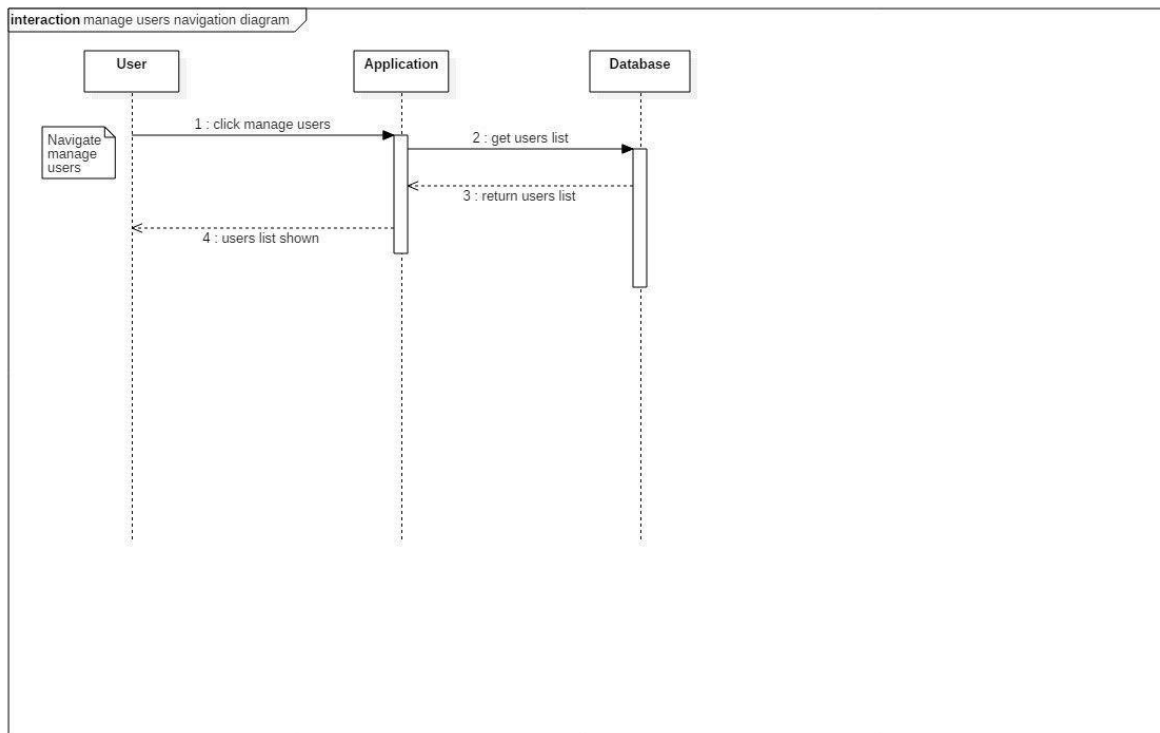✓ These detail classes show which user and which main class it depends on.
