

Cairo University

Faculty of Computers and Artificial Intelligence

CS251

Intro. to Software Engineering

Toffee

Software Design Specifications

Version 1.0



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CS251: Phase 2 –The Perfect Mix

Project: Toffee Project

Software Design Specification

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Team

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

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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



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Document Purpose and Audience

Purpose

The document is software design specification of Toffee Project which will discuss in details different kinds of diagrams will help to make the client see how its system will work and help developer to implement exactly what the client want.

Audience

- Stakeholders (all who will deals with this system like Managers, system admins and customers).
- Project owner.
- Software development team.



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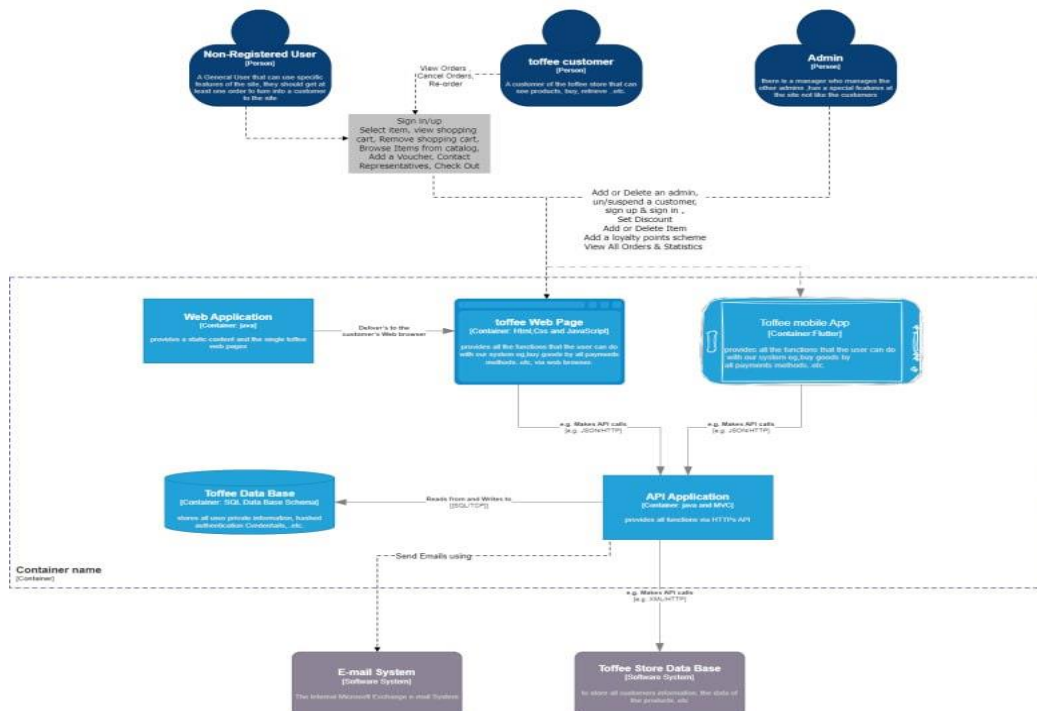
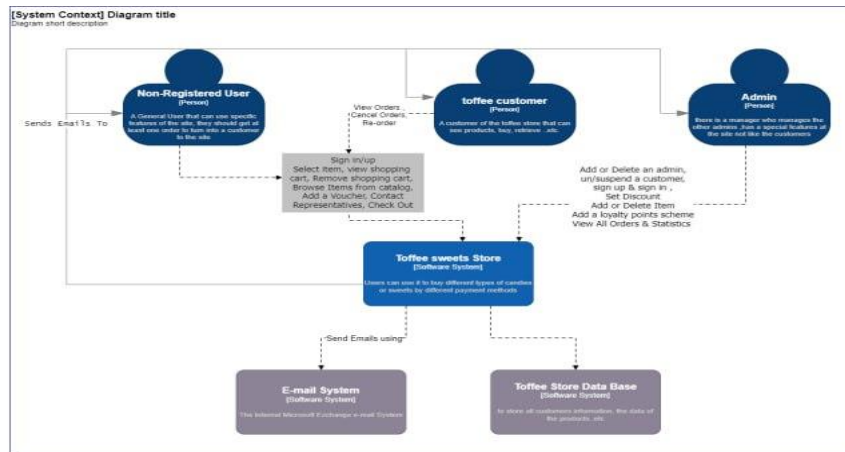
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System Models

I. Architecture Diagram

- **C4 Architecture Diagram** : Note: For clear image the C4 diagram will be attached to assignment file

