DHAKA UNIVERSITY CLUB MANAGEMENT SYSTEM

Software Requirement Specification

Group 3
BSSE07 Batch
Institute of Information Technology
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DHAKA UNIVERSITY CLUB MANAGEMENT SYSTEM

Submittted to

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LETTER OF TRANSMITTAL

17th December 2016

Dr. Kazi Muheymin-Us-Sakib

Professor

Institute of Information Technology

University of Dhaka

Subject: Submission of term report on "Dhaka University Club Management System".

Sir,

With due respect, we are submitting the report on the above topic you assigned to us. In this report, we have given our best effort albeit some shortcomings. We earnestly hope that you would excuse our errors and oblige thereby.

Yours sincerely

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ABSTRACT

The study is made for Dhaka University Club Management System. The scope of the study is to analyze the Dhaka University Club Management System and to know its functions and drawbacks, and design the SRS of this system. The object of this study is to develop an SRS (software requirements and specification) of Dhaka University Club Management System. This study also describes the current system of the Dhaka University Club.

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CHAPTER 1: INTRODUCTION

This chapter is a part of our software requirement specification for the project “Dhaka University Club Management System”. In this chapter we focus on the intended audience for this project.

1.1 PURPOSE

This document briefly describes the Software Requirement Analysis of Dhaka University Club Management System. It contains functional, non-functional and supporting requirements and establishes a requirements baseline for the development of the system. The requirements contained in the SRS are independent, uniquely numbered and organized by topic. The SRS serves as an official means of communicating user requirements to the developer and provides a common reference point for both the developer team and the stakeholder community. The SRS will evolve over time as users and developers work together to validate, clarify and expand its contents.

1.2 INTENDED AUDIENCE

This SRS is intended for several audiences including the customers as well as the project managers, designers, developers, and testers.

- The customer will use this SRS to verify that the developer team has created a product that is acceptable to the customer.
- The project managers of the developer team will use this SRS to plan milestones and a delivery date, and ensure that the developing team is on track during development of the system.
- The designers will use this SRS as a basis for creating the system’s design. The designers will continually refer back to this SRS to ensure that the system they are designing will fulfill the customer’s needs.

- The developers will use this SRS as a basis for developing the system's functionality. The developers will link the requirements defined in this SRS to the software they create to ensure that they have created a software that will fulfill all of the customer's documented requirements.
- The testers will use this SRS to derive test plans and test cases for each documented requirement. When portions of the software are complete, the testers will run their tests on that software to ensure that the software fulfills the requirements documented in this SRS. The testers will again run their tests on the entire system when it is complete and ensure that all requirements documented in this SRS have been fulfilled.

1.3 Conclusion

This analysis of the audience helped us to focus on the users who will be using our analysis. This overall document will help each and every person related to this project to have a better idea about the project.

CHAPTER 2: INCEPTION OF DUCMS

In this chapter, the Inception part of the SRS will be discussed briefly.

2.1 INTRODUCTION

Inception is the beginning phase of requirements engineering. It defines how a software project gets started and what the scope and nature of the problem to be solved is. The goal of the inception phase is to identify concurrent needs and conflicting requirements among the stakeholders of a software project. At project inception, we establish a basic understanding of the problem, the people who want a solution, the nature of the solution that is desired and the effectiveness of preliminary communication and collaborations between the other stakeholders and the software team.

To establish the groundwork we have worked with the following factors related to the inception phases:

- List of stakeholders
- Recognizing multiple viewpoints
- Working towards collaboration
- Requirements questionnaire

2.1.1 List of Stakeholders

Stakeholder refers to any person or group who will be affected by the system directly or indirectly. Stakeholders include end-users who interact with the system and everyone else in an organization that may be affected by its installation. At inception, a list of people who will contribute input as requirements are elicited. The initial list will grow as stakeholders are contacted because every stakeholder will be asked: “Whom else do you think I should talk to?”

To identify the stakeholders we consulted with Club Manager and asked him following questions:

- Who is paying for the project?
- Who will be using the project outcomes?
- Who gets to make the decisions about the project (if this is different from the money source)?
- Who has resources I need to get the project done?
- Whose work will my project affect? (During the project and also once the project is completed).

We identified the following stakeholders for our automated club management system of Dhaka University.

Club Manager: A manager is selected for the Dhaka University Club. He has the administrative power over the system. Almost all decisions are taken by the club manager.

Executive Committee: A committee is formed with 15 members. There are one president, two vice-presidents, one treasurer, one secretary, two additional secretaries and eight general members. Associate members are selected based on their application by the executive committee in a meeting. This committee is elected in the annual meeting.

General Member: General members are the faculty members or the officers of the University of Dhaka. They can also be the recommender for outsiders who want to join the club.

Associate Member: Associate members are the outsiders who want to join the club. There can be a maximum of 50 associate members in a certain period of time. They need a recommendation from a member of the club. Their application is finally approved by the executive committee.

Developers: Developers are one of the stakeholder because they are also affected by this system. They develop this system and work for further development. If there occurs any system interruption, they will find the problem and try to solve it.

University: University of Dhaka will finance the project and it has some rules and regulation to maintain this system. We have to follow them strictly. It will also be affected by this system so we consider it as one of our stakeholders.

2.1.2 Recognizing Multiple Viewpoints

Different stakeholders achieve different benefits from the system. Consequently, each of them has a different view of the system. So we have to recognize the requirements from multiple points of view, as well as multiple views of requirements. Assumptions are given below:

Club Manager's viewpoint:

- User friendly and efficient system
- Error free system
- Easy to operate
- Minimum maintenance cost
- Availability of expected requirements within budget
- Store member related information
- Generate annual report for expenses and incomes.

General Member's viewpoint:

- Easy to access
- Strong authentication
- User friendly
- Notification for expenses
- High security of member's information

Associate Member's viewpoint:

- Easy to access

- Strong authentication
- User friendly
- Online guidance

Developer's viewpoint:

- Easy to develop
- No ambiguous requirement

University's viewpoint:

- User friendly
- Efficient system
- Error free system
- Cost within budget
- Less maintenance cost
- No disruption of rules and regulations

2.1.3 Working towards Collaboration

Every stakeholder has their own requirements. There are some common and conflicting requirements of our stakeholder. That's why we followed the following steps to merge these requirements-

- ✓ Find the common and conflicting requirements
- ✓ Categorize them
- ✓ List the requirements based on stakeholder's priority points
- ✓ Make final decision about requirements

Common requirements:

- ✓ User friendly
- ✓ Efficient system
- ✓ Error free system
- ✓ Strong authentication

Conflicting requirements:

- ✓ Limited budget
- ✓ Cost within budget.
- ✓ High security of the system
- ✓ Easy access (Different stakeholder wants different type of access)

Final requirements: We finalize the following requirements based on stakeholder's priority point:

- User friendly system
- Strong authentication
- Maximum error free system. (5%-10% error is considerable)
- Restrict access to functionality of the system based upon user roles
- High security of member's information
- Automated submission of application

2.1.4 Requirements Questionnaire

We first ask the stakeholder some context free questions to understand the project's overall performance and goals. These questions are mentioned in section 2.1.1. These questions help us to identify the stakeholders of the project. Then we ask our next set of questions to better understand the problem and take stakeholder's opinion about the solution. The final set of question focused on the effectiveness of the communication activity itself.

2.2 Conclusion

The Inception phase helped us to establish basic understanding about the club management system of University of Dhaka, identify the stakeholders who will be benefited if this system becomes automated, define the nature of the system and the tasks done by the system, and establish a preliminary communication with our stakeholders.

In our project, we have established a basic understanding of the problem, the nature of the solution that is desired and the effectiveness of preliminary communication and collaboration between the stakeholders and the software team. More studies and communication will help both sides (developer and client) to understand the future prospect of the project. Our team believes that the full functioning document will help us to define that future prospect.

CHAPTER 3: ELICITATION OF DUCMS

After discussing on the Inception phase, we need to focus on the Elicitation phase. So this chapter specifies the Elicitation phase.

3.1 INTRODUCTION

Requirements Elicitation is a part of requirements engineering that is the practice of gathering requirements from the users, customers and other stakeholders. We have faced many difficulties, like understanding the problems, making questions for the stakeholders, limited communication with the stakeholders due to a short amount of time and volatility. Though it is not easy to gather requirements within a very short time, we have surpassed these problems in an organized and systematic manner.