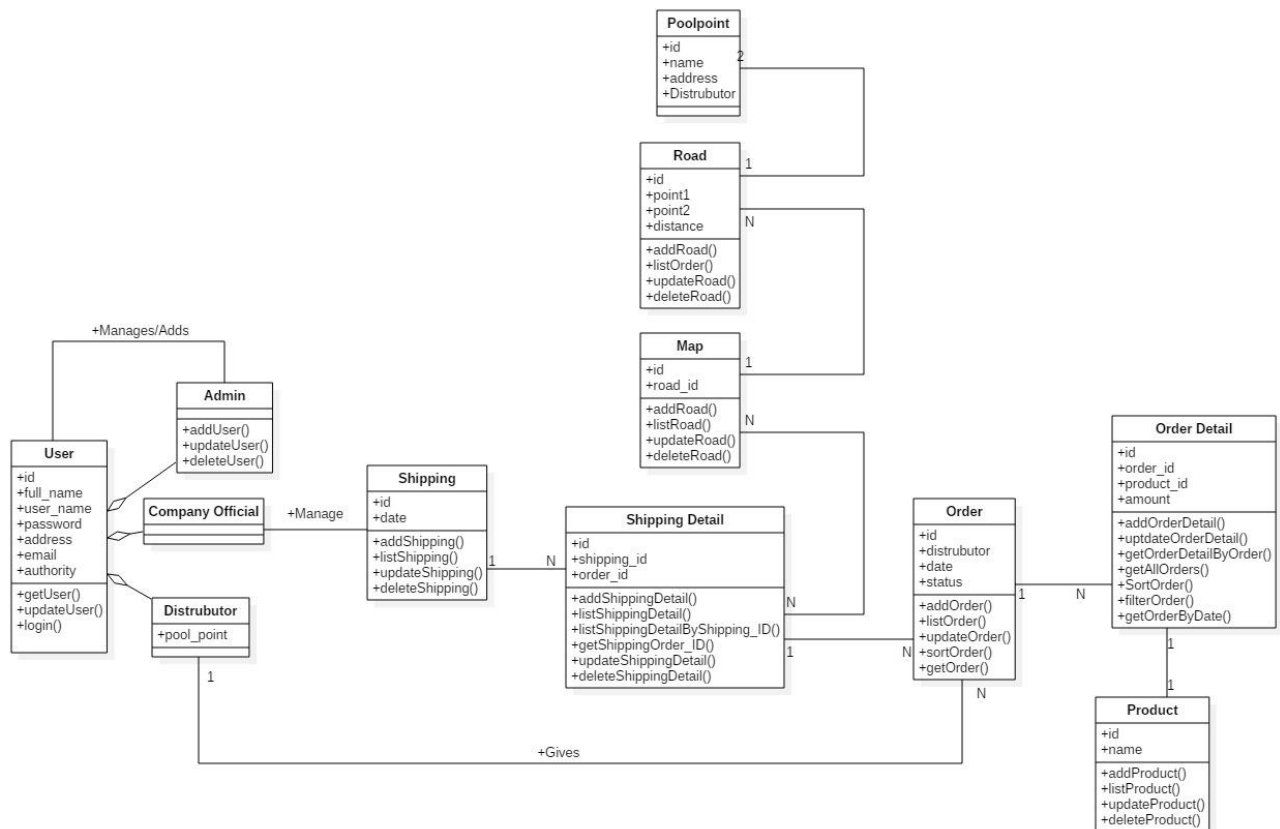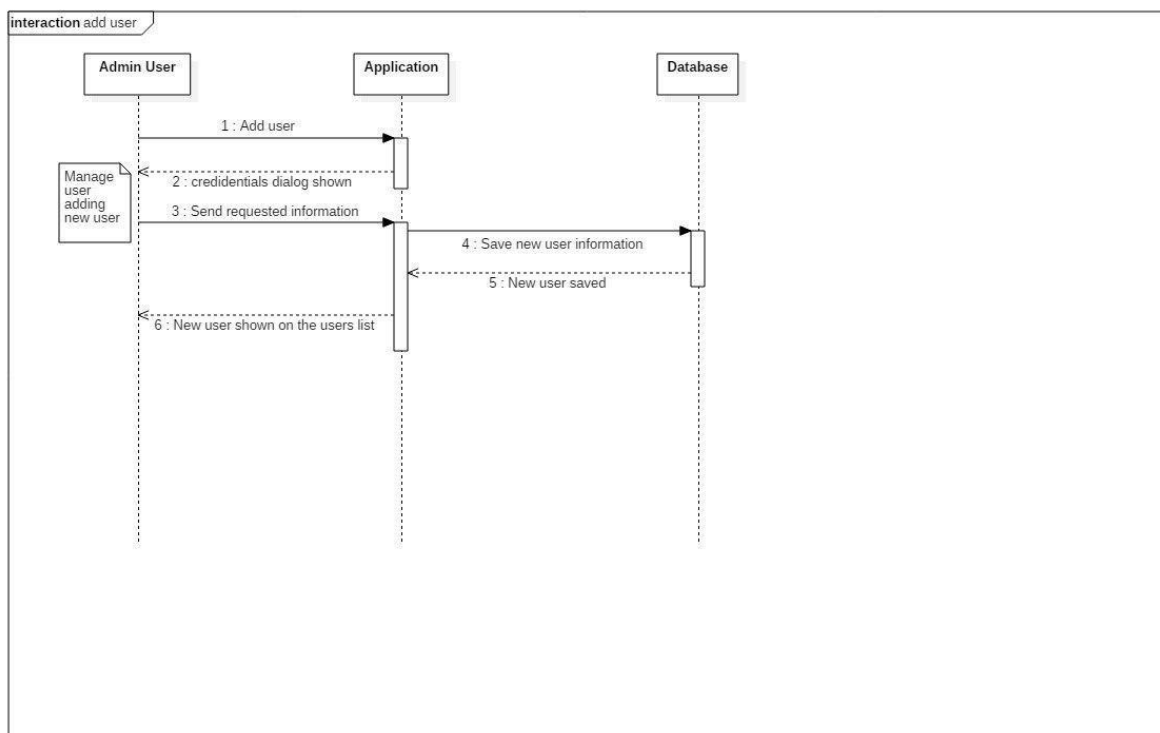
3.4   Sequence/Communication Diagrams