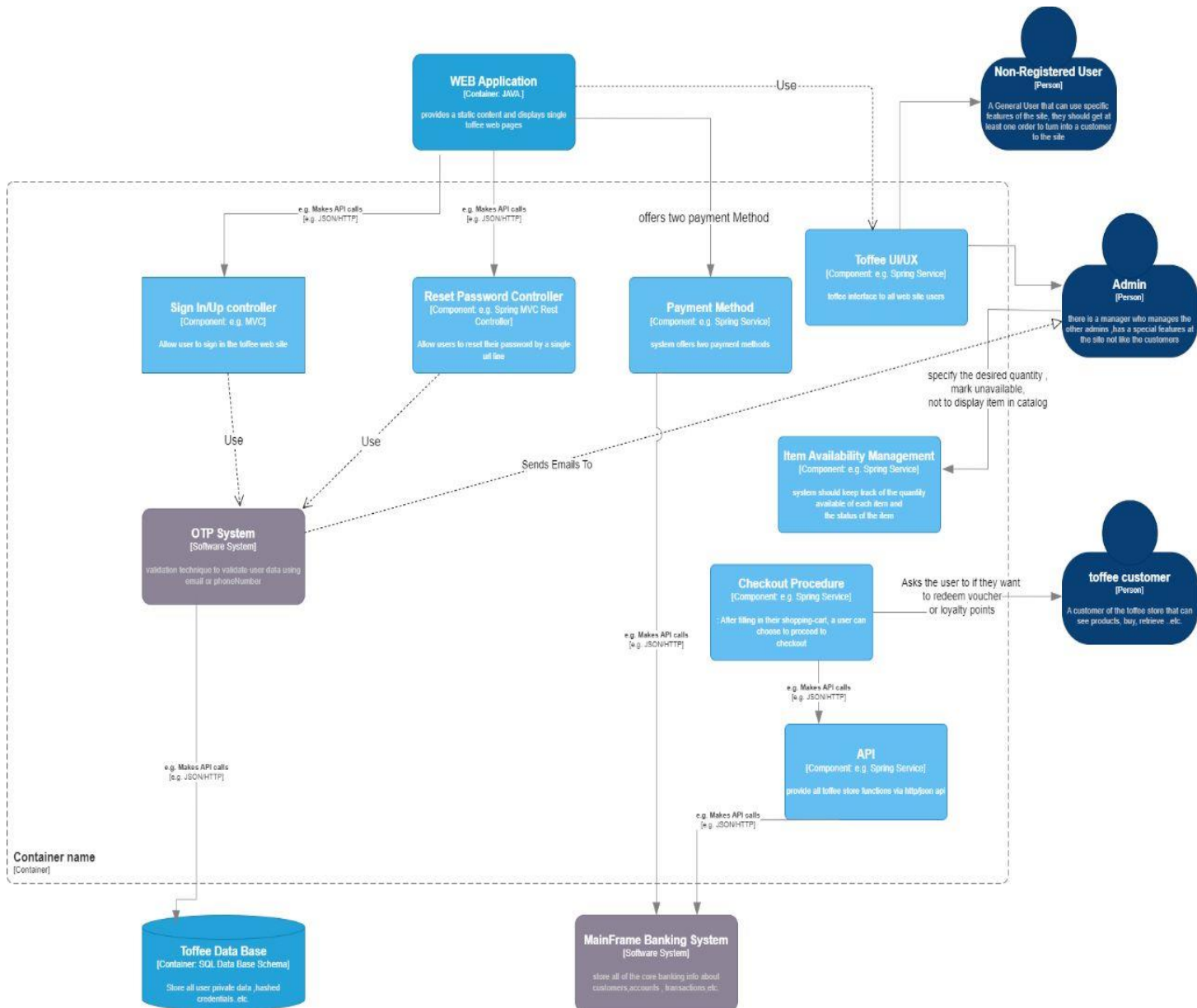




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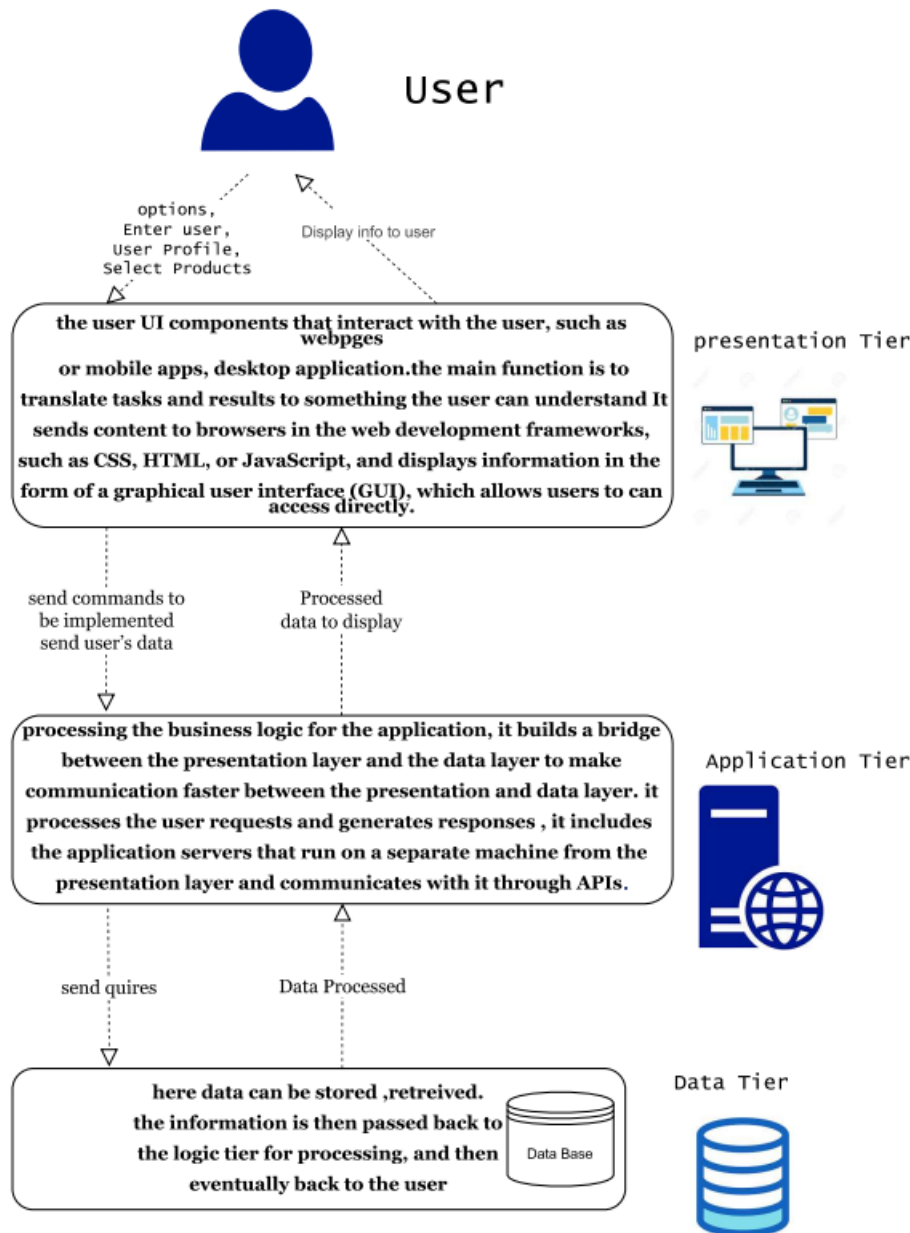


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- 3-Tier Architecture Diagram





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We decided to represent toffee store by using C4 Architecture diagram and 3-tier Architecture diagram as the 3-tier diagram is a simple diagram represents the main 3 tiers in the toffee project which are presentation tier which interacts with user and in this tier there are the GUI of toffee projects , second tier is application tier in application tier all the logical project process done to response actions of the user , the third tier is the Data tier where all the data of toffee project are stored in databases to be used in application tier. We also used C4 diagram to show the most important component in the system and the external components which system needs and the components the admins need also show the relation between these components and with users.

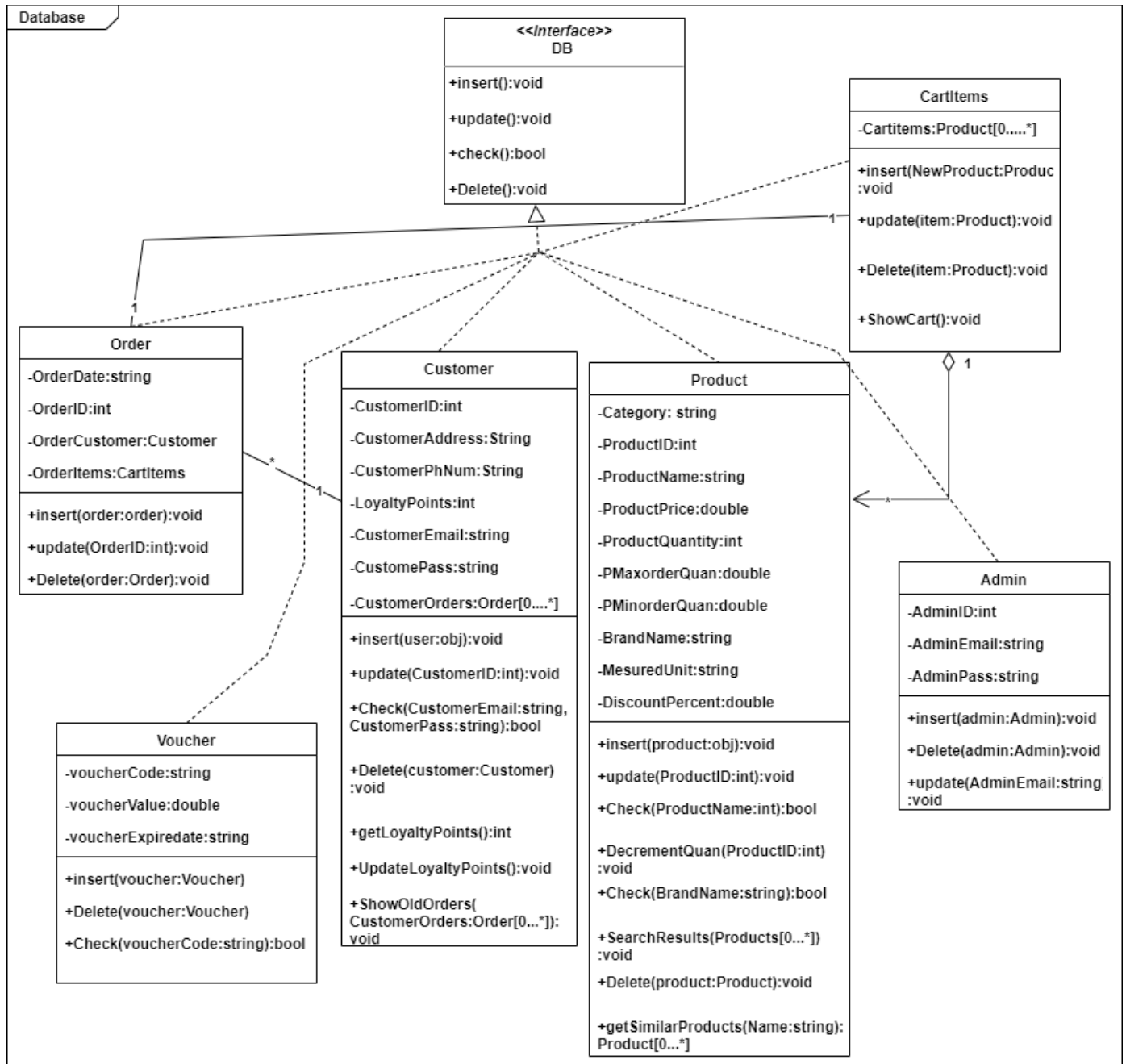
| Component | Description & Responsibility |
|---|---|
| Database | In the database all information about the toffee system will stored in different tables for examples tables for customers information to used in login and registration and products table to help in viewing products and in searching. ..etc. Database component one of most important keys on this project as all rest of components depend on database. |
| Mobile Application (For toffee client) | In mobile application the client can use all functionalities of toffee store like sign un , login ,search about item , see all items , make order and so on . |
| Website | The functionalities that the user can do in toffee store website. |
| Single Screen for website | A website consists of single screens this screens has the GUI that the user use to interact with system. |
| API for Mobile Application | This component translate the user input into data to can send them to another component and get the suitable response. |
| Toffee UI/UX | This component responsible for user interface and user experience with toffee project |
| Mobile Application (for Admin) | This mobile applications has all the functionalities the admin can use in toffee project like add item or update price or see statistics , and so on. |
| Sign Up Controller | This component is to do sign up procedure and it has relation between OTP and database. |
| Reset Password controller | This component is to resent password and have relation with OTP for security and relation with database to update password. |
| Payment Method | This component to check user choose any payment method as there are 4 payment method and each one has specific relations and operations. |
| Item Availability management | This component role it to update products status and check if each product is available and this component has relation with database. |
| OTP | This an external component which used to verify user mobile number , user email. |
| MainFrame Banking system | This an external component which used to do money transactions with smart wallets and handle this finical tech. |
| Checkout Procedure | Confirm that all the process of order has done correctly. |



