

CSE 222 – Data Structures and Algorithms

Final Project Report

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2. Problem Definition

Customer relationship management (CRM) is the combination of practices, strategies and technologies that companies use to manage and analyze customer interactions and data throughout the [customer lifecycle](#). The goal is to improve customer service relationships and assist in customer retention and drive sales growth. CRM systems compile customer data across different channels, or points of contact, between the customer and the company marketing materials and [social networks](#). CRM systems can also give [customer-facing](#) staff members detailed information on customers' personal information, purchase history, buying preferences and concerns.

A CRM solution helps you focus on your organisation's relationships with individual people — including customers, service users, colleagues, or suppliers — throughout your lifecycle with them, including finding new customers, winning their business, and providing support and additional services throughout the relationship.

3. Users of the system

➤ Admin

- Login/Logout from System
- Update My Profile
- Change Account Password
- Manage Products
- Manage Offering
- Manage Users
- Has Control over System
- Manage Customer Feedback
- Manage Salesman
- Manage Schedule
- View all Customers

➤ Business Developer

- Login/Logout from System
- Update My Profile
- Change Account Password
- Manage Products
- Manage Offering
- Manage Users
- Manage Schedule
- Has Control over System
- View all Customers

➤ Customer

- Login/Logout from System
- Update My Profile
- Change Account Password
- Add Comment
- Send Message to System
- Contact Detail

4. Requirements in details

4.1 Non-Functional Requirements

CRM system will provide manage customer and control them to make their work better.

Admin will control their under departments easily.

System will hold informations about users and products.

System implemented for using business owner.

4.2 Functional Requirements

➤ Customer Login

Customer: ID and password is required

The system must only allow user with valid ID and password to log in the system.

➤ Business Developer Login

Business Developer: ID and password is required.

The system must only allow Business Developer with valid ID and password to log in the system.

➤ Admin Login

- Admin: ID and password is required.
- The system must only allow Admin with valid ID and password to log in the system.
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➤ Customer Sign Up

Customer: ID, name, surname and password is required.

The system must only allow user with valid data to sign up to the system.

➤ Admin Sign Up

Admin: ID, name, surname and password is required.

The system must only allow user with valid data to sign up to the system.

➤ **Business Developer Sign Up**

Business Developer: ID, name, surname and password is required.

The system must only allow Business Developer with valid data to sign up to the system.

➤ **Update Profile**

User (Admin, Customer, Business Developer) can update own profile.

User can change password.

User edit informations about themselves like name etc.

➤ **Customer Feedbacks**

Customer can send feedback with sending message to admins.

Customer can add comment to products.

➤ **Manage System**

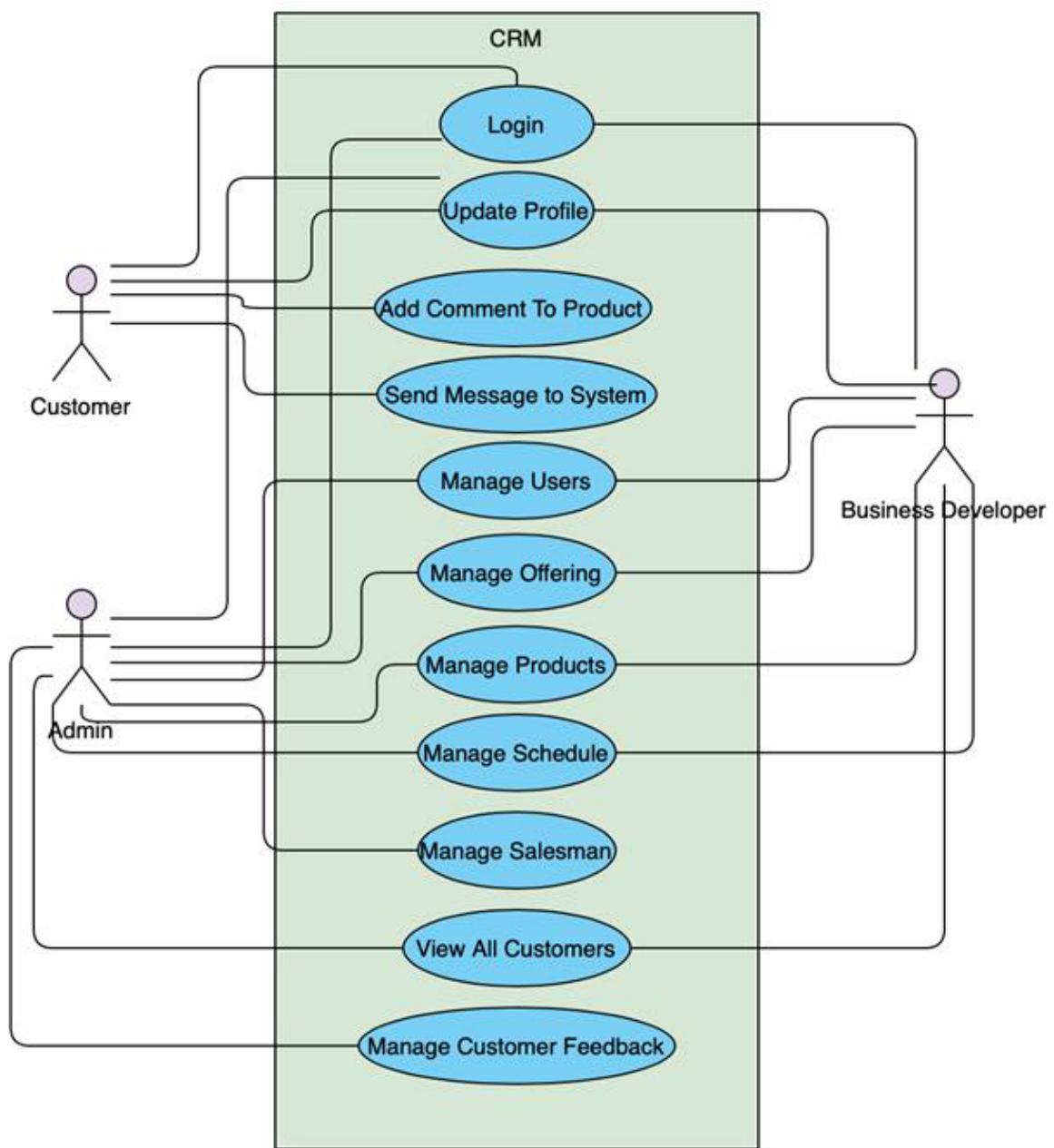
Admin can manage users, products, schedule, salesman, customer feedbacks and control them.