✓ When application starts login page is displayed.
✓ User logs in to the system with username and password.
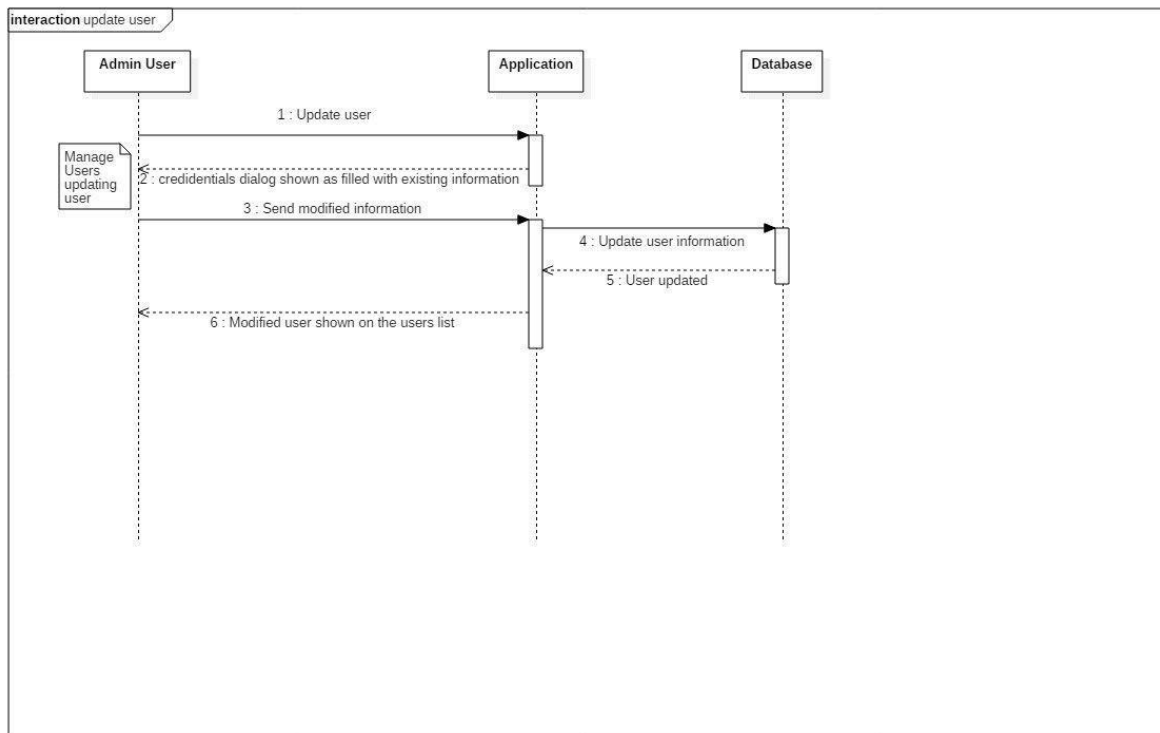✓ Login successful message is shown.