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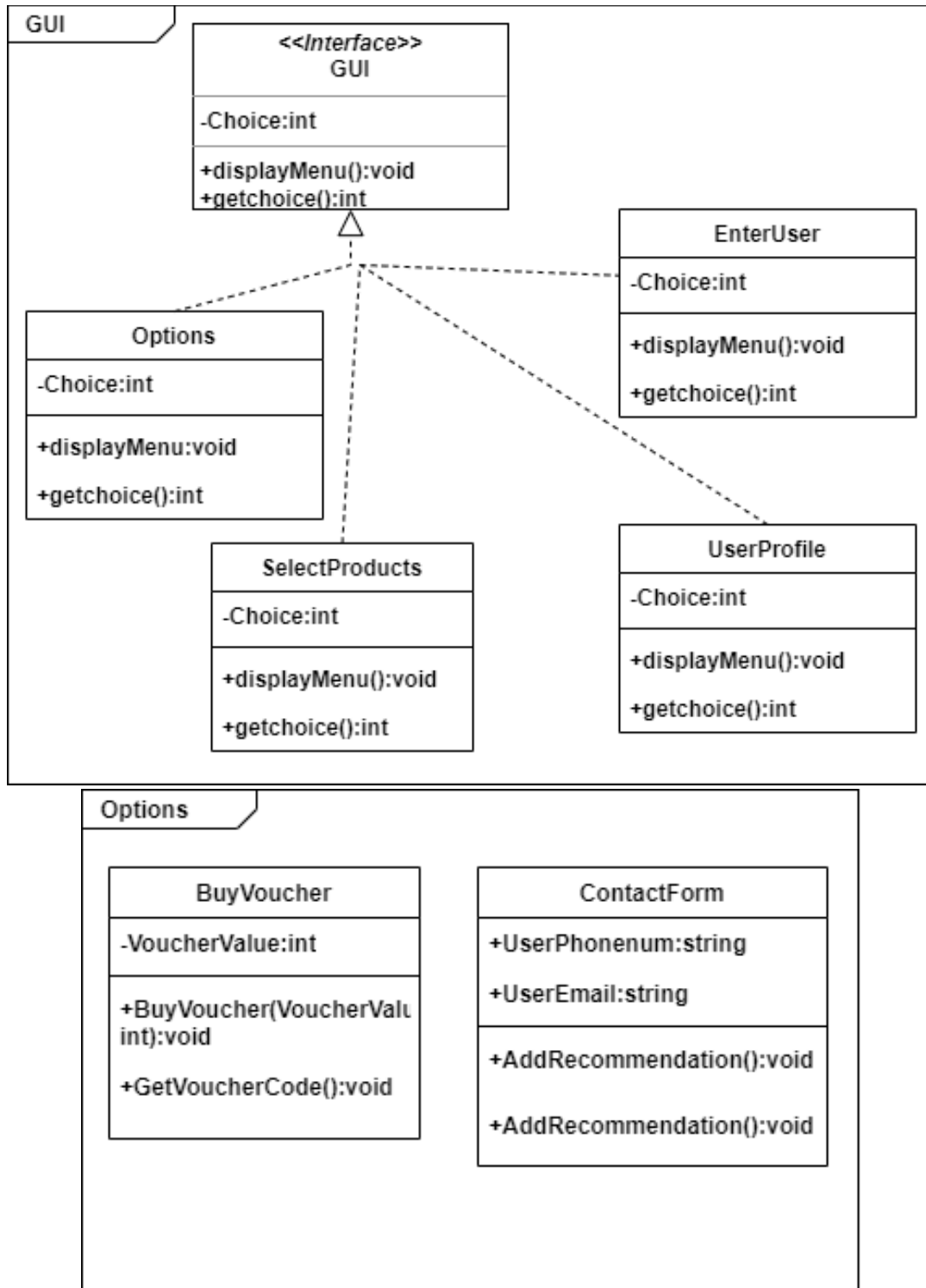




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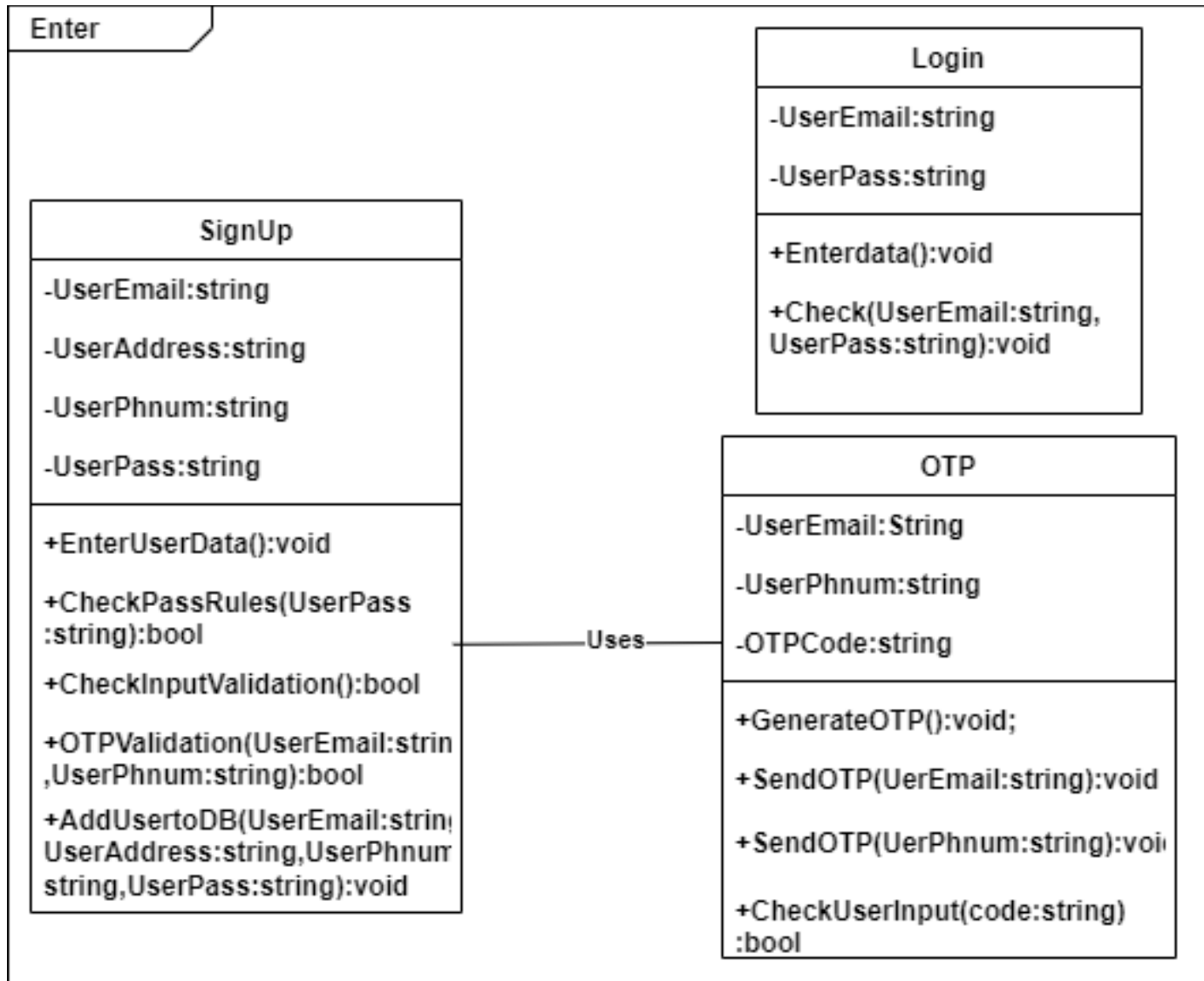




