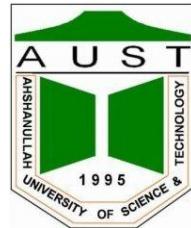


Ahsanullah University of Science & Technology

Department of Computer Science and Engineering



Final Report on

“Power Up Gym”

Course Number & Name: CSE 3224 - Information & System Design Lab

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1 Project Overview

Our project is about the gym management system. This project “Gym Management System” is a solution for fitness centers to manage the members and their data in an easier and more convenient way. The administrator can view all the members and the staffs working under them as well as their details. The administrator can also manage schedules, memberships, facilities and much more anytime, anywhere.

2 User Story

As a gym owner/manager:

- I want to enter new equipment, member, staff into the Gym Management System, categorizing them according to-
 - Equipment - buying dates, maintenance, etc.
 - Members - buying membership date, expiry date, etc.
 - Staff - salary, designation, etc.
 - Trainer - rating, work hour, etc.

So that those data can be easily managed and organized.

- The system should provide an interface to input new equipment, update, delete and assign them to packages, such as gymnastics, aerobics, cardio etc.
- I should be able to specify package details including name, description, price and duration.
- I want to input customer information into the Gym Management System, so that we can provide personalized service and maintain an up-to-date customer database.
- I should be able to input customer details, including name, contact information, address, and any relevant preferences or notes, as well as update and delete them.

- The system should store the customer information securely for future transactions and loyalty program enrollment.
- Upon successful update, the changes should be reflected in the customer's profile for future interactions and transactions.

As a Gym Member:

- I want the UI to be very user friendly and easy to navigate and accessible.
- The system should have the particular customer data handled very well and provide some statistical dashboards.
- The system should have the option to record constructive feedbacks.

3 Process Model: Agile Scrum Methodology

As we are making a gym management system, the most suitable process would be the **Agile scrum methodology**. The Agile Scrum model is an iterative and incremental approach to software development that emphasizes flexibility, collaboration, and delivering value to customers. The Agile development process is highly suitable for a gym owner to manage the customers and the services of the gym. Here are the reasons why the Agile model is suitable for our project:

3.1 Flexibility and Adaptability

Agile model provides flexibility to accommodate changing requirements in the gym facility. As new packages and equipment emerge, Agile model allows seamless integration and ensures an up-to-date website.

3.2 Collaboration

The scrum framework encourages collaboration throughout the project. Through Sprint Reviews, stakeholders can provide feedback on the implemented functionalities, ensuring the system meets their expectations.

3.3 User-Centric design and personalization

Agile enables user-centric design and personalization. Close collaboration with users and customers helps understand their requirements, resulting in a tailored system according to their needs.

3.4 Risk management

The Agile Scrum model supports effective risk management by promoting early detection. Regular Sprint Review provides opportunities to identify and address risk promptly, ensuring that any issues are resolved on time.

3.5 Continuous improvement and maintenance

Agile promotes continuous improvement and maintenance of the system post-launch. By gathering feedback from users, we can easily identify areas for enhancement and implement iterative updates. This iterative approach allows the system to evolve and adapt to changing customer needs and market trends over time.

This model allows for adapting to changing requirements, delivering value incrementally, involving users throughout the development process, incorporating iterative feedback, and managing risks effectively in our project which makes this model highly suitable for our project.

4 Prototype Design

4.1 Owner's Perspective

As a gym owner, I need to log into the Power Up Gym Management System using my username and password to access essential features and carry out my tasks efficiently.

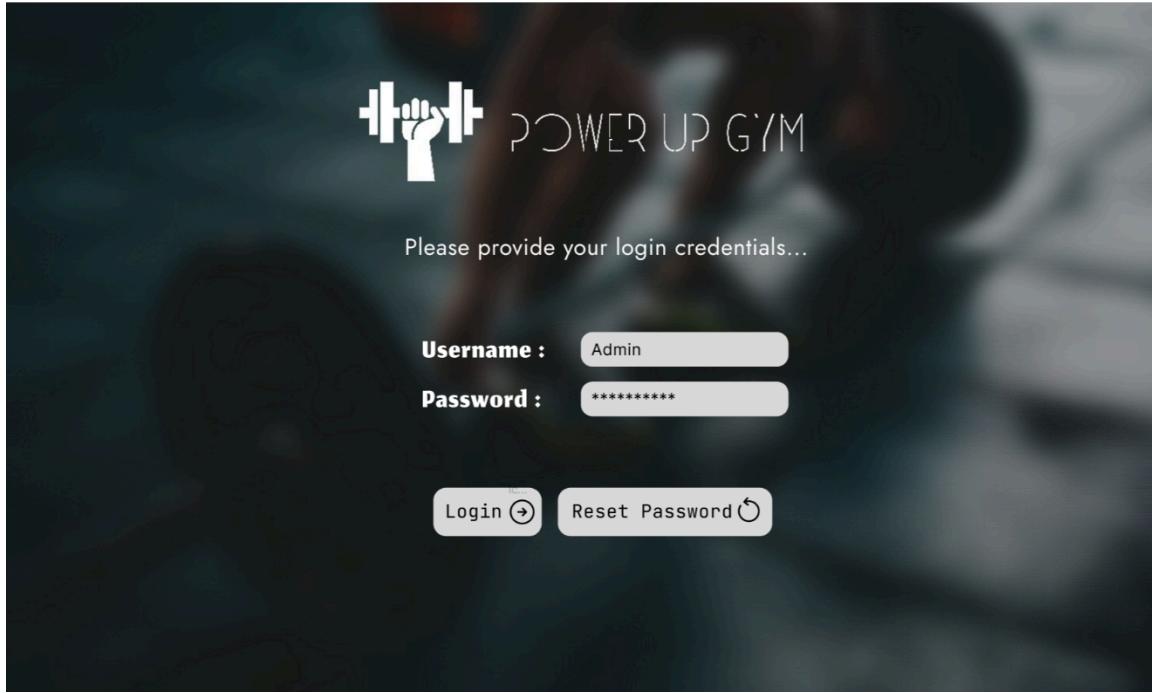


Fig 1: Login UI for admin & employee

Upon logging in, I desire to have full control over customer management, employee management, and package management functionalities within the system. Additionally, I require a comprehensive calculation showcasing the expenses incurred on equipment purchases and utilities, as well as an overview of the incoming revenue generated by the gym. This information is crucial for me as an owner to accurately determine and assess the overall profitability of the business.

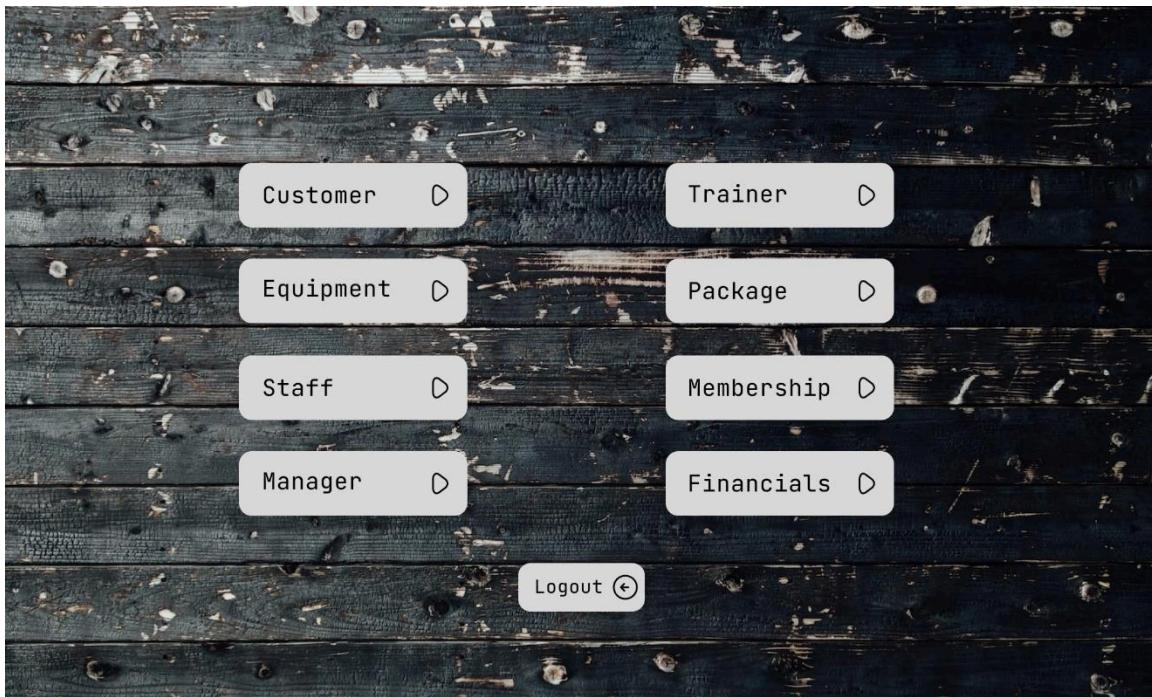


Fig 2: Admin Dashboard

The image shows a 'Customer enrollment UI' with a dark background. The title 'Add New Customer' is at the top. Below it is a form with the following fields and their values:

Name :	Sultan
Height :	165 cm
Weight :	70 kg
Exercise Type :	Cardio
Joining Date :	13 - 06 - 2023
Package No :	Basic - 002
Manager ID :	02
Trainer ID :	011
Paid amount :	3500/-

To the right of the form are three circular icons with symbols: a plus sign (+), a minus sign (-), and a left arrow (←). The entire form is set against a dark, slightly blurred background.

Fig 3: Customer enrollment UI

Edit Customer Info

Customer ID :	00157801
Name :	Yasir
Weight :	75 kg
Exercise Type :	Cardio
Trainer ID :	011

(Icon...)

✓
✗
-

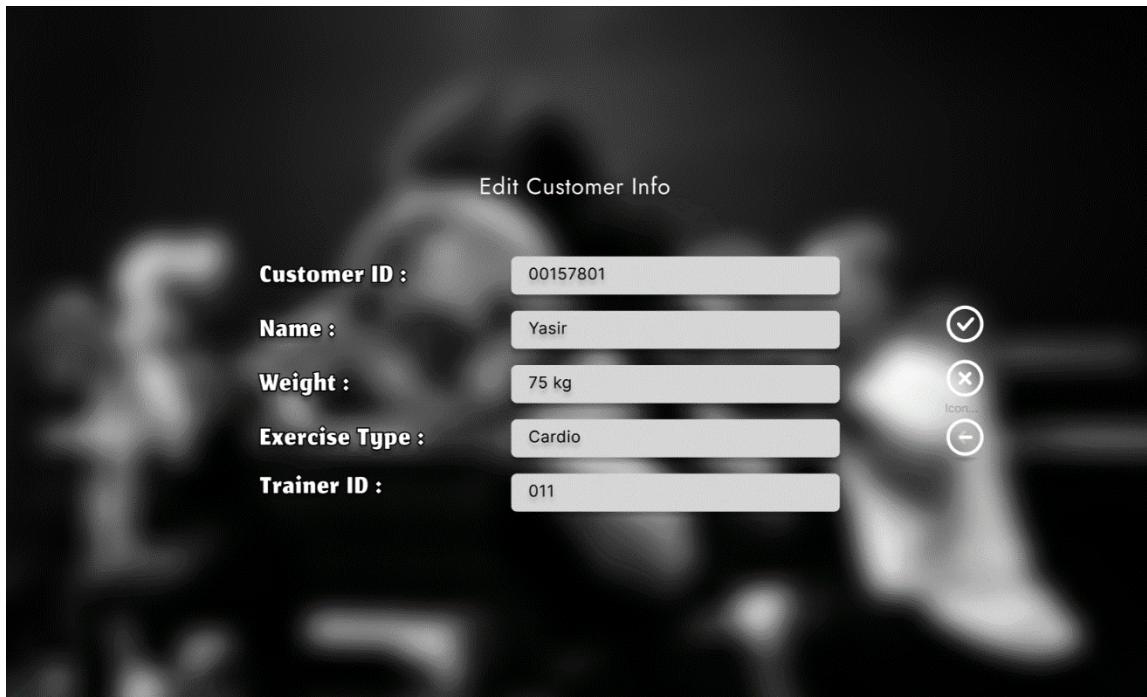
A screenshot of a mobile application interface titled "Edit Customer Info". It displays five input fields for customer information: Customer ID (00157801), Name (Yasir), Weight (75 kg), Exercise Type (Cardio), and Trainer ID (011). To the right of each input field is a small circular button containing a checkmark, an X, or a minus sign, likely for validation or deletion. The background is dark.

Fig 4: Customer info revision UI

Edit Staff Info

Staff ID :	16
Name :	Hasibul
Salary :	15000/-
Leave Date :	Null
Work Post :	Logistics
Daily Work Hour :	8am to 5pm
Manager ID :	03

(Icon...)

✓
✗
↶

A screenshot of a mobile application interface titled "Edit Staff Info". It displays seven input fields for staff information: Staff ID (16), Name (Hasibul), Salary (15000/-), Leave Date (Null), Work Post (Logistics), Daily Work Hour (8am to 5pm), and Manager ID (03). To the right of each input field is a small circular button containing a checkmark, an X, or a left arrow, likely for validation or deletion. The background is dark.