3.2 ELICITING REQUIREMENTS

We have seen Question and Answer (Q&A) approach in the previous chapter, where the inception phase of requirement engineering has been described. The main task of this phase is to combine the elements of problem solving, elaboration, negotiation and specification. The collaborative working approach of the stakeholders is required to elicit the requirements. We have finished the following tasks for eliciting requirements-

- Collaborative Requirements Gathering
- Quality Function Deployment
- Usage Scenarios
- Elicitation work products

3.2.1 Collaborative Requirements Gathering

We have met with many stakeholders in the Inception phase such as the club manager, general members, our classmates and teachers. These meetings created an indecisive state for us to elicit the requirements. To solve this problem we have met with the stakeholders (who are acting a vital rule in the whole process) again to elicit the requirements. A slightly different scenario from these approaches has been found.

Following activities have been completed to accomplish this task.

- The meetings were conducted with the club manager and general members; they were questioned about their requirements and expectations from the Dhaka University Club Management System.
- They were asked about the problems they were facing with the current manual system.
- Lastly we selected our final requirement list from the meetings.

3.2.2 Quality Function Deployment

Quality Function Deployment (QFD) is a technique that translates the needs of the customer into technical requirements for software. Ultimately the goal of QFD is to translate subjective quality criteria into objective ones that can be quantified and measured and which can then be used to design and manufacture the product. It is a methodology that concentrates on maximizing customer satisfaction from the software engineering process. So we have followed this methodology to identify the requirements for the project. The requirements, which are given below, are identified successfully by the QFD.

3.2.2.1 Normal Requirements

Normal requirements are generally the objectives and goals that are stated for a product or system during meetings with the customer. The presence of these requirements fulfills customers' satisfaction. These are the normal requirements for our project.

1. User-friendly design.
2. Allow new members to register for the club.
3. Interactive menu for each day's catering services is provided alongside appropriate images for ordering food.
4. Allow members/nonmembers to book community space for events.
5. A database is maintained for accounting purposes so that an annual report can easily be generated and stored.
6. Allow manager to add new revenue or expense item, alter list of food items served, and approve new associate members and club space booking.
7. Allow manager access to any previous annual or monthly financial report.

8. Prevent the issue with “Ghost billing”.
9. Notify members about their total monthly bill via SMS.
10. Allow existing members to access their monthly expense reports.

3.2.2.2 Expected Requirements

These requirements are intrinsic to the product or system and may be so elementary that the customer does not explicitly state them. Their absence will be a cause for significant dissatisfaction. Below the expected requirements for our project are briefly described.

1. IDs is provided so that only valid users can safely login to the system and see notification.
2. Restrict access to system functionalities based upon user roles.
3. The user interface is to make use of selectable fields wherever possible instead of fields that require the user to type in data.
4. The system’s configuration is to be documented and updated as changes to the system are made due to patches, new releases, etc.
5. The online interface provides photos and interactive calendars in the section of renting space for events.
6. Provide two factor authentication, where session PINs will be sent via SMS.
7. Members are able to set alerts for expense limits during a month.
8. A member can keep track of her monthly expenses as she can get access to her previous orders.
9. The user interface is to follow standard web practices such that the web interface is consistent with typical internet applications.

3.2.2.3 Exciting Requirements

These requirements are for features that go beyond the customer's expectations and prove to be very satisfying when present. Following are some exciting requirements of our project.

1. A member can ask questions and submit complaints to a dedicated employee via a virtual helpline.
2. All the necessary aspects on the user interface contain tooltip information alongside a virtual manual so that even users who are not familiar with automated systems can use this with ease.
3. Offer access to DUCMS through a mobile app.
4. Display nutrition facts (carbohydrate, protein, fat, calorie count) about the food items offered.

3.2.3 Usage Scenario

Dhaka University Club Management System (DUCMS) is an automated system for the following purposes:

1. Member registration
2. Ordering food
3. Booking community space
4. Management activities
5. Member activities

New Member Registration

The club has two types of members: General Members (GM) and Associate Members (AM). General members are either university faculty members or officers. Faculties and officers of University of Dhaka (DU) are eligible to join Dhaka University Club (DUC) as GM. AMs are outsiders who can join the club upon approval from the executive committee. At any time there can be a maximum of fifty AMs. Non-member DU faculties and officers can register as a GM of DUC by using their Dhaka University Employee Identification Number (DUEIN) to fill out the new member registration form.

The new member registration form for GM contains the following information:

1. Name
2. Department
3. Designation
4. Contact Number
5. Present Address
6. Permanent Address
7. DUEIN
8. Photo
9. Username
10. Password (must be at least eight digits long and include one uppercase letter and number)

Outsiders who want to become AM of DUC can apply by filling out the new member registration form for AM, along with their recommender's DUEIN, subject to a vacant position. After being approved by the recommender, applications are then scrutinized and approved by the executive committee manually. A list of successful candidates is published by the club manager. Eligible applicants are notified to pay DUC AM membership fees which is verified by the bank, by cross-referencing Bank A/C number, Application Reference number and amount.

The new member registration form for AM will contain the following information:

1. Name
2. Occupation
3. Contact Number
4. Present Address
5. Permanent Address
6. Photo
7. Bank A/C No.
8. Recommender’s DUEIN
9. Username
10. Password (must be at least eight digits long and include one uppercase letter and number)

Upon registration AMs will be sent a temporary ad hoc DUEIN to login into DUCMS via SMS and email. Users can either use their DUEIN or username and password to login to DUCMS.

The rest of the Member's information will be generated from the Member Registration Application and the information will be stored in the Database.

Ordering Food

Each table in the club premises (porch, lounge, reading room, ordering counter) will have a dedicated electronic device for ordering food. Each electronic device will be identified with a table number (identified by MAC address), and will be connected to the DUCMS web interface, through which members of the DUCMS will be able to login with their credentials and order food.

This panel will display an interactive list of food items or menu, currently available for ordering. Each food item will have:

1. Food name
2. Multiple pictures of the food item (up to five pictures)
3. User daily rating
4. Nutritional Facts (carbohydrate, protein, fat and calorie count per serving)
5. Price
6. Amount in the cart

Through this panel they will be able to order the food item, mention the quantity of the item they want to order. After selecting all the items and specifying the quantity, users will be able to add to, cancel or submit cart. Before placing the order the user will be prompted to verify the correctness of her order. Upon confirmation the user will be prompted to complete her order by logging in with her credentials. If two factor authentication is enabled a session PIN, a four-digit number, will be generated for each attempted login with correct credentials and sent via SMS to the user's mobile phone. A virtual receipt will be generated with every completed order.

All club members will also be able to use their own devices to login into the DUCMS web interface for ordering food; in which case she will need to login with valid credentials in order to gain access to the food ordering panel and identify their table using an interactive map which displays ID and position of all the tables within the club premises.

Booking Community Space for Events

Members and non-members can also apply to book community space for events from DUC, based on availability. Club space is rented out for community events only on Friday of every week between 10:00 am to 4:30 pm. Every application made by a non-member is first approved by the recommender (existing member of DUC) and then by the Club Manager.

Members can apply for booking community space by logging in. Every application made by a member is approved by CM only.

Upon approval, the applicant is notified to pay booking fees within three working days and the space is allocated at desired date, and applicant is notified, after payment has been verified by the bank. If payment is not received within three working days, the application is automatically nullified and the community space becomes available for booking again.

Application by non-member will contain the following information:

1. Name of Applicant
2. Present Address
3. Permanent Address
4. Contact Number
5. Booking Purpose
6. Booking Date and Time
7. Name of Recommender
8. Contact Number of Recommender
9. DUEIN of Recommender

Notification SMS/Email will contain:

1. Applicant's Name
2. Booking Date and Time
3. Amount

4. Application ID

Manager's Dashboard

- Club manager will be able to add revenue sources such as:
    1. University Grants
    2. Donation
    3. Club Space Rent
    4. Interest on Savings Bank Account
    5. Raffle Draw
    6. Club Rent Received in Advance
    7. Souvenir Contribution (Advertisement)
    8. Club Premises Rent
    9. Security Deposit (Club Shop)
    10. Miscellaneous Receipts

- In addition, the following sources of revenue will be automatically generated and maintained within the DUCMS:

    1. Subscription from GM
    2. Subscription from AM
    3. Security Deposit from AM
    4. Catering Sales

- The CM will also be able to add expenses incurred during the financial period such as:
    1. Staff Salaries and Benefits
    2. Catering Expenses
    3. Repairing and Maintenance
    4. Cleaning Supplies

5. Stationary
6. Newspaper
7. Recreational Expenses
8. Bank Charge
9. Audit fees
10. Club Booking Return
11. Miscellaneous Expenses

Other than the categories of items listed above, the CM will also be able to create new revenue or expense categories.