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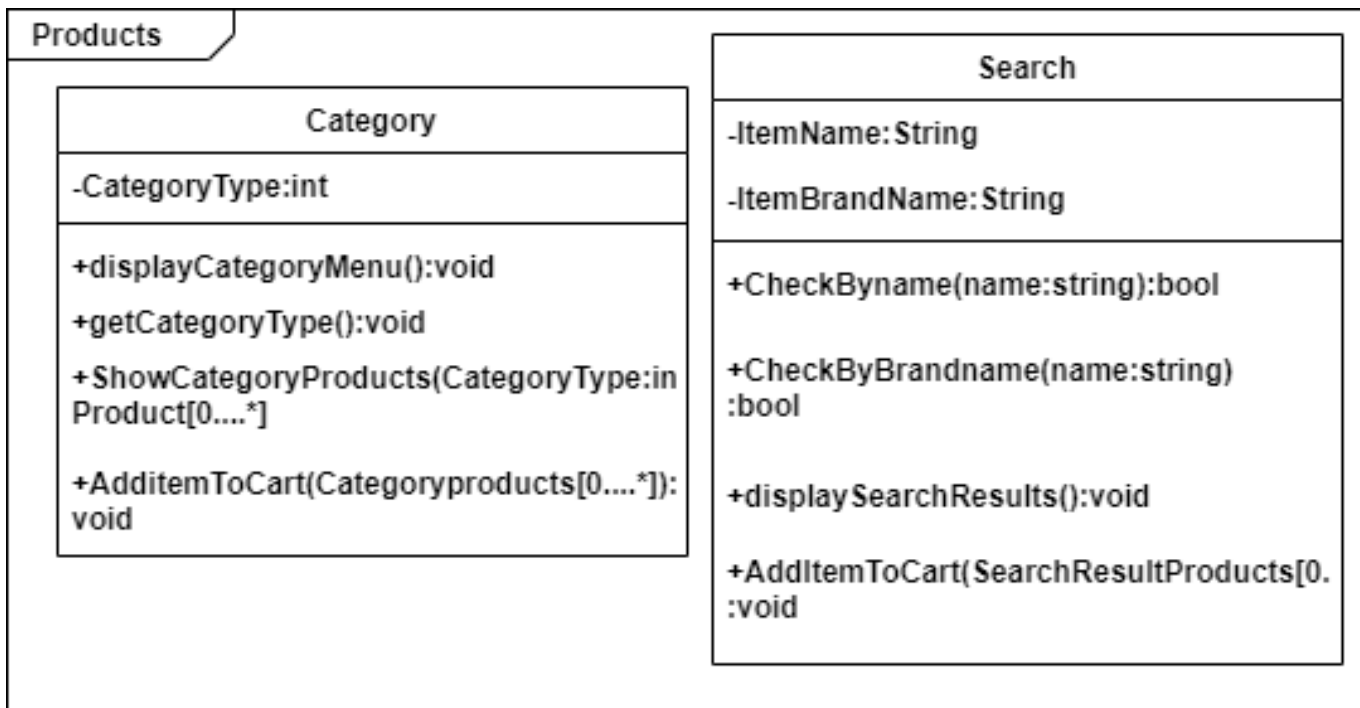
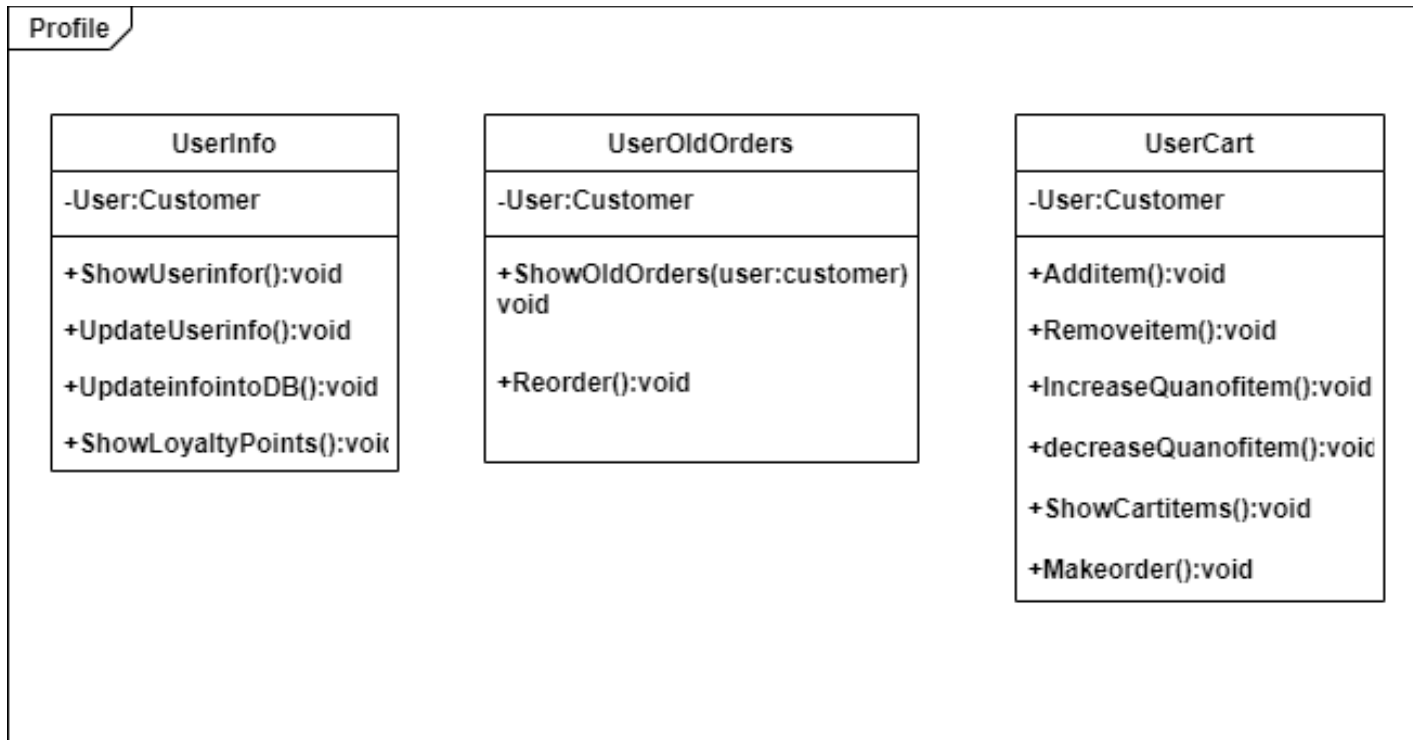




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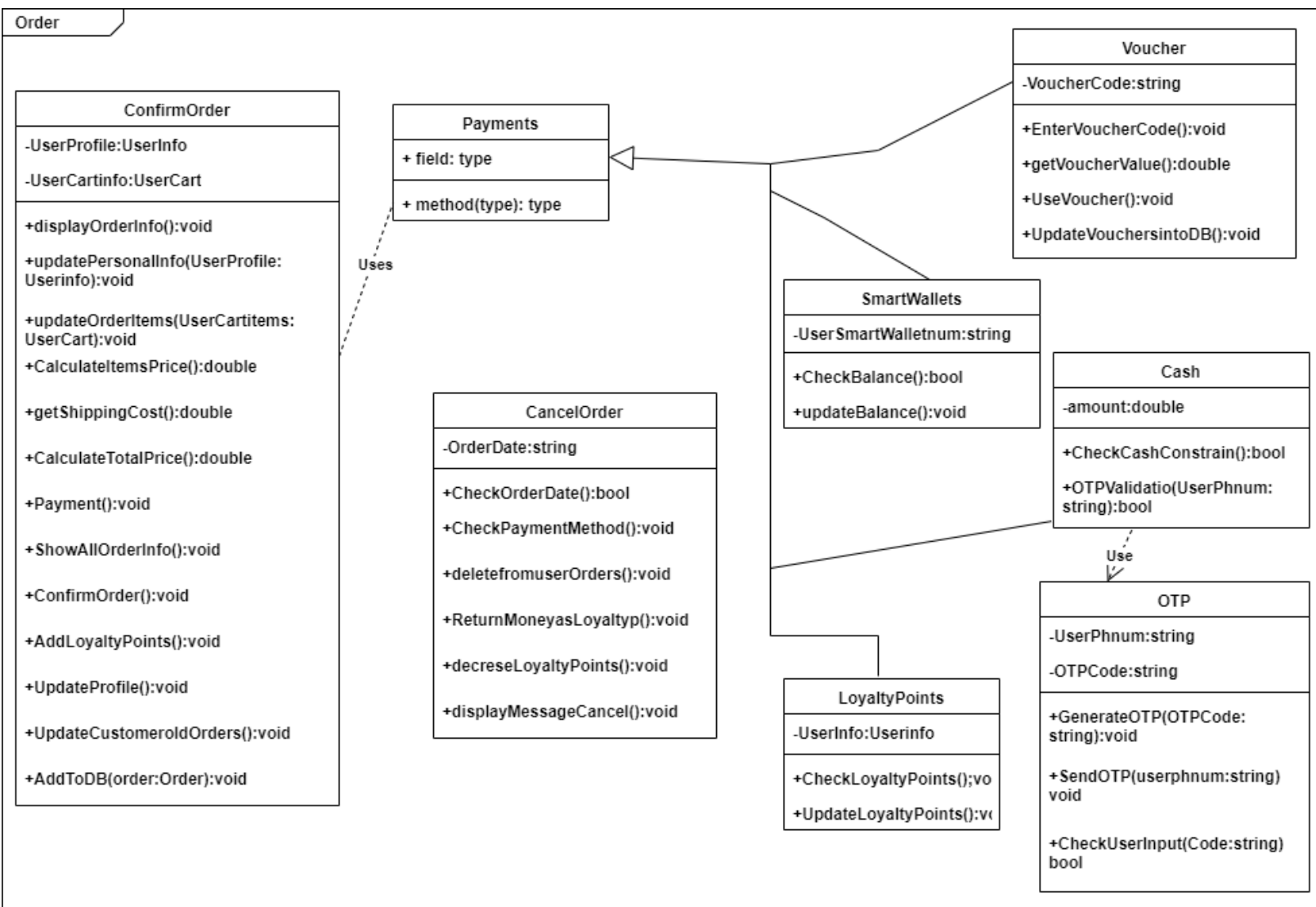