Fig 5: Staff info revision UI

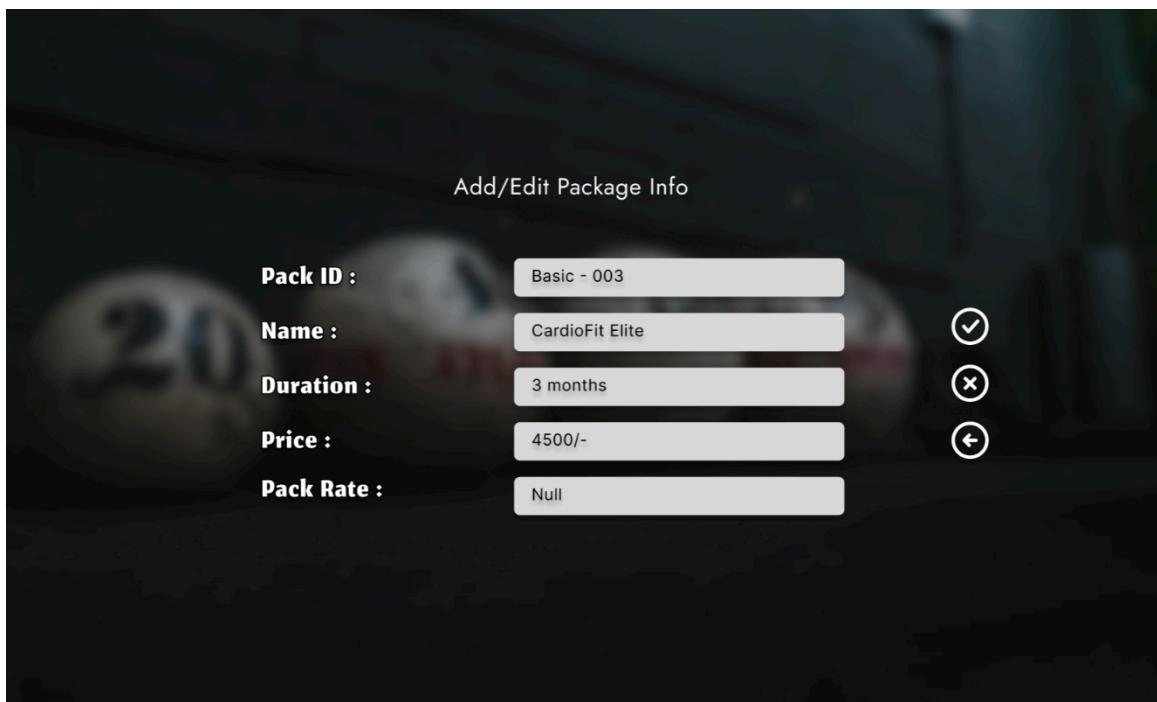


Fig 6: Create/modify package info UI

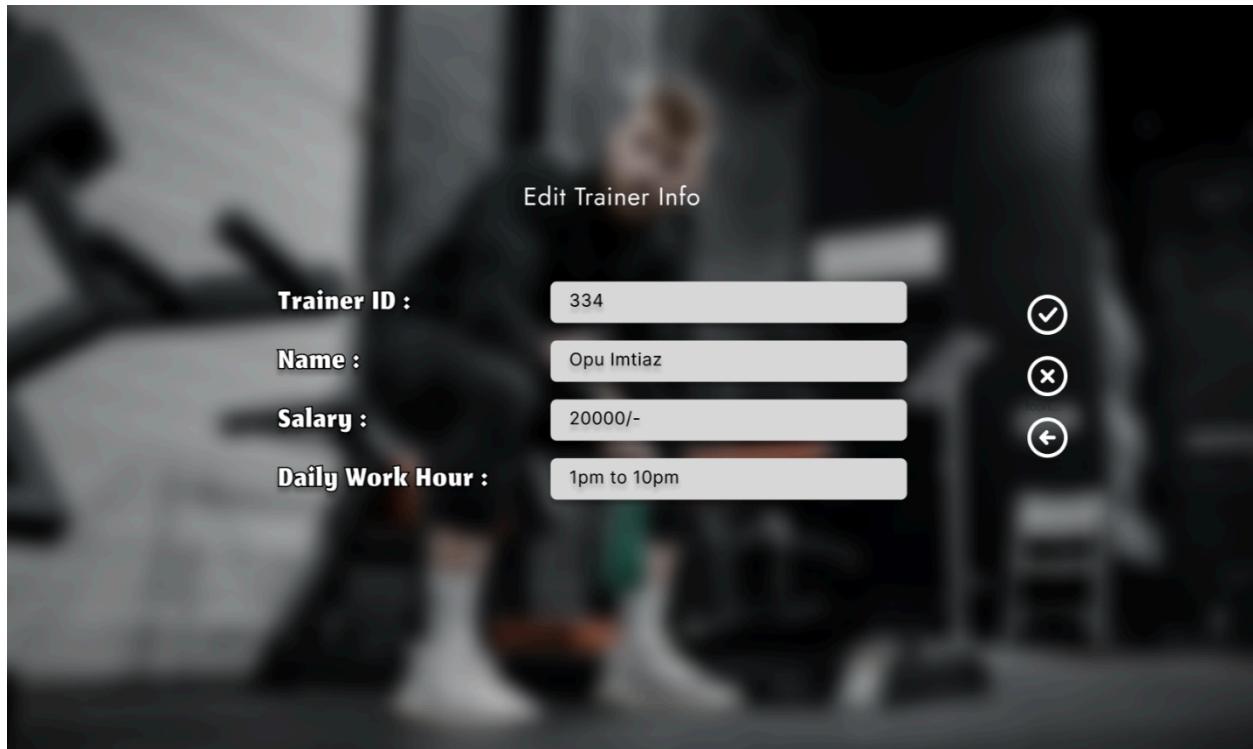


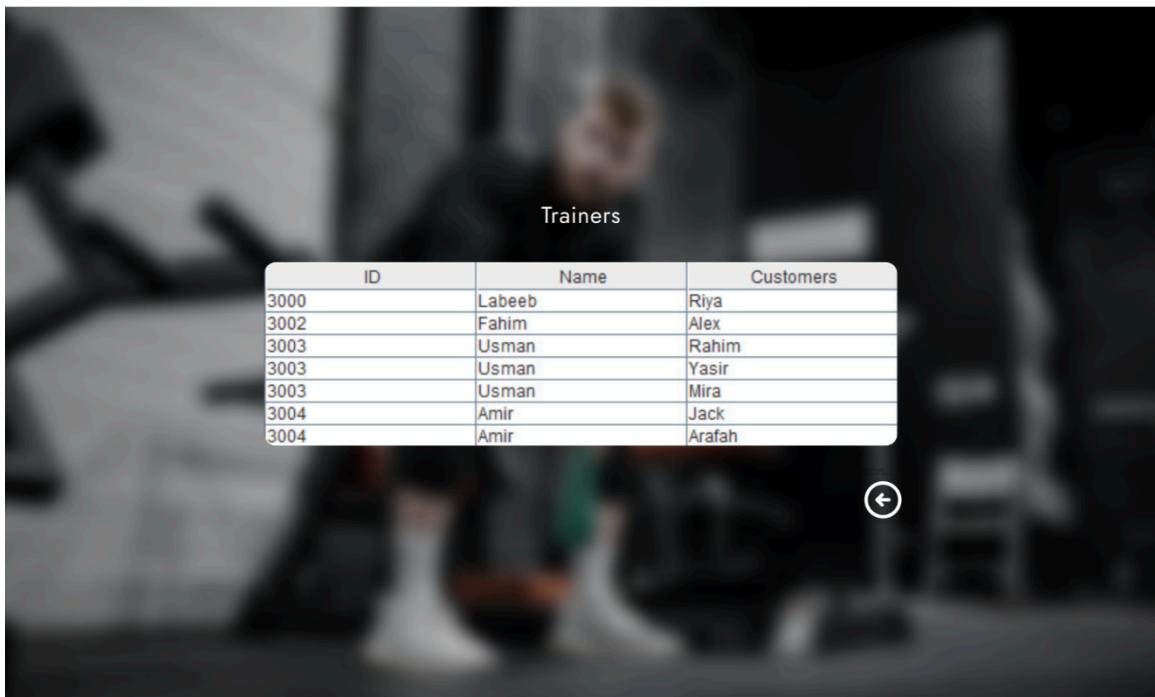
Fig 7: Add/modify trainer info UI

Customer Info														
Name	Id	Join	Height	Weight	Amount	Excercise	Manager	Trainer	MemberID	Expires	Pack	Pack_Dur...	Pack_Price	Pack_rati...
Rahim	1000	2019-12-15	1.69m	59kg	34000.00	Abs	Saad	Usman	1000	2024-12-15	Premium	1 year	30000.00	5 star
Jack	1001	2021-02-15	1.732m	60kg	24000.00	Back	Saad	Amir	1001	2024-02-15	Elite	6 months	20000.00	2 star
Alex	1002	2022-03-15	1.701m	66kg	22000.00	Arms	Aasim	Fahim	1002	2025-03-15	Basic	3 months	18000.00	3 star
Krafah	1003	2020-04-15	1.794m	71kg	24000.00	Chest	Zain	Amir	1003	2024-04-15	Elite	6 months	20000.00	2 star
Yasir	1004	2022-05-15	1.733m	73kg	22000.00	Abs	Aasim	Usman	1004	2025-05-15	Basic	3 months	18000.00	3 star
Riya	1005	2019-09-15	1.68m	63kg	16000.00	Chest	Aasim	Labeeb	1005	2023-09-15	Silver	1 month	12000.00	3 star
Mira	1006	2021-01-15	1.701m	65kg	17000.00	Arms	Zain	Usman	1006	2024-01-15	Bronze	15 days	13000.00	4 star

Fig 8: Customer information UI

Packages & Rating				
id	name	duration	price	rating
1	Gold	3 months	25000.00	5 star
2	Premium	1 year	30000.00	5 star
3	Elite	6 months	20000.00	2 star
4	Basic	3 months	18000.00	3 star
5	Silver	1 month	12000.00	3 star
6	Bronze	15 days	13000.00	4 star

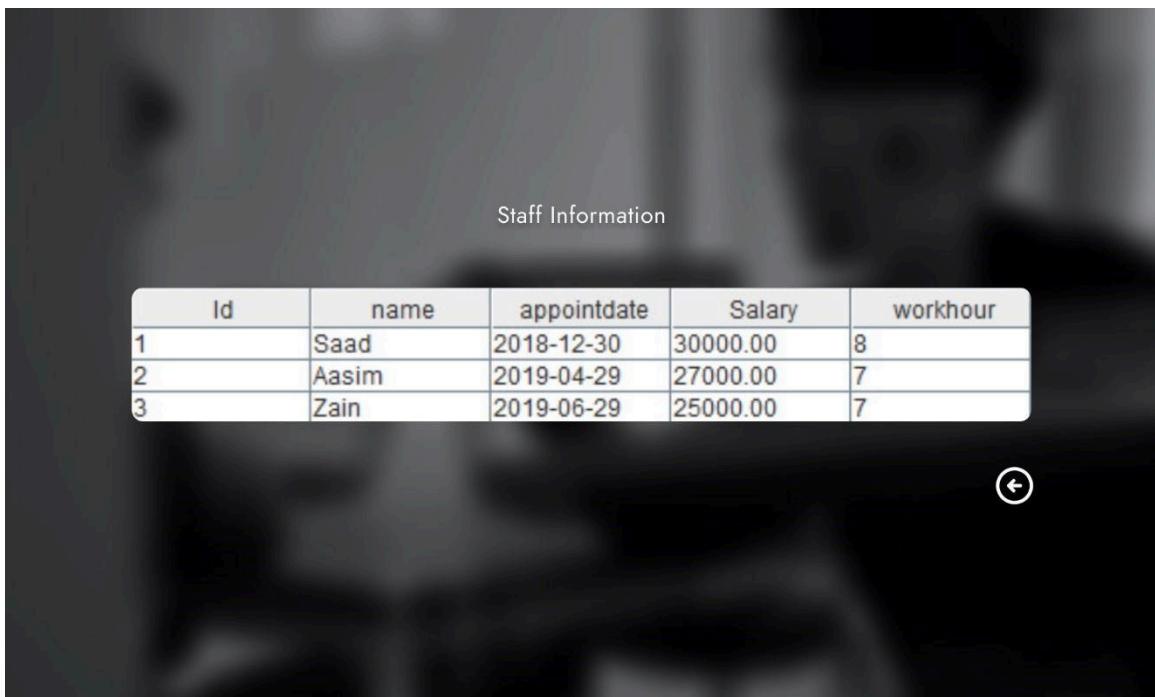
Fig 9: Package information UI



Trainers

ID	Name	Customers
3000	Labeeb	Riya
3002	Fahim	Alex
3003	Usman	Rahim
3003	Usman	Yasir
3003	Usman	Mira
3004	Amir	Jack
3004	Amir	Arafah

Fig 10: Trainer information UI



Staff Information

Id	name	appointdate	Salary	workhour
1	Saad	2018-12-30	30000.00	8
2	Aasim	2019-04-29	27000.00	7
3	Zain	2019-06-29	25000.00	7

Fig 11: Staff information UI



Financials

name	buydate	maintainance	payid	cost
Power rack	2018-12-30	6 months	23414	40000.00
Chest press ...	2018-12-30	4 months	23451	18000.00
Lat pulldown ...	2019-12-30	2 months	26432	34000.00
Roman chair	2019-02-27	3 months	47839	39000.00
Hammer stre...	2018-12-30	3 months	74199	27000.00
Adjustable we...	2018-12-30	3 months	74212	16000.00

Fig 12: Financial information UI

4.2 Customer's Perspective

As a customer of Power Up Gym, I will have access to various packages offered, along with their ratings. Additionally, I can view information about the trainers available at the gym, including their ratings. Furthermore, I will be able to explore the gym's equipment inventory.

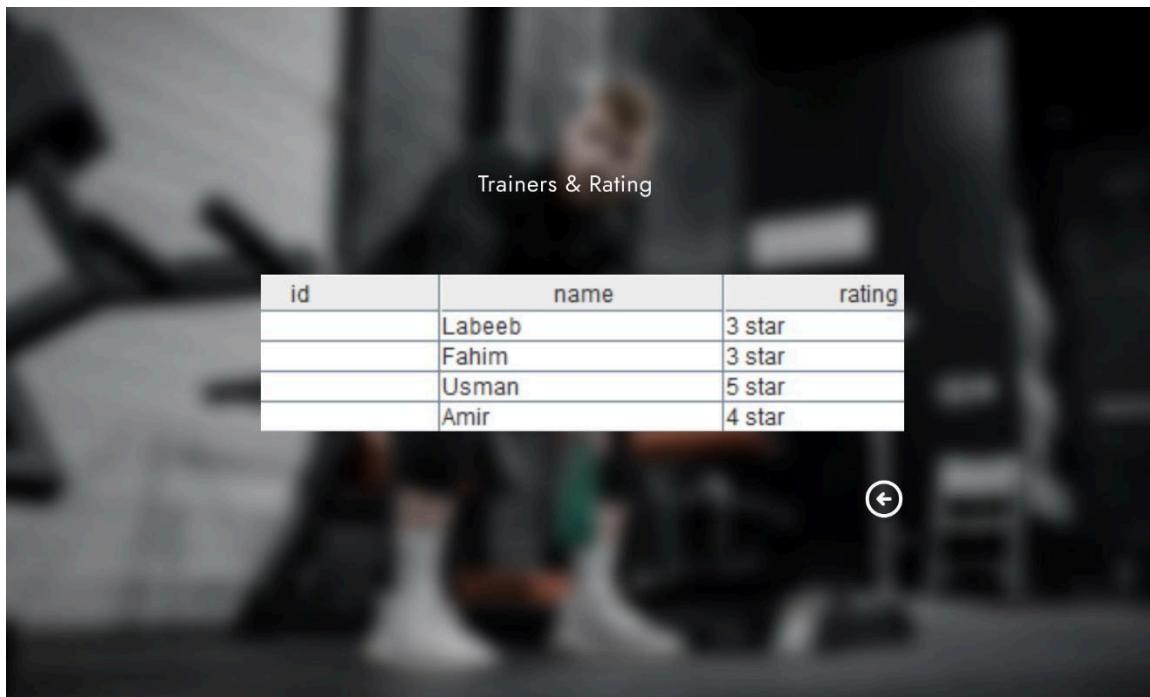


Fig 13: Training and rating

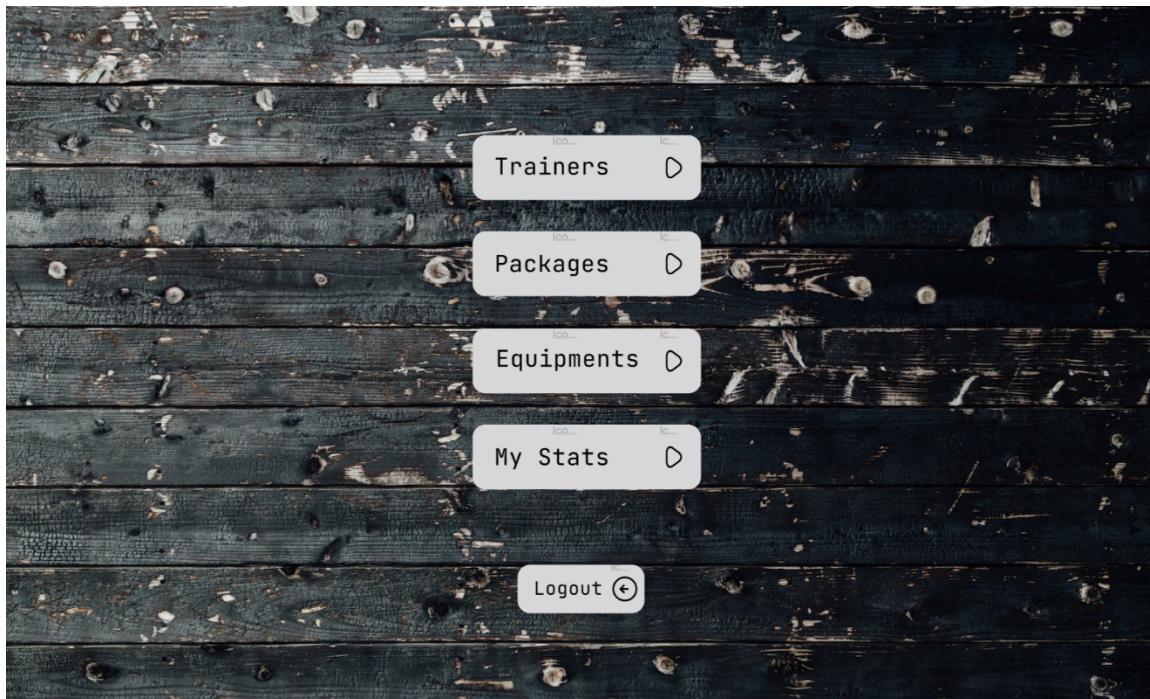


Fig 14: User Dashboard

Packages & Rating

	id	name	duration	price	rating
1	Gold	3 months	25000.00	5 star	
2	Premium	1 year	30000.00	5 star	
3	Elite	6 months	20000.00	2 star	
4	Basic	3 months	18000.00	3 star	
5	Silver	1 month	12000.00	3 star	
6	Bronze	15 days	13000.00	4 star	

(Back)

Fig 15: Package & rating UI

Available Equipments

	name	buydate
	Power rack	2018-12-30
	Chest press ...	2018-12-30
	Lat pulldown ...	2019-12-30
	Roman chair	2019-02-27
	Hammer stre...	2018-12-30
	Adjustable we...	2018-12-30

(Back)

Fig 16: Available equipment UI

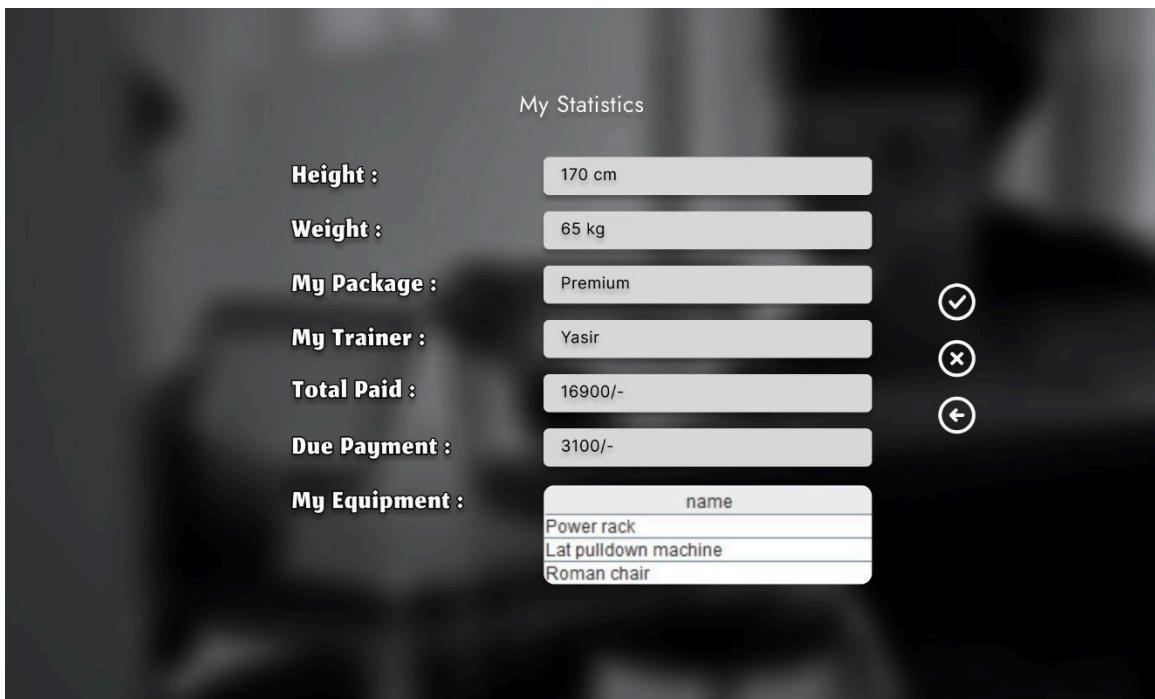


Fig 17: User statistics UI

5 Functional Point Ranking According to Complexity

Table 1: Weights of 5-FP attributes

Measurement Parameters	Low	Average	High
Number of External Inputs (EI)	7	10	15
Number of External Outputs (EO)	5	7	10
Number of External Inquiries (EQ)	3	4	6
Number of Internal Files (ILF)	4	5	7
Number of External Files (EIF)	3	4	6

5.1 Calculate Unadjusted Function Points (UFP)

We are calculating the complexity value for each Functional Point Components. The complexity values we are assigning (low, average, high) are used to estimate the effort and resources required for implementing each functional point. Generally, higher complexity points involve more intricate operations, validations, calculations, or interactions with other components, leading to more development effort. Meanwhile, lower complexity points tend to involve simpler operations with less complexity.