✓ Admin user can navigate to the manage users page.
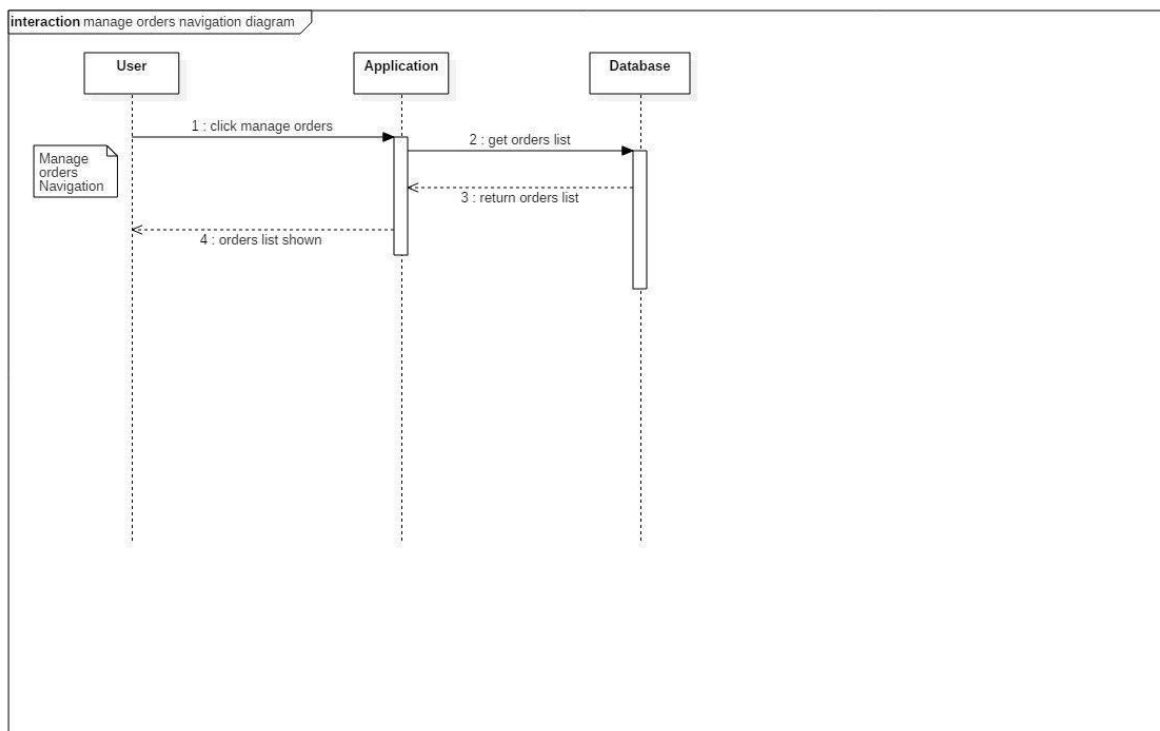✓ Admin user can see the list of users.