- CM will be able to record transactions of any given or newly created category. Each transaction will have a category and an amount.
- At any given time the CM will be able to generate a managerial report listing the following:
    1. Receipts
    2. Payments
    3. Current Surplus/Deficit
    4. Summary of members (Number of GM and AM)
    5. Food items served along with number of items sold

Reports will also be automatically generated and stored, monthly and annually.

- At the end of each month a Reimbursement Report will be generated and sent solely for the purpose of Dhaka University's Accounting Department (DUAD), listing:
    1. Total Catering Sales of the month
    2. Total Subscription fees for the month
    3. Individual Member's Monthly Bill (Subscription fees and Catering Sales)
- The CM will also have the responsibility of approving:
    1. New AMs through her dashboard
    2. Application for booking club space
- Publish list of approved AMs
- View list of all the club members and their details, provided during registration.
- CM will also be able to update the following information provided during registration:
    1. DUEIN

2. Name
3. Photo
4. Password
5. Contact Number
6. Present Address
7. Permanent Address

- CM can change name, picture, nutritional fact, price and available days of the week for existing food items served. She will also be able to add new food items to the list or remove existing ones.
- The CM will also be able to check the current status of payments (Unpaid/Paid) :
    1. AM's monthly subscription
    2. AM's security deposit
    3. Club Space booking fees

All payments will be automatically verified by the bank, by cross-referencing Bank A/C number, Application Reference number and amount.

Members' Dashboard

Members will be able to view a graphical list of food items served for every day of the week. Each food item will have:

1. Food Name
2. Multiple Pictures of the food item (up to five pictures)
3. User daily rating
4. Nutritional Facts (carbohydrate, protein, fat and calorie count per serving)
5. Price
6. Quantity added to cart

Members can also rate their food out of 5 from their dashboard. The rating feature will be available for the member after the first food she purchases. She can also change her rating for a food later on. After a member rates a food item, average food rating is updated.

The member will be prompted to rate purchased but unrated food items each month. She can choose to ignore it for the time being and rate it later.

The following components will be present for the rating:

1. List of Food
2. Rating (out of 5) from other users
3. The member's rating

Members can book community space from their dashboard based on availability. Application for booking community space can then be verified and approved by CM, after which the member will be requested to complete her payment within three working days; the space is allocated at desired date after payment has been verified by the bank. If payment is not received within three working days, the application is automatically nullified and the community space becomes available for booking again.

Members will be able to access their real-time expense reports at any given time through the web interface. Here they will be able to find details for their every transaction:

1. Date
2. List of Items ordered
3. Quantity of each item ordered
4. Bill amount

Members will also be able check their total expense for the current month and past twelve months at any given time. At the end of each month members will be notified by SMS of the total bill incurred during the month.

Members can also set alerts for expense limits during a month, where a member will be notified by SMS if and when they exceed their aforementioned expense limits.

Club members will also be able to enable two factor authentication. If two factor authentication is enabled, a session PIN, a four-digit number, will be generated, for each attempted login with correct credentials, and sent via SMS to the user's mobile phone.

A member will also receive automated request if she is considered as a recommender by non-member applying to rent community space or registering as an AM. The message will have the following information:

1. Recommendation Purpose
2. Booking purpose (if renting out community space)
3. Applicant Name

4. Present Address
5. Contact Number

The member will have the option to approve or decline the request.

Members will also be able to update the following information they provided during registration:

1. Photo
2. Password
3. Contact Number
4. Present Address
5. Permanent Address
6. Department (only for GMs)
7. Designation (only for GMs)
8. Occupation (only for AMs)
9. Bank A/C number (only for AMs)
10. Expense limit

3.2.3 Elicitation Work Product

At first we have to know whether the output of the Elicitation task may vary because of the dependency on the size of the system or the product to be built. Here, the Elicitation work product includes:

- Making a statement of our requirements for the Dhaka University Club Management System.
- Making a bounded statement of scope for our system.
- Making a list of customers, users and other stakeholders who participated in the requirements elicitation.
- Making a list of requirements that are organized by function and domain constraints that apply to each other.
- A set of usage scenarios that provide insight into the use of the system.
- Description of the system's technical environment.

CHAPTER 4: SCENARIO BASED MODELING OF DUCMS

This chapter describes the Scenario Based Model for the Dhaka University Club management System.

4.1 INTRODUCTION

Although the success of a computer-based system or product is measured in many ways, user satisfaction resides at the top of the list. If we understand how end users (and other actors) want to interact with a system, our software team will be better able to properly characterize requirements and build meaningful analysis and design models. Hence, requirements modeling begins with the creation of scenarios in the form of Use Cases, activity diagrams and swim lane diagrams.

4.2 DEFINITION OF USE CASE

A Use Case captures a contract that describes the system behavior under various conditions as the system responds to a request from one of its stakeholders. In essence, a Use Case tells a stylized story about how an end user interacts with the system under a specific set of circumstances. A Use Case diagram simply describes a story using corresponding actors who perform important roles in the story and makes the story understandable for the users.

The first step in writing a Use Case is to define that set of “actors” that will be involved in the story. Actors are the different people that use the system or product within the context of the function and behavior that is to be described. Actors represent the roles that people play as the system operators. Every user has one or more goals when using system.

Primary Actor

Primary actors interact directly to achieve required system function and derive the intended benefit from the system. They work directly and frequently with the software.

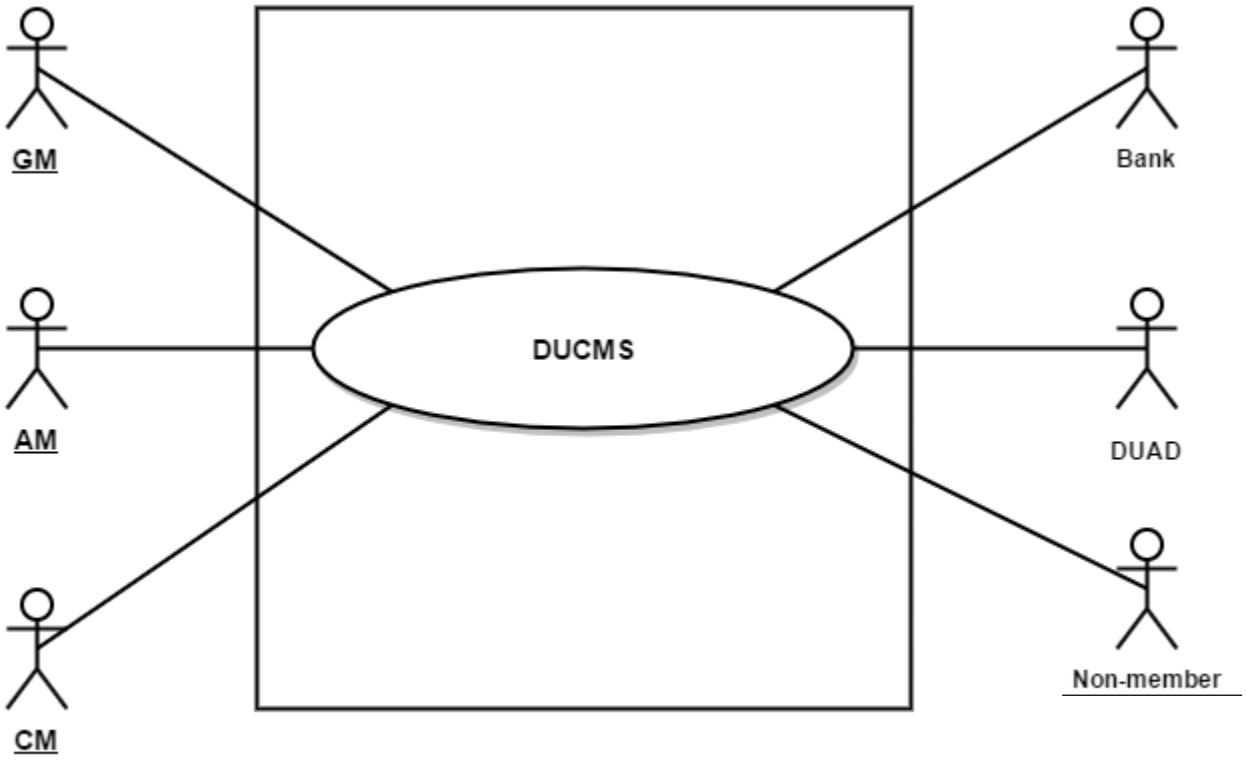
Secondary Actor

Secondary actors support the system so that primary actors can do their work. They either produce or consume information.

4.3 Use Case Diagrams

Use Case diagrams give the non-technical view of overall system.