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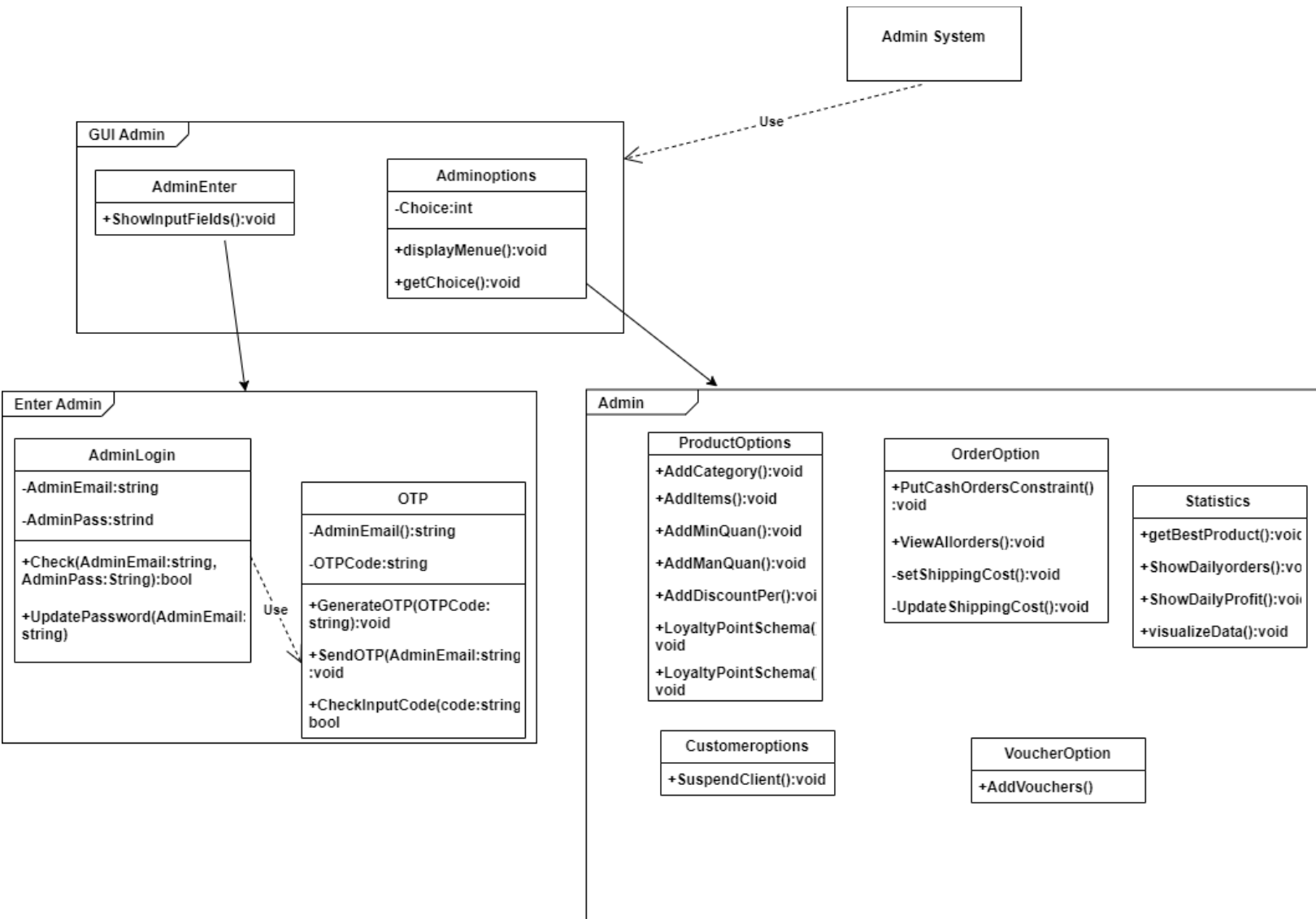




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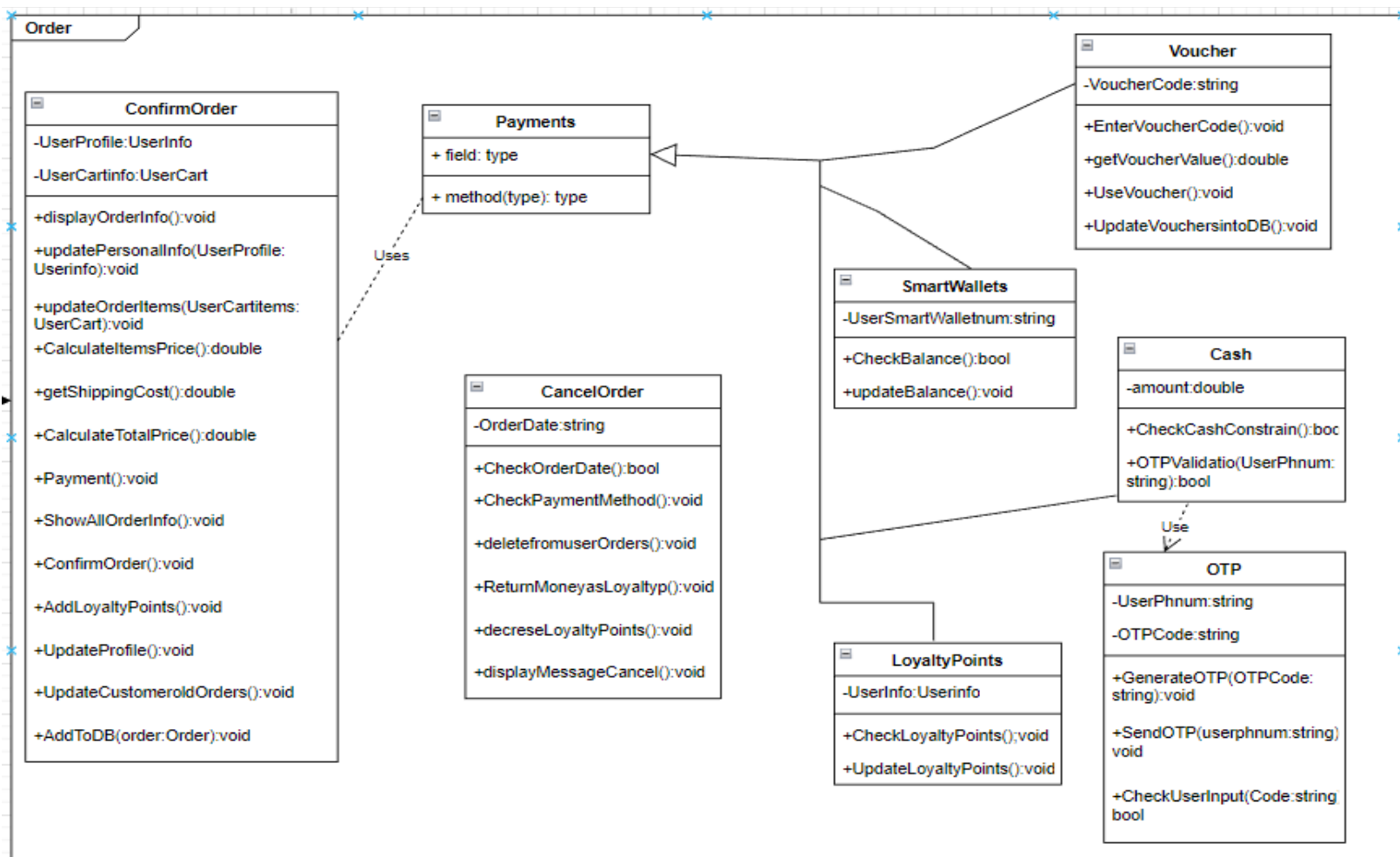