5.2 Admin/Owner's Perspective

1. External Inputs (EI):

- **Admin Login (Low Complexity):** A basic authentication process where administrators log in using a simple username and password.
- **Add New Customer (Average Complexity):** Capturing and validating customer information before adding it to the system.
- **Edit Customer (Average Complexity):** Updating existing customer details, which includes searching, editing, and saving changes.
- **Show Customer (Low Complexity):** Displaying customer details after retrieving them from the database by taking CustomerID as input.
- **Add New Equipment (Average Complexity):** Requires input validation, storing detailed equipment information, and potentially associating it with maintenance schedules.
- **Add Employee (Average Complexity):** Capturing employee information, including validation and storage.
- **Edit Employee (Average Complexity):** Updating existing employee details, which includes searching, editing, and saving changes.
- **Show Employee (Low Complexity):** Displaying employee information after retrieving it from the database after taking EmployeeID as input.
- **Add Package (Average Complexity):** Capturing package details, applying validation, and saving them in the system.

Total Weighting Factor for EI: $(7*3) + (10*6) + (15*0) = 81$.

2. External Outputs (EO):

- **Show Customer (Average Complexity):** Retrieval and presentation of customer details from the database to display their information.
- **Membership Information (Low Complexity):** Displaying membership-related information, typically showcasing different membership states or levels.
- **Show Equipment (Average Complexity):** Fetching equipment details from the database and presenting them to users.
- **Show Employee (Average Complexity):** Presenting employee details sourced from the database.
- **Show Expenses & Revenue (High Complexity):** Complex calculation and data processing to provide a comprehensive overview of the gym's financial status.
- **Show Package (Average Complexity):** Displaying package specifics fetched from the database.

Total Weighting Factor for EO: $(5*1) + (7*4) + (10*1) = 43.$

3. External Inquiries (EQ):

- **Show Customer Details (Average Complexity):** The operation involves searching for a customer by ID and displaying their details. A straightforward retrieval without complex processing.
- **Show Equipment Details (Low Complexity):** Fetching equipment specifics from the database in response to external inquiries. Involves moderate processing to filter and retrieve relevant data.
- **Show Employee Information (Low Complexity):** Responding to external inquiries by displaying employee details sourced from the database. A simple retrieval without significant processing.
- **Show Financial Overview (High Complexity):** Complex calculation and data processing to present a comprehensive financial summary in response to external inquiries.

- **Membership Information (Low Complexity):** Responding to external inquiries by displaying data about different membership states or levels. A straightforward retrieval without significant processing.
- **Show Package Details (Low Complexity):** Responding to external inquiries by displaying package specifics fetched from the database. A simple retrieval without complex processing.

Total Weighting Factor for EQ: $(3*4) + (4*1) + (6*1) = 22$.

4. Internal Logical Files (ILF):

- Admin Information Database Table (Low Complexity).
- Customer Information Database Table (Low Complexity).
- Equipment Information Database Table (Low Complexity).
- Employee Information Database Table (Low Complexity).
- Financial Information Database Table (High Complexity).
- Package Information Database Table (Low Complexity).

Total Weighting Factor for ILF: $(4*5) + (5*0) + (7*1) = 27$.

5. External Interface Files (EIF):

Total Weighting Factor for EIF: $(3*0) + (4*0) + (6*0) = 0$.

Table 2: Computing weighting factor

Measurement Parameters	Weighting Factor
Number of External Inputs (EI)	81
Number of External Outputs (EO)	43
Number of External Inquiries (EQ)	22
Number of Internal Files (ILF)	27
Number of External Files (EIF)	0
Total Count:	173

So, UFP₁ = 173

5.3 User/User's Perspective

1. External Inputs (EI):

- **Login (Low Complexity):** A straightforward user authentication process involving a username and password.

Total Weighting Factor for EI: $(7*1) + (10*0) + (15*0) = 7.$

2. External Outputs (EO):

- **My Stats (High Complexity):** Displaying personalized fitness statistics or records for the logged-in user.
- **Packages (Average Complexity):** Presenting information about available gym packages, including details such as pricing, features, and associated trainers.

Total Weighting Factor for EO: $(5*0) + (7*1) + (10*1) = 17.$

3. External Inquiries (EQ):

- **My Stats (Low Complexity):** Retrieving and displaying individual fitness data for the user, like past workouts or progress.
- **Packages (Low Complexity):** Responding to user queries about package details, providing straightforward information about available options and trainers.

Total Weighting Factor for EQ: $(3*2) + (4*0) + (6*0) = 6.$

4. Internal Logical Files (ILF):

- User Information Database Table (Low Complexity).
- Package Information Database Table (Low Complexity).

Total Weighting Factor for ILF: $(4*2) + (5*0) + (7*0) = 8.$

5. External Interface Files (EIF):

- **Total Weighting Factor for EIF:** $(3*0) + (4*0) + (6*0) = 0.$

Table 3: Computing weighting factor

Measurement Parameters	Weighting Factor
Number of External Inputs (EI)	7
Number of External Outputs (EO)	17
Number of External Inquiries (EQ)	6
Number of Internal Files (ILF)	8
Number of External Files (EIF)	0
Total Count:	38

So, $UFP_2 = 38$

Therefore, $UFP = UFP_1 + UFP_2 = 173 + 38 = 211$

5.4 Calculate Complexity Adjustment Factor (CAF)

Table 4: 14-Factors

General System Characteristics (GSC)	Degree of Influence (DI) (0-5)
Data Communications	1
Distributed Data Processing	0
Performance	4
Heavily User Configuration	0
Transaction Rate	3
Online Data Entry	0
End-User Efficiency	5
Online Update	0
Complex Processing	5
Reusability	4
Installation Ease	2
Operational Ease	4
Multiple Sites	0
Facilitate Change	4
Total degree of influence (TDI):	32

$$\text{So, CAF} = [0.65 + (0.01 * \text{TDI})] = [0.65 + (0.01 * 32)] = 0.97$$

5.5 Calculate Functional Points (FP)

$$\text{So, FP} = \text{UFP} * \text{CAF} = 211 * 0.97 = 204.67$$

6 Gantt Chart

This chart is to showcase the timeline and development of the above-mentioned modules throughout the development process of the project, **Power Up Gym**.

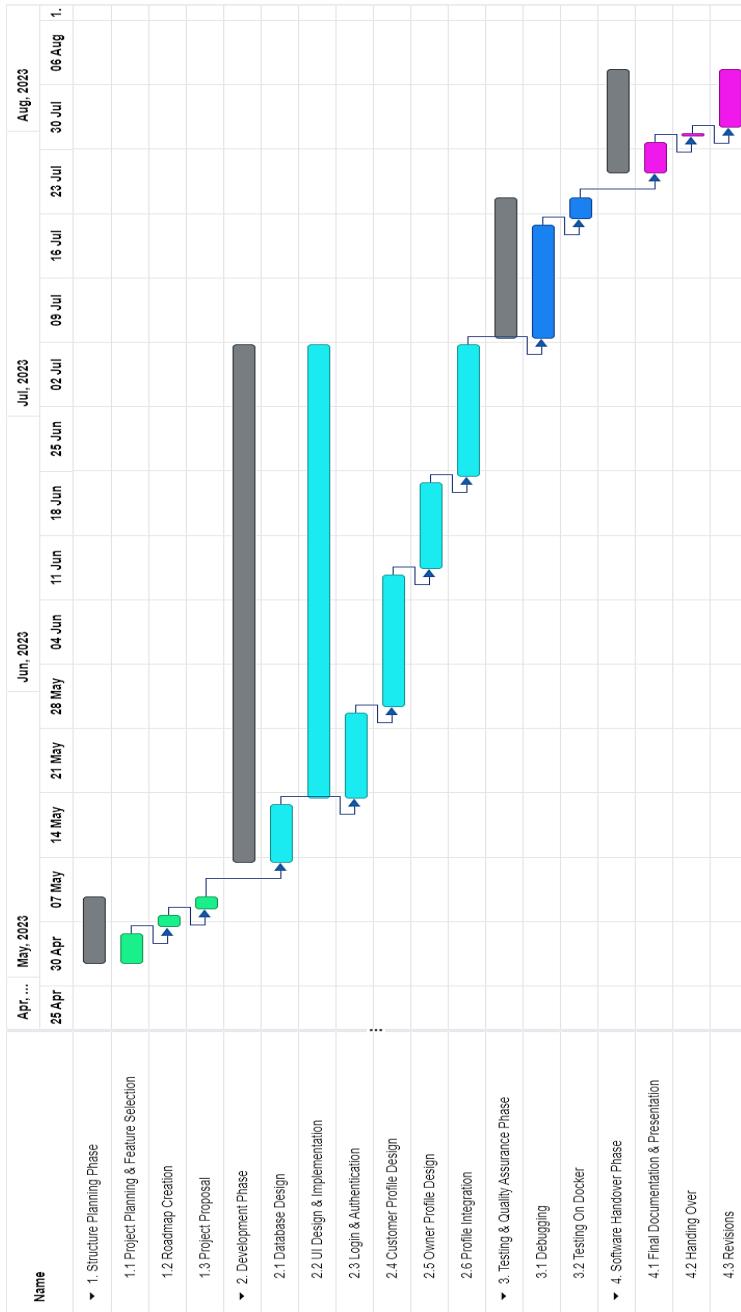
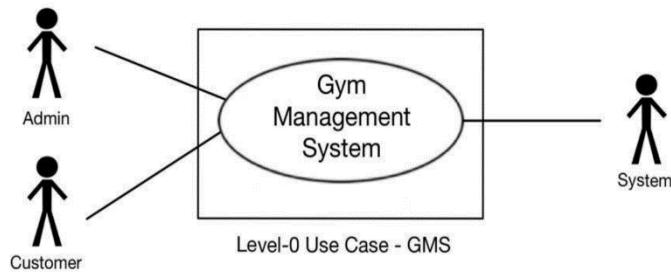


Fig 18: Ghantt Chart

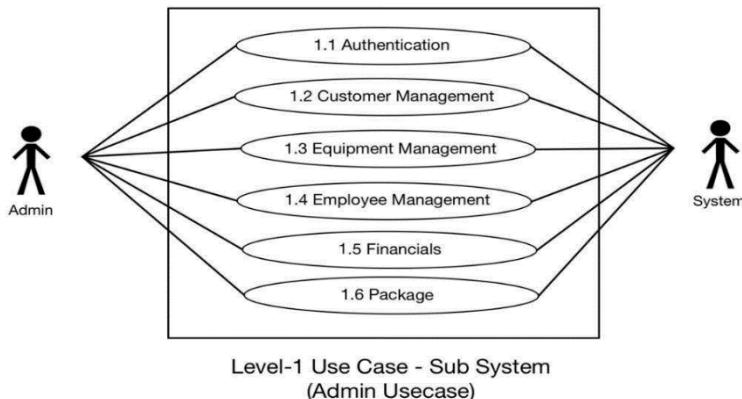
7 User Case Diagram

Level 0 Use-case – GMS:



The system involves two primary actors: the Admin/Owner and the Customer/User. Both actors directly interact with the system to perform various actions. The admin is responsible for managing and controlling the system, while the user utilizes the system to access its features and functionalities.

Level 1 Use-case – Sub System (Admin Use-case):



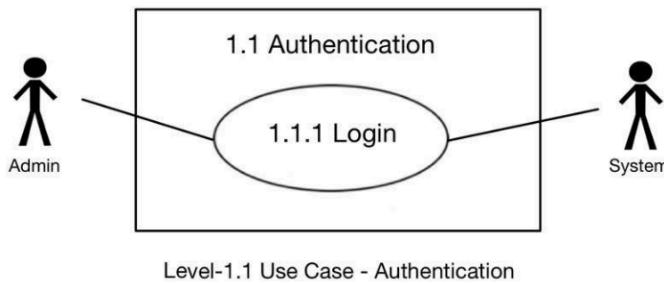
The Power Up Gym Management System consists of the following subsystems for admin/owner:

1. Authentication
2. Customer Management
3. Equipment Management
4. Employee Management
5. Financial Management

6. Package Management

These subsystems handle various aspects of the system's functionality, such as user authentication, customer information management, equipment and inventory management, employee management, financial operations, and package management.

Level 1.1 Use-case – Authentication:



The admin is required to input their username and password for login. If the entered credentials match the records, the login is considered successful, and a message confirming "Login successful" is displayed and access to the system is granted.

In the case where either the username, password, or both are incorrect, the system generates an error message, allowing the user to make another attempt to log into the system.

Action Reply:

Admin/Owner:

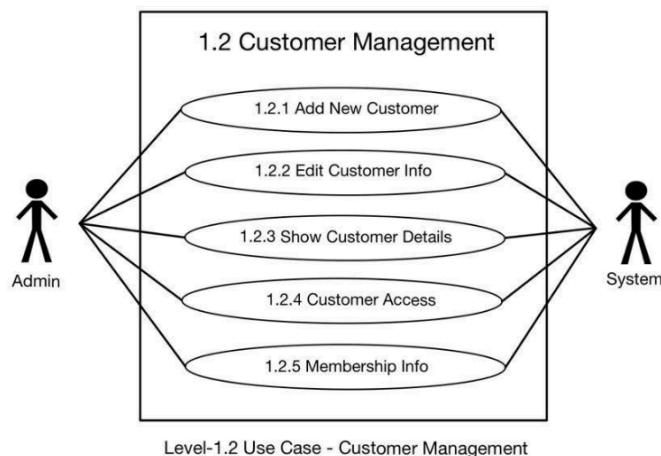
A1: Admin enters his username and password.

R1: The system verifies the entered credentials. If the username and password match, the login is successful, and the admin is granted administrative access to the system.

A2: Admin provides incorrect login information.

R2: The system displays an error message and allows the admin to retry logging in.

Level 1.2 Use-case – Customer Management:



The admin can add new customer to the system, edit/update any customer information, retrieve any customer details and their access to the gym and view the membership info.

Action Reply:

Admin/Owner:

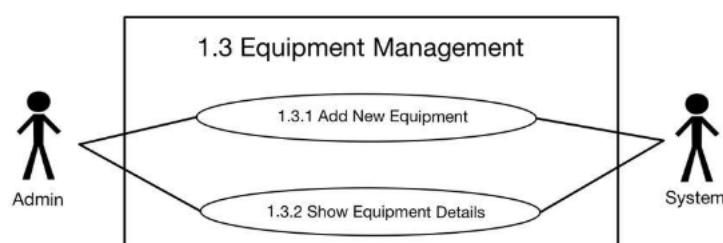
A1: Admin selects add new customer or edit customer information options.

R1: The system will take the input data from the admin and will save the data in database.

A2: Admin selects add show customer details or customer access or membership info options.

R2: The system retrieves the data from the database and shows admin.

Level 1.3 Use-case – Equipment Management:



The admin can add new equipment to the gym and log the entries in the database. Afterwards he can view the relevant details such as buying date, price, maintenance date, maintenance status etc.

Action Reply:

Admin/Owner:

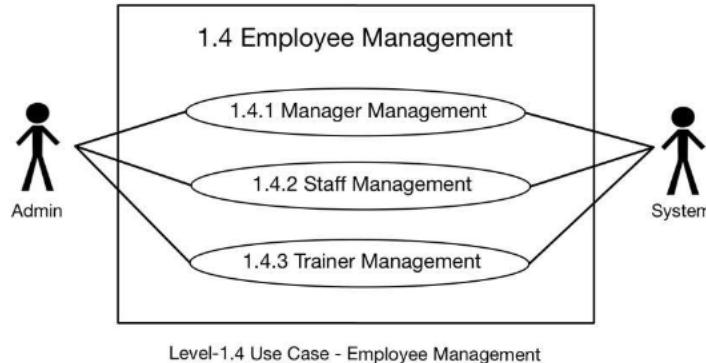
A1: Admin selects add new equipment option.

R1: The system will take the input data from the admin and will save the data in database.

A2: Admin selects show equipment details.

R2: The system retrieves necessary data from the database and shows admin.

Level 1.4 Use-case – Employee Management:



The system is designed to handle three types of employees: manager, staffs & trainers.

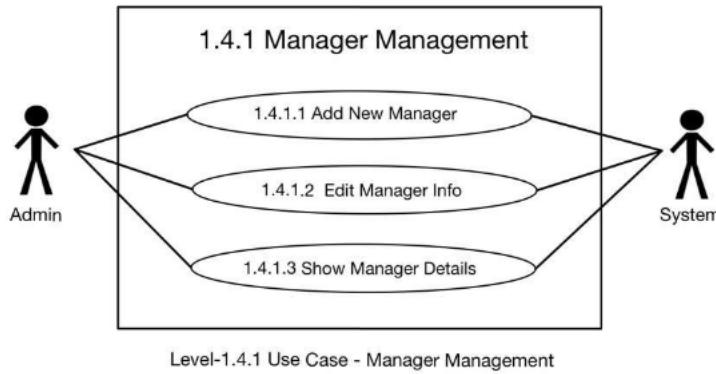
Action Reply:

Admin/Owner:

A1: Admin selects manager management or staff management or trainer managements.

R1: The system will take the admin to new windows for respective operations.

Level 1.4.1 Use-case – Manager Management:



The admin can add new manager for the gym, can edit their information and view them according to their ID no.

