Cairo University
Faculty of Computers and Artificial Intelligenc

CS251

Intro. to Software Engineering

Toffee

Software Design Specifications

Version 1.0

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Team

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Document Purpose and Audience

Purpose

This software design document is for an e-commerce system named toffee. This document will break down all the components of the toffee project into small components to describe what the purpose of each one is and how it will be implemented.

The purpose of this document is to ensure that the final outputted software product meets the requirements of the customer in all aspects as its primary functions, and non primary functions. it will serve as a tool for verification and validation for the final product.

Audience

- Project Manager
- Development Team
- Stakeholders

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System Models

I. Architecture Diagram

A suitable software architecture design for the toffee project is a 3-tier system that includes:

- **Presentation Tier**
  - This tier has all the user interface logic. It is considered the linking tier between the actors that use the application and the rest of the application functions.
- **Application Tier**
  - This tier has all the functionalities of the application like the system logic component. It considers the control tier between the outer actors and the inner database system.
- **Data Tier**
  - The last tier in software architecture design.It is used to store and manage the system data as users, orders, and catalog data.

NOTE** The rest of the software architecture component will appear in the **C4 Model**

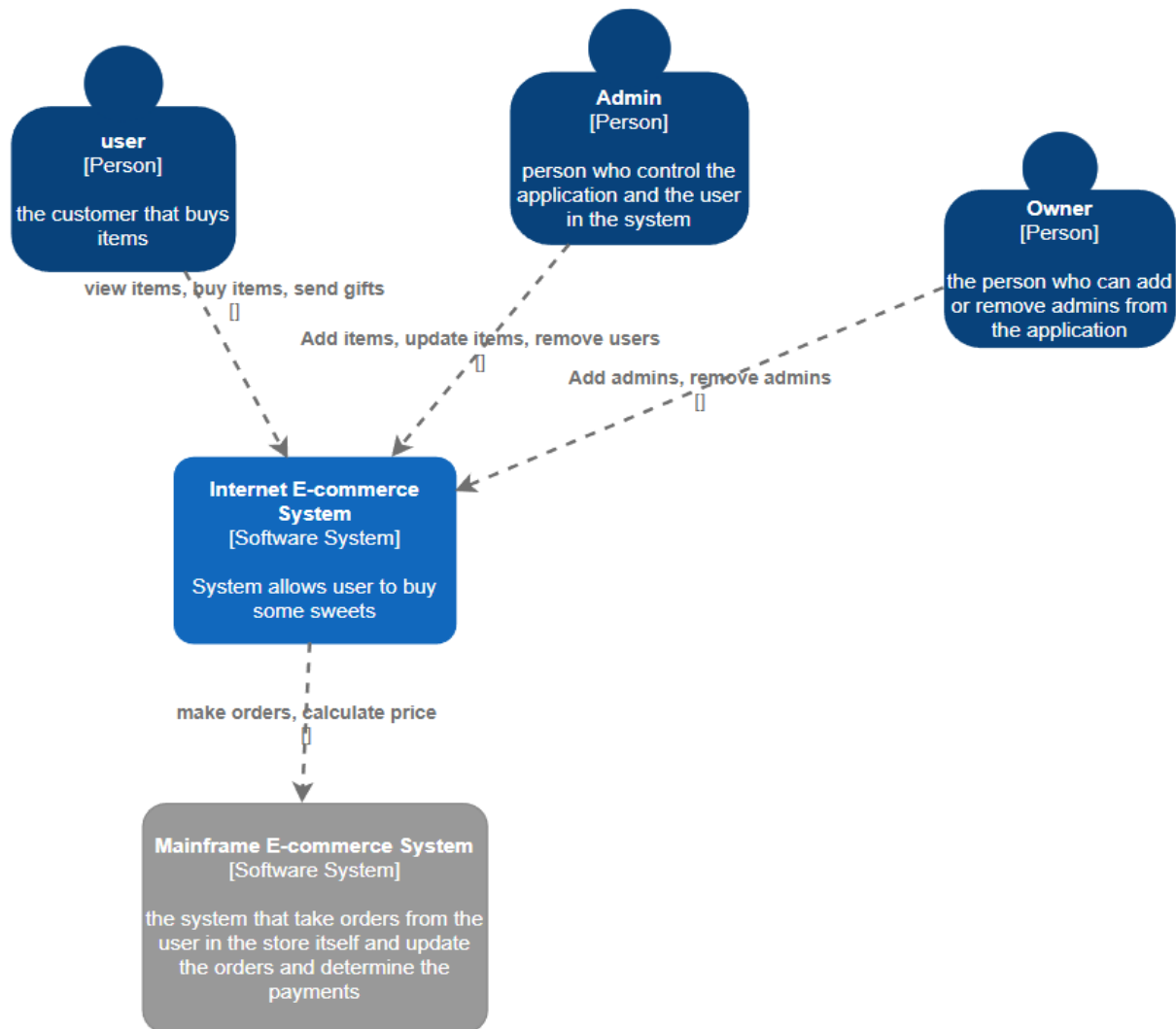**CU – FCAI – CS251 Introduction to Software Engineering – 2023 - Software Design Specifications**
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C4 Model

1. System Context Level

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2. Container Diagram Level

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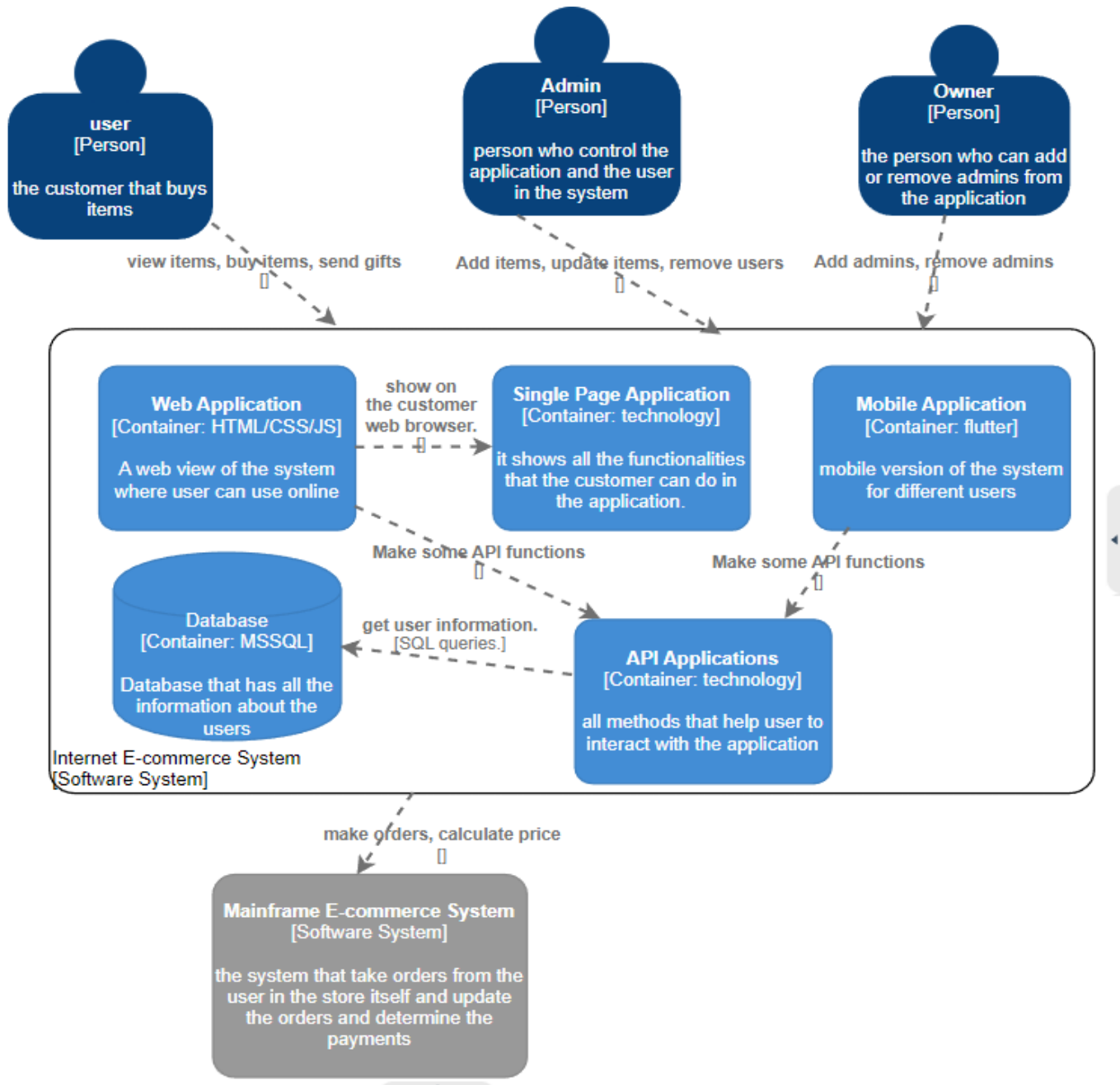
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3. Component Diagram Level