Business Developer can manage users, products, schedule and control them.

4.3. Software & Hardware Requirements

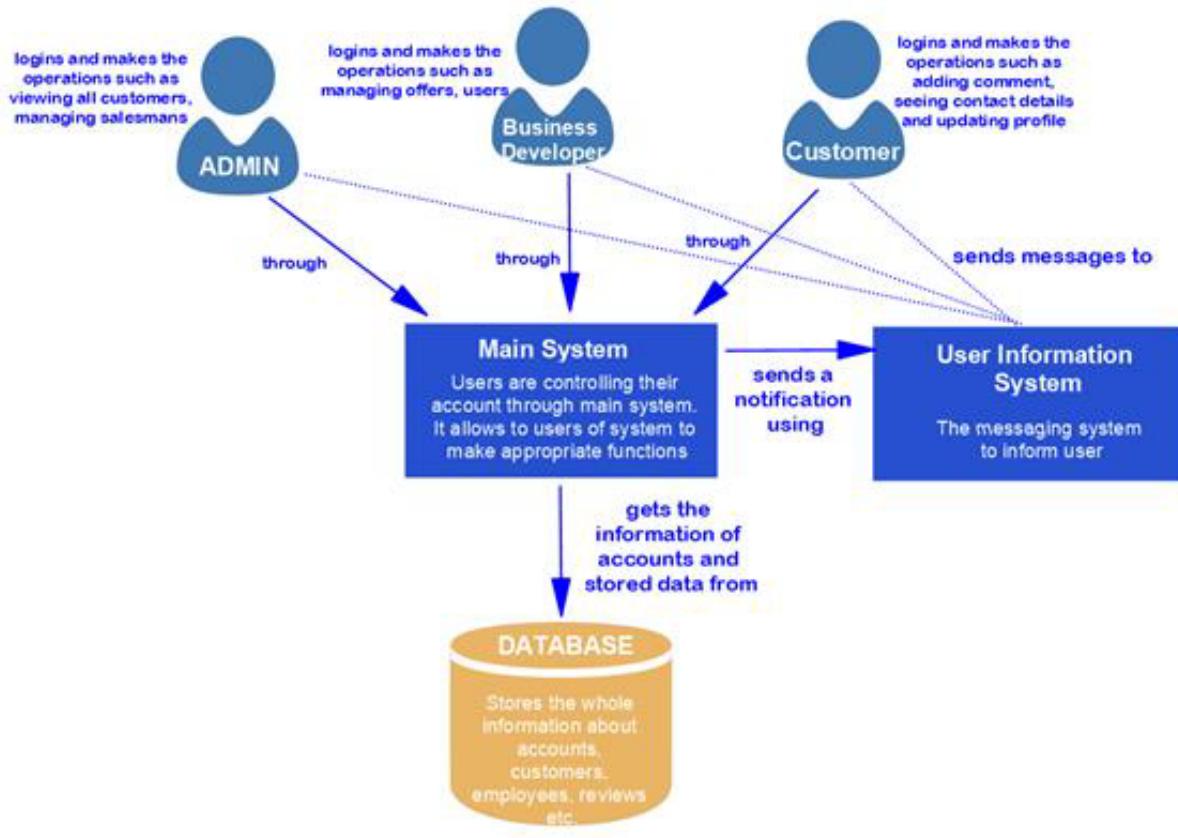
Development tools and programming language Java will use to write whole code and develop.