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III. Class Responsibility Table

| Class ID | Class Name | Description & Responsibility |
|----------|----------------|---|
| 1.G1 | Toffee website | Description: This class is a control class which will use 2 major classes (Database class & GUI class). Responsibility: Connect project class to control and manage system of Toffee project. |
| 2.G2 | Admin system | Description: This class is also a control class and uses 2 major classes (Database class & Admin GUI class). Responsibility: Connect Admin classes to control and manage the functionalities of Admin system. |
| 3.DB1 | DB | Description: This an interface has the common methods between the class In the database classes like delete, update, ...etc. Responsibility: This interface has abstraction methods that will be implemented by different class implementations suiting its functionality. |
| 4.DB2 | Customer | Description: This class have the important attributes about customer, also have the methods related by customer information. Responsibility: Store customer data in the database and to use it in different functions in Toffee project, override the functions of DB interface by the implementation related to customer information, do some queries to retrieve specific data that will be used to achieve specific functionalities in Toffee project. |
| 5.DB3 | Product | Description: This class describes the important attributes of the products of Toffee store and some methods related by product information. Responsibility: Store important information about each product in database to use it in different methods like searching, override the methods of DB interface by implementation related to product information. |
| 6.DB4 | CartItems | Description: This class its attribute is an array of products, some methods related to cart of the customer and its items. Responsibility: store the items of each customer cart so it have relation between customer class each customer have only one cart, and also have relation between product class which is cart items has zero or more product (Aggregation), have method to retrieve all the items in the cart which we will use in userinfo class, in this class also we override the implementation of the DB interface. |



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| Class ID | Class Name | Description & Responsibility |
|----------|----------------|---|
| 7.DB5 | Order | <p>Description: This class has the info of order and some functionalities related to order information and its relations with other classes.</p> <p>Responsibility: Store order information in the data base to retrieve them in different functions like show old orders to make user able to do “reordering” to one of them , override to the DB methods , this class has relation with customer class as one customer can do 0 or more order so customer also have an array of orders , class order also have relation with CartItems class as user can do order by the items of the cart so one order will done by the items of one cart.</p> |
| 8.DB6 | Admin | <p>Description: This class has attributes about admin information and so method related to admin information and it functionality.</p> <p>Responsibility: Store information about admins, override DB methods with implementation related to admin information.</p> |
| 9.DB7 | Voucher | <p>Description: This class describes voucher has attributes like voucher code & voucher value and some methods related to voucher information.</p> <p>Responsibility: Store vouchers information like its code and its value and override methods of DB interface like insert will add new voucher to database and delete will delete this voucher after user use it admin have access to add vouchers manually.</p> |
| 10.GUI1 | GUI | <p>Description: This an interface has the common methods between the 4 GUI classes in Toffee Project.</p> <p>Responsibility: do an Abstraction implementation for the common methods between these classes.</p> |
| 11.GUI2 | EnterUser | <p>Description: This a control class has the GUI of enter screen.</p> <p>Responsibility: This class will display a menu which has login, sign up and take the user choice then it has a relation with Enter package which has 2 classes sign up and login.</p> |
| 12.GUI13 | UserProfile | <p>Description: This a control class have the GUI of user Profile screen.</p> <p>Responsibility: This class will display a menu which has the options in the profile like User Info, User Cart , User Old Orders and take the user choice then it has a relation with Profile package which has 3 classes UserInfo , UserCart , UserOldOrders .</p> |
| 13.GUI14 | SelectProducts | <p>Description: This a control class has the GUI of Toffee project products.</p> <p>Responsibility: This class will display a menu which has the options in selecting products so user have 2 options category which user get all products of chosen category after choosing it from displayed menu and searching option which can be done by product name or brand name this class related with package product which have 2 class category & searching.</p> |
| 14.GUI15 | Options | <p>Description: This control class has the GUI of options that user can choose.</p> <p>Responsibility: This class will display options which is buy voucher and contact form this class will be related with options package which have 2 classes BuyVoucher and ContactForm</p> |



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| Class ID | Class Name | Description & Responsibility |
|----------|---------------|---|
| 15.EU1 | SignUp | Description: This is an enter class which user used to sign up to Toffee project. Responsibility: this class have to make user enter all required data and check validation of each input then after all process completed and OTP validation is completed then will call function addUserinTODB so this class has a relation with database to insert new customers. |
| 16.EU2 | Login | Description: This enters class which user used to login to Toffee project to enter to its profile. Responsibility: This class have to make user enter his email and his password and connect with database and check if there are user with this password and this email then If it is valid, it enter user to its profile else display message explain the problem either invalid email or password. |
| 17.EU3 | OTP | Description: This class uses OTP technique to make relation between each account and email of the user. Responsibility: this class should make validation of email of the user by sending a code into the email of the user then ask user to enter this code if there are equal this validation is achieved else there are a problem display message to user to explain the problem. |
| 18.PFU1 | UserInfo | Description: This class interacts with user information in the user profile. Responsibility: this class should display the information of the user who just logged into Toffee project and retrieve its information from database, so this class must have a relation between this class and class customer in database. |
| 19.PFU2 | UserOldOrders | Description: This class interacts with user old orders which appear in user profile. Responsibility: This class should display all the old orders which user did and its order with all details like all items and prices and this information will be retrieved from database so this class will have relation with customer class in database and user can do reorder for old order. |
| 20.PFU3 | UserCart | Description: This class interacts with usercart which appears in user profile. Responsibility: This class should display all elements which is in the cart and the information of its product can also update cart by adding item to it or deleting item from it and user can do order by the items which exists in the cart user cart have the relation with class CartItems with this class. |
| 21.P1 | Category | Description: This class interacts with different categories and its products and different functionalities which users can use. Responsibility: This class must display menu with all available categories and then after user choose one then will retrieve all products of this category and user can add product to cart to order them so this class should have relation with 2 classes in database these classes is products and CartItems. |
| 22.P2 | Search | Description: This class interacts with the search feature in toffee project. Responsibility: this class have methods that enable user to search by product name or by category name and this class has relation with class product in database to search into these data and if there are no item by this name in the database we use function getsimilarproducts(productCategoryname). |



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| Class ID | Class Name | Description & Responsibility |
|----------|--------------|--|
| 23.OP1 | BuyVoucher | <p>Description: This class interacts with vouchers and how users can buy a voucher.</p> <p>Responsibility: This class should make user enter the value of voucher that he wants to buy and search in database so this class should have relation with class voucher which exists in database and when user buy it should update database to delete this code from the section not sold vouchers.</p> |
| 24.OP2 | ContactForm | <p>Description: This class interacts with the contact form option which exists in the Toffee project.</p> <p>Responsibility: This class should make the user enter its data and give him menu if he has recommendation of complain and record its reply and if it is complained will continue the complain process.</p> |
| 25.O1 | ConfirmOrder | <p>Description: This class will interact with the process of confirmation of an order.</p> <p>Responsibility: This class do some functionalities all of it related with the process of the order it enable user to update the items of order or update the information of orders and choose the payment method to and check all the input then confirm order and all it to database to customer orders so this class should be related with class order in database and add loyalty points to this user profile this class also calculate the total price of the order + shipping cost .</p> |
| 26.O2 | Payments | <p>Description: This class specializes in the payment it is an abstract class.</p> <p>Responsibility: This class will have basic methods of payment as there are 4 typed of payments in the Toffee project that will be inherited from this class.</p> |
| 27.O3 | Voucher | <p>Description: This an inner class “child of payment class” this class work When user choose voucher method to pay for order.</p> <p>Responsibility: This class should make user enter the code of the voucher and must check if this voucher is valid or not and this will have a relation between this class and class voucher which exists in database also should check if the value of this voucher can cover the total money for this order or user should use another way to complete the rest of the order cost.</p> |
| 28.O4 | Smartwallets | <p>Description: This an inner class “child of payment class” this class work When users choose Smart wallets method to pay for order.</p> <p>Responsibility: This class should make user to enter his information about its smart wallets and there will be functioned to check if the smart wallets has enough balance to cover the total cost of the order as if it is enough or user should use another method to cover the total cost of the order.</p> |
| 29.O5 | Cash | <p>Description: This an inner class “child of payment class” this class work When a user chooses Cash method to pay for order.</p> <p>Responsibility: This class should make OTP validation by using the phone number of the user and should check the cash order constraint which is the limits of products and cost.</p> |



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| Class ID | Class Name | Description & Responsibility |
|----------|-----------------|---|
| 30.O6 | LoyaltyPoints | <p>Description: This an inner class “child of payment class” this class work When the user chooses Loyalty points method to pay for order.</p> <p>Responsibility: This class should check if the loyalty points is enough for cover the total cost of this order or user needs to do another way to cover all the order cost.</p> |
| 31.O7 | OTP | <p>Description: This class uses OTP validation to connect user order with its mobile number.</p> <p>Responsibility: this class takes the mobile number of the customer and then it generates code to the customer and then customer should enter this code to validate and confirm the order if the customer will pay cash.</p> |
| 32.O8 | CancelOrder | <p>Description: This class interacts with the cancelation operation.</p> <p>Responsibility: This class activate if the user want to cancel order and then it will call the function check time to check if the order done before 24 hours so it id valid to cancel or not , then if it is valid then it will back the value of the order to loyalty points to user profile if the order was paid by using voucher of loyalty points or smart wallets if cash it will not return points.</p> |
| 33.GUIA1 | AdminEnter | <p>Description: This a control which deals with the GUI of login screen of admin system in Toffee project.</p> <p>Responsibility: This class must have the input fields and have the relation with AdminLogin class.</p> |
| 34.GUIA2 | AdminOptions | <p>Description: This a control which deals with the GUI of options screen of admin system in Toffee project.</p> <p>Responsibility: This class should display a menu of options categories the admin can do in toffee project.</p> |
| 35.AL | AdminLogin | <p>Description: This class interacts with login admin to system.</p> <p>Responsibility: This class make user enter his email and its password then check in database if this a correct password or not this class has a relation with Admin class in database.</p> |
| 36.AOP1 | ProductOptions | <p>Description: This class displays and interacts with the functionalities that the admin can do on products.</p> <p>Responsibility: This class should make the admin can add category or product of update in the information of the customer and so on ... , this class has a relation with product class in database.</p> |
| 37.AOP2 | CustomerOptions | <p>Description: This class displays and interacts with the functionalities that the admin can do on customers.</p> <p>Responsibility: This class should make admin to be able to suspend user from using the toffee store, this class have a relation with customer class in database.</p> |