interaction manage users navigation diagram

| User | Application | Database |

1 : click manage users
Navigate manage users
2 : get users list
3 : return users list
4 : users list shown

✓ Admin user can add a new user.

interaction add user

| Admin User | Application | Database |

1 : Add user
Manage user adding new user
2 : credidentials dialog shown
3 : Send requested information
4 : Save new user information
5 : New user saved
6 : New user shown on the users list

✓ Admin user can update an existing user.

interaction update user

Admin User — Application — Database

1 : Update user

Manage Users updating user

2 : credidentials dialog shown as filled with existing information

3 : Send modified information

4 : Update user information

5 : User updated

6 : Modified user shown on the users list

✓ User can navigate to the manage orders page.
✓ User can see the list of orders.

interaction manage orders navigation diagram

User — Application — Database

1 : click manage orders

Manage orders Navigation

2 : get orders list

3 : return orders list

4 : orders list shown

✓ User can sort the orders.

interaction sort order operation

| User | Application |

1 : Click table column to sort table

Manage order Sort table

2 : Table sorted based on related column
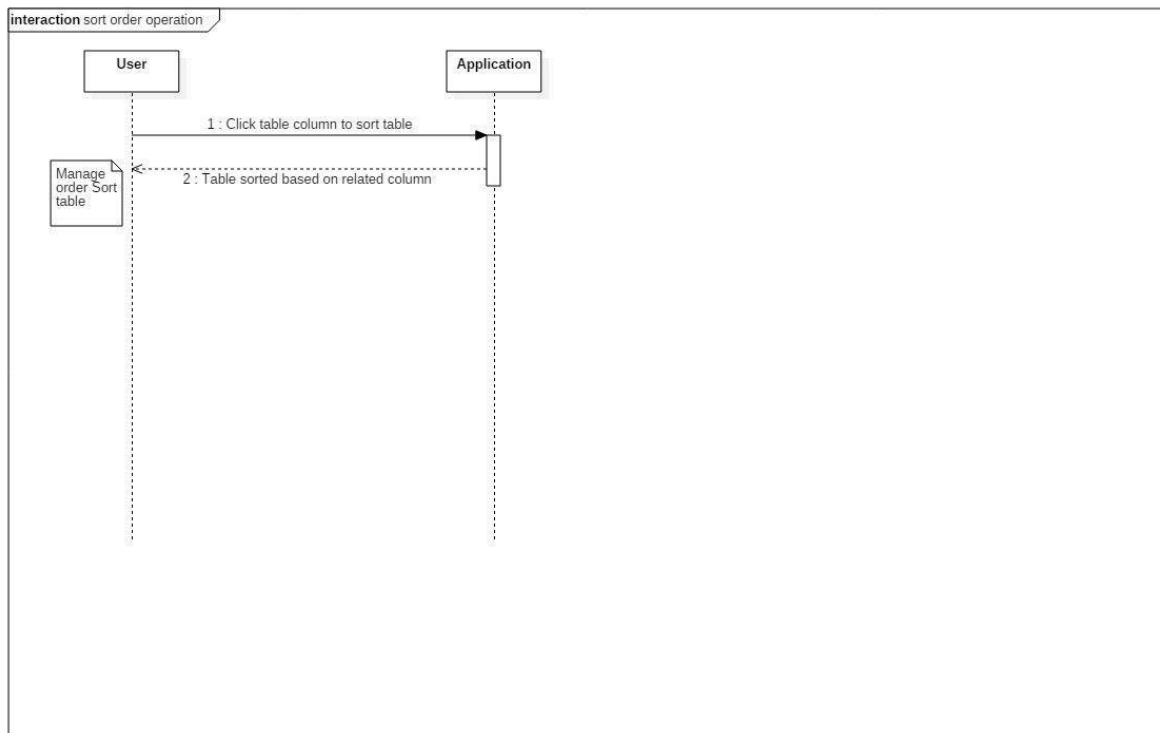
✓ User can search a specific order.

interaction search

| User | Application | Database |

1 : fill search textbox and send

2 : get orders by searched text

Search operation for orders

3 : Return list of orders

4 : show searched orders
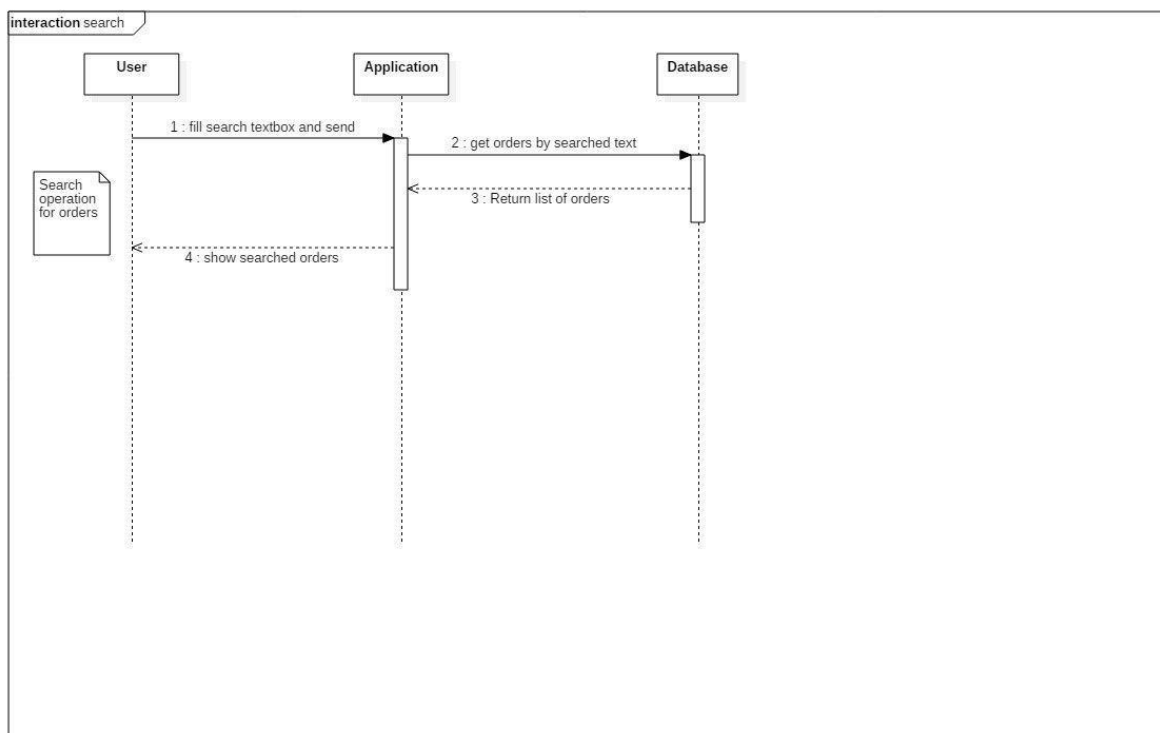
✓ User can change the status of selected orders.