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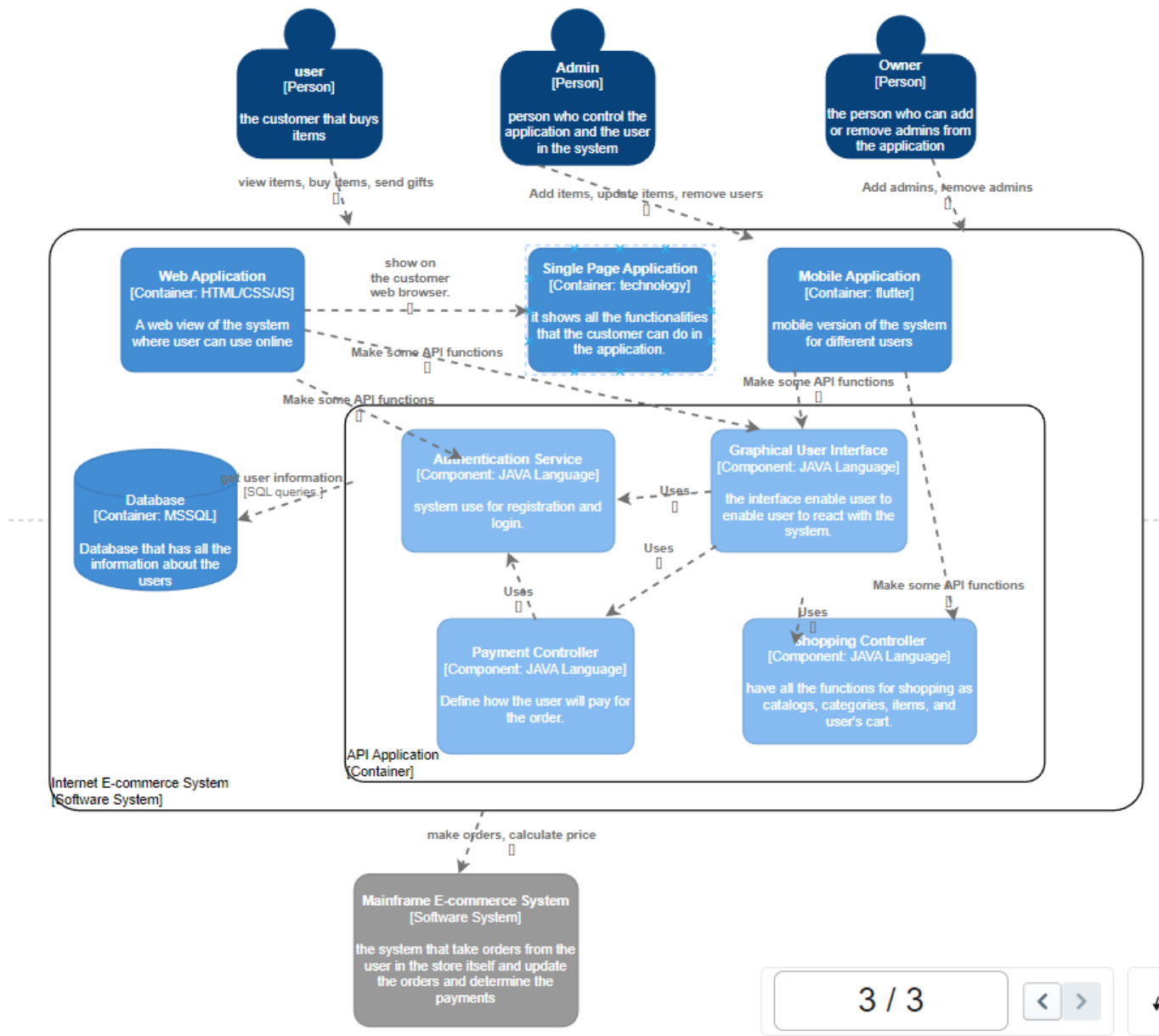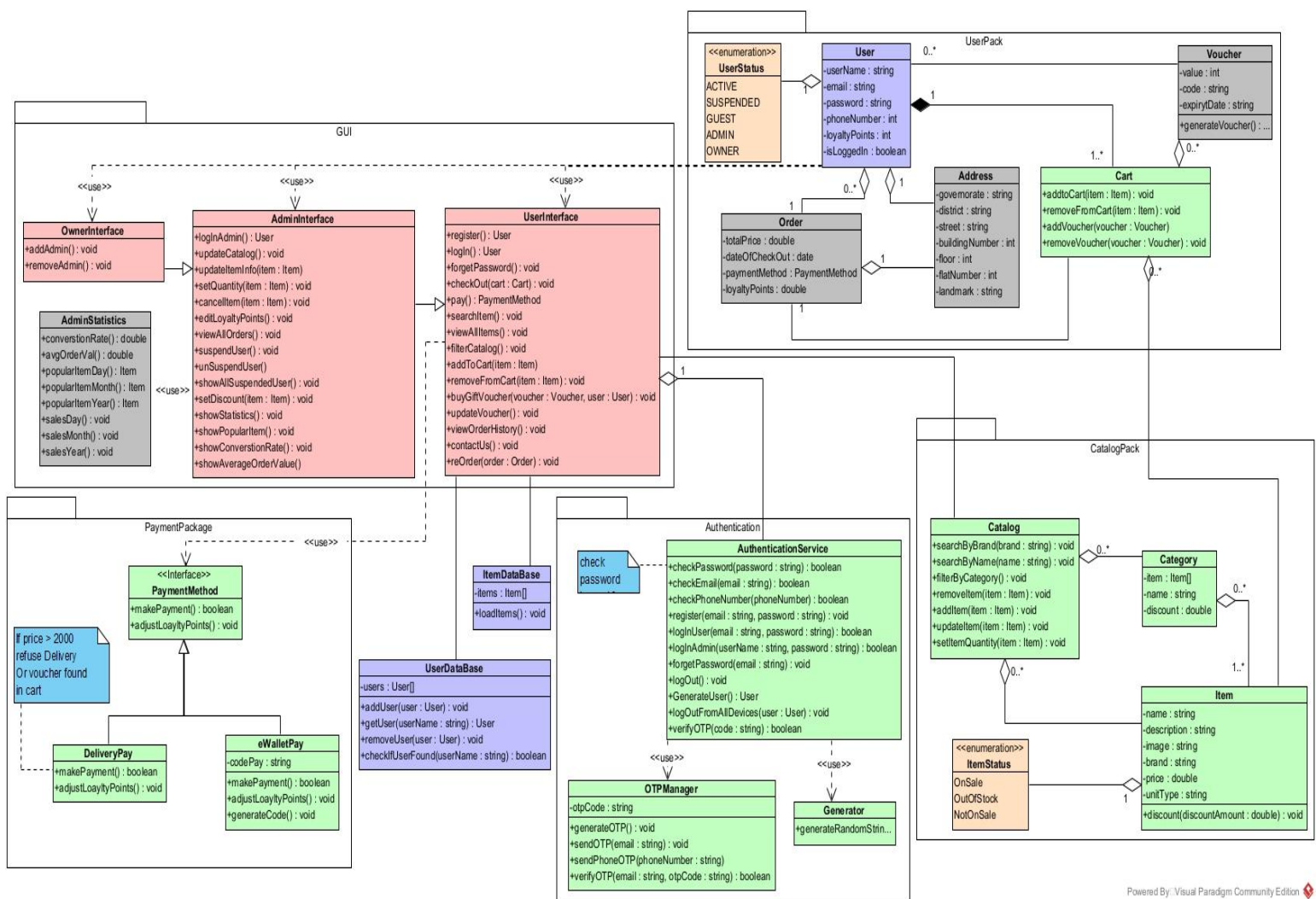
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4. Code Level

This level appears in class, sequence, and state diagrams in this SDS document.