5. Use-Case Diagram

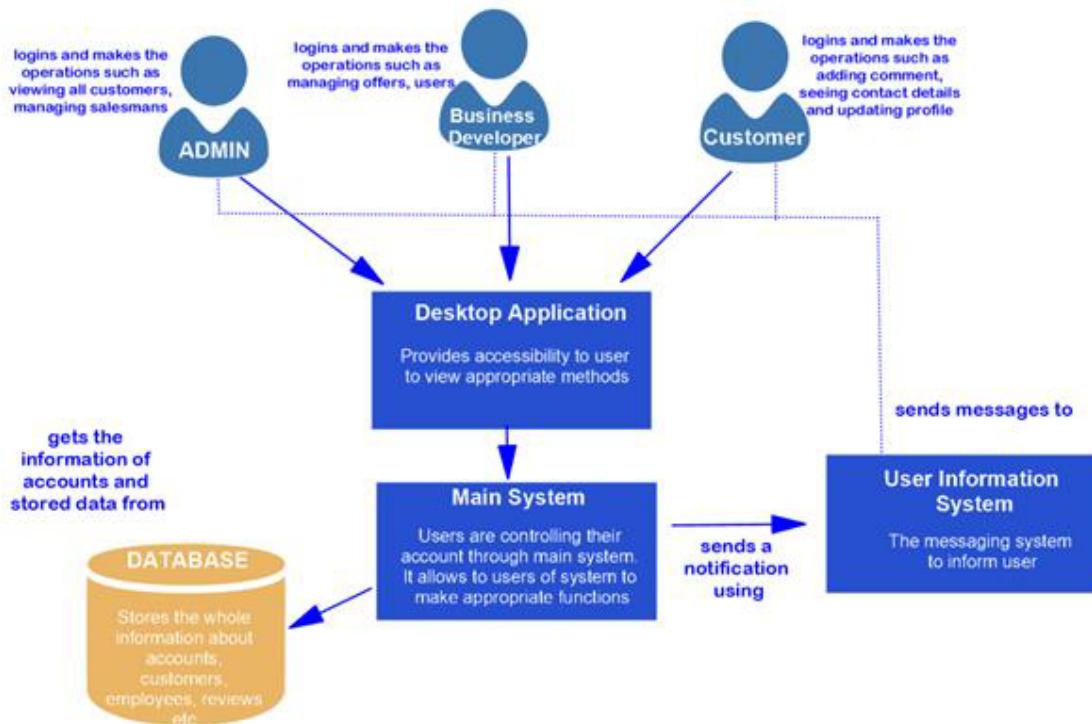


6. C4 Model

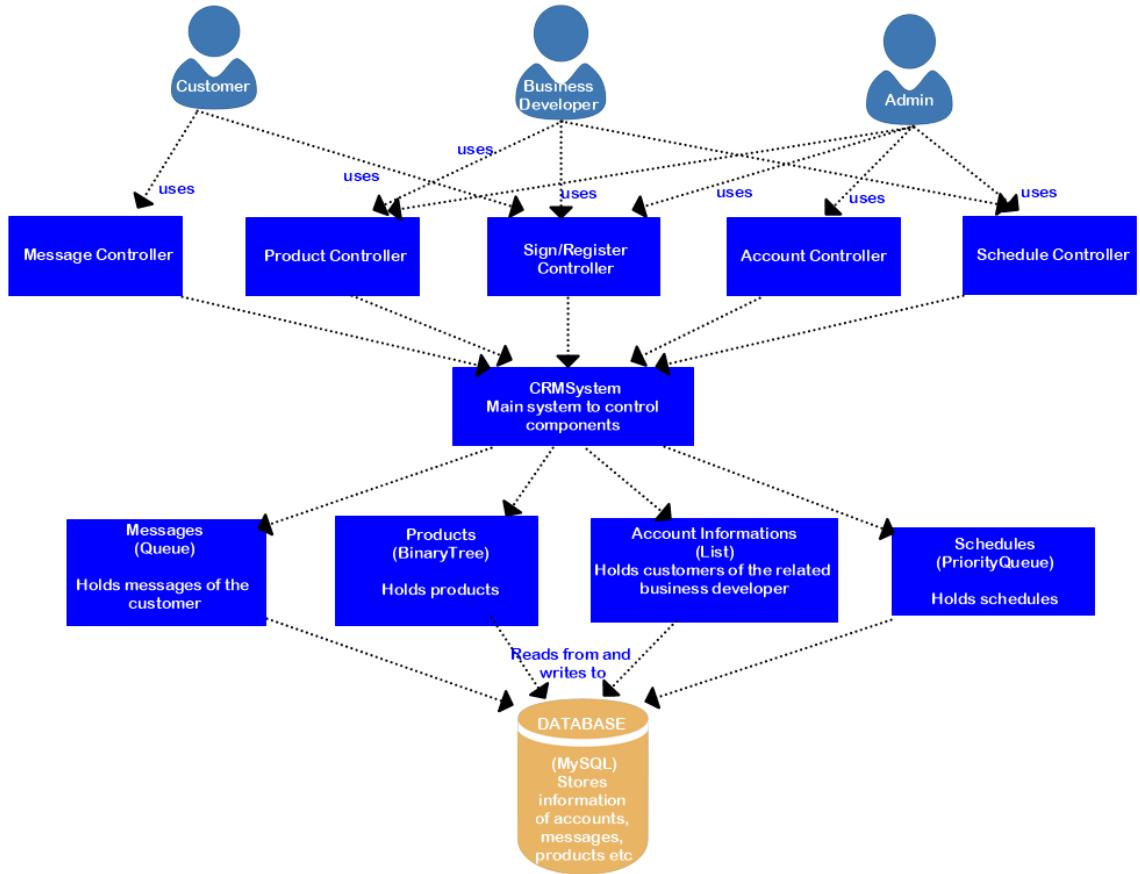
Level 1: System Context Diagram



Level 2: Container Diagram



Level 3: Component Diagram



Messages: To holds the messages sent from user, we will use Queue.