4.3.1 Level-0 Use Case Diagram-DUCMS



Level 0: DUCMS

Figure 1: Level 0 Use Case diagram-DUCMS

Name:	**Club Management System**
ID:	**CMS-L-0**
Primary Actors:	**AM, GM, CM, Non-member**
Secondary Actors:	**Bank, DUAD**

Description of Use Case Diagram Level 0:

After analyzing the user story we found six actors who will directly use the system as a system operator. Primary actors are those who will play action and get a reply from the system whereas secondary actors only produce or consume information.

Following are the actors of Dhaka University Club management system –

- General member - GM (primary)
- Associate member - AM (primary)
- Club manager - CM (primary)
- Bank (secondary)
- Non-member (primary)
- DUAD (secondary)

4.3.2 Level-1 Use Case Diagram-Subsystems

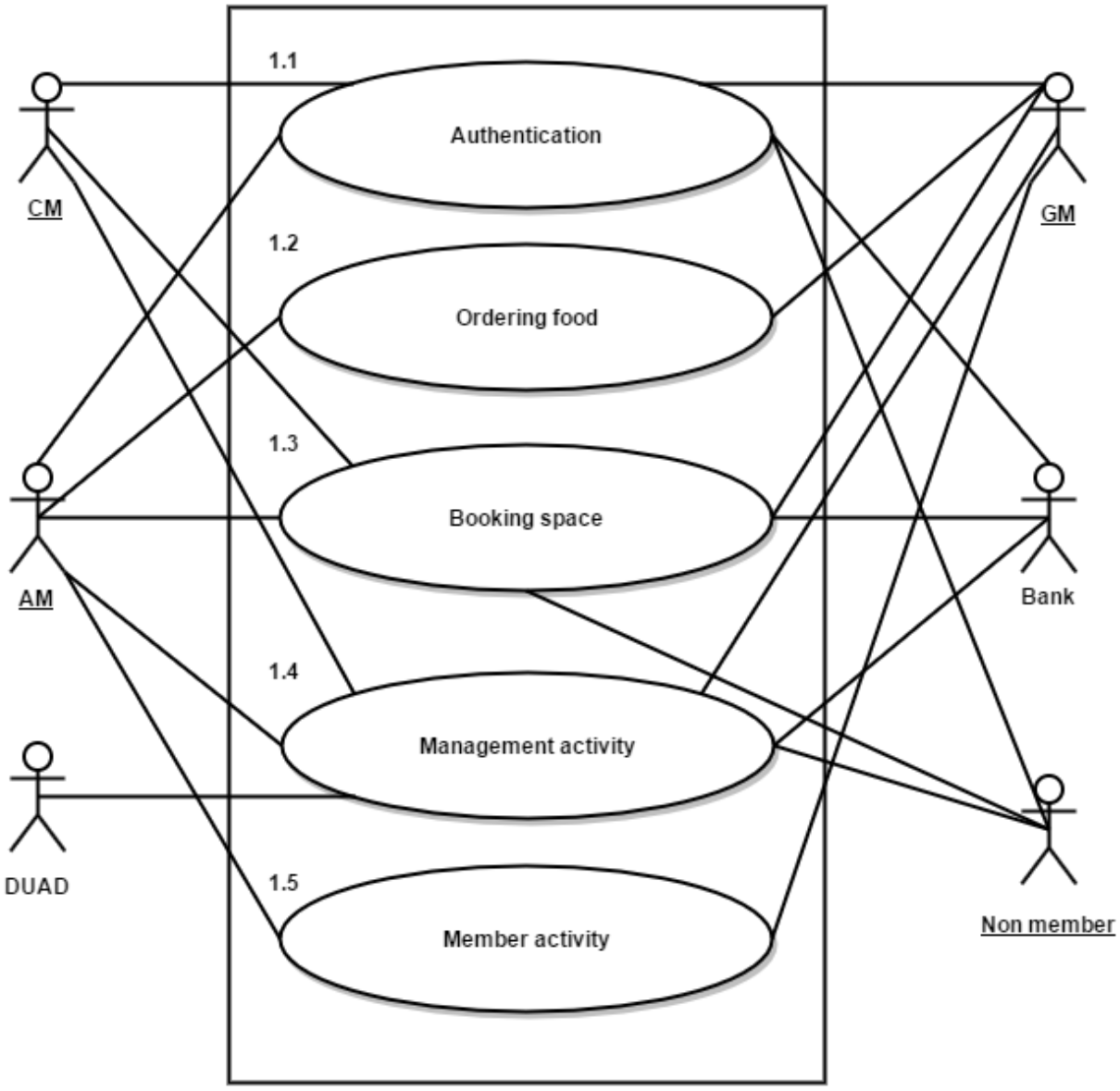


Figure 2: Level 1 Use Case diagram-Subsystems

Name:	**Subsystems of Club Management System**
ID:	**CMS-L-1**
Primary Actors:	**AM, GM, CM, Non-member**
Secondary Actors:	**Bank, DUAD**

Description of Use Case Diagram Level 1:

There are five subsystems in the Club Management System. They are:

1. Authentication
2. Ordering food
3. Booking for events
4. Management activity
5. Member activity

4.3.3 Level-1.1 Use Case Diagram-Authentication

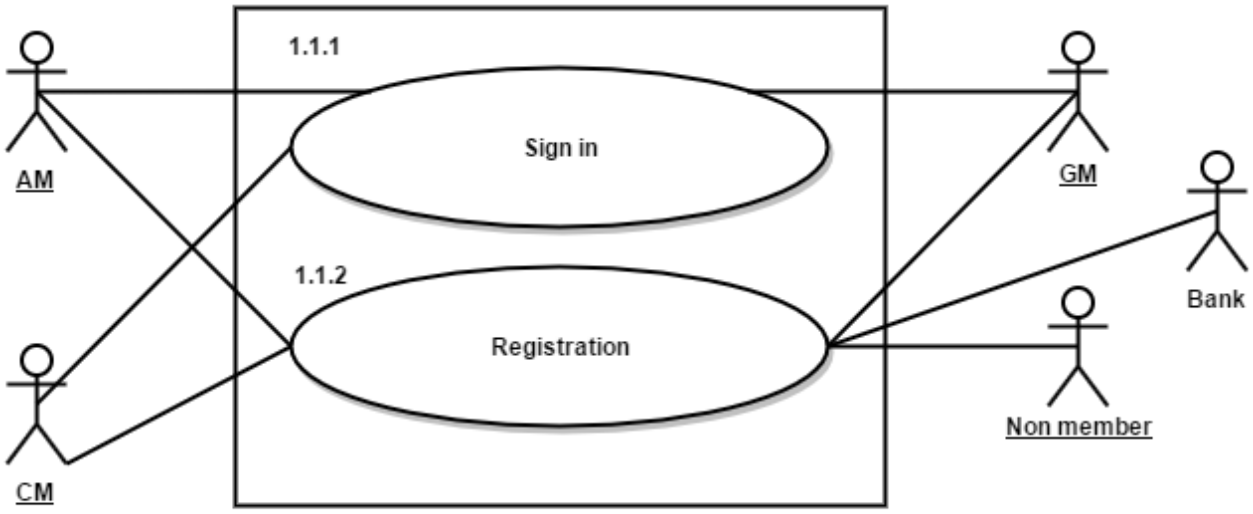


Figure 3: Level 1.1 Use Case diagram-Authentication

Name:	**Authentication**
ID:	**CMS-L-1.1**
Primary Actors:	**AM, GM, CM, Non member**
Secondary Actors:	**Bank**

Description of Use Case Diagram Level 1.1:

Authentication is the process of determining whether someone or something is, in fact, who or what it is declared to be. The authentication subsystem of Club Management System can be divided into two parts. They are:

1. Sign in
2. Registration

4.3.4 Level-1.1.1 Use Case Diagram-Sign in

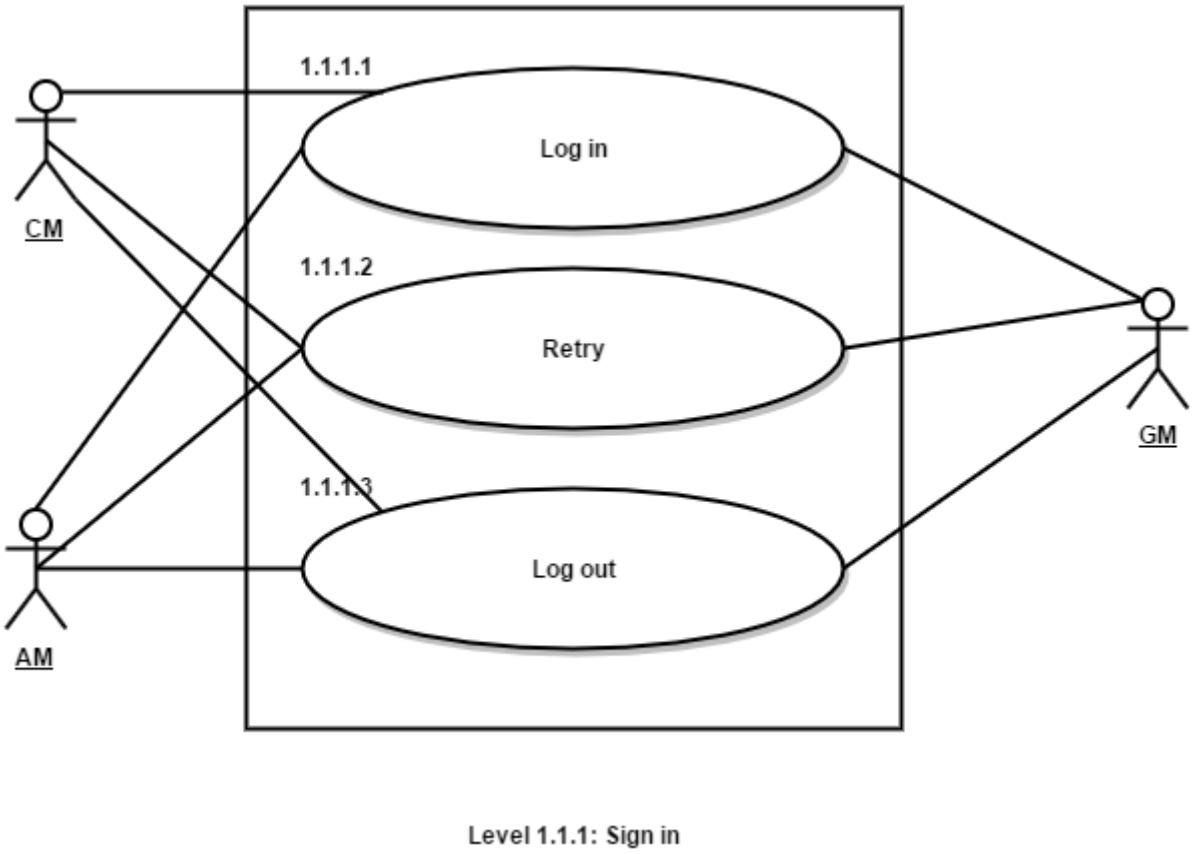


Figure 4: Level 1.1.1 Use Case diagram-Sign in

Name:	**Sign in**
ID:	**CMS-L-1.1.1**
Primary Actors:	**AM, GM, CM**

Description of Use Case Diagram Level 1.1.1:

1. Visit the login page.
2. Input valid user ID or username & password.
3. Proceed to the next activity.

Action-Reply of Use Case Diagram Level 1.1.1:

- Action: **Member/CM** will enter DUCEIN or username and password to login to DUCMS.
  Reply: She will be allowed to enter into the system upon entering correct credentials.
- Action: **Member/CM** given Username or password is wrong for the fourth time.
  Reply: Allow her to reset or recover the password and username through email.

4.3.5 Level-1.1.2 Use Case Diagram-Registration

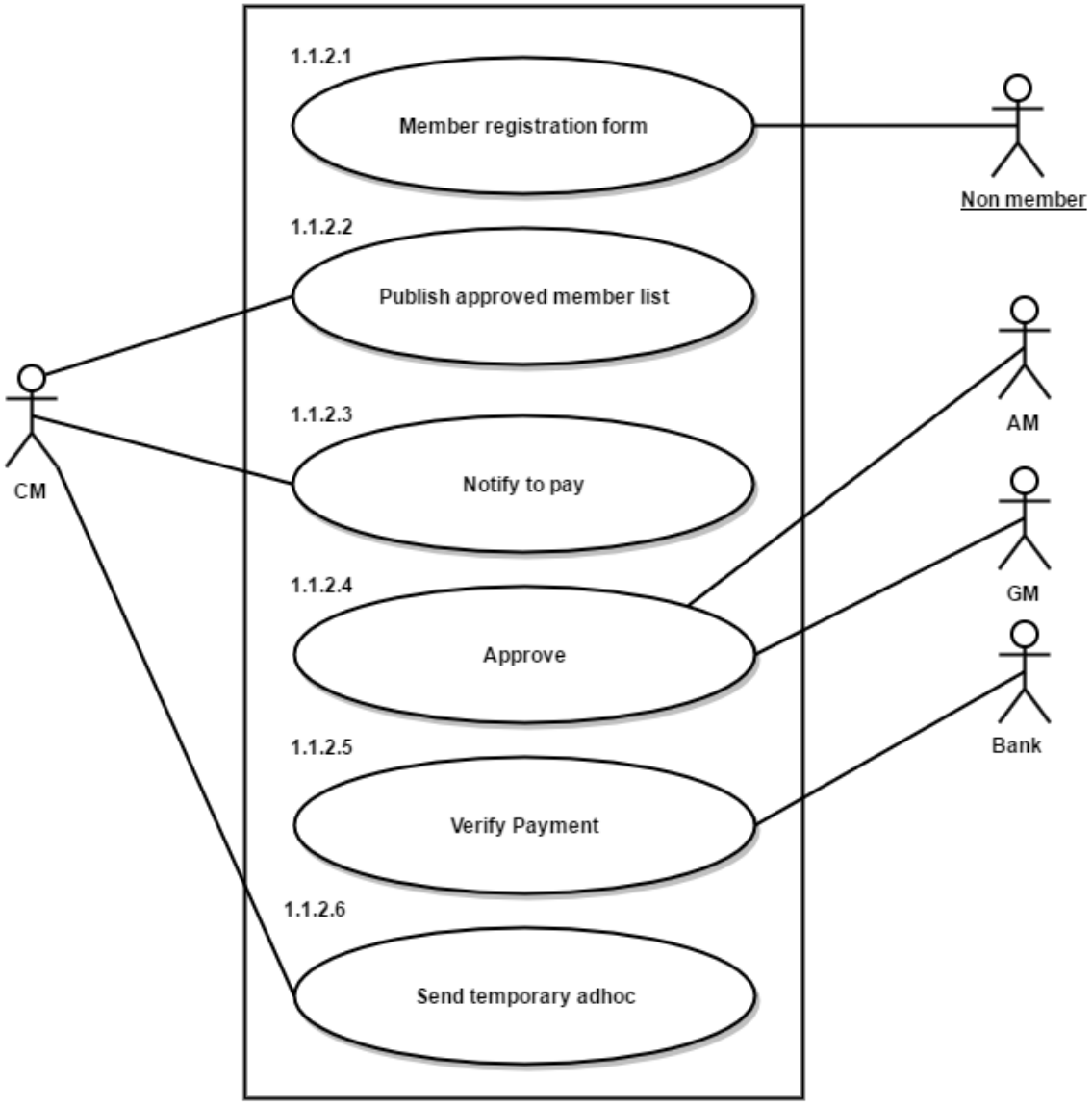


Figure 5: Level 1.1.2 Use Case diagram-Registration

Name:	**Registration**
ID:	**CMS-L-1.1.2**
Primary Actors:	**Non-member**
Secondary Actors:	**Bank, CM, AM, GM**

Description of Use Case Diagram Level 1.1.2:

The club has two types of members: General Members (GM) and Associate Members (AM). General members are either university faculty members or officers. Faculties and officers of University of Dhaka (DU) are eligible to join Dhaka University Club (DUC) as GM. AMs are outsiders who can join the club upon approval from the executive committee. At any time there can be a maximum of fifty AMs. Non-member DU faculties and officers can register as a GM of DUC by using their Dhaka University Employee Identification Number (DUEIN) to fill out the new member registration form.

The new member registration form for GM contains the following information:

1. Name
2. Department
3. Designation
4. Contact Number
5. Present Address
6. Permanent Address
7. DUEIN
8. Photo
9. Username
10. Password (must be at least eight digits long and include one uppercase letter and number)

Outsiders who want to become AM of DUC can fill out the new member registration form for AM, along with a letter of recommendation from a GM, subject to a vacant position. Applications are then scrutinized and approved by the executive committee manually. A list of successful candidates is published by the club manager. Eligible applicants are notified to pay DUC AM membership fees which is verified by the bank.