Action Reply:

Admin/Owner:

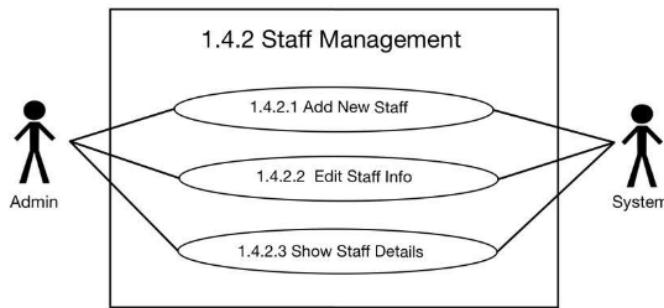
A1: Admin selects add new manager or edit manager information option.

R1: The system will take the input data from the admin and will save the data in database.

A2: Admin selects show manager details.

R2: The system retrieves necessary data from the database and shows admin accordingly.

Level 1.4.2 Use-case – Staff Management:



Level-1.4.2 Use Case - Staff Management

The admin can add new staff for the gym, can edit their information and view them according to their shifts.

Action Reply:

Admin/Owner:

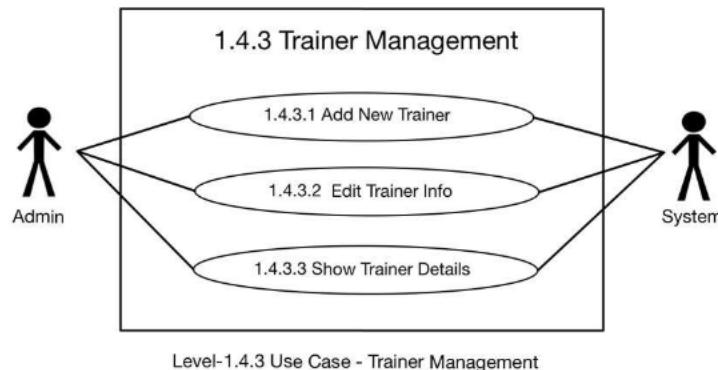
A1: Admin selects add new staff or edit staff information option.

R1: The system will take the input data from the admin and will save the data in database.

A2: Admin selects show staff details.

R2: The system retrieves relevant data from the database and shows admin accordingly.

Level 1.4.3 Use-case – Trainer Management:



The admin can hire new trainers for the gym, can edit their information and view them according to their ratings.

Action Reply:

Admin/Owner:

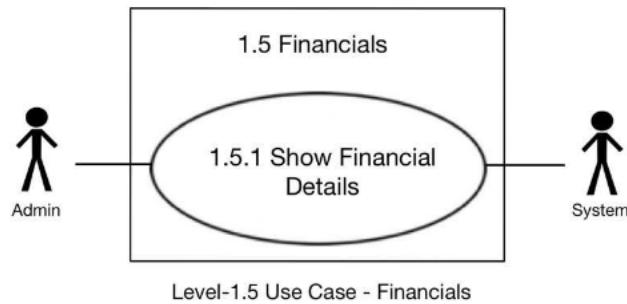
A1: Admin selects add new trainer or edit trainer information option.

R1: The system will take the input data from the admin and will save the data in database.

A2: Admin selects show trainer details.

R2: The system retrieves necessary data from the database and shows admin accordingly.

Level 1.5 Use-case – Financial Management:



The system keeps track of all the expenses occurs in a monthly time period and all the revenue generated from the customers. It processes the data and can show the net income, expense, profit/loss, valuable customers, most valued package etc. information according to admin's need.

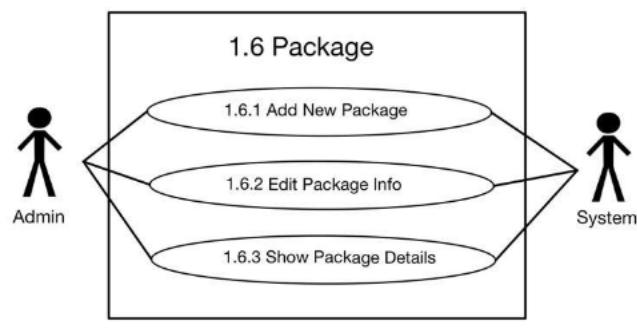
Action Reply:

Admin/Owner:

A1: Admin selects show financial details option.

R1: The system takes time period input from the admin, retrieves the data from database, processes the data and shows the data.

Level 1.6 Use-case – Package Management:



The gym management system can offer customers a range of diverse packages to cater to their needs. These packages are designed to provide flexible options based on individual preferences and fitness goals. Packages can be created and modified as well as the acceptance/rating of the packages can be viewed by admin.

Action Reply:

Admin/Owner:

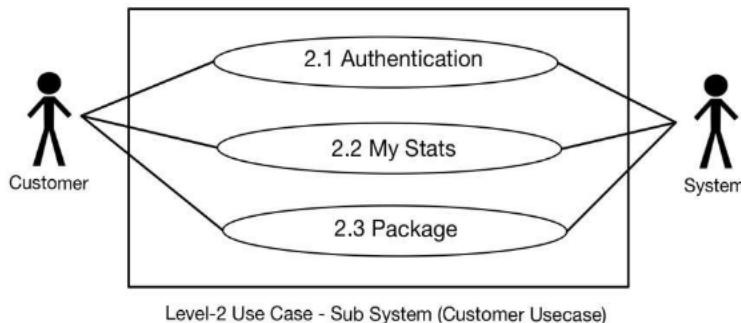
A1: Admin selects add new package or edit package information option.

R1: The system will take the input data from the admin and will save the data in database.

A2: Admin selects show package details.

R2: The system retrieves necessary data from the database and shows admin accordingly.

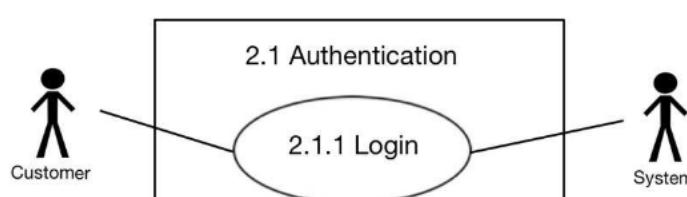
Level 2 use case – Sub System (Customer Use-case):



The Power Up Gym Management System consists of the following subsystems for customer/user:

1. Authentication.
2. My Stats.
3. Package.

Level 2.1 Use-case – Authentication:



The user is required to input their username and password to log into the system. Upon entering the credentials, if they match the records, the login is considered successful. The system then displays a message confirming "Login successful" and grants the user access to the system.

However, if the entered username, password, or both are incorrect, the system generates an error message. This allows the user to make another attempt to log into the system by providing the correct login information.

Action Reply:

User/Customer:

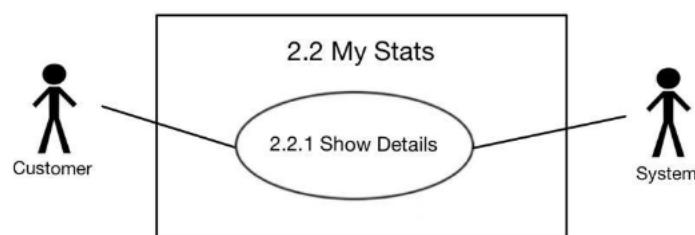
A1: User enters their username and password.

R1: The system validates the entered credentials. If the username and password are a match, the login is successful, and the user gains access to the system.

A2: User provides incorrect login information.

R2: The system presents an error message, giving the user the opportunity to retry logging in with the correct credentials.

Level 2.2 Use-case – My Stats:



Level-2.2 Use Case - My Stats

The users can conveniently access and view their personalized gym statistics. This includes essential information such as their active gym

package, assigned trainers, available equipment, dedicated manager, and their current height and weight.

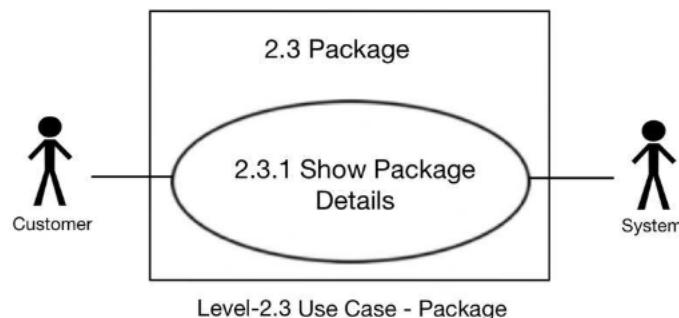
Action Reply:

User/Customer:

A1: User selects show details option.

R1: The system retrieves data from the database and conveniently shows the user.

Level 2.3 Use-case – Package:



The gym management system can offer customers a range of diverse packages and all of the available packages can be viewed by customer to choose from.

Action Reply:

User/Customer:

A1: User selects show package details.

R1: The system retrieves data from database and shows the details of available packages.