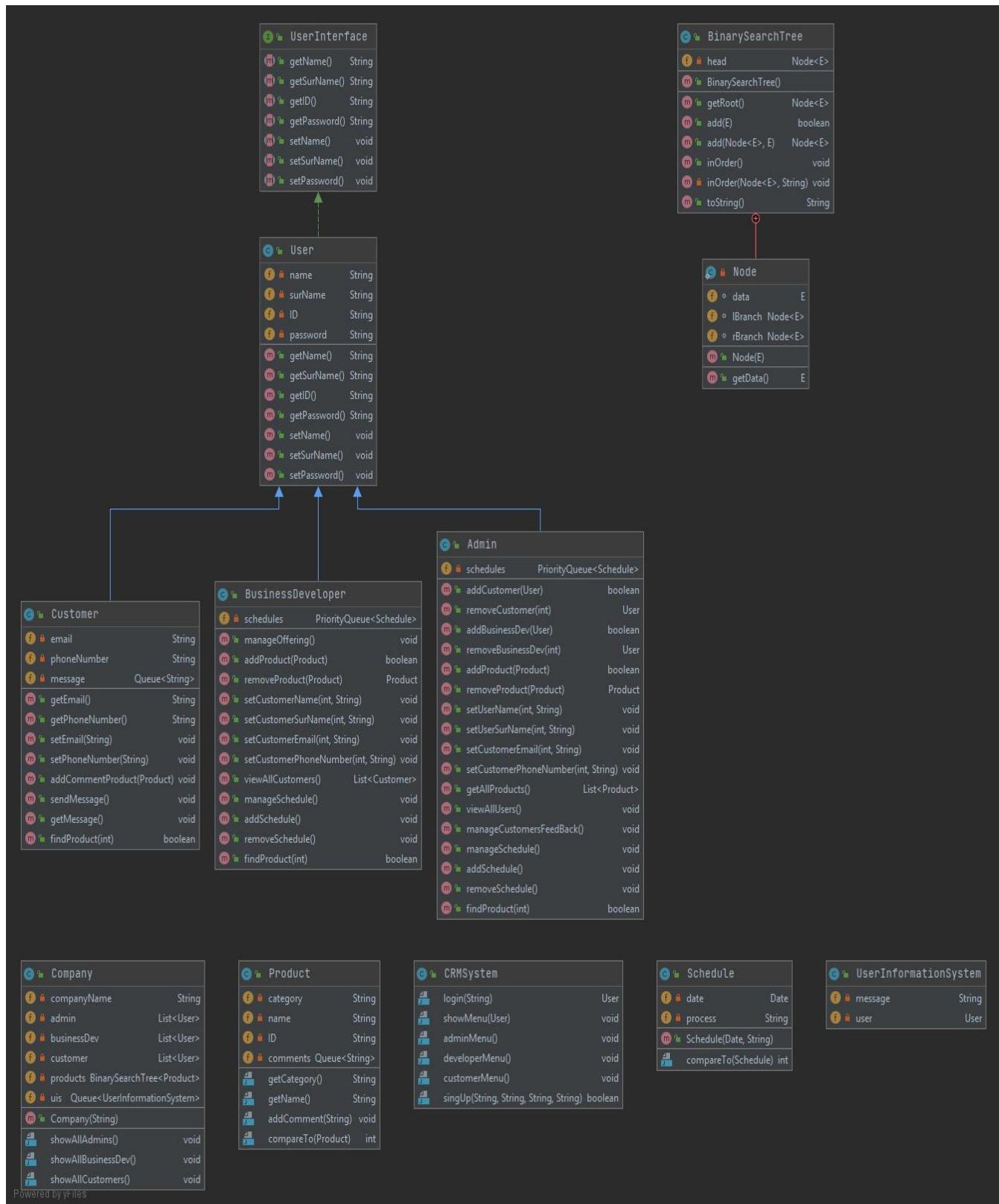
First message will be first element to give an answer.

Products: We will use Binary Tree to hold products which are taken from Database. We selected Binary Tree because there may be a lot of products and searching is very important.

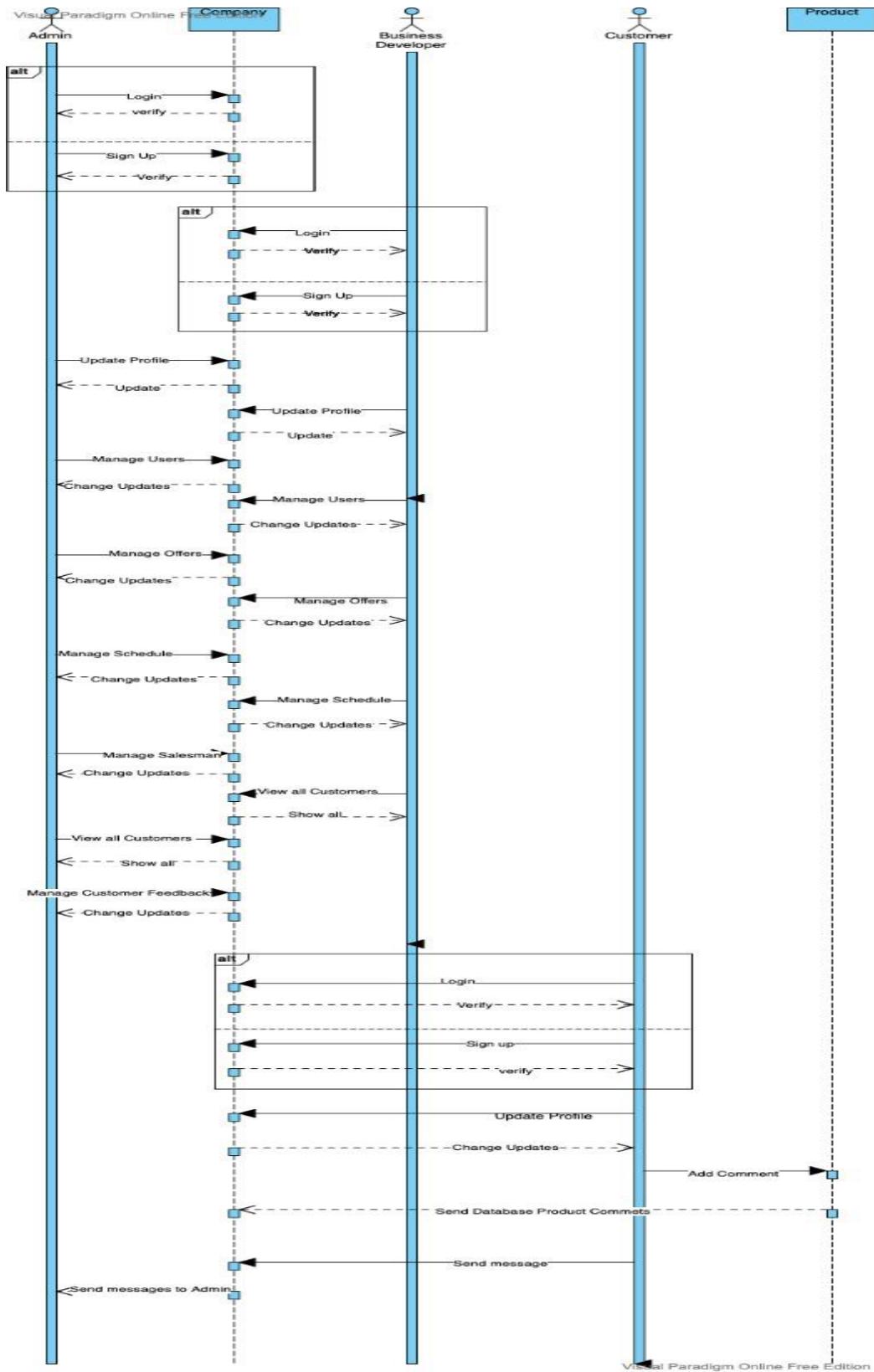
Account Informations: To holds the information (details) such as password, email, username of the account, we will use List Data Structure. We can get any information of a specific customer in O(1) time.