II. Class Diagram(s)

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III. Class Descriptions

Class ID	Class Name	Description & Responsibility
1.	User	It is a simple class used to hold the data of any user that will use the application. The user may be: ● Normal customer. ● An Admin. ● An Owner. The data it holds as: Name, email, password, phone number, other application data as a cart for each user, vouchers, the status of the user (active, suspended, guest) And a Boolean for logged-in to check if a user is logged-in to the system or not.
2.	Address	This class has all the basic information about the address of each user in the system: ● Governorate, District, Street, building number, floor, flat Number, landmark.
3.	UserStatus	An Enumeration class is used to change the status of the user from: ● Active. ● Suspended. ● Guest. ● Admin. ● Owner.
4.	UserInterface	It is the class that is used when a normal customer is using the application. It has all the functionality that is mentioned in the SRS for the user. Responsibility of the class it handles the user's functions requirements as: ● register. ● Login. ● forget password. ● checkout order ● determine payment method. ● search for items. ● view all items. ● filter catalog by certain item. ● add items to cart. ● remove items from cart. ● buy gift vouchers. ● view order history. ● make reorder. ● contact the store.

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Class ID	Class Name	Description & Responsibility
5.	AdminInterface	It is the class that is used when an admin is using the application. The admin can make all the functionality of a normal user plus modify some data. Responsibility of the class handles the admin's functions requirements as: ● update catalog. ● Update item info. ● Set quantity for items. ● Cancel items. ● View all orders. ● Suspend certain users. ● Unsuspend certain users. ● Set discount for items. ● Show some admin statistics.
6.	AdminStatistics	It is a class that is used to make the implementation of functions as simple as possible and to separate concerns of each method it handles all the statistical methods the admin could use in the application as: ● showing the popular item in a certain time duration (day, month, year) ● show statistics of the store. ● Calculate conversion rate. ● Calculate average order value.
7.	OwnerInterface	It is the class that is used when an owner is using the application. The owner can do two more functions: ● add new admins. ● remove them for your place.
8.	Payment method	This interface is used to implement different payment's classes as: ● Delivery Pay. ● E-wallet pay. It has some functionality to make the payment and adjust loyalty points based on the payment method.
9.	DeliveryPay	This class is used to have all functionality of delivery pay. It is responsible for determining how the payment operation will go and it adjusts the user loyalty points based on what he bought. Also, It checks the price of payment to see if it was above 2000 egp then refuses the payment.
10.	eWalletPay	This class is used to have all functionality of e-wallet pay its responsibility to determine how the payment operation will go, generating a code for the user and closing it after 24hrs, and it adjusts the user loyalty points based on what he bought.
11.	AuthenticationService	This class is used to handle all the authentication operation in the system as: ● Log-in. ● Registration. ● Forget password. ● Log out. ● Check the password if it has some constraints. ● Check email to follow certain guidelines.
12.	OTPManager	This class is used to handle the OTP operations in the application whether it is used to: ● Send an OTP msg to a certain email. ● Generate a code for the OTP. ● Verify if the OTP user used is correct.

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Class ID	Class Name	Description & Responsibility
13.	Cart	Each user in the system has one cart where he can: ● Add items to the cart. ● Remove items from the cart.
14.	Voucher	It identifies the basic data for the vouchers as: ● Voucher code. ● An expiry date.
15.	Order	The order class has some basic data as: ● The total price of the items. ● Date of checkout. ● Payment method used to confirm the order. ● Loyalty points gained from this order.
16.	Catalog	This class has all the categories and items that the store has. It provides some methods to the user: ● Search for certain items by brand, or name. ● Filter catalog based on a certain category. It provides more functions for the admin as: ● Remove items from the catalog. ● Update item. ● Add a new item. ● Set the number of certain items in the catalog
17.	Category	This class is used to differentiate between some items based on a certain category. This helps the user find the item he needs and makes it easy for the admin to add discounts based on a certain category.
18.	Item	This class identifies the item in the application. It shows some of its basic data: Name, description, image, brand, price, item-unit. Also, it provides a discount method for the admin.
19.	ItemStatus	An Enumeration class that is used to change item status from: ● On sale ● Out of the sale ● Not in the stock
20.	UserDataBase	Its class is used to control the database of the system when the user is registered for the first time it is appended to the database this class has some responsibilities as: ● Add users to the database. ● Get users from the database. ● Remove users from the database. ● Check If a user is found in the database.
21.	ItemDataBase	This class is used to store all items data and has method load to fill the catalog.
22.	Generator	This class is used to generate random strings that will be used later, its methods: ● generateRandomStrings.

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IV. Sequence diagrams

1. Register User

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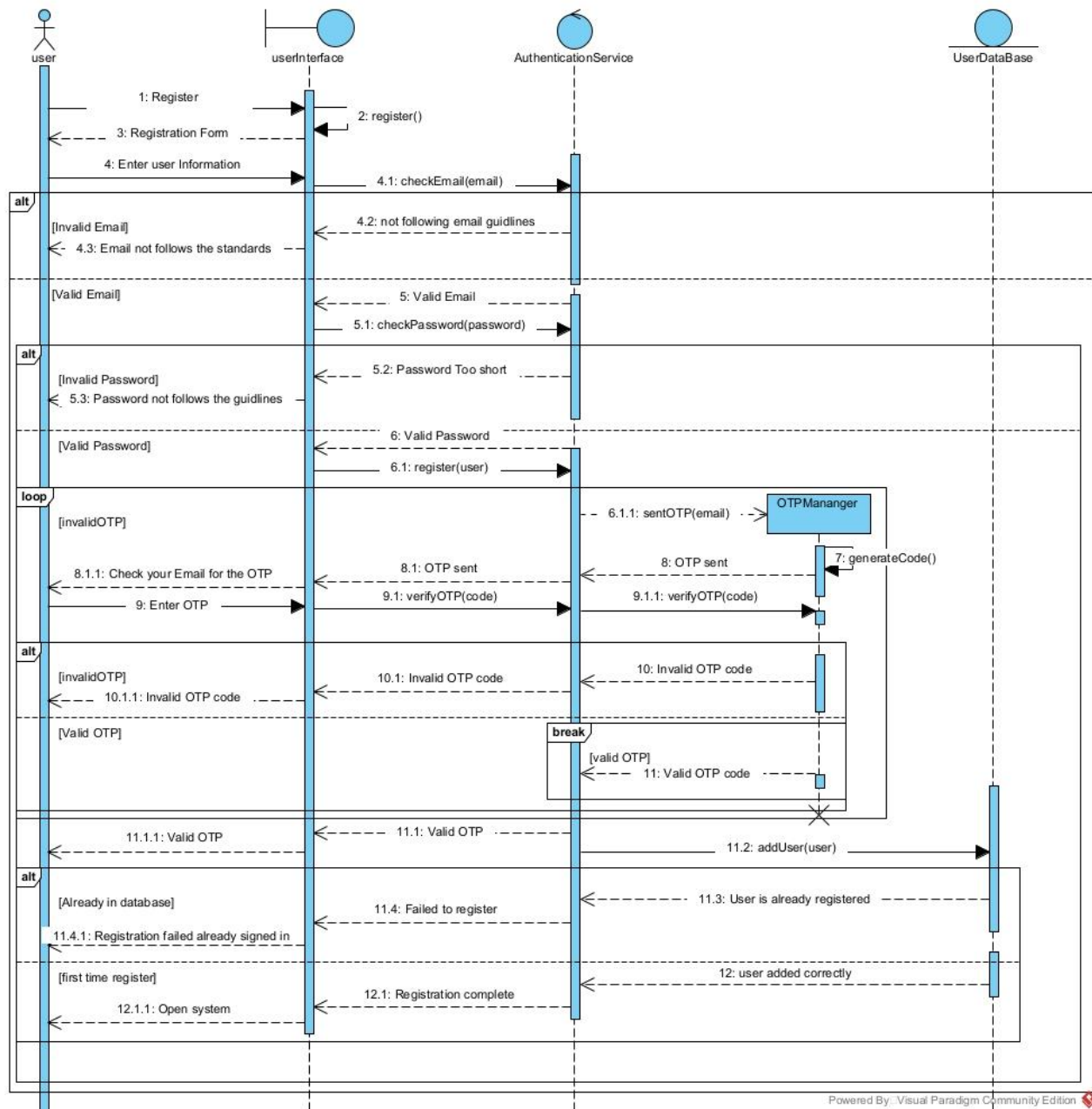
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2.1 Suspend User