8 Swimlane Diagram

8.1 Admin Use-case

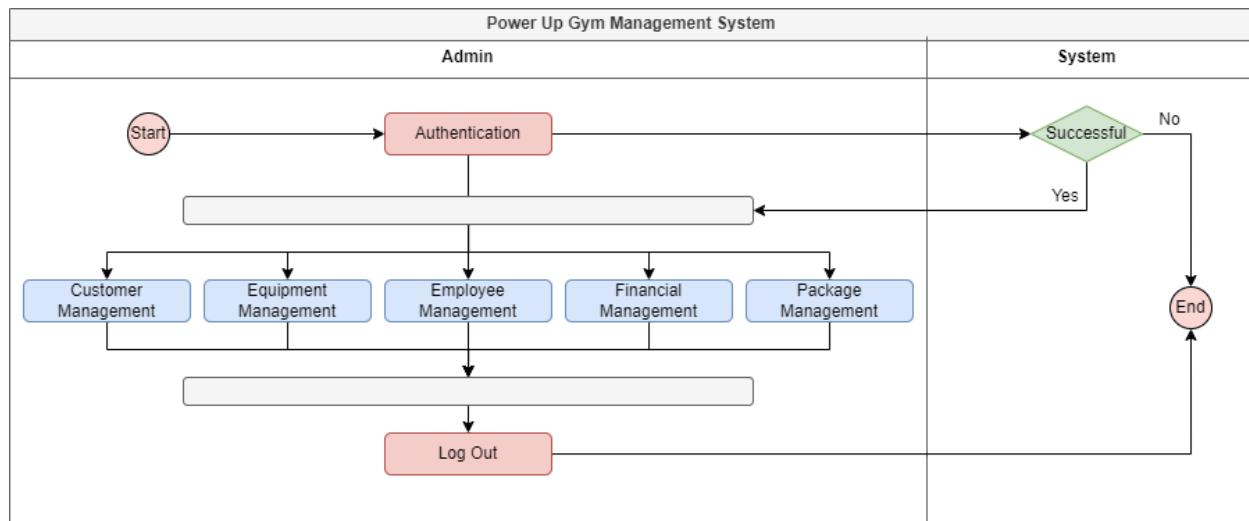


Fig 19

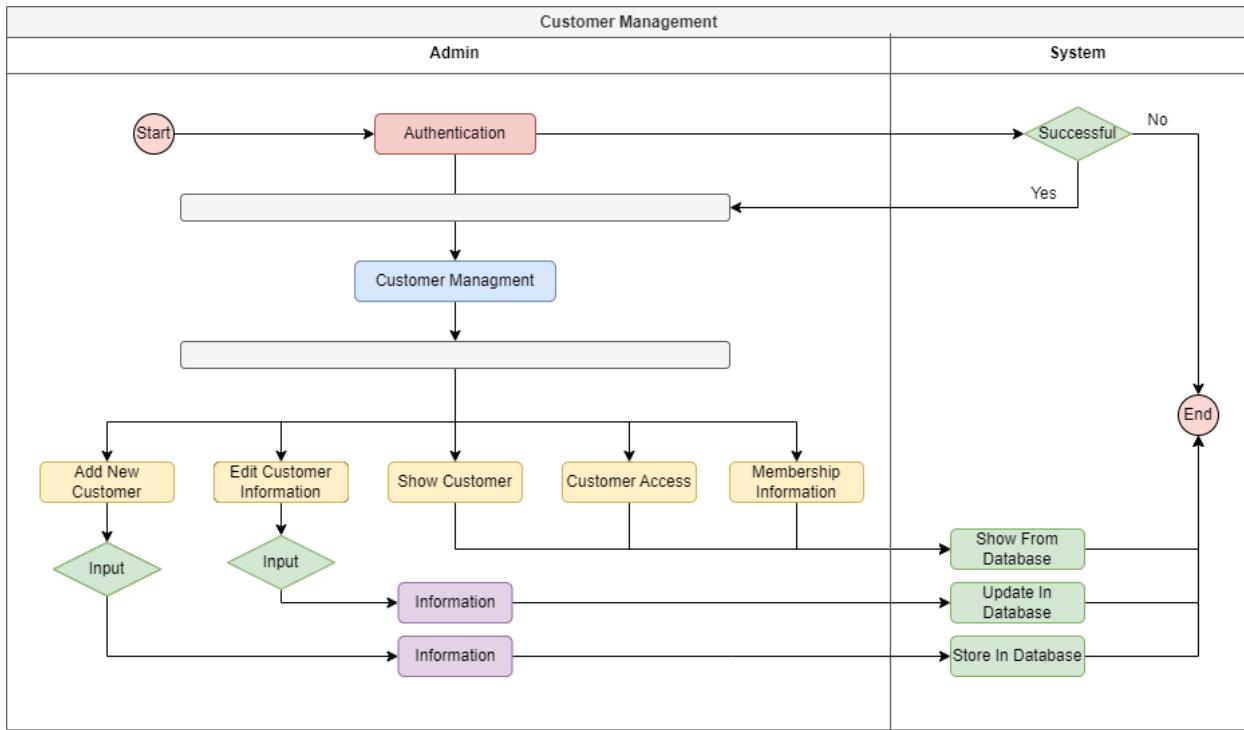


Fig 20

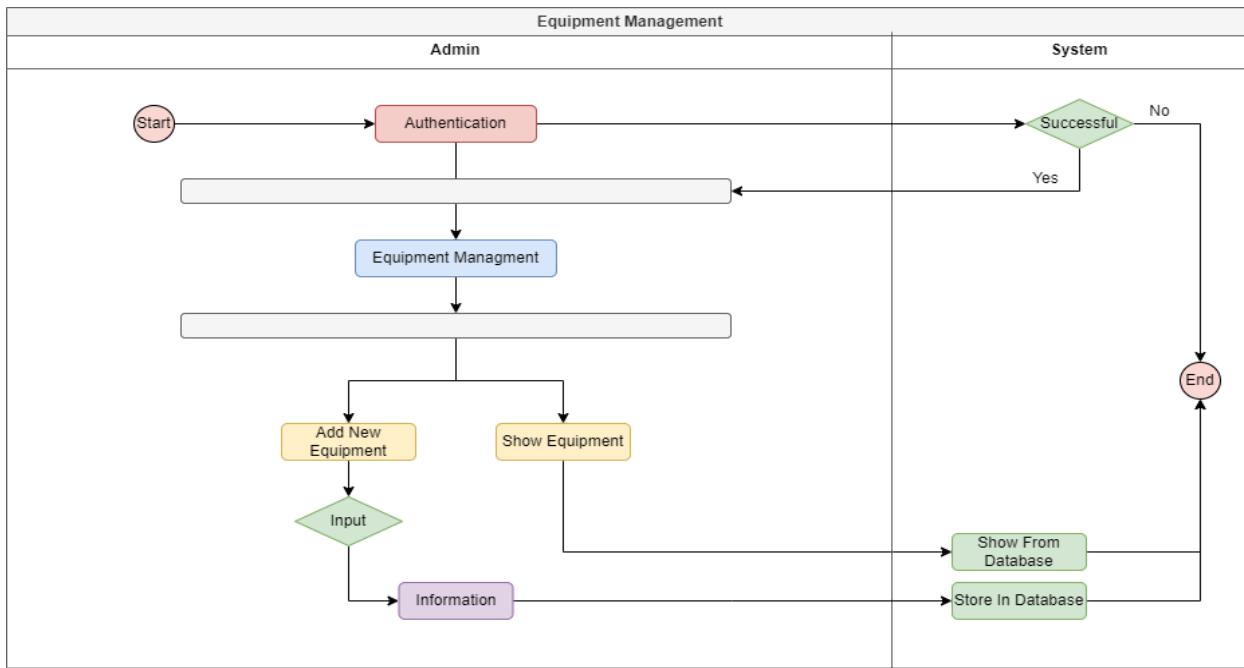


Fig 21

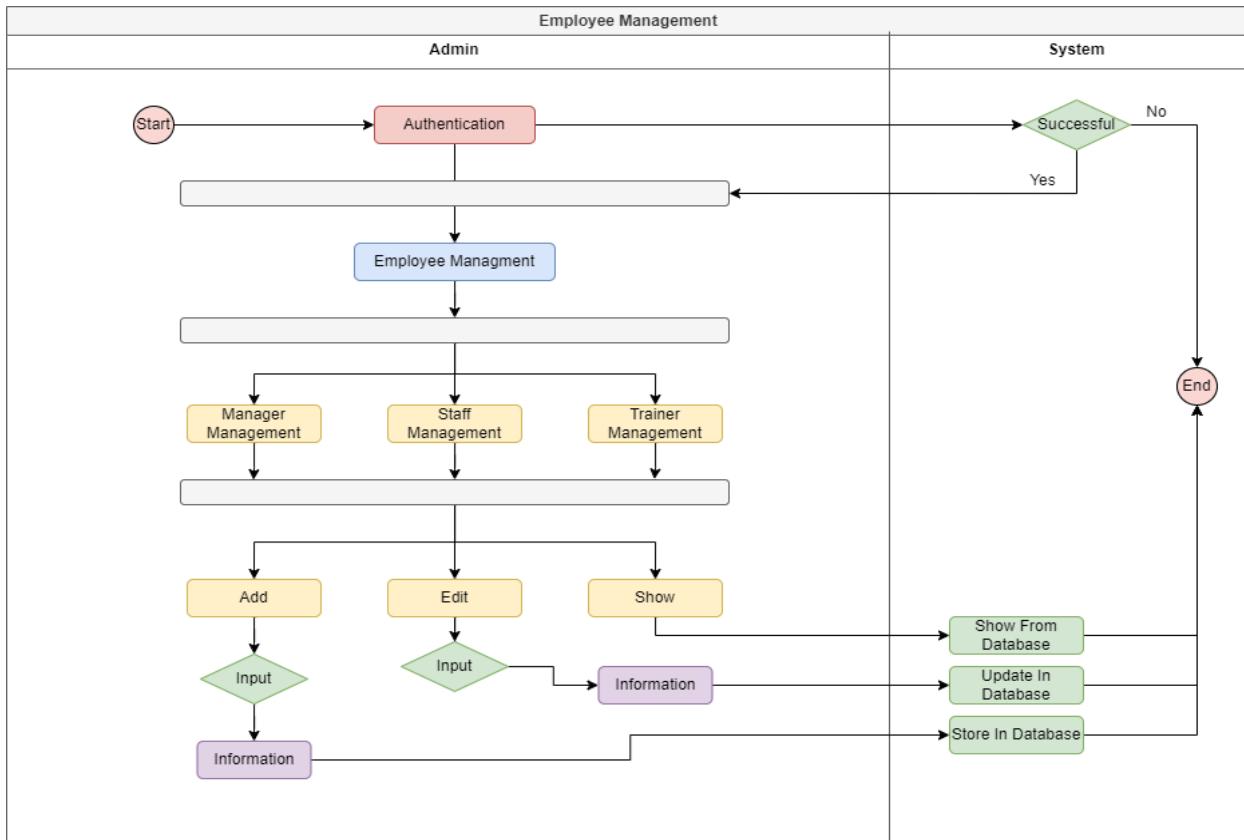


Fig 22

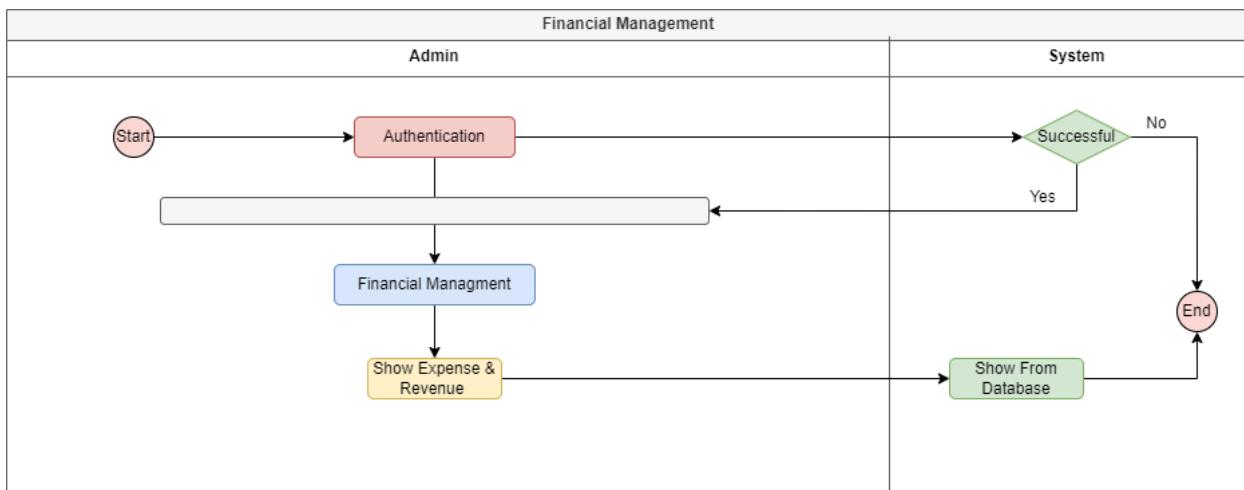


Fig 23

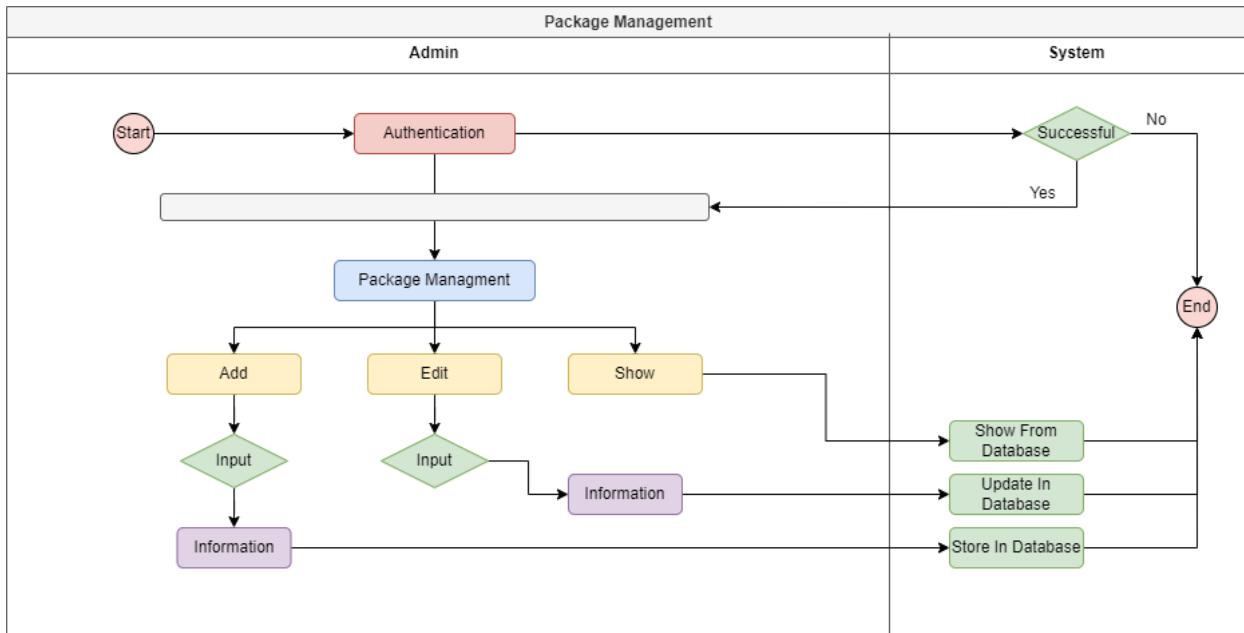


Fig 24

8.2 Customer Use-case

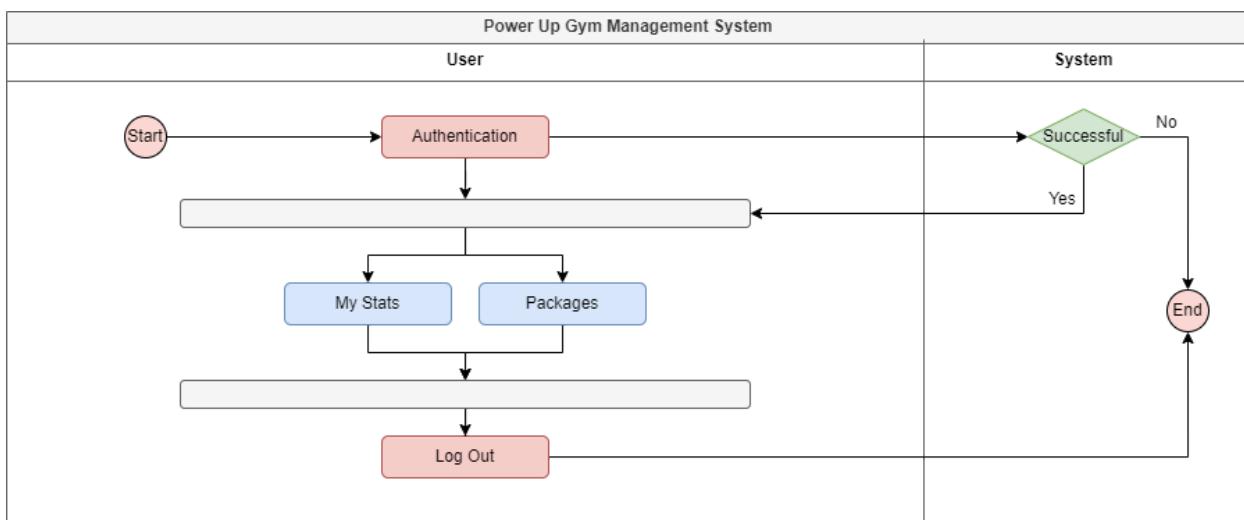


Fig 25

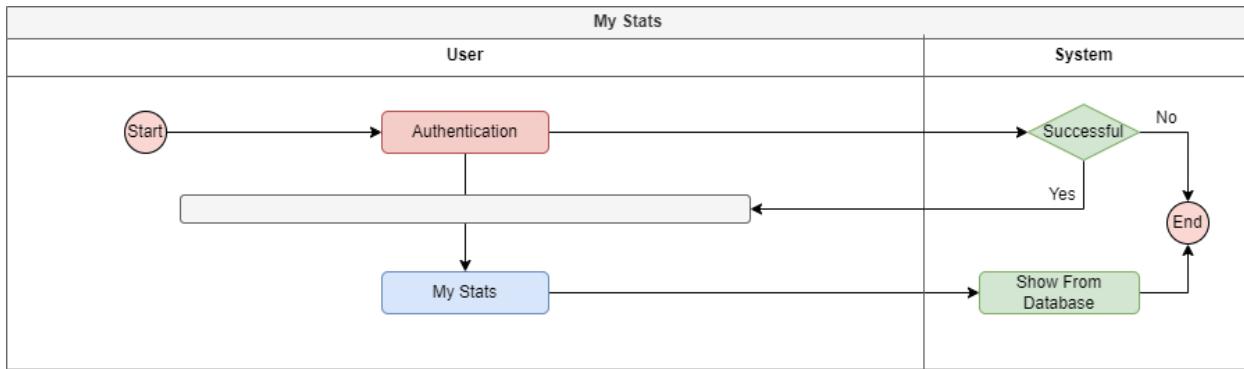


Fig 26

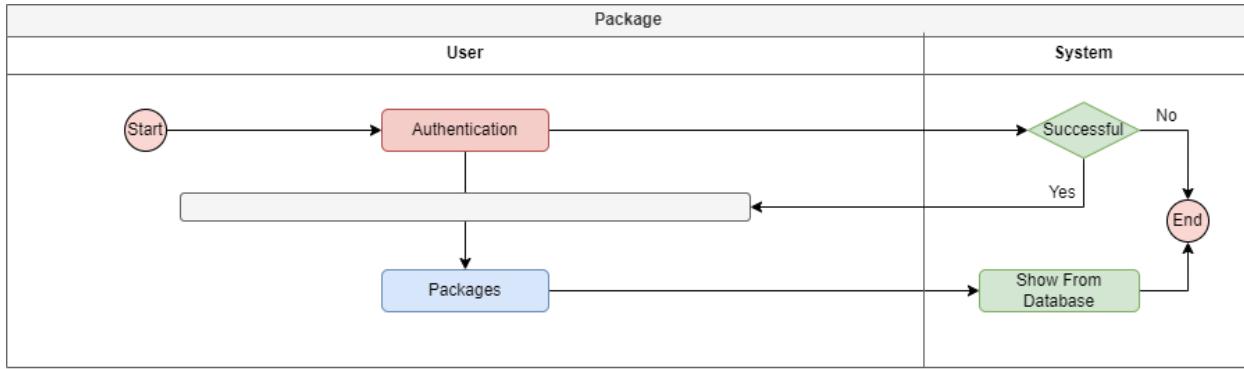
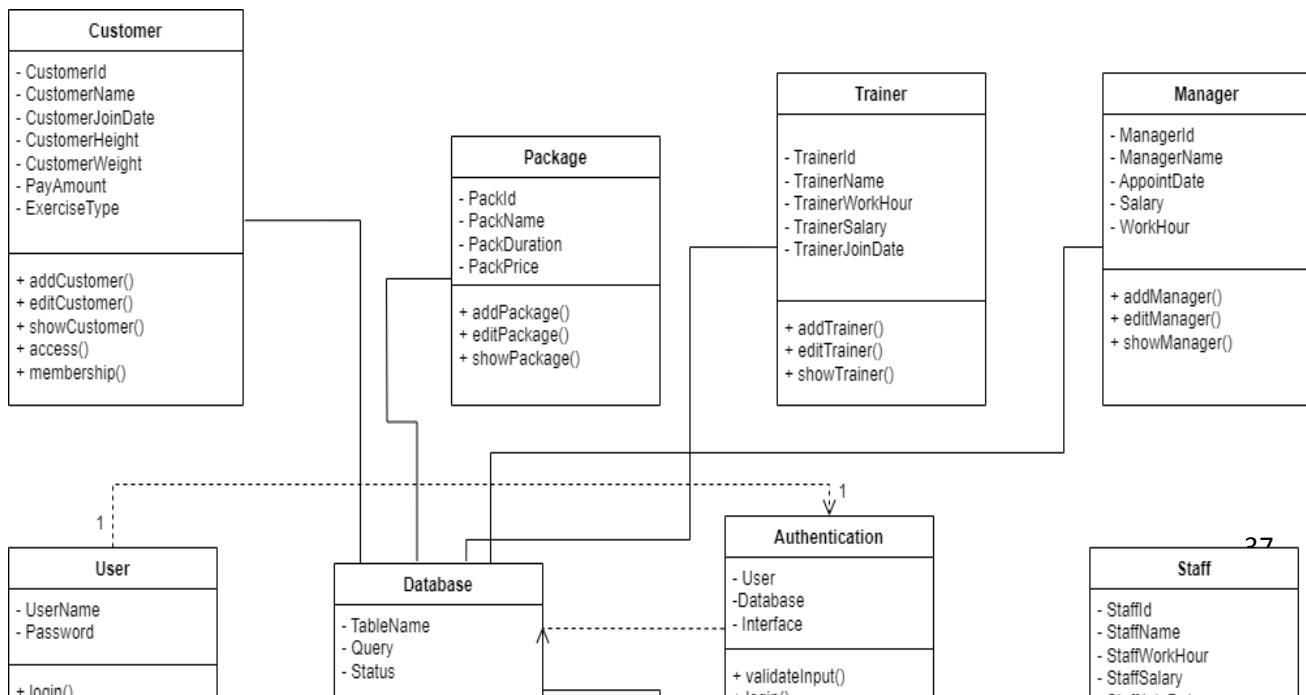