Schedules: Schedules have a priority then using PriorityQueue for schedules will be best option. For this reason, we will use PriorityQueue to holds schedules which are taken from Database

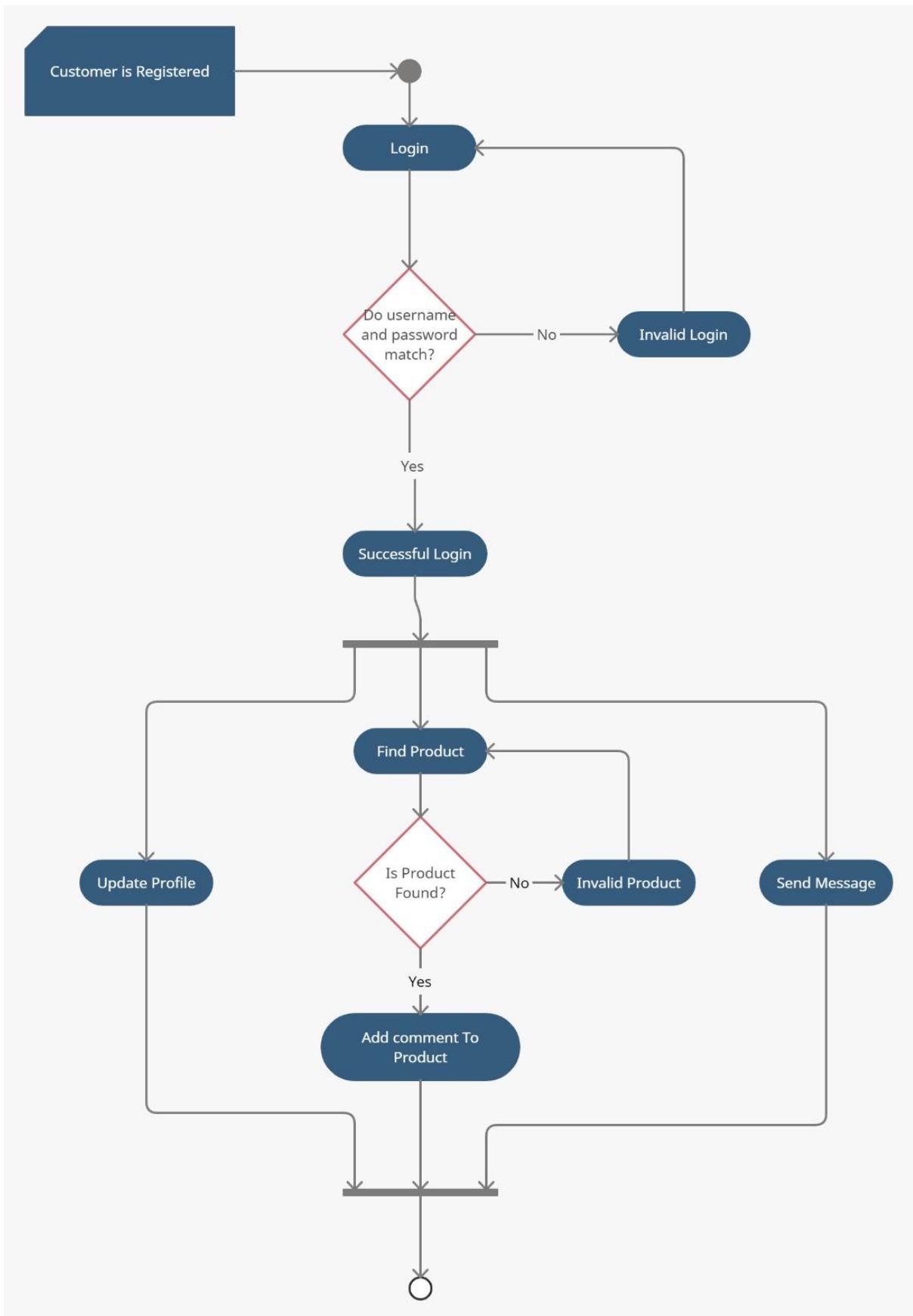
7. Class Diagrams

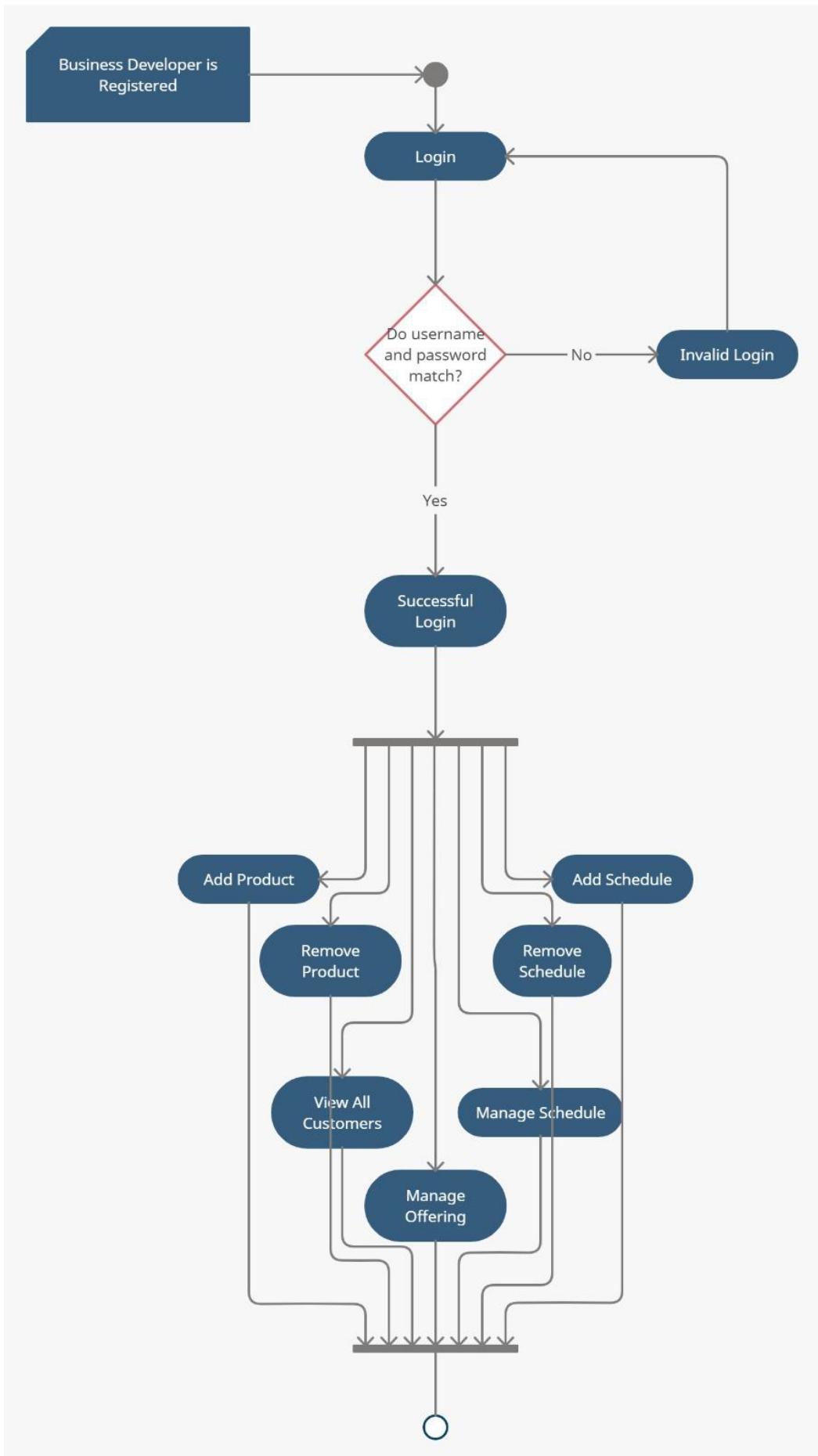


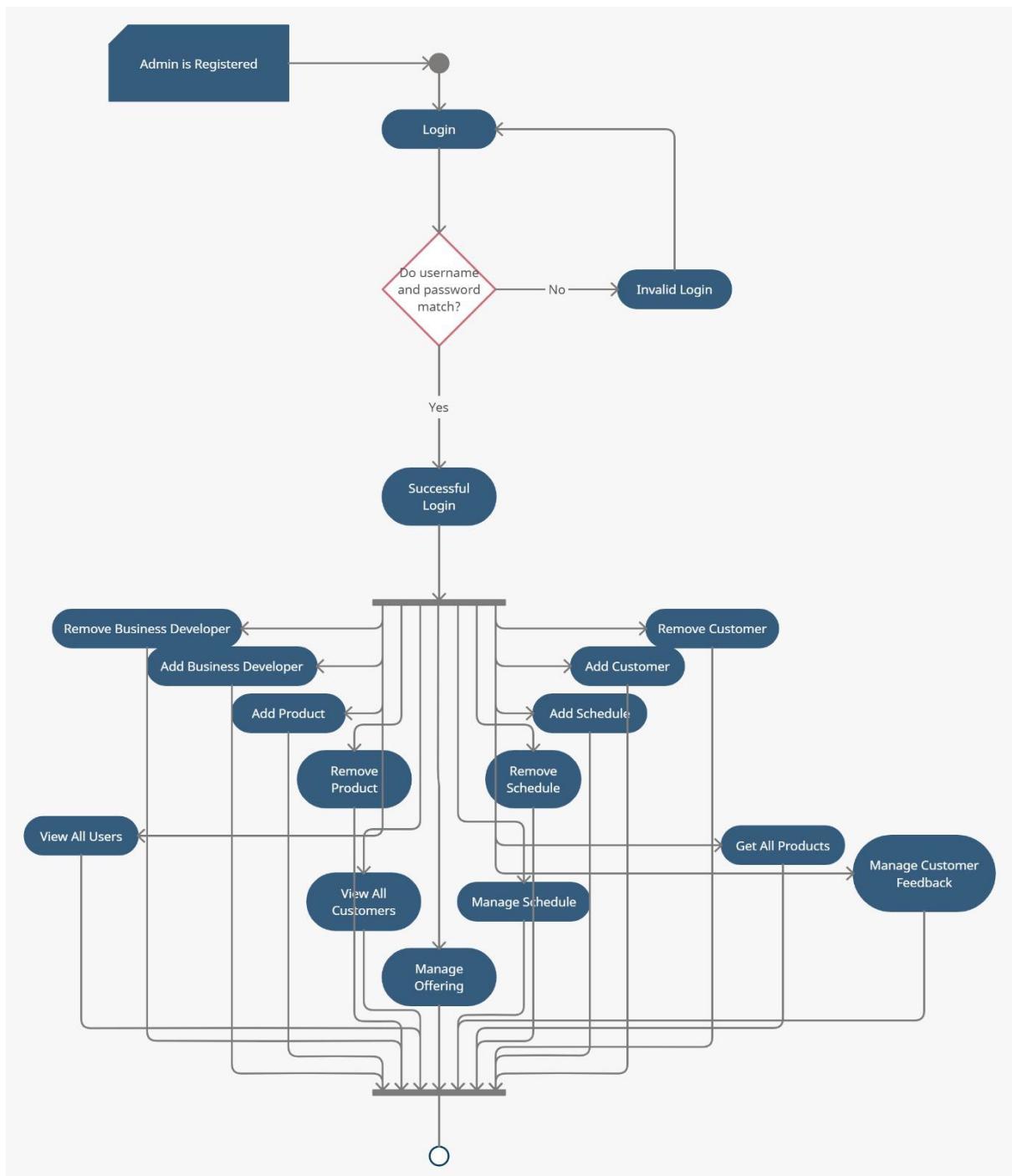
8. Sequence Diagram



9. Activity Diagrams







10. Non-trivial Implementation Details

- *We will call the login method after checking password and user id, which are in Company class, by using mainMenu method which is in CRMSystem class to get the input from user.*
- *We will register the user regarding the returned value after checking them in the Company class. We will call the signUp method after taking the input from user in mainMenu method which is in CRMSystem class.*
- *To add a user into the system, we will use signUp method to get the information of user and by using these values we will call Customer class' constructor to add them as a new user into the customer List which is in Company class.*
- *Admins can use addBusinessDev method (which is Admin class) to input required information to register a Business Developer. We will call BusinessDeveloper class' constructor to create a new BusinessDeveloper to add it into the List which is in Company class.*
- *Admins can use addCustomer method (which is Admin class) to input required information to register a Customer. We will call Customer class' constructor to create a new Customer to add it into the customer List which is in Company class.*
- *All users that registered into the system can enter the product id to search the Product. findProduct(String) method will handle this operation.*
- *Admins can use removeBusinessDev method to remove a Business Developer from the List which is in Company class. The admin will enter the information of Business Developer in removeBusinessDev method.*
- *The product that sold by Business Developer will be taken from the Company class and added into the previousOrders List which is in Customer class.*
- *Admin and BusinessDeveloper can use addSchedule() method to enter the input of time and process to create a new Schedule object. (Schedule class' constructor will be called)*
- *All users can use updateProfile method to update his/her profile. The input will be taken in this method. We will use set methods of User class to set the new values into the private fields.*