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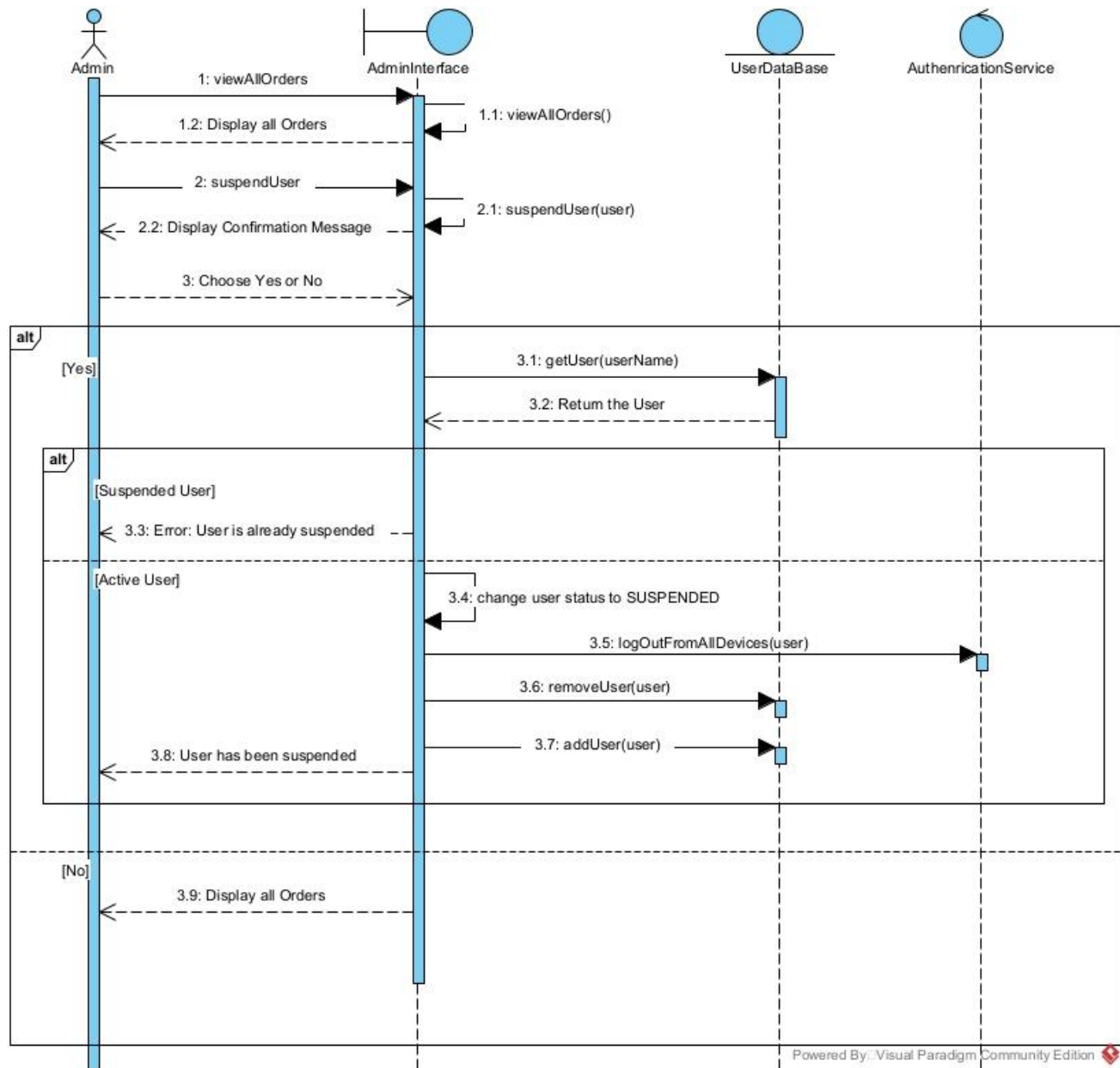
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2.2 Unsuspend User

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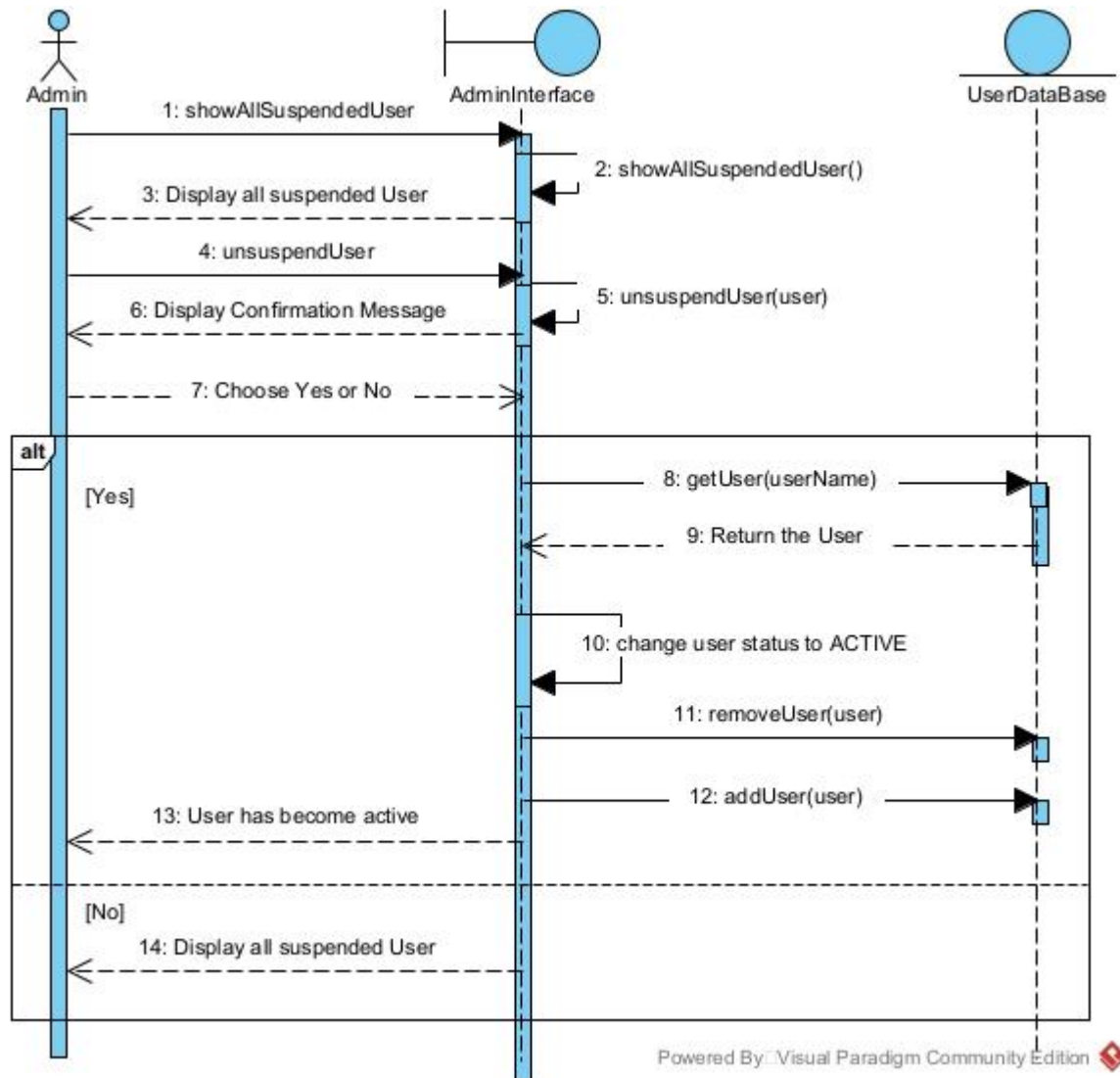
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3. Admin LogIn