interaction change status of order

User   Application   Database

1 : select orders

2 : Press confirm button

3 : update order status

Update order status

4 : updated order status

5 : show updated order list
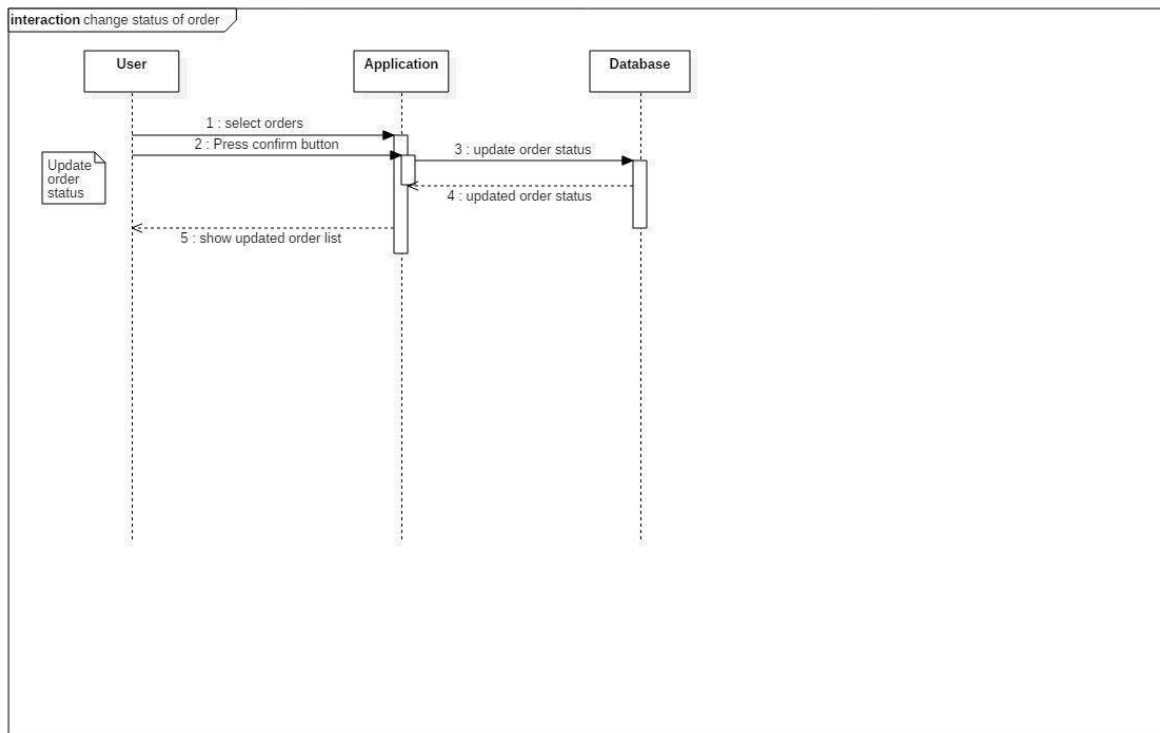
4. USER INTERFACE MODEL