- *The Business Developer may suggest a product to a user by using manageOffering() method. In this method, we will use previous orders of the given customer (the input will be taken in manageOffering method) to suggest a product. Previous orders will determine the category of the suggested product.*

11. Test Cases

Test Case ID	Test Case Objective	Prerequisite	Steps	Input Data	Expected Output
TC_01	Verify that Admin login page is works with valid mail and password.	Admin must have been registered to the system at the coding stage.	1)Insert valid Admin mail 2)Insert Admin password	valid@gmail.com Valid password: *****	Prints 'Login is successfull' message. 'Admin Menu' appears on the screen.
TC_02	Verify that Business Developer login page is works with valid mail and password.	Business Developer must have been registered to the system by Admin.	1)Insert valid Business Developer mail 2)Insert Business Developer password	valid@gmail.com Valid password: *****	Prints 'Login is successfull' message. 'Business Developer Menu' appears on the screen.
TC_03	Verify that Customer login page is works with valid mail and password.	Customer must have already created an account	1)Insert valid Customer mail 2)Insert Customer password	valid@gmail.com Valid password: *****	Prints 'Login is successfull' message. 'Customer Menu' appears on the screen.

TC_04	Verify that login page is works with valid mail and invalid password.	Admin must have been registered to the system at the coding stage / BD must register by Admin / User have an account.	1)Insert valid mail 2)Insert invalid password	valid@gmail.com Invalid password: *****	Prints 'Incorrect login credentials' message. 'Log in' page reappears on the screen.
TC_05	Verify that login page is works with invalid mail/username and valid password.	Admin must have been registered to system/ BD must register by Admin / User have an account	1)Insert invalid mail or username 2)Insert invalid password	invalid@gmail.com / invalidUsername Valid password: *****	Prints 'Incorrect login credentials' message. 'Log in' page reappears on the screen.
Test Case Objective ID	Test Case Cas	Prerequisite	Steps	Input Data	Expected Output
TC_06	Verify that login page is works with invalid mail and invalid password.	Admin must have been registered to the system at the coding stage / BD must register by Admin / User have an account.	1)Insert invalid mail 2)Insert invalid password	invalid@gmail.com Invalid password: *****	Prints 'Incorrect login credentials' message. 'Log in' page reappears on the screen.