The new member registration form for AM will contain the following information:

1. Name
2. Occupation
3. Contact Number
4. Present Address
5. Permanent Address
6. Photo
7. Bank A/C No.
8. Username
9. Password (must be at least eight digits long and include one uppercase letter and number)

Upon registration AMs will be sent a temporary adhoc DUEIN to login into DUCMS via SMS and email. Users can either use their DUCEIN or username and password to login to DUCMS.

Action-Reply of Use Case Diagram Level 1.1.2:

- Action: **Non-member** DU faculty or officer enters DUEIN.
  Reply: She will be allowed to fill out the new member registration form.
- Action: **Non-member** Outsiders who want to become AM of DUC can fill out the new member registration form for AM.
  Reply: Recommending **member** is notified.
- Action: **Nonmember Outsider** gets approval from executive committee (**Club Manager**)
  Reply: **Nonmember Outsider** will be notified and get a temporary ad hoc DUEIN to login into DUCMS via SMS and email.
- Action: **Member/CM** enter correct username and password
  Reply: She will be allowed to enter the system.

4.3.6 Level-1.2 Use Case Diagram-Ordering Food

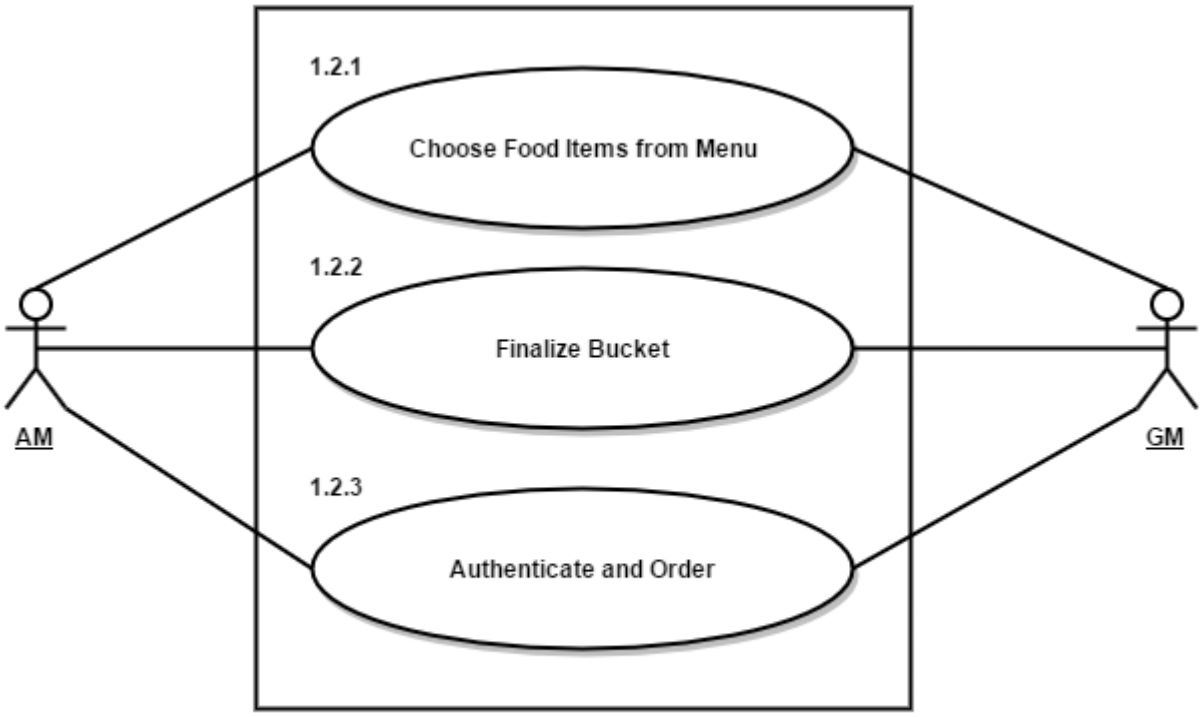


Figure 6: Level 1.2 Use Case diagram-Ordering Food

Name:	**Ordering Food**
ID:	**CMS-L-1.2**
Primary Actors:	**AM, GM**

Description of Use Case Diagram Level 1.2:

Each table in the club premises (porch, lounge, reading room, ordering counter) will have a dedicated electronic device for ordering food. Each electronic device will be connected to the DUCMS web interface, through which members of the DUCMS will be able to login with their credentials and order food.

This panel will display an interactive list of food items, currently available for ordering. Each food item will have:

1. Food name
2. Multiple pictures of the food item (up to five pictures)
3. User daily rating
4. Nutritional Facts (carbohydrate, protein, fat and calorie count per serving)
5. Price
6. Amount in the cart

Through this panel they will be able to order the food item, mention the quantity of the item they want to order. After selecting all the items and specifying the quantity, users will be able to place their order. Before placing the order the user will be prompted to verify the correctness of her order. Upon confirmation the user will be prompted to complete her order by logging in with her credentials. If two factor authentication is enabled a session PIN, a four-digit number, will be generated for each attempted login with correct credentials and sent via SMS to the user's mobile phone.

All club members will also be able to use their own devices to login into the DUCMS web interface for ordering food; in which case she will need to login with valid credentials in order to gain access to the food ordering panel and choose their table number using an interactive map which displays ID and position of all the tables within the club premises.

Action-Reply of Use Case Diagram Level 1.2:

- Action: **Member** chooses a food item.
  Reply: She will be prompted to specify amount.
- Action: **Member** will specify amount.
  Reply: She can then add that food item to her cart.
- Action: **Member** will finalize her order.
  Reply: She will be prompted to check the correctness of her order.
- Action: **Member** will log in to her account.
  Reply: She will then be able to place order.
- Action: **Member** will place order.
  Reply: She will be displayed the status of the order and be returned to the menu stage.

4.3.7 Level-1.3 Use Case Diagram-Booking Space

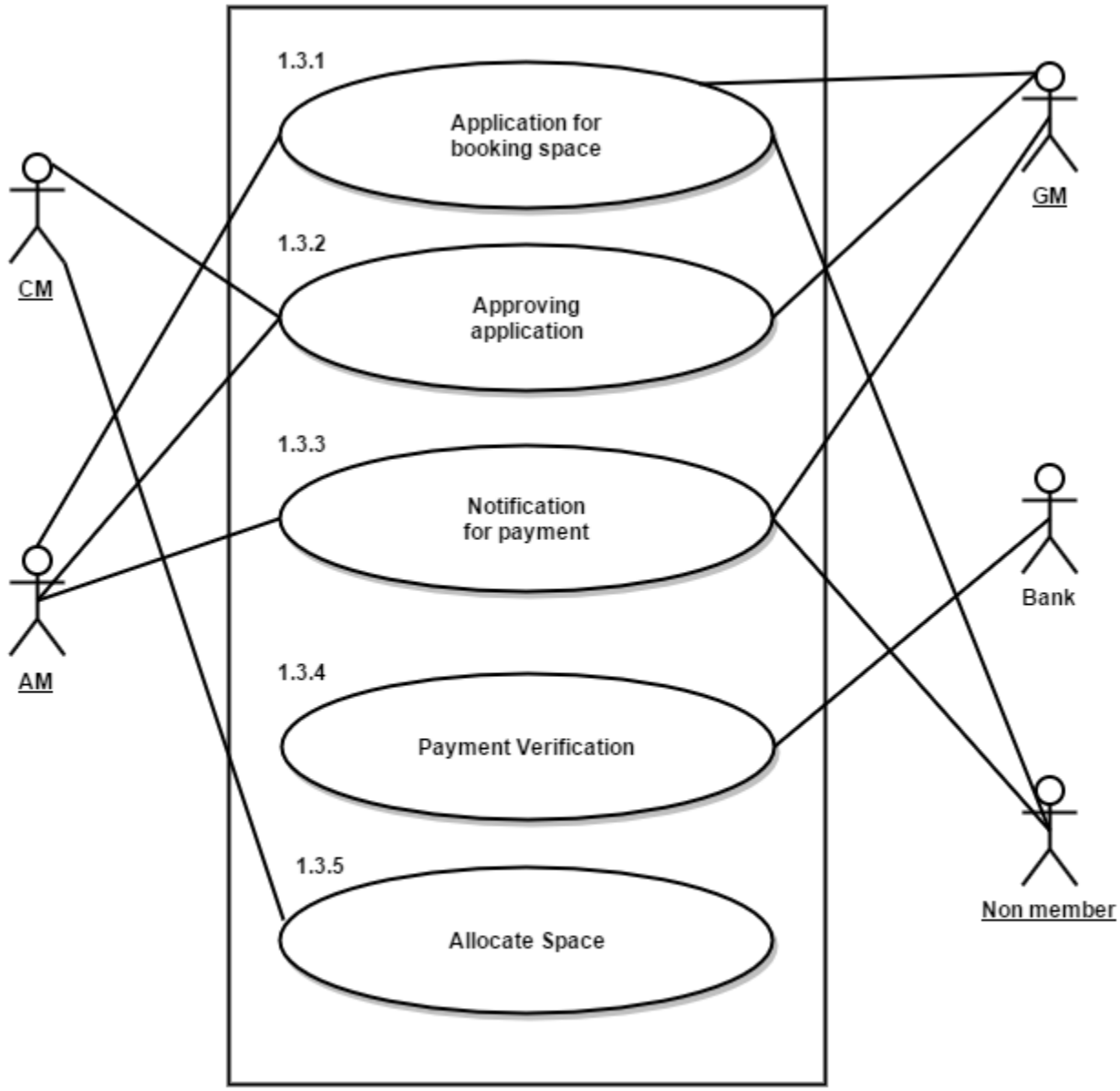


Figure 7: Level 1.3 Use Case diagram-Booking Space

Name:	**Booking Community Space for Events**
ID:	**CMS-L-1.3**
Primary Actors:	**AM,GM, Non-member, CM**
Secondary Actor:	**Bank**