Fig 27

9 Class Diagram



27

Fig 28: UML Class Diagram

10 State Diagram

10.1 Admin/Owner

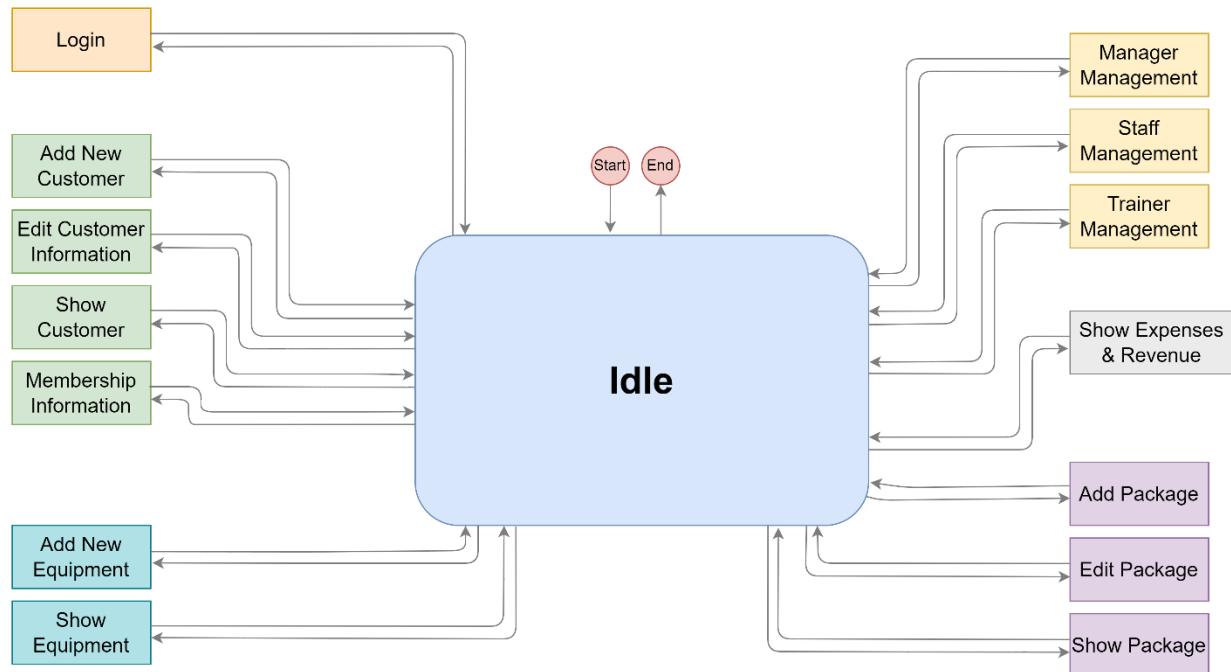


Fig 29

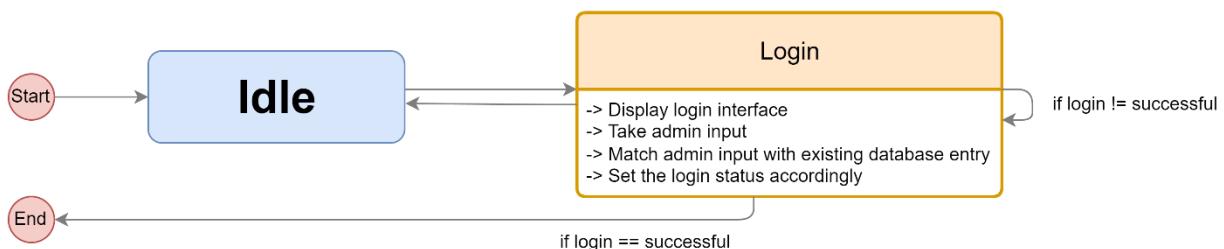


Fig 30

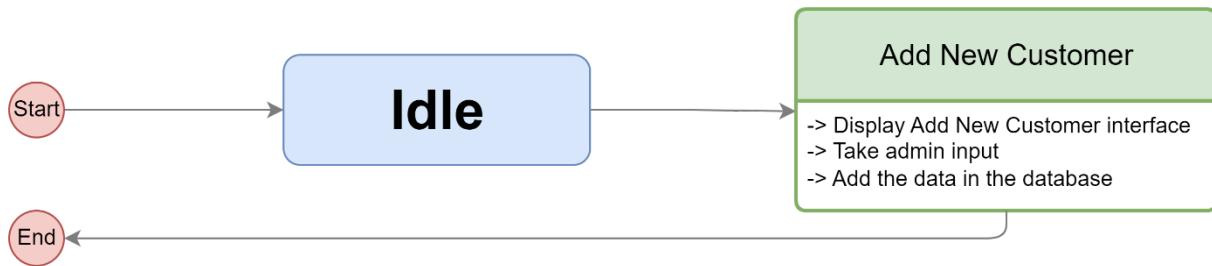


Fig 31

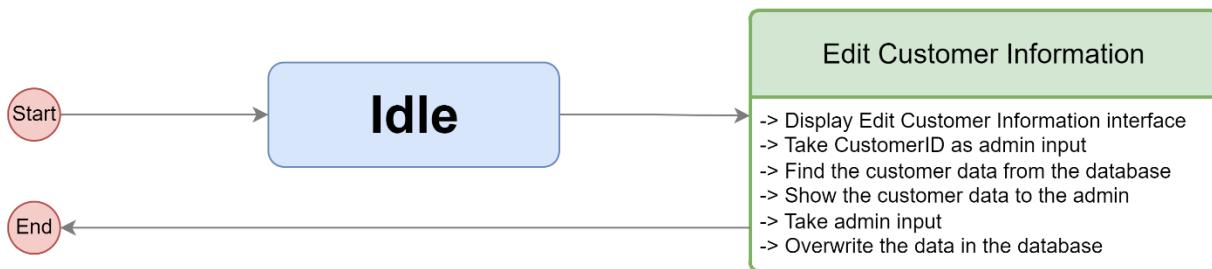


Fig 32

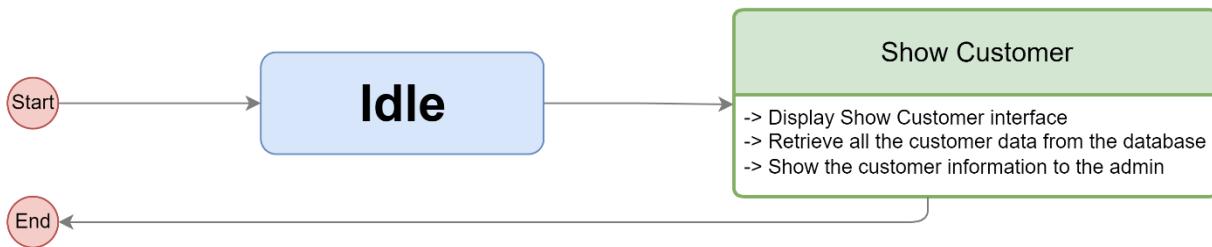


Fig 33

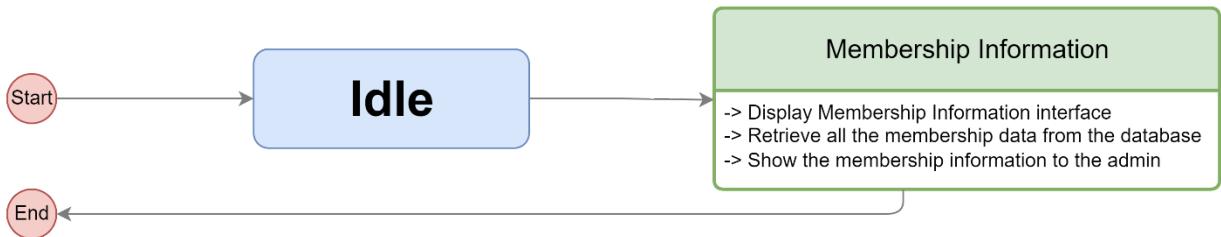


Fig 34

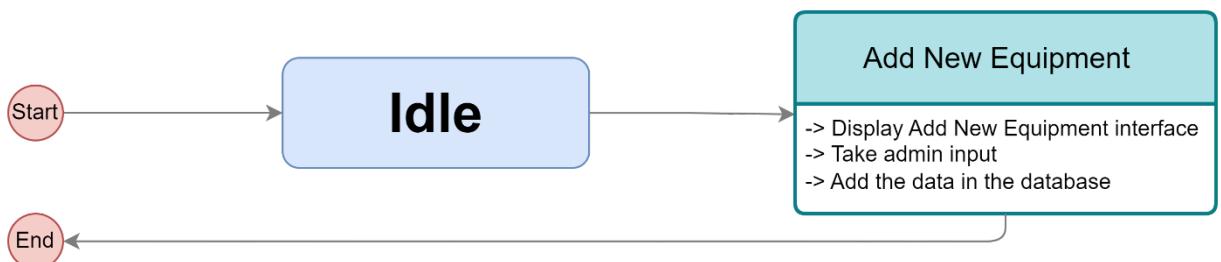


Fig 35

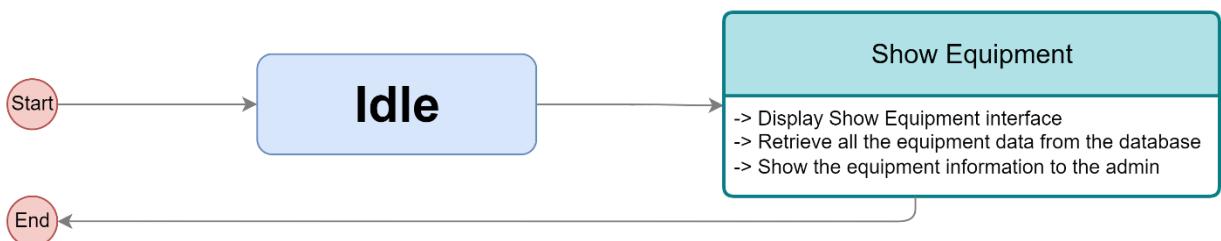


Fig 36

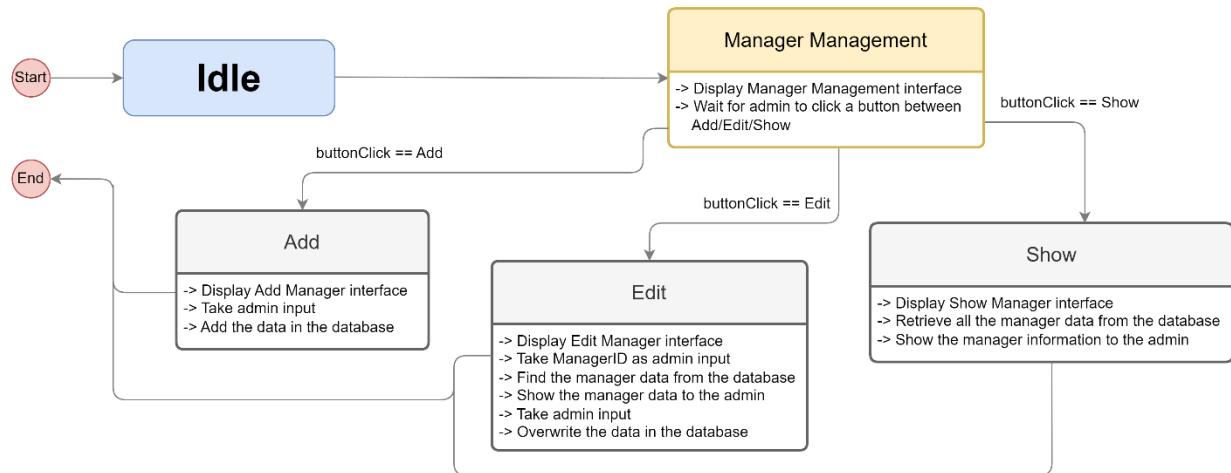


Fig 37

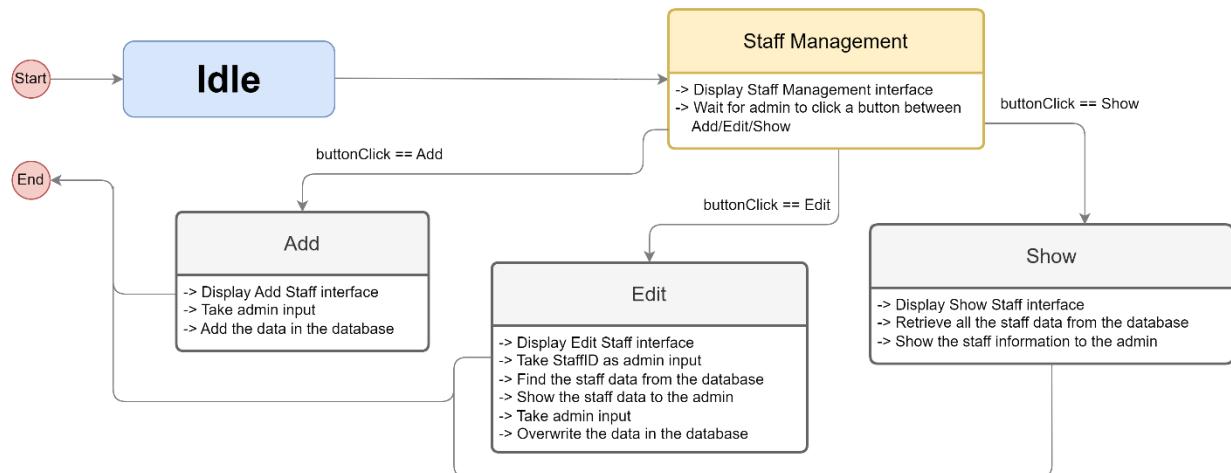


Fig 38