4.1 WEB App. GUI

4.1.1 Login
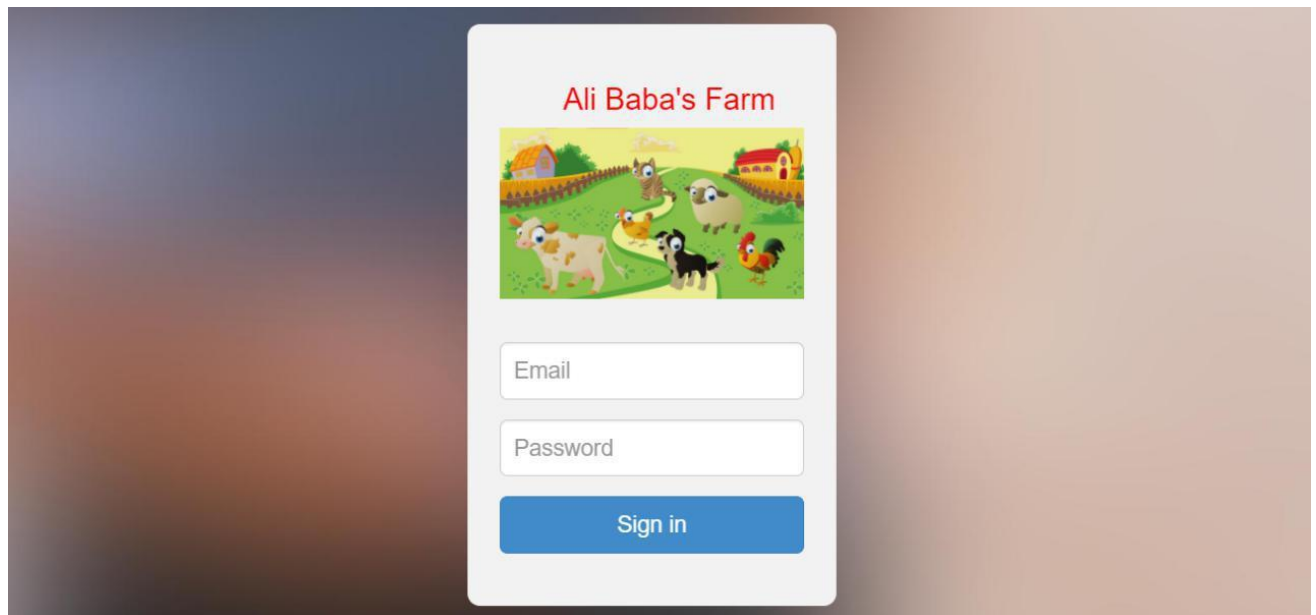
4.1.2 Menu
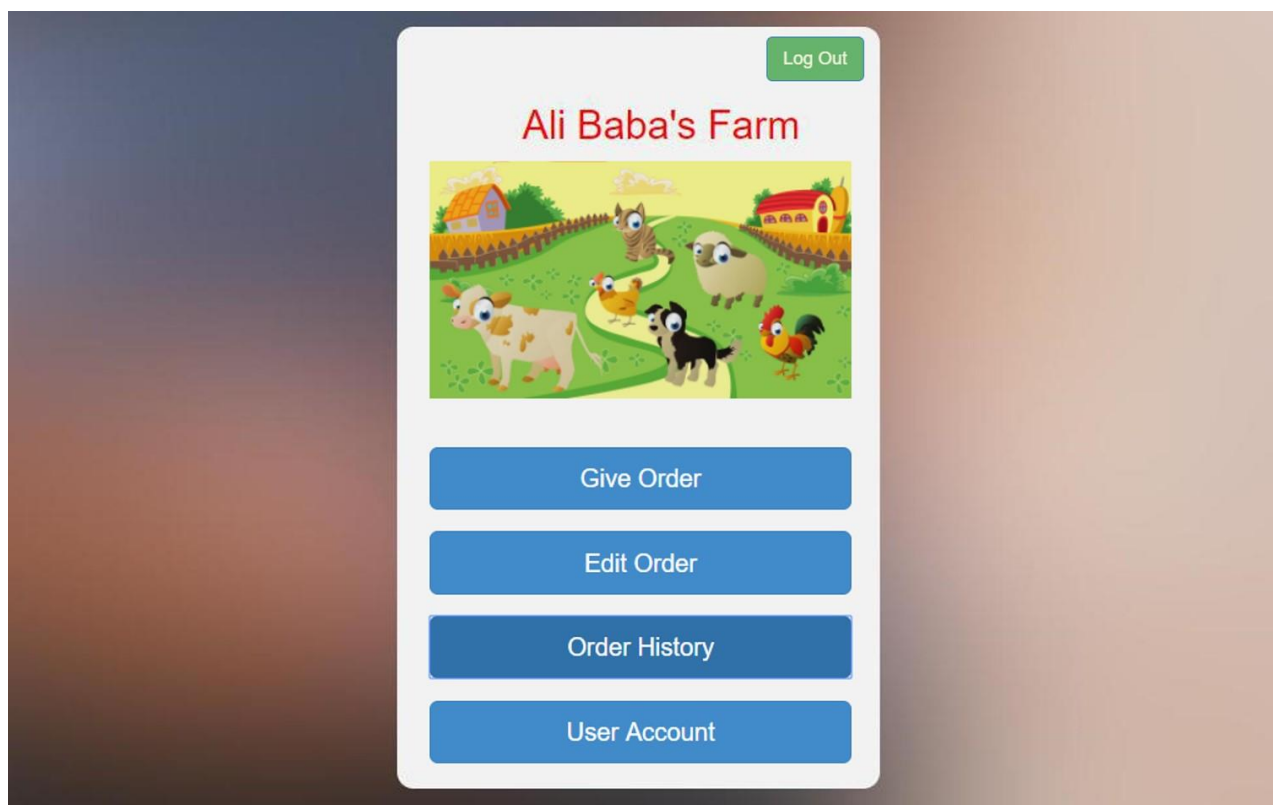
4.1.3 Give Order