TC_07	Verify that 'Change Password' option works with proper informations	The 'Change Password' option should be selected from the menu.	1)Insert current password correctly 2)Insert new appropriate password	Current correct password: ***** New password: *****	Prints 'Password has been changed successfully' message. 'Menu' reappears on the screen.
TC_08	Verify that 'Change Password' option works with wrong current password.	The 'Change Password' option should be selected from the menu.	1)Insert current password incorrectly 2)Insert new appropriate password	Current incorrect password: ***** New password: *****	Prints 'The password entered does not match the current password' message. 'Change password' page reappears on the screen.

TC_09	Verify that 'Change Password' option works with improper new password.	The 'Change Password' option should be selected from the menu.	1)Insert current password correctly 2)Insert new improper password	Current correct password: ***** New password: ****	Prints 'New password cannot be less than 6 characters' message. 'Change password' page reappears on the screen.
TC_10	Verify that 'Change Password' option works with the same password as before	The 'Change Password' option should be selected from the menu.	1)Insert current password correctly 2)Insert new password which is same the current	Current correct password: ***** New password: *****	Prints 'New password cannot be same as the before' message. 'Change password' page reappears on the screen.
Test Case ID	Test Case Objective	Prerequisite	Steps	Input Data	Expected Output
TC_11	Verify that Customer can create an account	No account is logged in 'Sign up' option must be selected from the main menu.	1)Enter name, surname, ID, password, mail and phone number	"Sevra" "Genç" "76768909112" "232989" "sevra@gmail.com" "5357898989"	Prints 'New account created' message 'Log in' page reappears on the screen.
TC_12	Verify that BD or Admin can create account for Customer	BD or Admin must logged in their account. 'Add Customer' option must selected from the menu	1)Enter Customer's name, surname, ID, password, mail and phone number information	"Sevra" "Genç" "76768909112" "232989" "sevra@gmail.com" "5357898989"	Prints 'New account created' message Menu is reappears on the screen.