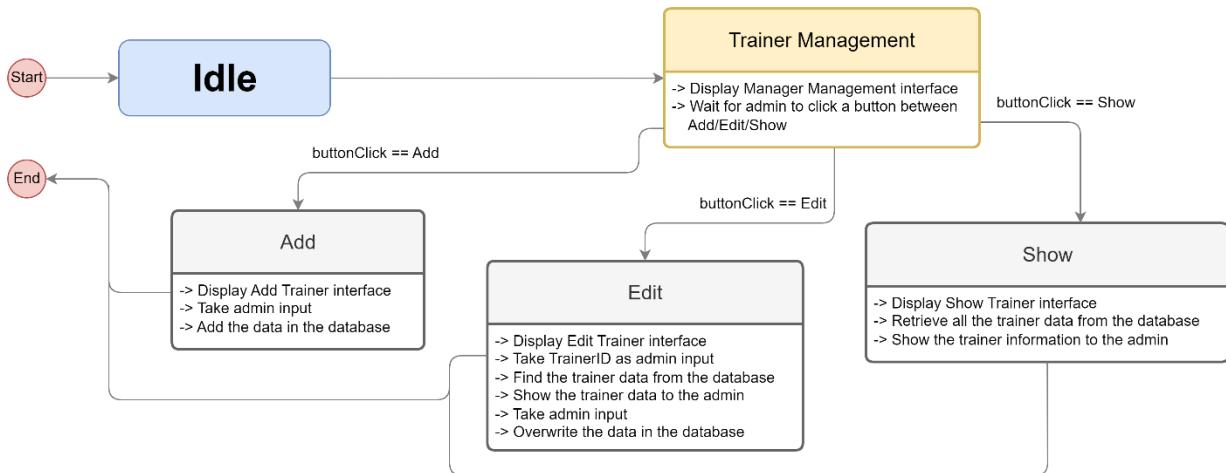


Fig 39

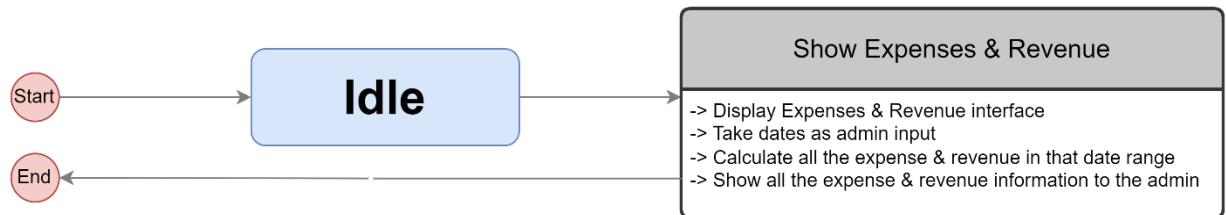


Fig 40

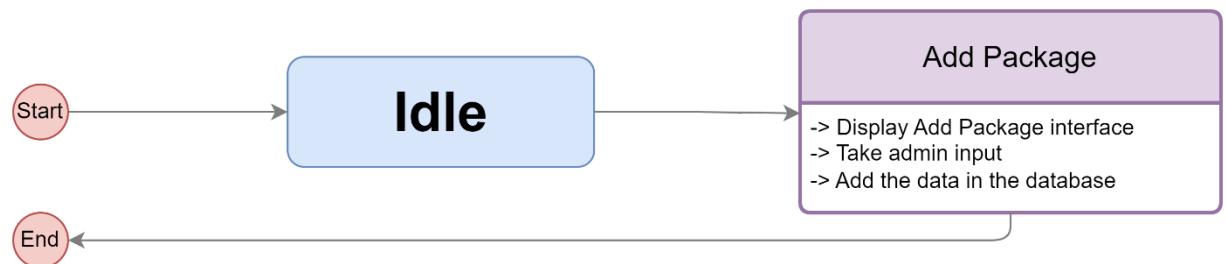


Fig 41

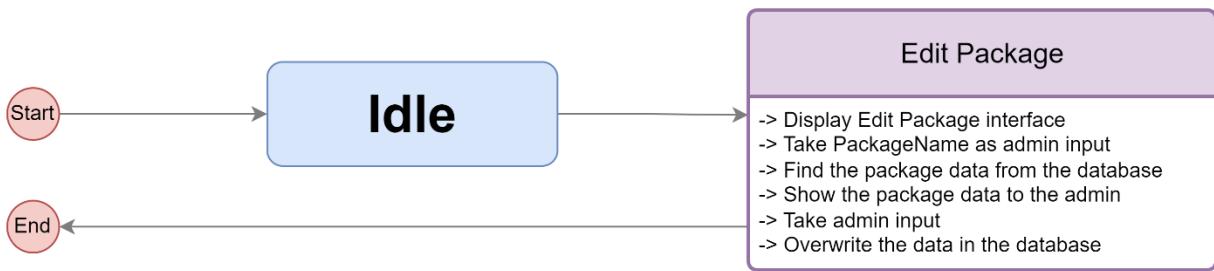


Fig 42

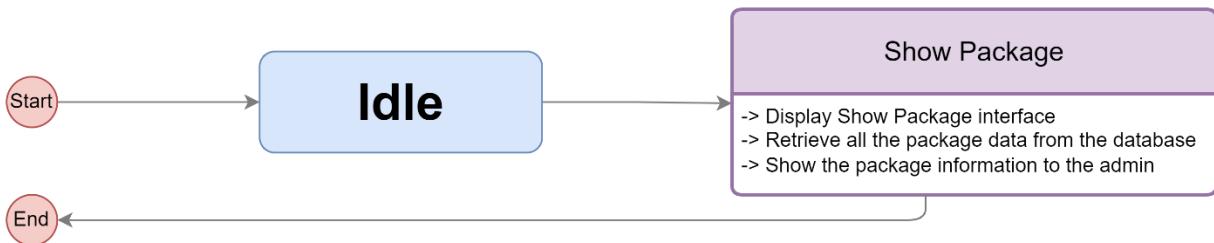


Fig 43

10.2 Customer/User

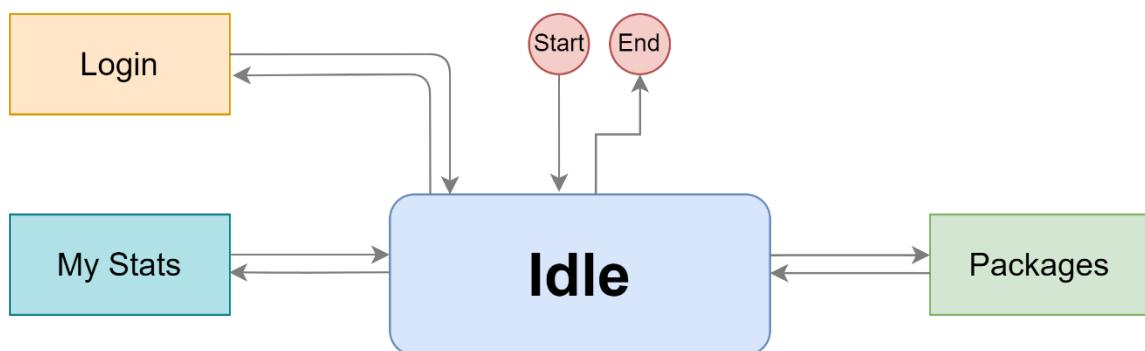


Fig 44

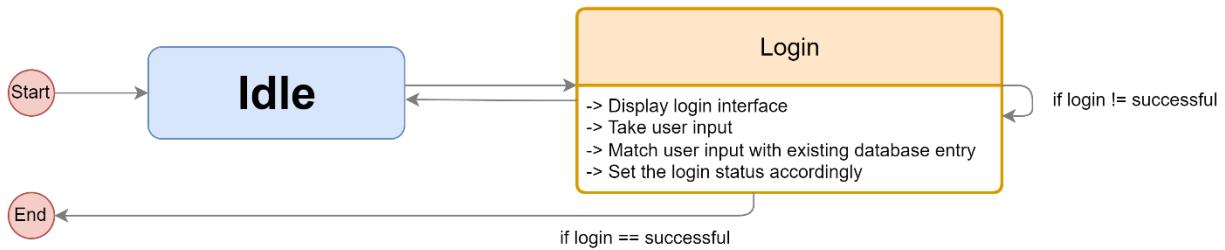


Fig 45

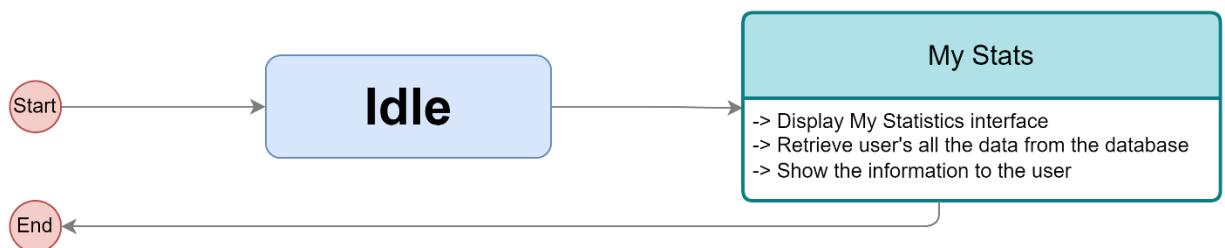


Fig 46

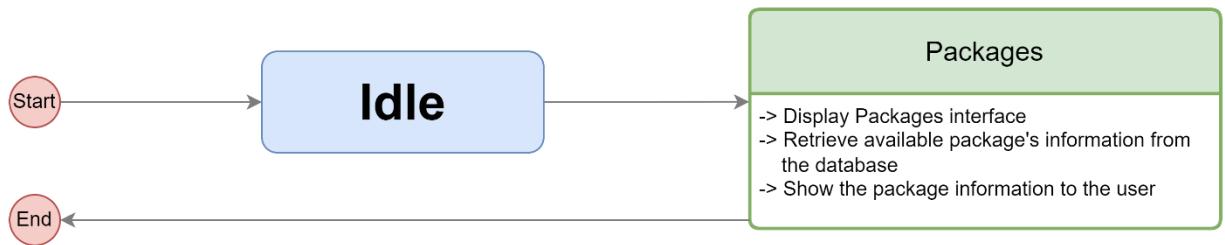


Fig 47

11 Data Flow Diagram

11.1 Admin/Owner

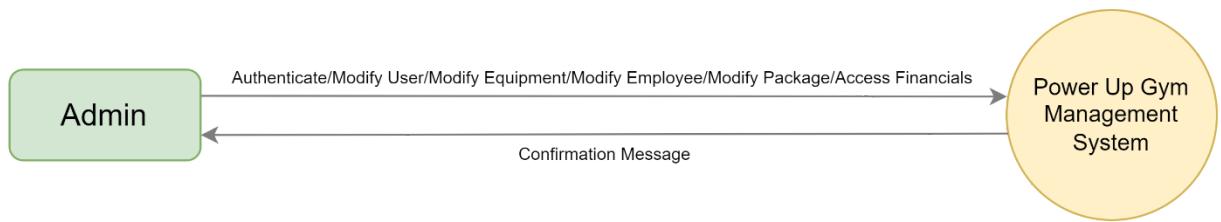


Fig 48

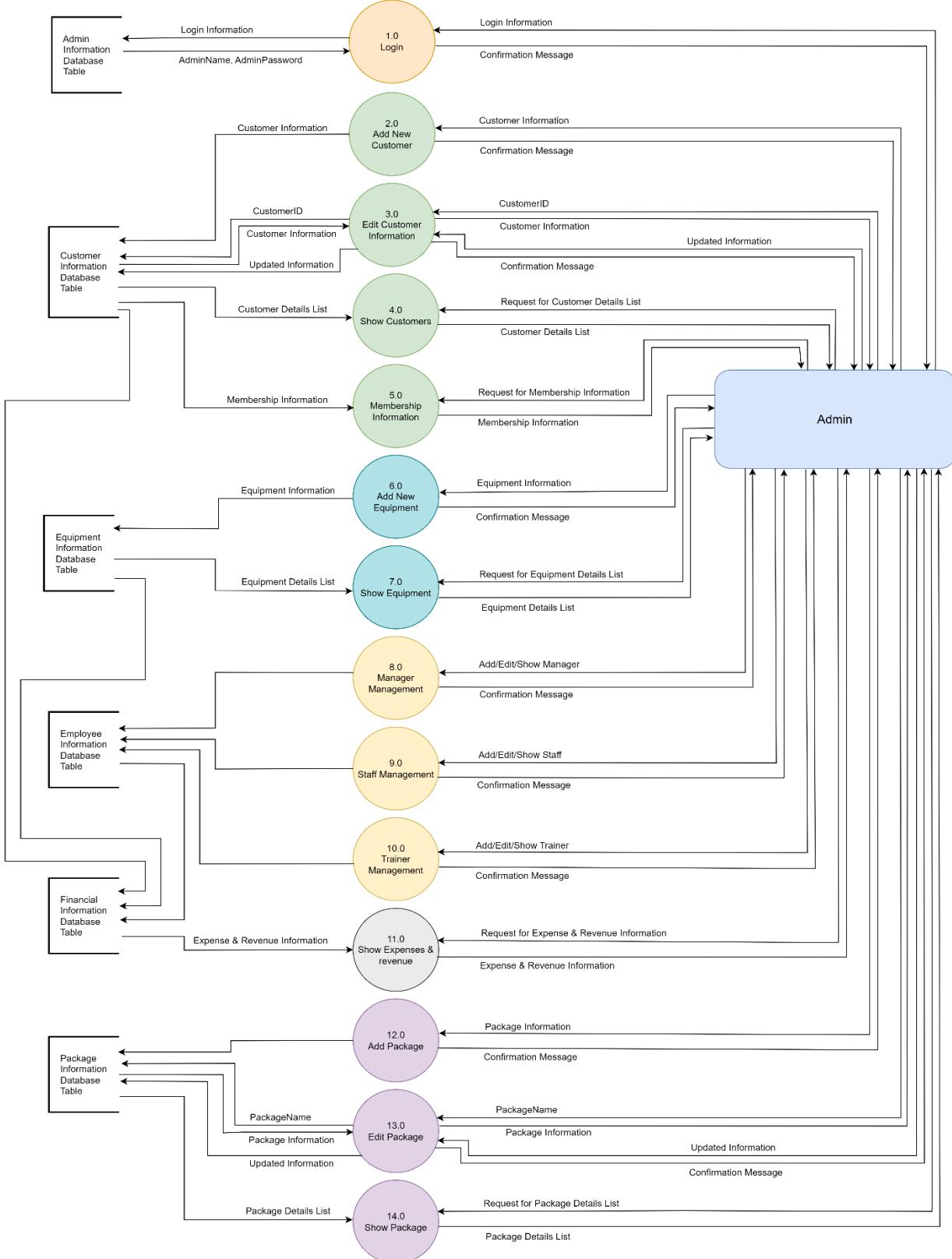