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| Class ID | Class Name | Description & Responsibility |
|----------|----------------|--|
| 38.AOP3 | OrderOptions | <p>Description: This class displays and interacts with the functionalities that the admin can do on orders.</p> <p>Responsibility: This class should make admin able to decide shipping costs and points for each order and so on.., this class has relation with order class in database.</p> |
| 39.AOP4 | VoucherOptions | <p>Description: This class displays and interacts with the functionalities that the admin can do on vouchers.</p> <p>Responsibility: This class should make admin add vouchers to database and decide expire date and so on this class has a relation with the class voucher in database.</p> |
| 40.AOP5 | statistics | <p>Description: This class helps admin to retrieve and do statistics on the information of database.</p> <p>Responsibility: This class must get statistics about products like best selling products, best brand , statistics about customer and the orders of each customer , statistics about orders and show all orders of the day and the profit of the day and profit of month and so on...</p> |



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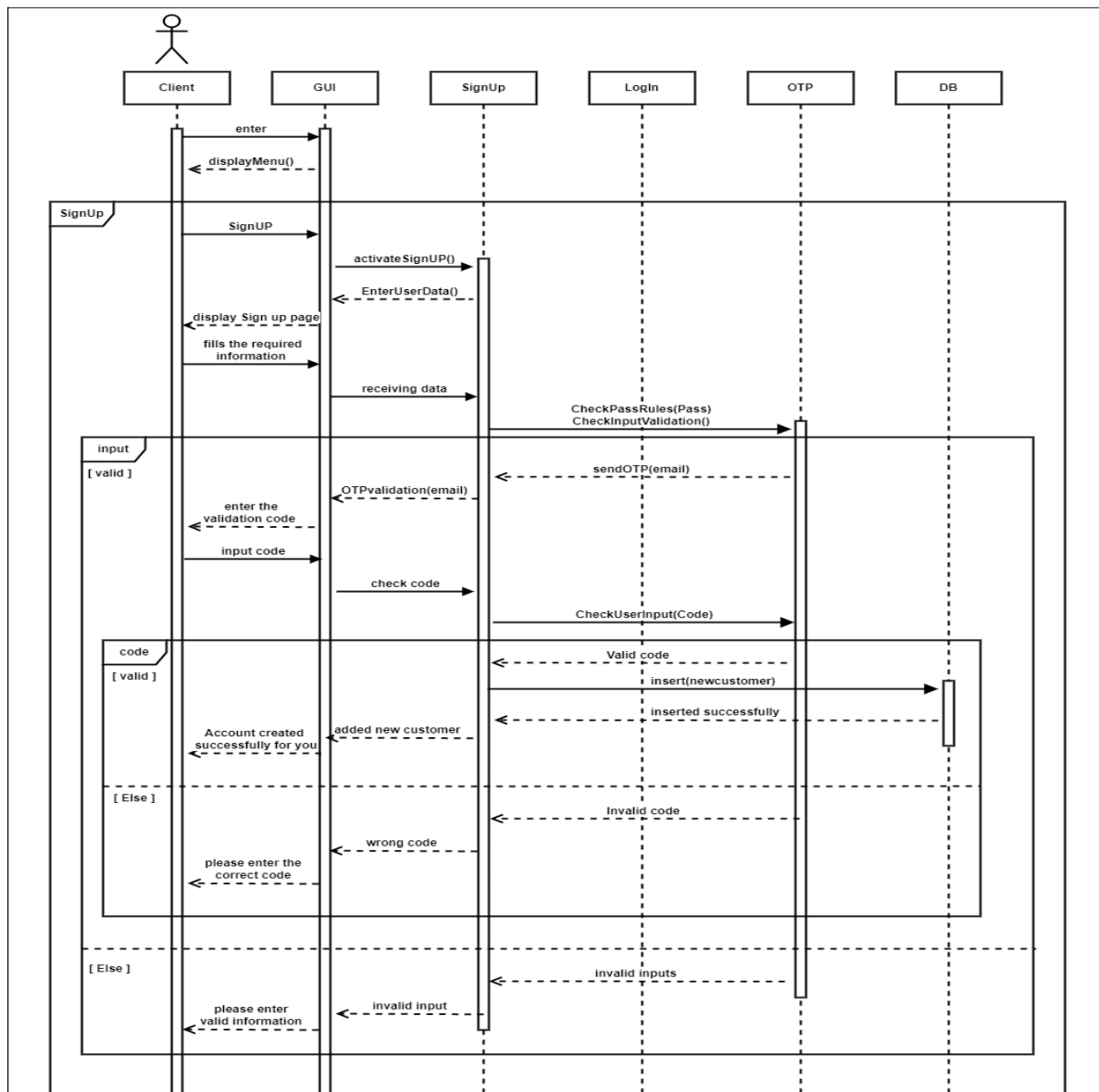
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IV. Sequence diagrams

Note: The FULL Sequence diagram PNG image will be attached to the Assignment to be able to zoom and see all the details .