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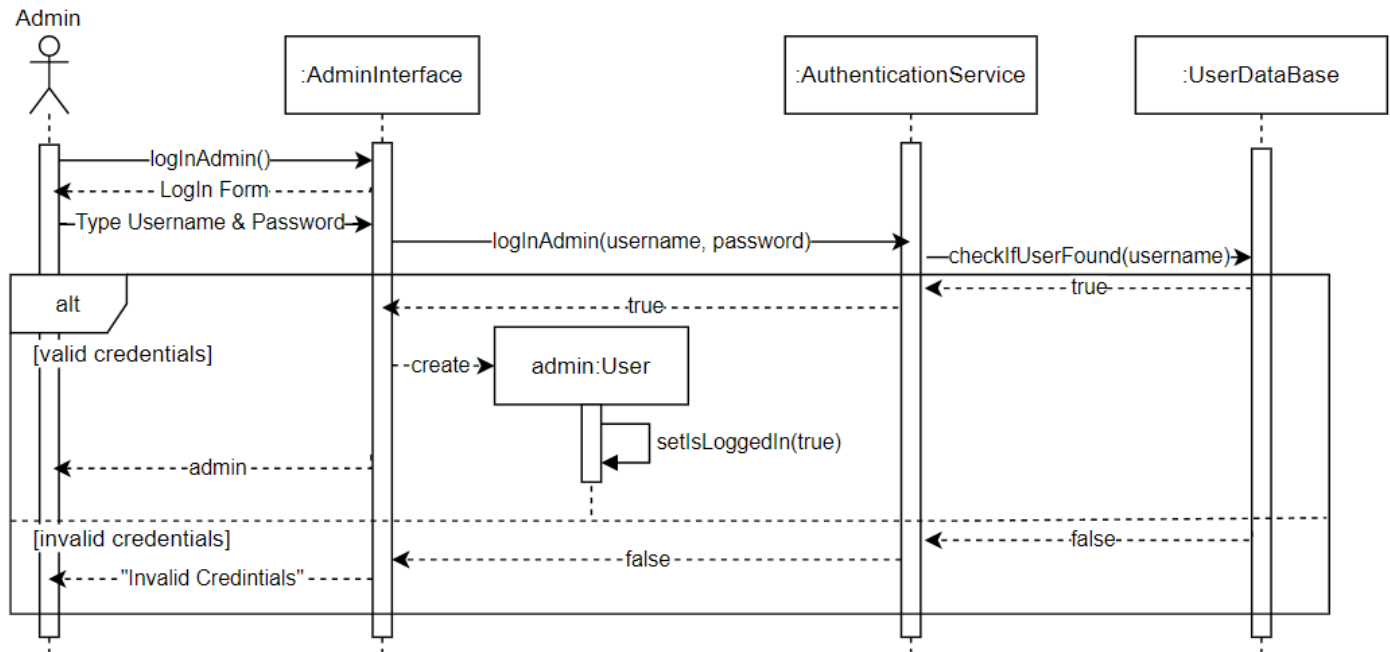
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4.1. Remove Admin

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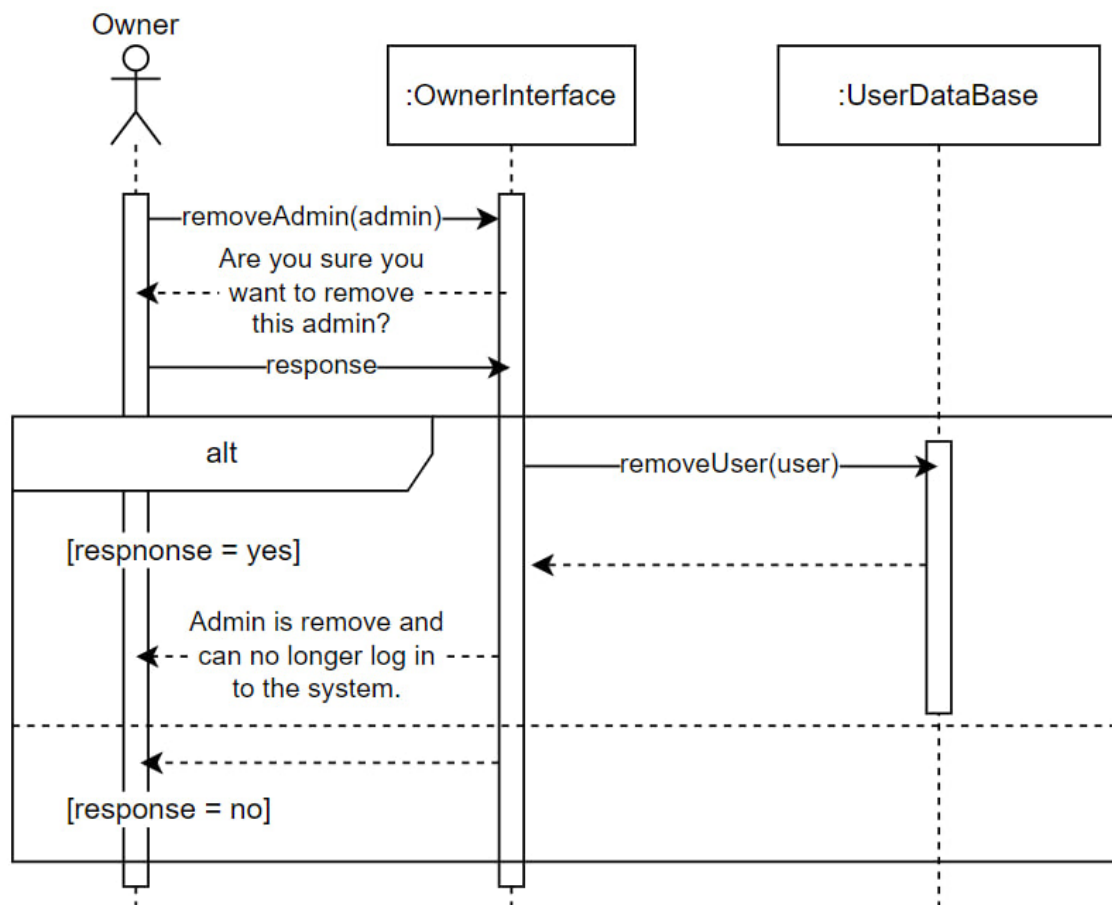
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4.2. Add Admin