TC_13	Verify that when create an account ID must be 11 character	Prerequisites of TC_11 or TC_12	Enter ID	Invalid ID: "2233446688"	Prints 'ID must be 11 character' message 'Sign up '/ 'Add Customer' page reappears on the screen.
TC_14	Verify that when create an account phone number must be 10 character	Prerequisites of TC_11 or TC_12	Enter phone number	Invalid phonenumber: "535232"	Prints 'Phone number must be 10 character' message 'Sign up '/ 'Add Customer' page reappears on the screen.
Test Case ID	Test Case Objective	Prerequisite	Steps	Input Data	Expected Output
TC_15	Verify that Customer's ID cannot be same as anyone	Prerequisites of TC_11 or TC_12	Enter ID	Same ID with other: "2233446688"	Prints 'Only one account can be opened with one ID' message 'Sign up '/ 'Add Customer' page reappears on the screen.
TC_16	Verify that Admin can remove Customer from the system	Admin must be logged in to the system	Enter ID of Customer	"76768909112"	Prints 'Customer is removed from the system' message 'Admin Menu' is reappears on the screen.

TC_17	Verify that Admin can add Business Developer	Admin must be logged in to the system	1)Enter BD's name, surname, ID, mail, password, phone number information	"xxx" "yyy" "76768909112" "xyxy@gmail.com" "232989" "5357898989"	Prints 'New Business Developer added' message 'Admin Menu' is reappears on the screen.
TC_18	Verify that Business Developer's ID cannot be same as anyone	Admin must be logged in to the system	Enter ID	Same ID with other: "2233446688"	Prints 'Only one account can be opened with one ID' message 'Add Business Developer' page reappears on the screen.
TC_19	Verify that Admin can remove Business Developer from the system	Admin must be logged in to the system	1)Enter BD's ID	"76768909112"	Prints 'Business Developer is removed from the system' message 'Admin Menu' is reappears on the screen.
TC_20	Verify that Admin / BD can add product to the system.	Admin or BD logged in to the system	Enter product's category, name and ID	"cccc" "nnnnn" "iiiiiiii"	Prints 'Product added successfully' message

EXPLANATION

- All the users will use the same menu to enter the system. The type of the user will be determined after logged in.
- The test cases to check the mail and password: 1-6
- The test cases to update the password of the user: 7-10
- The test cases to register a customer into the system: 11
- The test cases to register a customer by Admin or Business Developer: 12
- The test cases to validate the entered ID and phone number: 13-14
- The test cases to check the duplicate ID's while creating a new Customer or Business Developer: 15-18
- The test cases to use the Admin's remove and add operation on the Customer and Business Developer: 16-17-19
- The test cases to use the method of Admin or Business Developer to add a new Product: 20

11.Test Results

*****ADMIN*****

Name	Surname	ID
a1name	a1srname	A1
Hannibal	Lecter	A3

TC_01 - Verify that Admin login page is works with valid ID and password.

true

*****BUSINESS DEVELOPERS*****

Name	Surname	ID
b1name	b1srname	B1

TC_02 - Verify that Business Developer login page is works with valid ID and password.

true

*****CUSTOMERS*****

Name	Surname	ID	Phone Number
Ahmet	Er	C6	er
Arda	Kılıç	C54	kilic
Customer10	custom	C10	ccc
John	Doe	C7	432654756
Mustafa	Yilmaz	C-1458051921	null
c1name	c1srname	C1	c1phone
c2name	c2srname	C2	c2phone

TC_03 - Verify that Customer login page is works with valid ID and password.

true

TC_04 - Verify that login page is works with valid ID and invalid password.

false

TC_05 - Verify that login page is works with invalid ID and valid password.

false

TC_06 - Verify that login page is works with invalid ID and invalid password.

false

TC_11 - Verify that Customer can create an account.

*****CUSTOMERS*****

Name	Surname	ID	Phone Number
Ahmet	Er	C6	er
Arda	Kılıç	C54	kilic
Customer10	custom	C10	ccc
John	Doe	C7	432654756
Mustafa	Yilmaz	C-1458051921	null
c1name	c1srname	C1	c1phone
c2name	c2srname	C2	c2phone

TC_12 - Verify that BD or Admin can create account for Customer.

A new user was inserted successfully!

true

*****CUSTOMERS*****

Name	Surname	ID	Phone Number
Ahmet	Er	C6	er
Arda	Kılıç	C54	kilic
Customer10	custom	C10	ccc
Dan	Cron	C23	null
John	Doe	C7	432654756
Mustafa	Yilmaz	C-1458051921	null
c1name	c1srname	C1	c1phone
c2name	c2srname	C2	c2phone

TC_16 - Verify that Admin can remove Customer from the system.

A user was deleted successfully!

Customer is removed!

*****CUSTOMERS*****

Name	Surname	ID	Phone Number
Ahmet	Er	C6	er
Arda	Kılıç	C54	kilic
Customer10	custom	C10	ccc
John	Doe	C7	432654756
Mustafa	Yilmaz	C-1458051921	null
c1name	c1srname	C1	c1phone
c2name	c2srname	C2	c2phone

TC_17 - Verify that Admin can add Business Developer.

A new user was inserted successfully!

*****BUSINESS DEVELOPERS*****

Name	Surname	ID
b1name	b1srname	B1
Betty	Green	B12

TC_19 - Verify that Admin can remove Business Developer from the system.

A user was deleted successfully!

Business Developer is removed!

*****BUSINESS DEVELOPERS*****

Name	Surname	ID
b1name	b1srname	B1

TC_20 - Verify that Admin / BD can add product to the system.