1. Sequence Diagram for Sign Up & Login

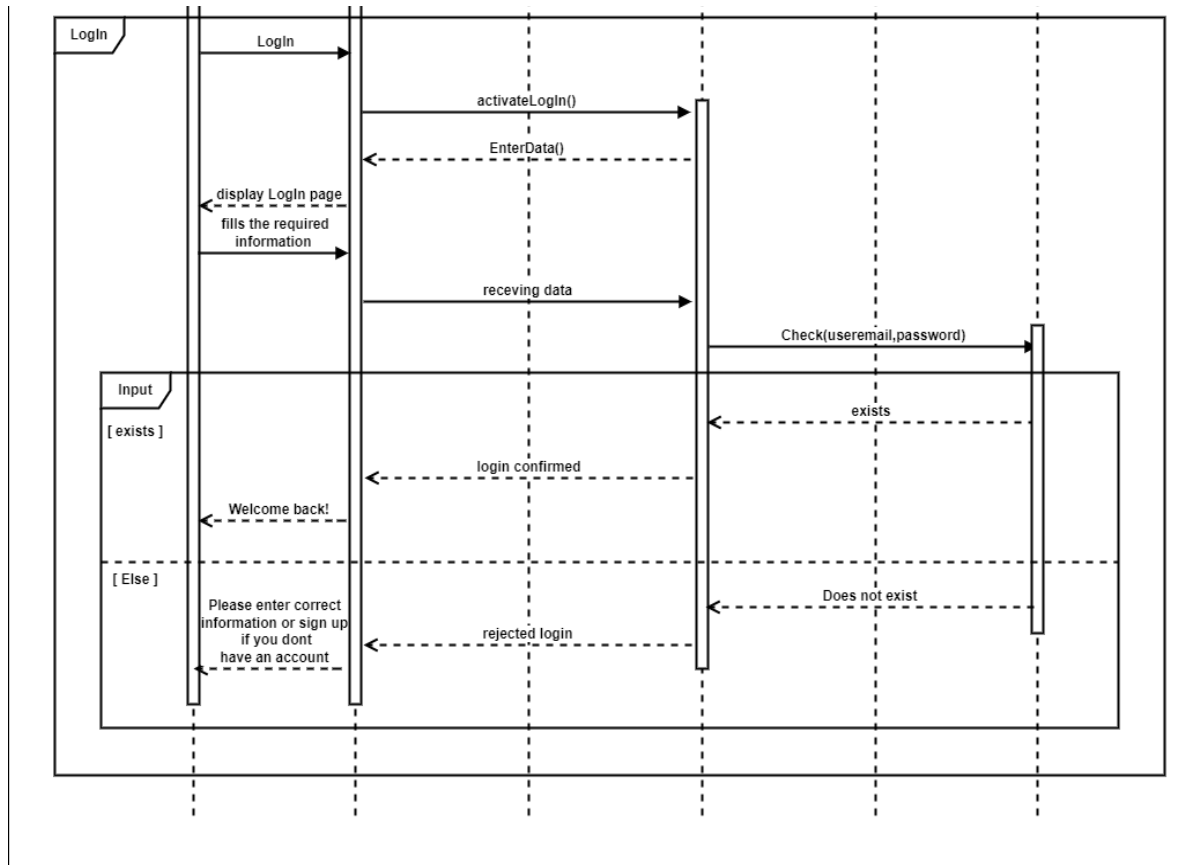




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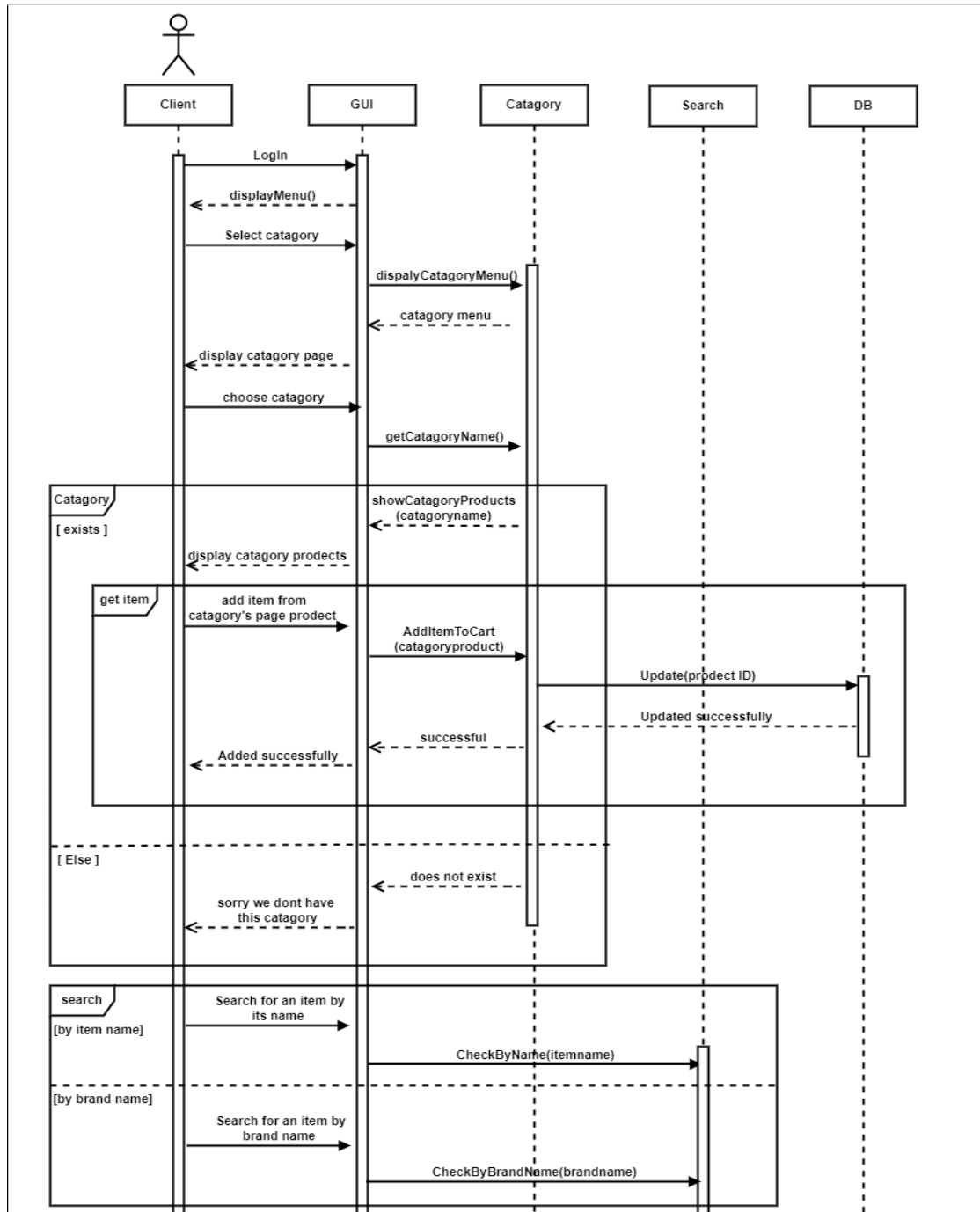


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2. Sequence Diagram for Choose a category & Search for an item.

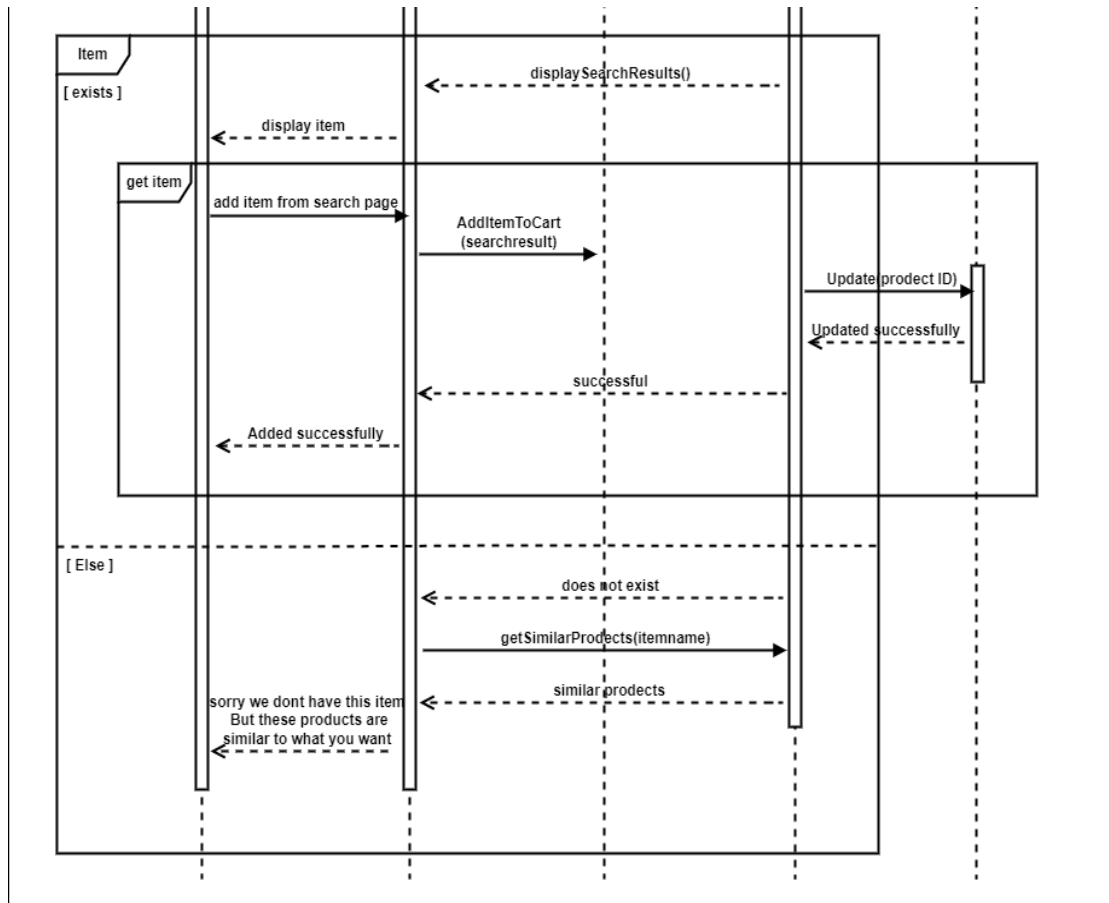




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Class - Sequence Usage Table

| Sequence Diagram | Classes Used | All Methods Used |
|---|---|---|
| 1. Sign Up & Login | Class GUI Class SignUp Class Login Class OTP Class DB | Void displayMenu() Void activateSignUP() Void EnterUserData() Boolean CheckPassRules(string Pass) boolean CheckInputValidation() void sendOTP(string email) Boolean OTPvalidation(string email) Boolean CheckUserInput(string Code) Void insert(customer newcustomer) Void activateLogin() Void EnterData() Void Check(string useremail,string password) |
| 2. Choose category & Search for an item | Class GUI Class Category Class Search Class DB | Void displayMenu() Void dispalyCategoryMenu() Void getCategoryName() Product<Array list>showCatagoryProducts(name catagoryname) Void AddItemToCart(string catagoryproduct) void Update(prodectID) Boolean CheckByName(string itemname) Boolean CheckByBrandName(string brandname) Void displaySearchResults(string name) Void AddItemToCart(string searchresult) Product<Array list>getSimilarProdects(string itemname) |

Tools

- Drawio.

Ownership Report

| Item | Owners |
|---------------------------|--|
| Salma Mamdoh Sabry | UML Diagram Class Responsibility Table |
| Roaa Talat Mohammed | Sequence Diagram Class - Sequence Usage Table |
| Janaa Raafat Abd Elhammed | 3 – tier Architecture C4 diagram |