Fig 49

11.2 Customer/User

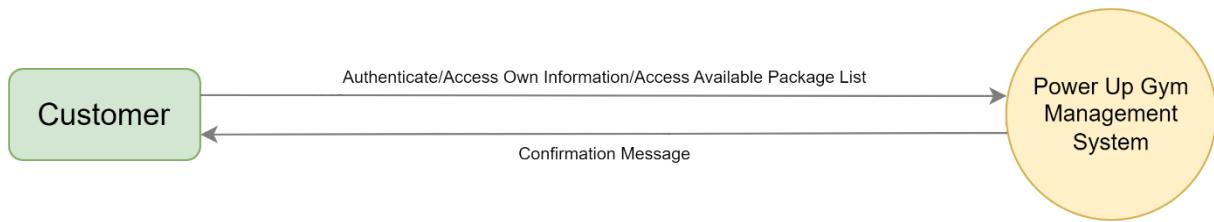


Fig 50

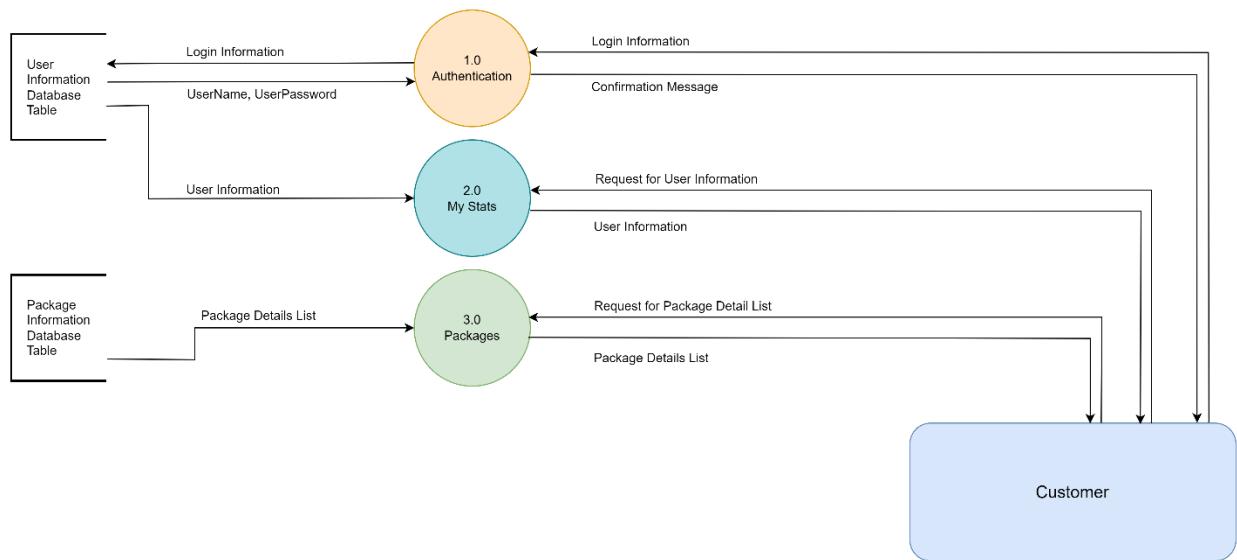


Fig 51

12 Sequence Diagram

12.1 Admin/Owner

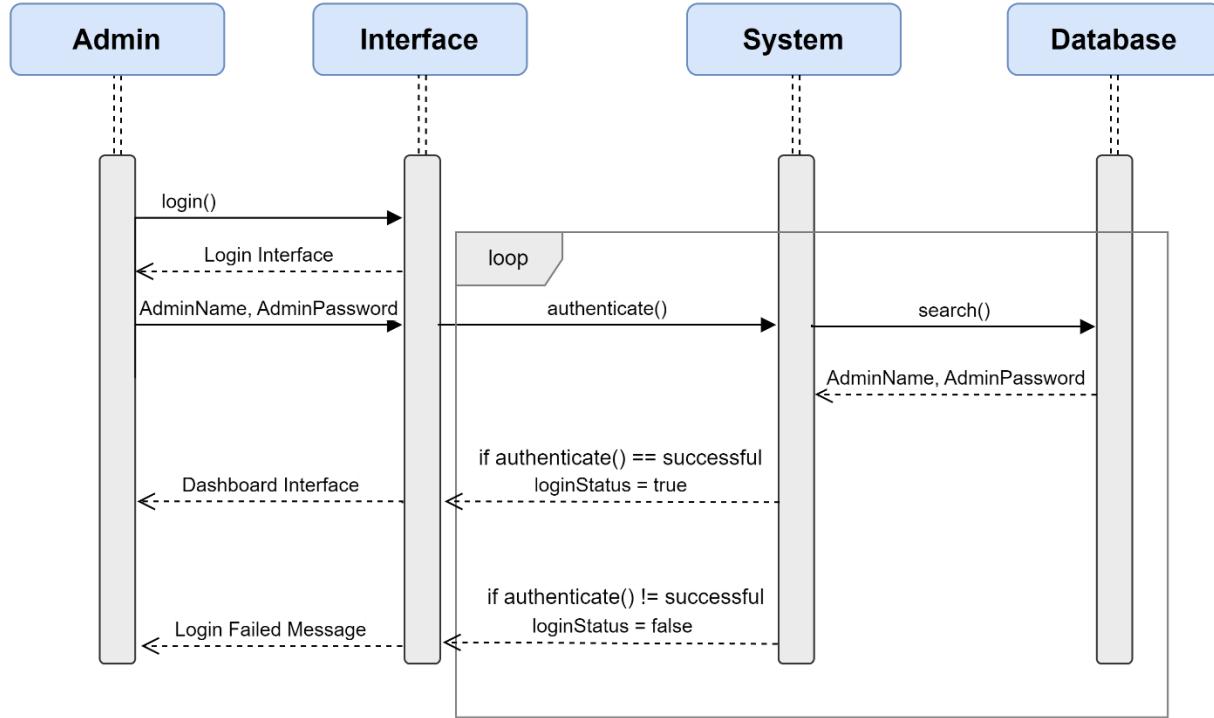


Fig 52

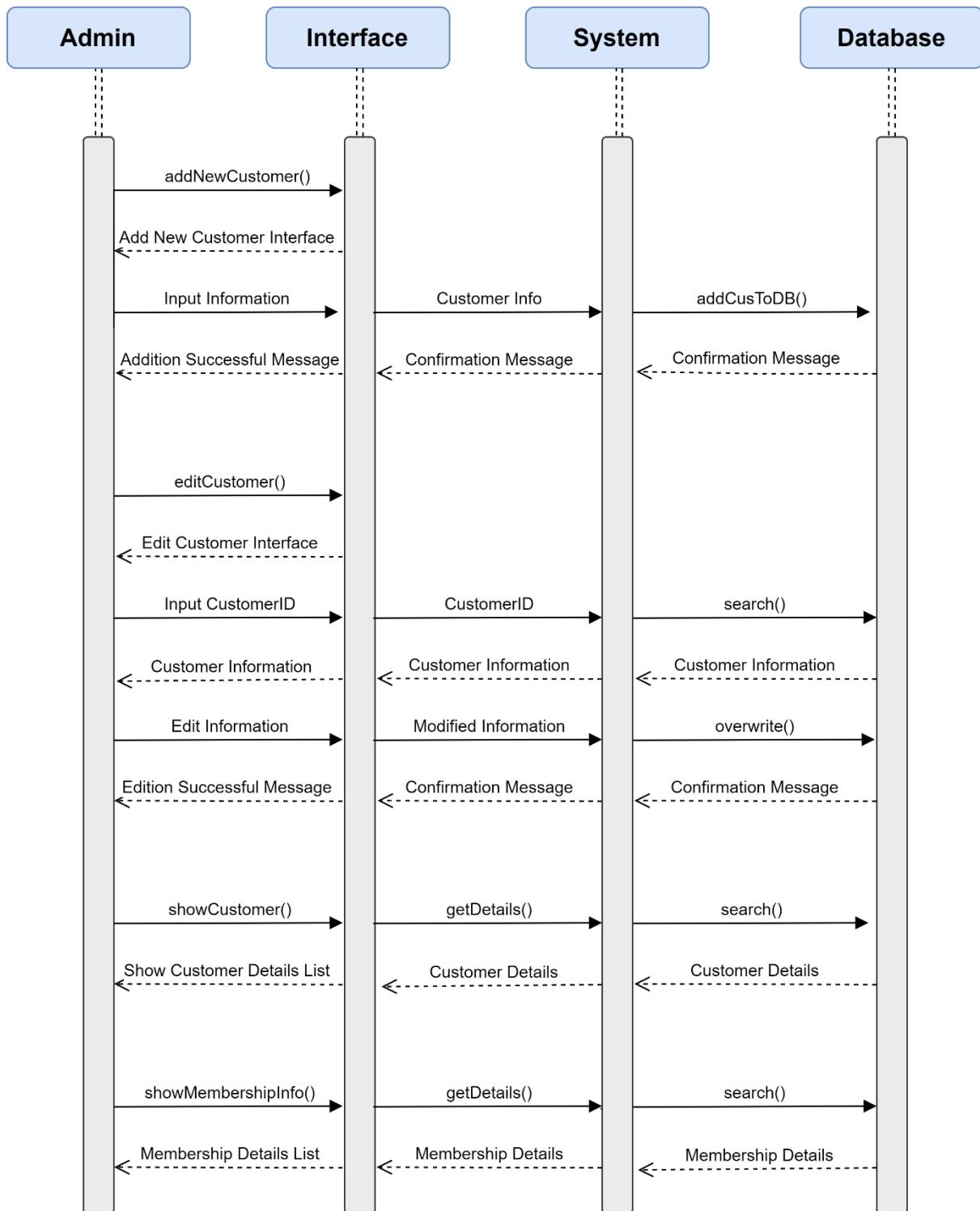


Fig 53

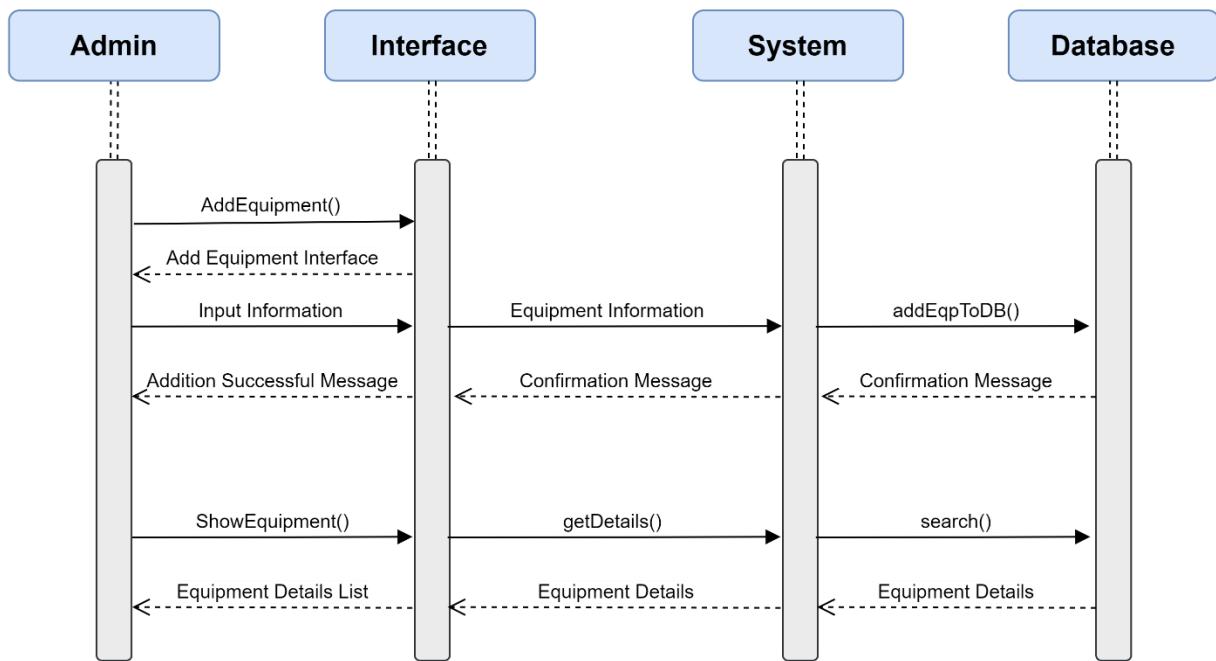


Fig 54

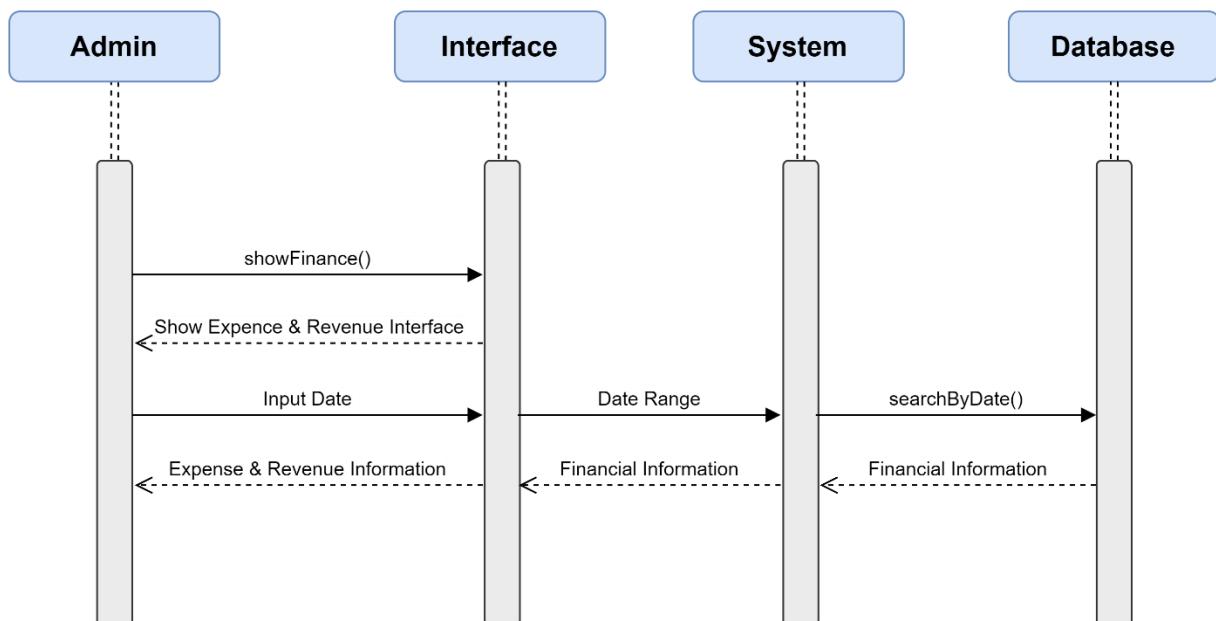


Fig 55

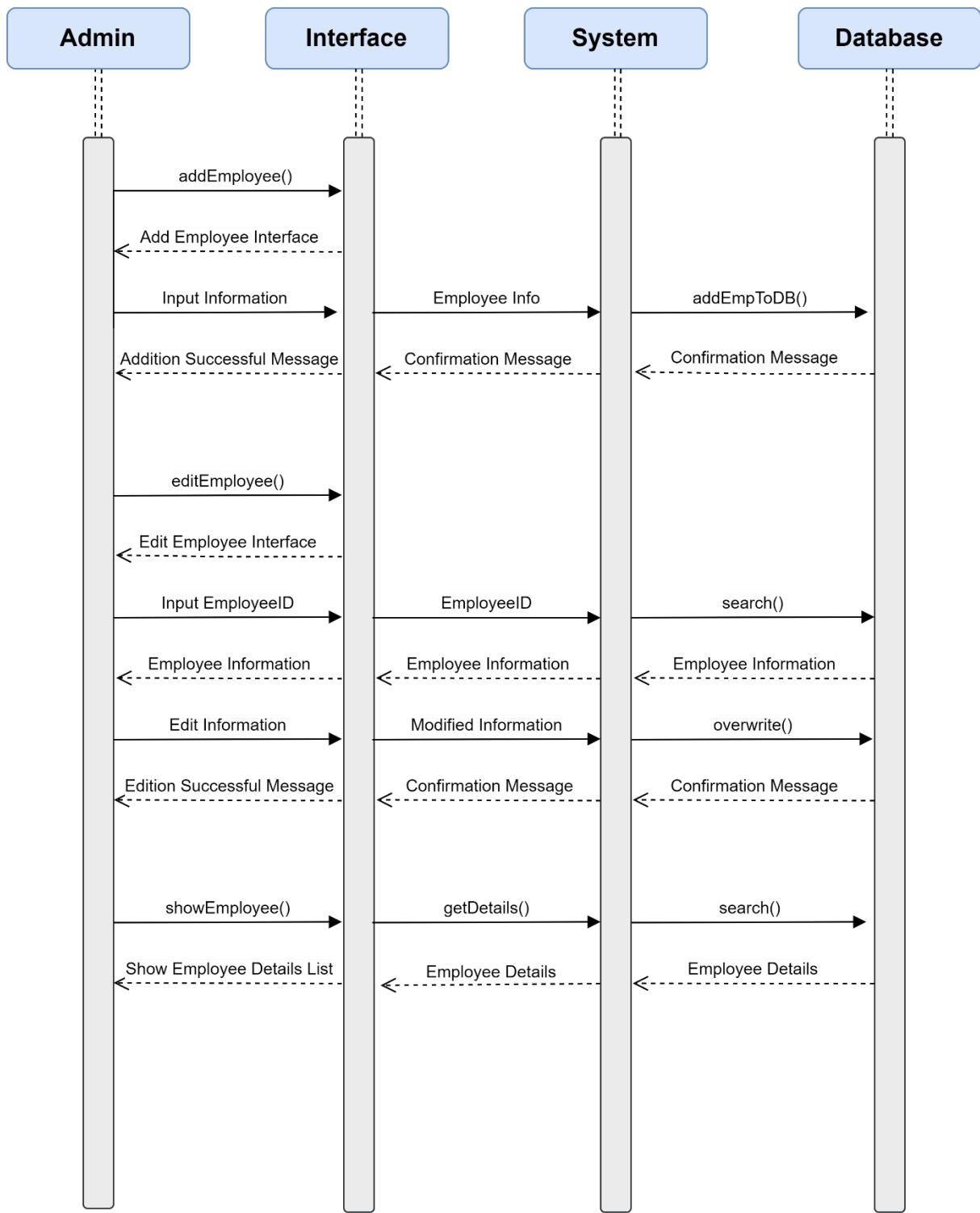


Fig 56

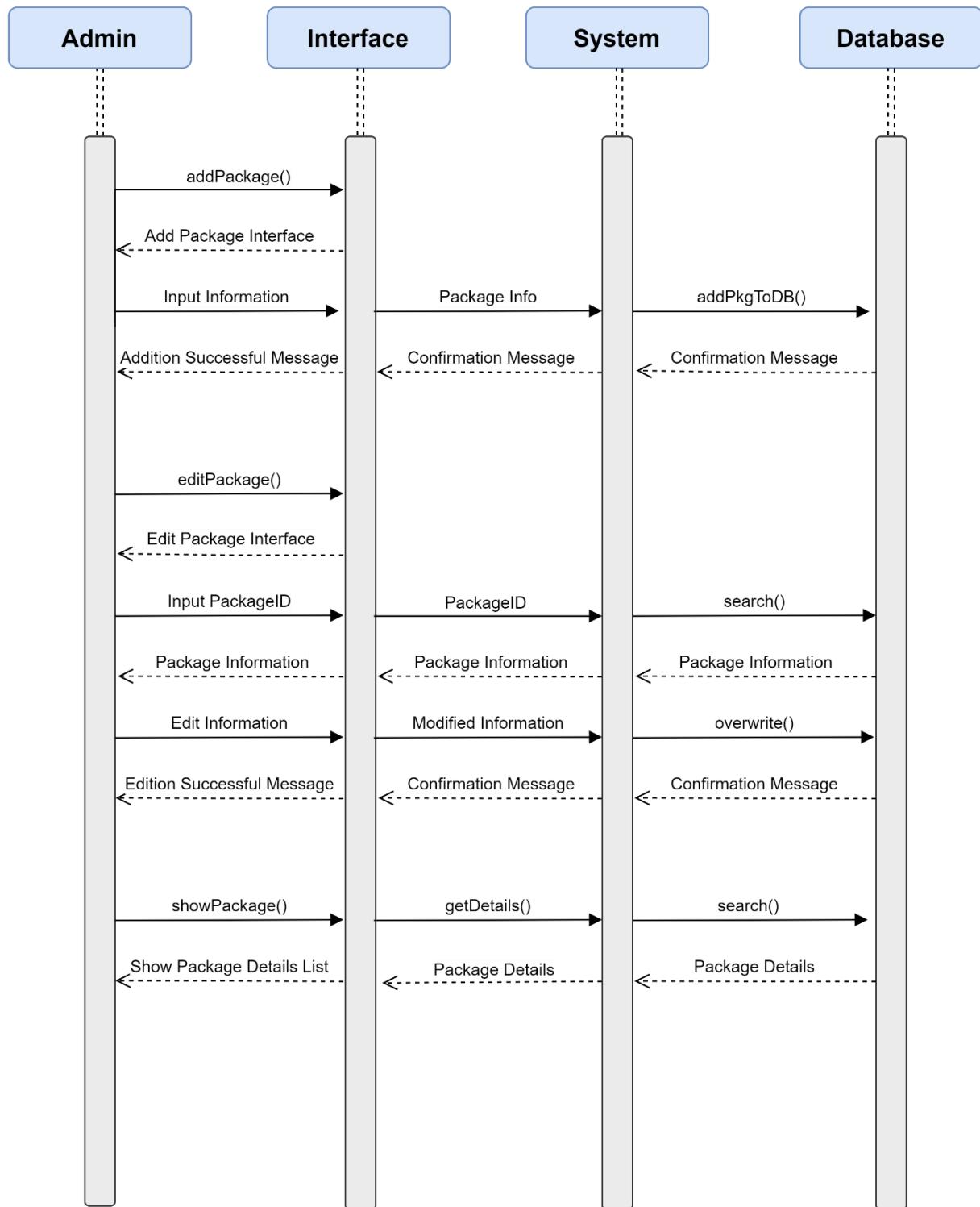


Fig 57

12.2 Customer/User

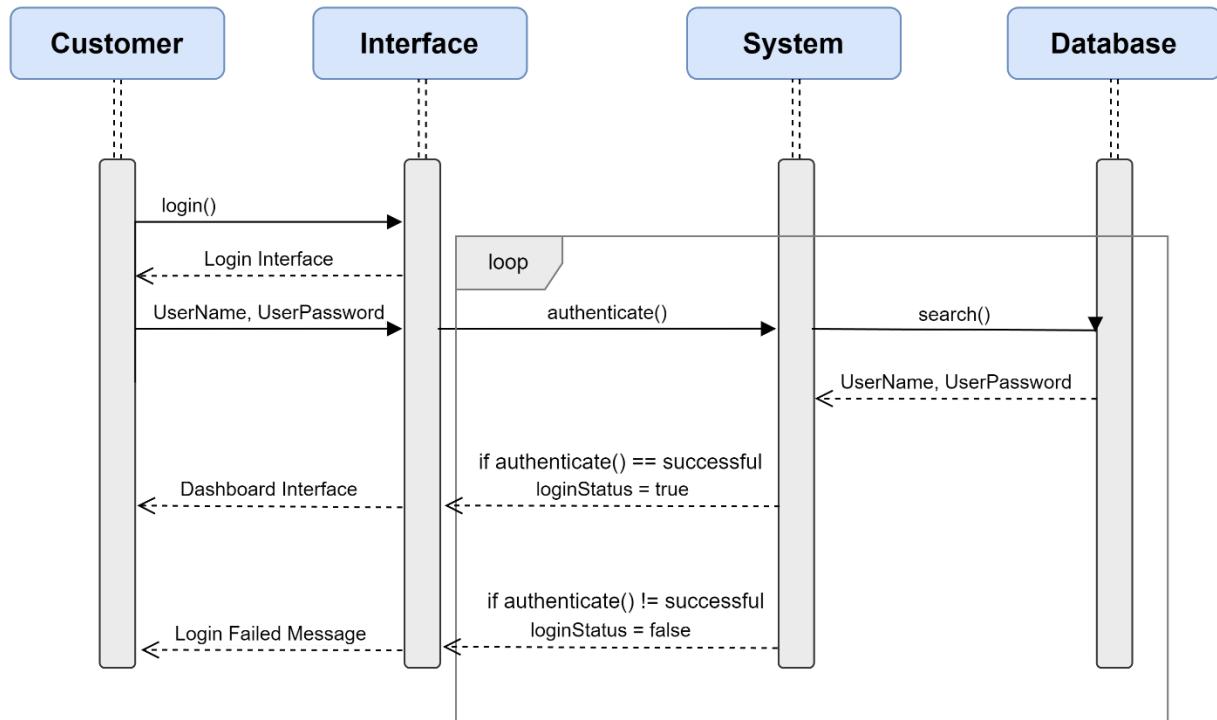


Fig 58

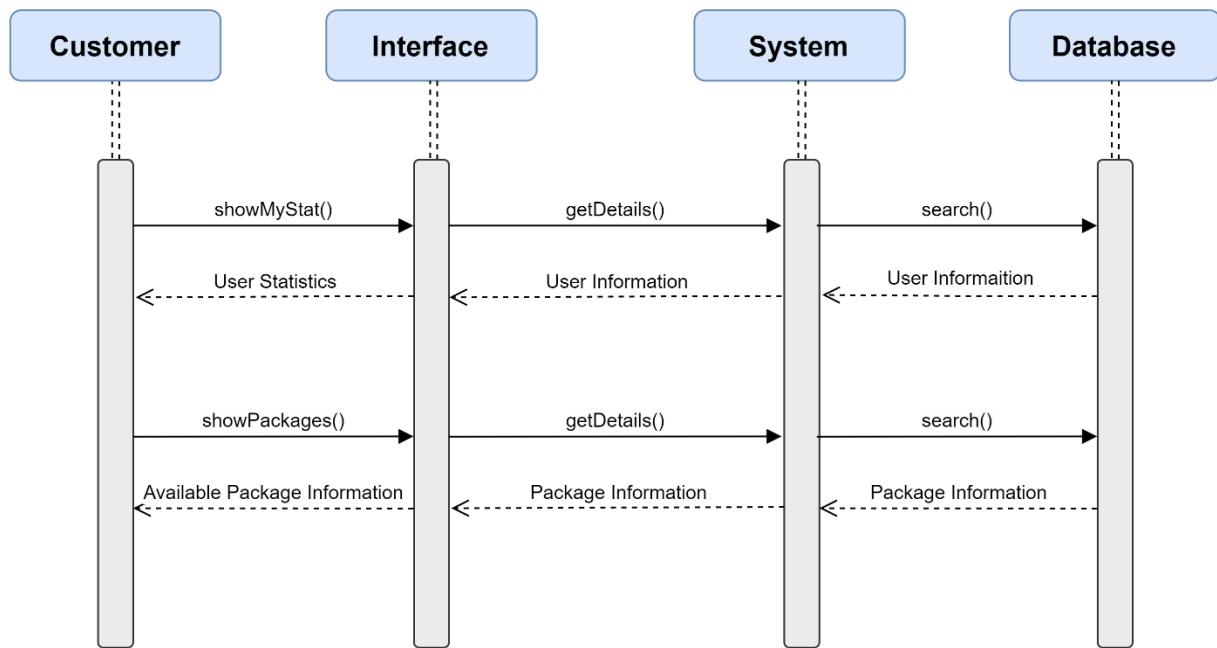


Fig 59