4.1.4 Order History

Order ID	Product Name	Amount (package)	Date	Status
	Milk	12	13.11.2017	
1	Yoghurt	9	13.11.2017	Pending
	Cheese	15	13.11.2017	
	Milk	8	19.11.2017	
2	Yoghurt	5	19.11.2017	Confirmed
	Cheese	6	19.11.2017	

4.1.5 Edit Order

4.2   Desktop App GUI
4.2.1 Login

4.2.2 Manager Orders

	Nr	Distributor	Product	Amount	Status	Date
☐	1	A	Milk	80pkg	Pending	22.11.2017
☑	2	A	Cheese	65pkg	Pending	22.11.2017
☐	3	B	Yogurt	50pkg	Confirmed	23.11.2017
☑	4	B	Milk	90pkg	Confirmed	23.11.2017
☐	5	C	Milk	120pkg	Pending	25.11.2017
☑	6	C	Yogurt	45pkg	Pending	25.11.2017
☐	7	C	Chese	70pkg	Confirmed	25.11.2017

Tabs: Manage Orders | Order History | Manage Users | Route Draw

Buttons: Confirm | Select All | Deselect All | ▼ | Q search

4.2.3 Order History

Nr	Distributor	Product	Amount	Status	Date
1	A	Milk	80pkg	Pending	22.11.2017
2	A	Cheese	65pkg	Pending	22.11.2017
3	B	Yogurt	50pkg	Delivered	27.11.2017
4	B	Milk	90pkg	Delivered	27.11.2017
5	C	Milk	120pkg	Pending	25.11.2017
6	C	Yogurt	45pkg	Pending	25.11.2017
7	C	Chese	70pkg	Delivered	27.11.2017

Tabs: Manage Orders | Order History | Manage Users | Route Draw

Q search

4.2.2 Manage Users

Nr.	Full Name	Username	Password	Address	E-Mail	Type
1	Fatih YILMAZ	fthylmz	*********	-	-	Admin
2	Okan YILDIRIM	oknyldrm	*********	-	-	COff.
3	Hasan E. ARI	hsnmrr	*********	-	-	COff.
4	Özgür AKTAŞ	ozgurakta	*********	-	-	COff.
5	Ali UÇAR	aliucar	*********	-	-	COff.
6	-	-	*********	-	-	Dist.
7	-	-	*********	-	-	Dist.

Tabs: Manage Orders | Order History | Manage Users | Draw Route

Buttons: Add User | Remove User | Update User | ▼ | Q search

4.2.2 Draw Route

	Nr	Distributor	Product	Amount	Status	Date
☐	1	A	Milk	80pkg	Confirmed	22.11.2017
☑	2	A	Cheese	65pkg	Confirmed	22.11.2017
☐	3	B	Yogurt	50pkg	Confirmed	23.11.2017
☑	4	B	Milk	90pkg	Confirmed	23.11.2017
☐	5	C	Milk	120pkg	Confirmed	25.11.2017
☑	6	C	Yogurt	45pkg	Confirmed	25.11.2017
☐	7	C	Chese	70pkg	Confirmed	25.11.2017

Tabs: Manage Orders | Order History | Manage Users | Draw Route

Buttons: Draw Route | ▼ | Q search