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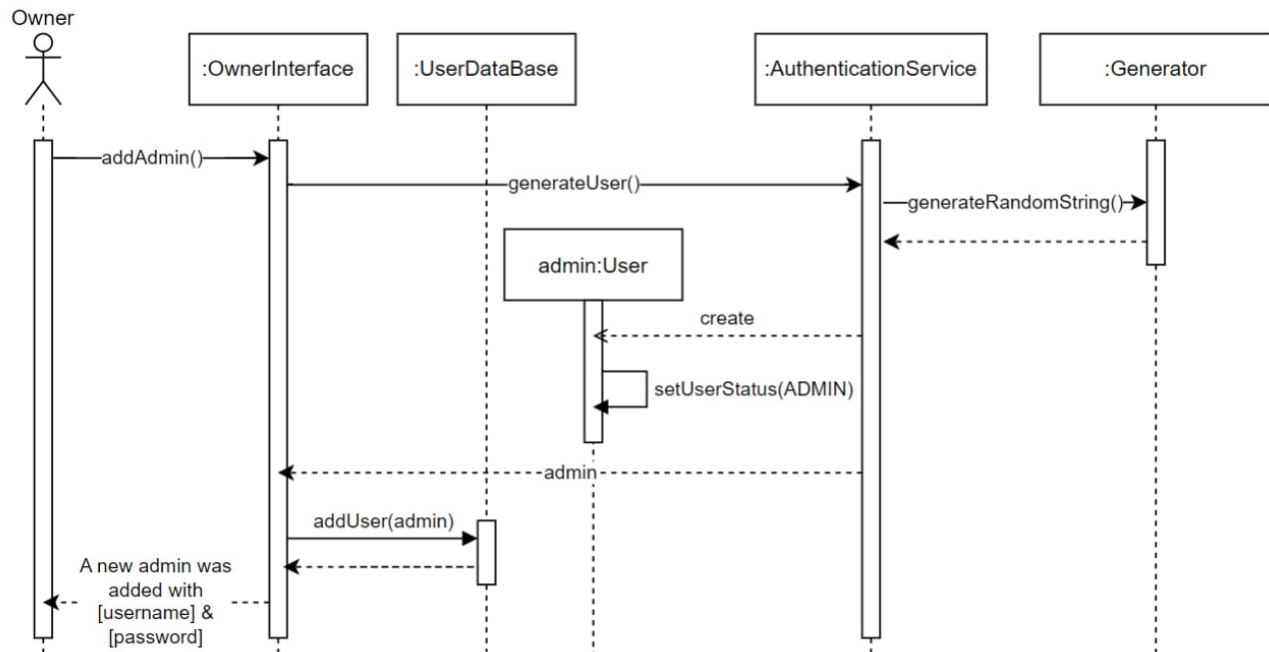
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5. Checkout
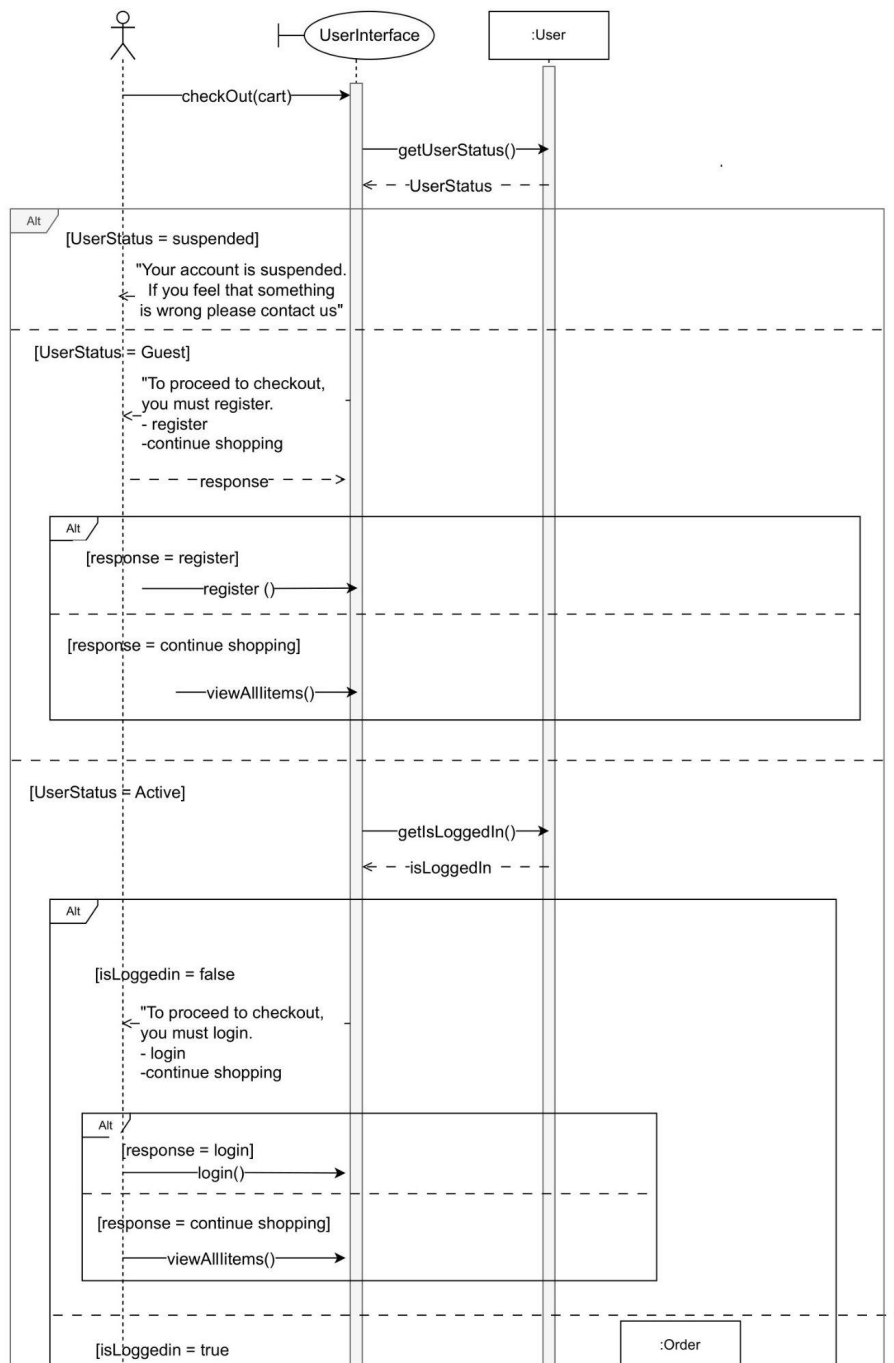
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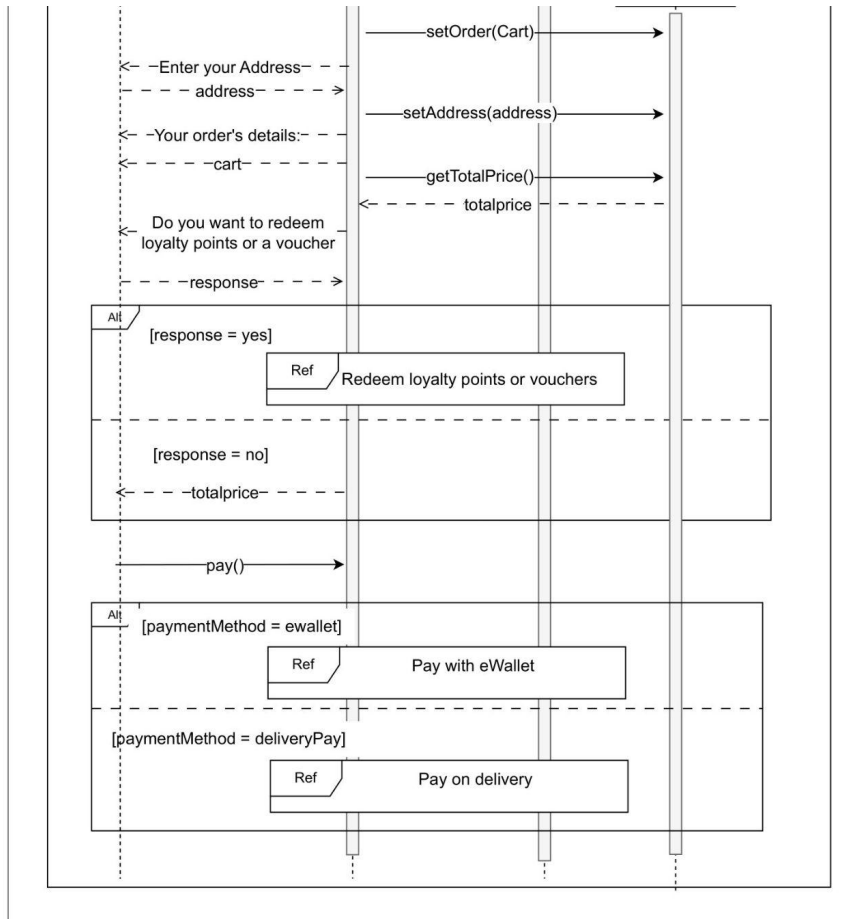
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5.1 Pay with eWallet

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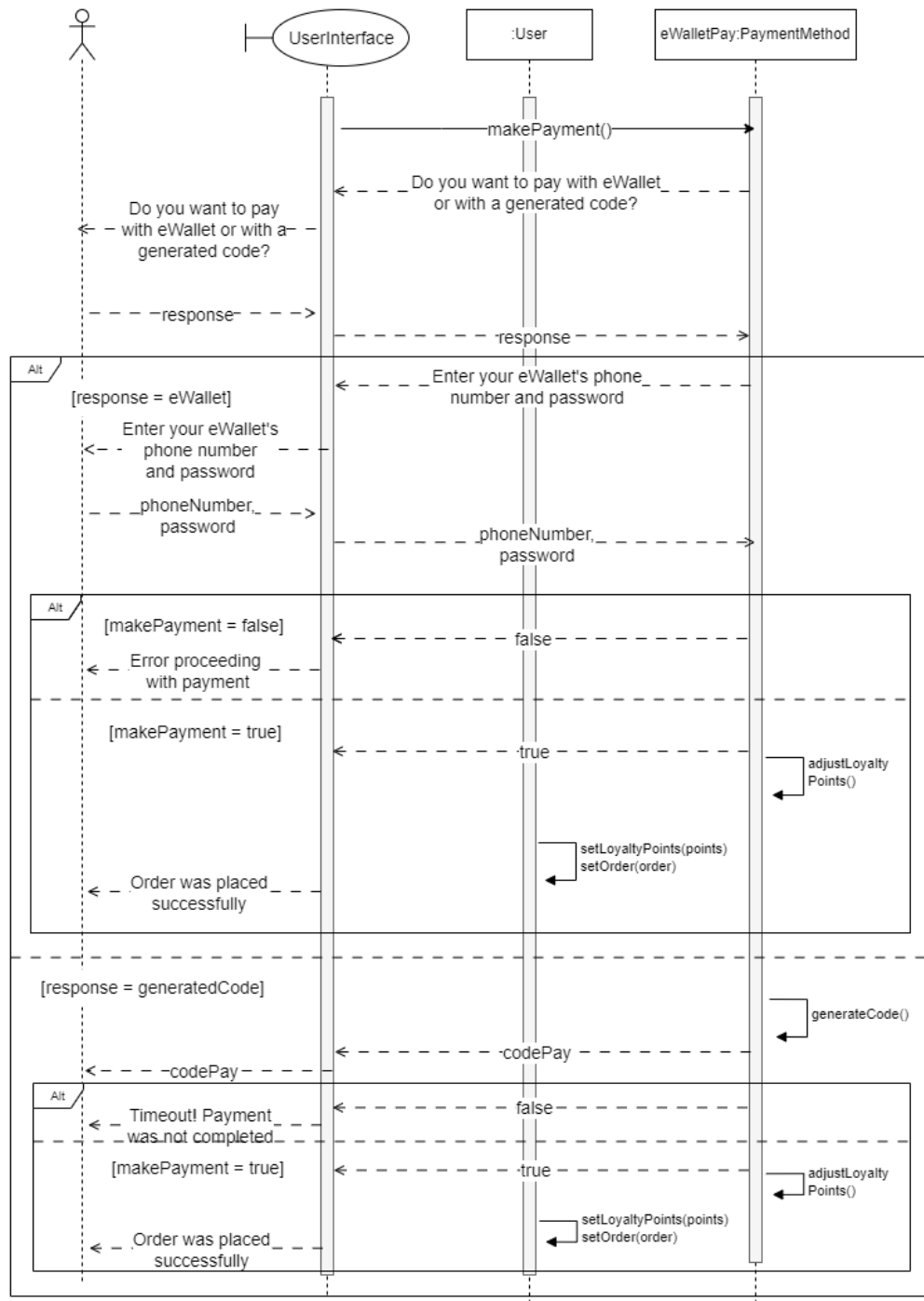
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5.2 Pay on Delivery

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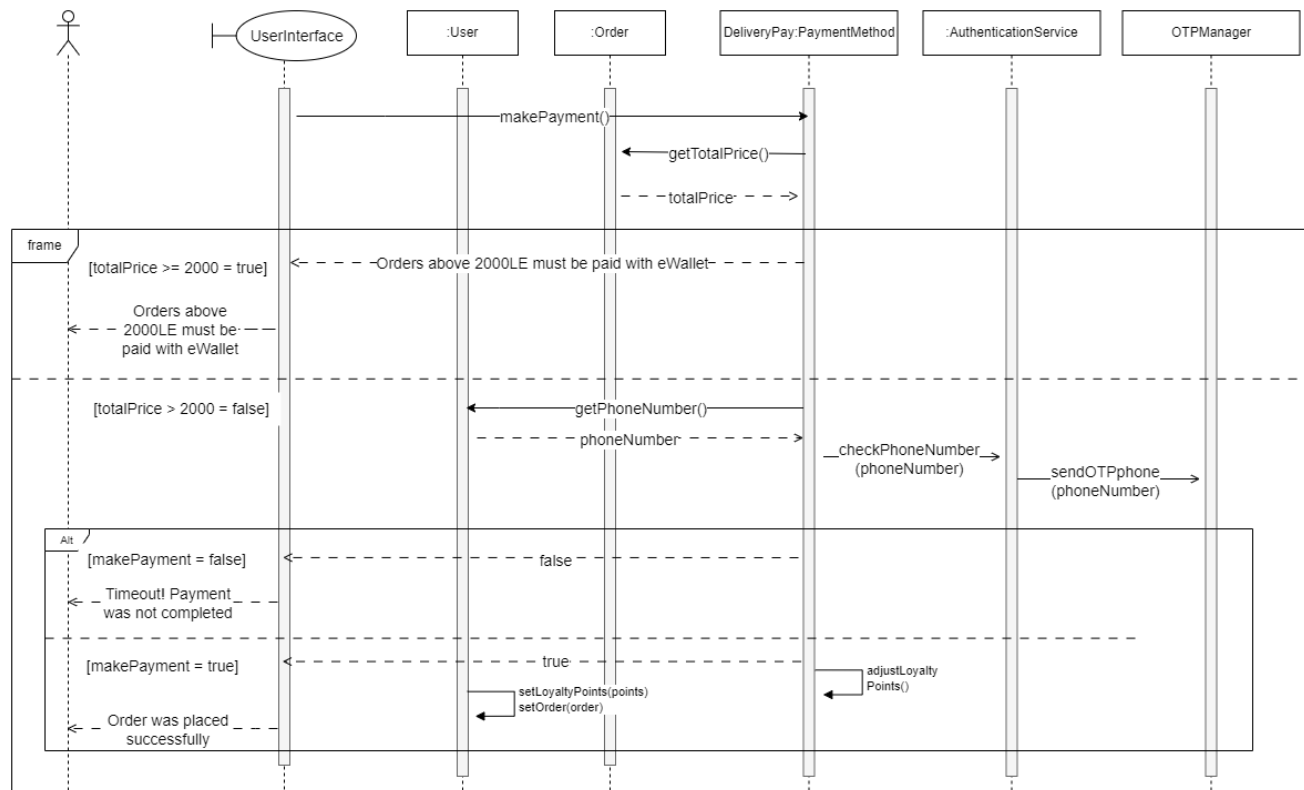
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6. Redeem loyalty points/ vouchers

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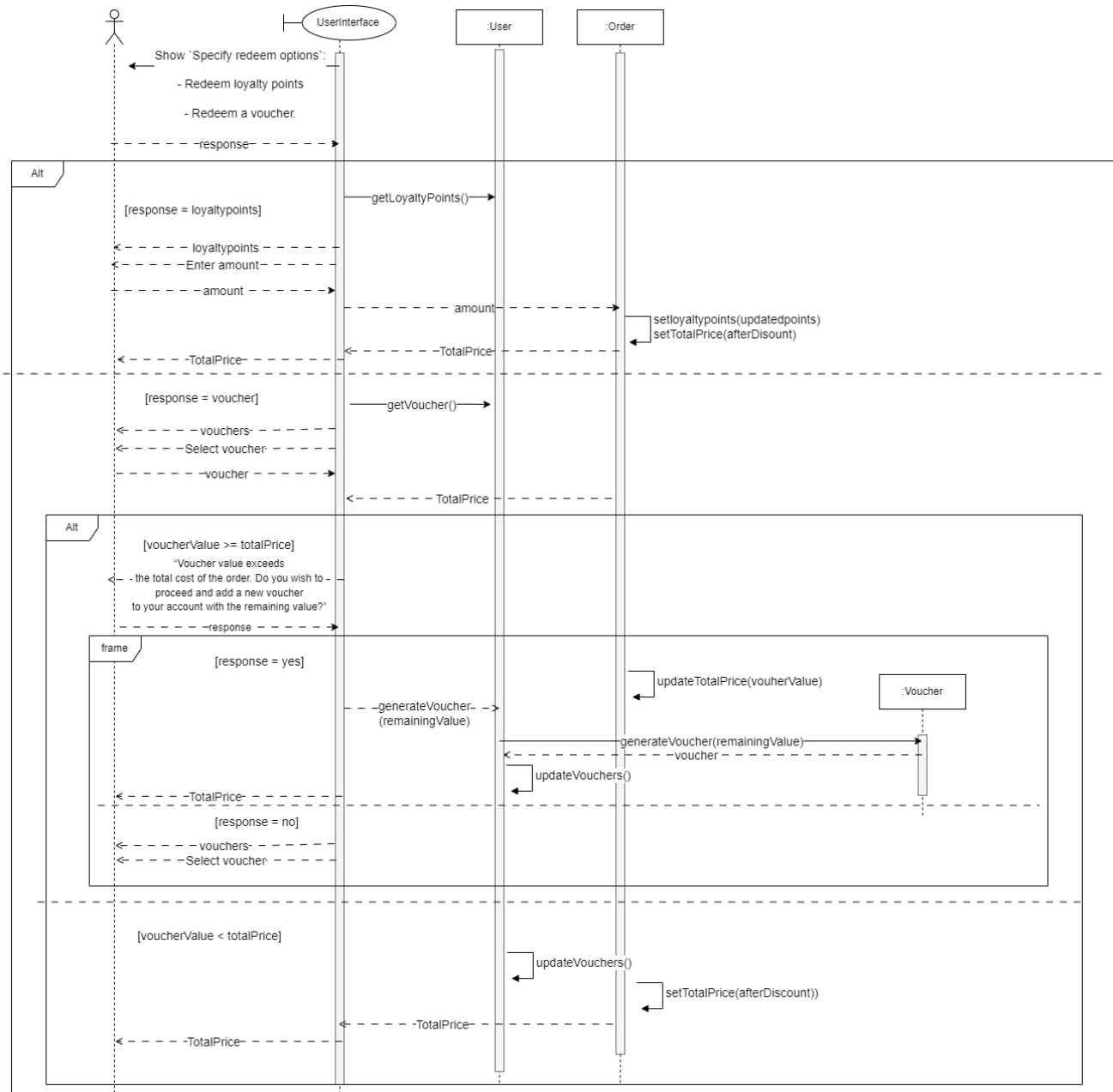
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Class - Sequence Usage Table

Sequence Diagram	Classes Used	All Methods Used
1.Register User	Class userInterface Class AuthenticationService Class UserDataBase Class OTPManager	Class userInterface: ● register() Class AuthenticationService ● register(user) ● checkEmail(email) ● checkPassword(password) ● verifyOTP(code) Class OTPManager ● sendOTP() ● verifyOTP() ● generateCode() Class UserDataBase ● addUser(user)
2.Suspend User	Class AdminInterface Class UserDataBase Class AuthenticationService	Class AdminInterface ● viewAllOrders() ● suspendUser(user) Class UserDataBase ● getUser(userName) ● removeUser(user) ● addUser(user) Class AuthenticationService ● logOutFromAllDevices()
2.1Unsuspend User	Class AdminInterface Class UserDataBase	Class AdminInterface ● showAllSuspendedUser() ● unsuspendUser(user) Class UserDataBase ● getUser(user) ● removeUser(user) ● addUser(user)
3. Admin Login	Class AdminInterface Class AuthenticationService Class User Class UserDataBase	Class AdminInterface ● logInAdmin() Class AuthenticationService ● logInAdmin(username, password) Class UserDataBase ● checkIfUserFound(username) Class User ● setIsLoggedIn()

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Sequence Diagram	Classes Used	All Methods Used
4.1 Remove Admin	Class OwnerInterface Class UserDataBase	**Class OwnerInterface** ● RemoveAdmin(admin) **Class UserDataBase** ● RemoveUser(user)
4.2 Add Admin	Class OwnerInterface Class UserDataBase Class AuthenticationService Class User Class Generator	**Class OwnerInterface** ● addAdmin() **Class AuthenticationService** ● generateUser() **Class Generator** ● generateRandomString() **Class User** ● setUserStatus(ADMIN) **Class UserDataBase** ● addUser(admin)
5. Checkout	Class UserInterface Class User Class Order	**Class UserInterface** ● checkOut(cart) ● register() ● viewAllItems() ● login() ● pay() **Class User** ● getUserStatus() ● getIsloggedIn() **Class Order** ● setOrder(order) ● setAddress(address) ● getTotalPrice()
5.1. Pay with eWallet	Class UserInterface Class User Class eWalletPay	**Class User** ● setLoyaltyPoints(points) ● setOrder(order) **Class eWalletPay** ● makePayment() ● adjustLoyaltyPoints() ● generateCode()

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Sequence Diagram	Classes Used	All Methods Used
5.2 Pay on Delivery	Class UserInterface Class User Class Order Class DeliveryPay Class AuthenticationService Class OTPManager	Class User ● getPhoneNumber() ● setLoyaltyPoints(points) ● setOrder(order) Class Order ● getTotalPrice() Class DeliveryPay ● makePayment() ● adjustLoyaltyPoints() Class AuthenticationService ● checkPhoneNumber(phoneNumber) Class OTPManager ● sendOTPphone(phoneNumber)
6.Redeem Loyalty points or Vouchers	Class UserInterface Class User Class Order Class Voucher	Class User ● getLoyaltyPoints() ● updateVouchers() ● setVoucher(voucher) Class Order ● setLoyaltyPoints(points) ● setTotalPrice(afterDiscount) Class Voucher ● generateVoucher(remainingValue)

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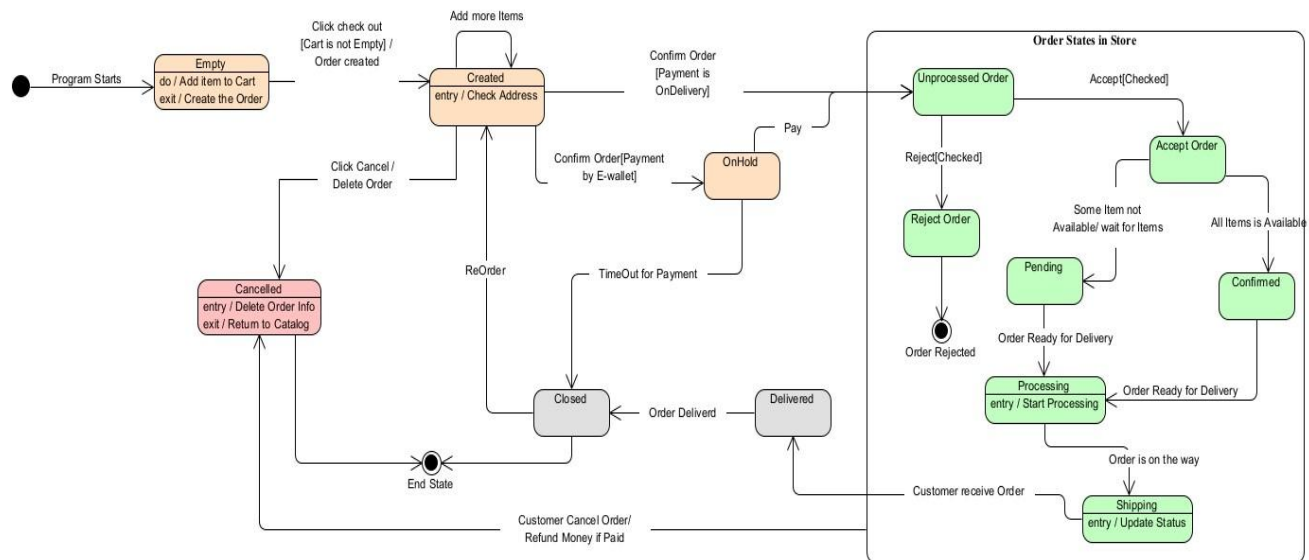**Edited by Mohamed Samir, Updated to V2.0 by Mohammad El-Ramly 10/4/2020 and V3.0 25/5/2021 | 25**

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V. State Diagram

Tools

- **Visual Paradigm**
- **Draw io**

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Ownership Report

Student	Item he/she created
Mohamed Essam Mahmoud Osman (20210346)	-Document Purpose and Audience. -Class Diagram, Class Diagram Description. -Register and Suspend user in Sequence Diagram. -State Diagram
Maya Ayman Zain El-din (20210508)	-Class Diagram, Class Diagram Description. -Admin login, Add Admin, and Remove Admin in Sequence Diagram. -State Diagram
Rawan AbdelRahman Younis Mohamed (20210524)	-Class Diagram, Class Diagram Description. -CheckOut, Pay with E-wallet, Pay on Delivery, Redeem Loyalty Points or Vouchers in Sequence Diagram. -State Diagram

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