Description of Use Case Diagram Level 1.3:

Members and non-members can also apply to book community space for events from DUC, based on availability. Every application made by a non-member is first approved by the recommender (existing member of DUC) and then by the Club Manager. Members can apply for booking community space by logging in. Every application made by a member is approved by CM only.

Upon approval from CM, the applicant is notified to pay booking fees within three working days; the space is allocated at desired date, and applicant is notified, after payment has been verified by the bank. If payment is not received within three working days, the application is automatically nullified and the community space becomes available for booking again.

Action-Reply of Use Case Diagram Level 1.3:

- Action: **Member** or **non-member** submits completes and submits application form. Reply: **Member** or **non-member** receives confirmation of submission. If application is from a **non-member**, it waits to be approved by its recommending **member**. If application is from a **member**, it awaits approval of **CM**.
- Action: Recommending **member** approves application.
  Reply: Application is sent to **CM** for approval.
- Action: Recommending **member** rejects application.
  Reply: Application is invalidated and applicant **non-member** is notified.
- Action: **CM** approves application.
  Reply: Applicant **member** or **non-member** is notified to pay booking fees within 3 working days.
- Action: Applicant **member** or **non-member** pays booking fees within 3 days.
  Reply: Space is allocated to applicant. Applicant is notified.
- Action: Applicant **member** or **non-member** does not pay booking fees within 3 working days.
  Reply: Application is invalidated and applicant is notified.

4.3.8 Level-1.4 Use Case Diagram-Management Activities

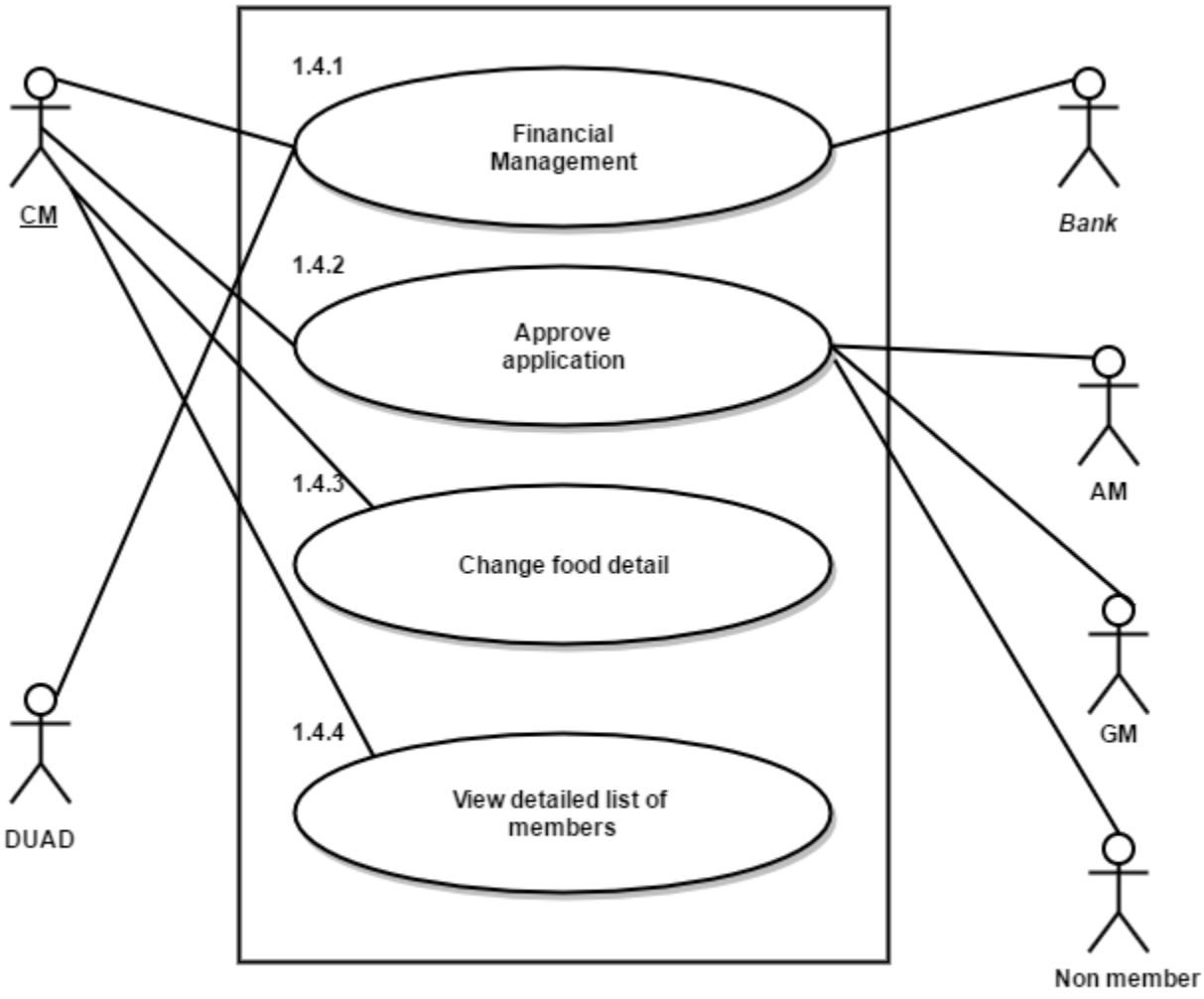


Figure 8: Level 1.4 Use Case diagram-Management Activities

Name:	**Management Activities**
ID:	**CMS-L-1.4**
Primary Actors:	**CM**
Secondary Actors:	**DUAD, Bank, Non-member, GM, AM**

Description of Use Case Diagram Level 1.4:

This subsystem manages the various tasks of the club manager. These tasks can be categorized as:

1. Financial Management
2. Approve Application
3. Change Food Detail
4. View Detailed List of Members

4.3.9 Level-1.4.1 Use Case Diagram-Manager's Financial Activities

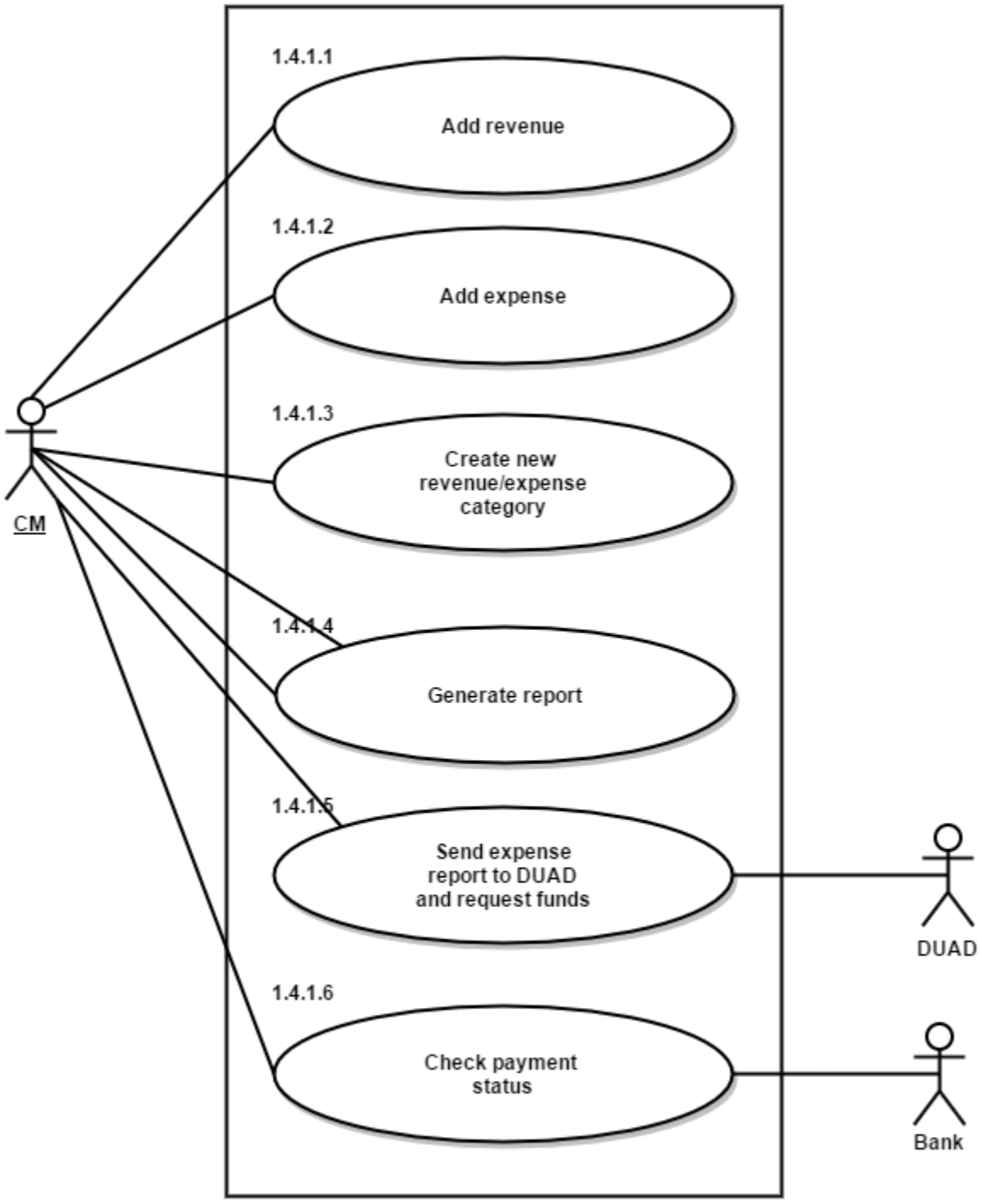


Figure 9: Level 1.4.1 Use Case diagram-Manager's Financial Activities

Name:	**Manager's Financial Activities**
ID:	**CMS-L-1.4.1**
Primary Actors:	**CM**
Secondary Actors:	**DUAD, Bank**

Description of Use Case Diagram Level 1.4.1:

Club manager will be able to add revenue sources and expenses. Other than the categories of items provided, the CM will also be able to create new revenue or expense categories. At any given time the CM will be able to generate a report listing the following:

1. Receipts
2. Payments
3. Current Surplus/Deficit
4. Summary of members (Number of GM and AM)
5. Food items served along with number of items sold

Reports will also be automatically generated and stored, monthly and annually.

At the end of each month another type of report will be generated and sent solely for the purpose of Dhaka University's Accounting Department listing:

1. Total Catering Sales of the month
2. Total Subscription fees for the month
3. Individual Member's Monthly Bill (Subscription fees and Catering Sales)

The CM will also be able to check the current status of payments (Unpaid/Paid):

1. AM's monthly subscription
2. AM's security deposit
3. Club Space booking fees

Action-Reply of Use Case Diagram Level 1.4.1:

- Action: **CM** adds revenue
  Reply: Store revenue and recalculate current Surplus or Deficit.
- Action: **CM** adds expense
  Reply: Store expense and recalculate current Surplus or Deficit.
- Action: **CM** creates new Revenue/Expense category
  Reply: Store new category.
- Action: **CM** generates report
  Reply: Create, store and display report
- Action: System sends expense report to DUAD
  Reply: Delivery Confirmation
- Action: **CM** checks payment status
  Reply: Display list of transactions with bank

4.3.10 Level-1.4.2 Use Case Diagram-Approving Applications

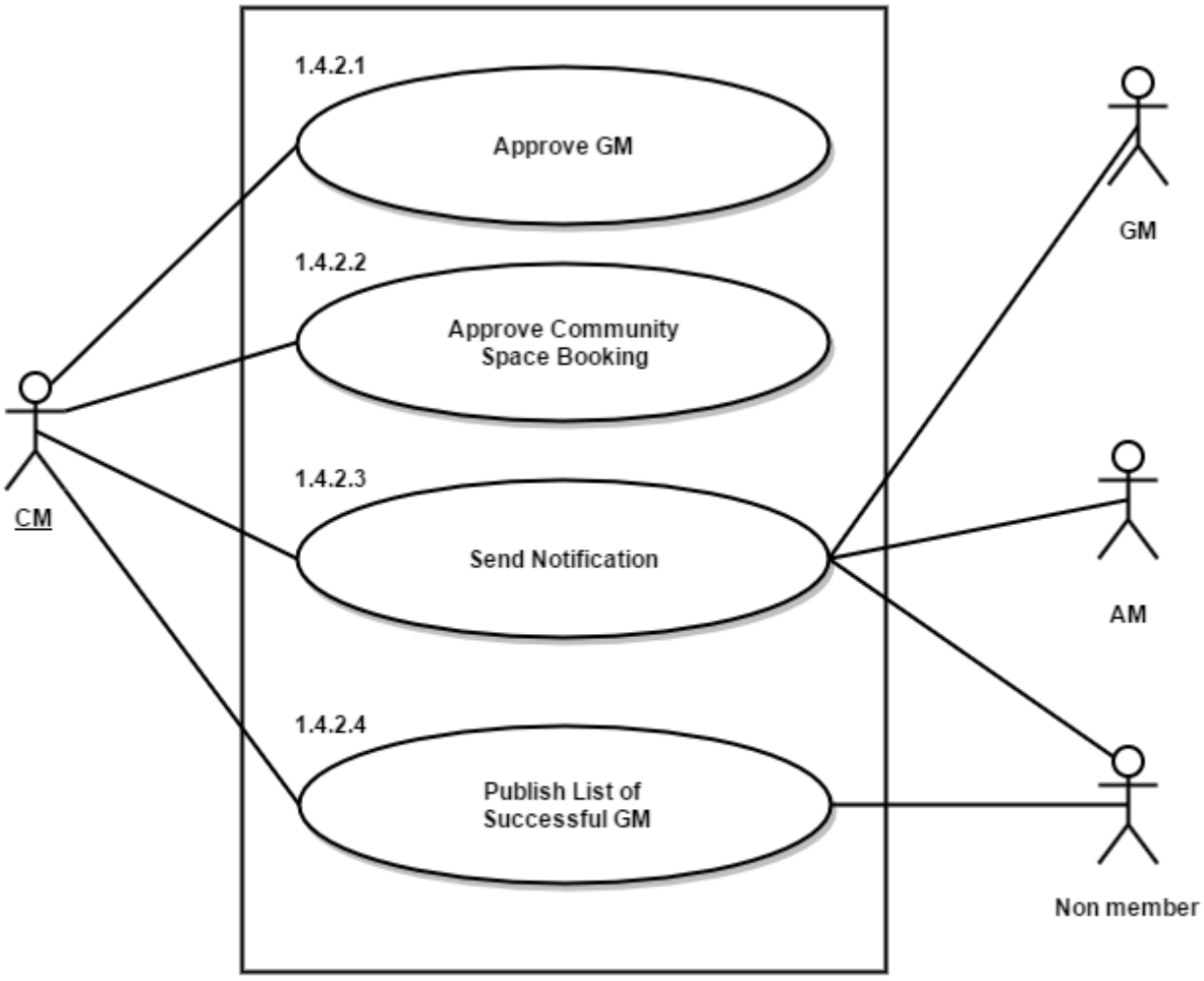


Figure 10: Level 1.4.2 Use Case diagram-Approving Applications

Name:	**Management Activities**
ID:	**CMS-L-1.4.2**
Primary Actors:	**CM**
Secondary Actors:	**Non-member, GM, AM**

Description of Use Case Diagram Level 1.4.2:

The CM will also have the responsibility of approving:

1. New AMs through her dashboard
2. Application for booking club space

Publish list of approved AMs.

Action-Reply of Use Case Diagram Level 1.4.2:

- Action: **CM** approves application for GM or Community Space Booking
  Reply: Send notification for payment
- Action: **CM** publishes list of successful GM
  Reply: Upload list to DUC website

4.3.11 Level-1.4.3 Use Case Diagram-Change Food Detail

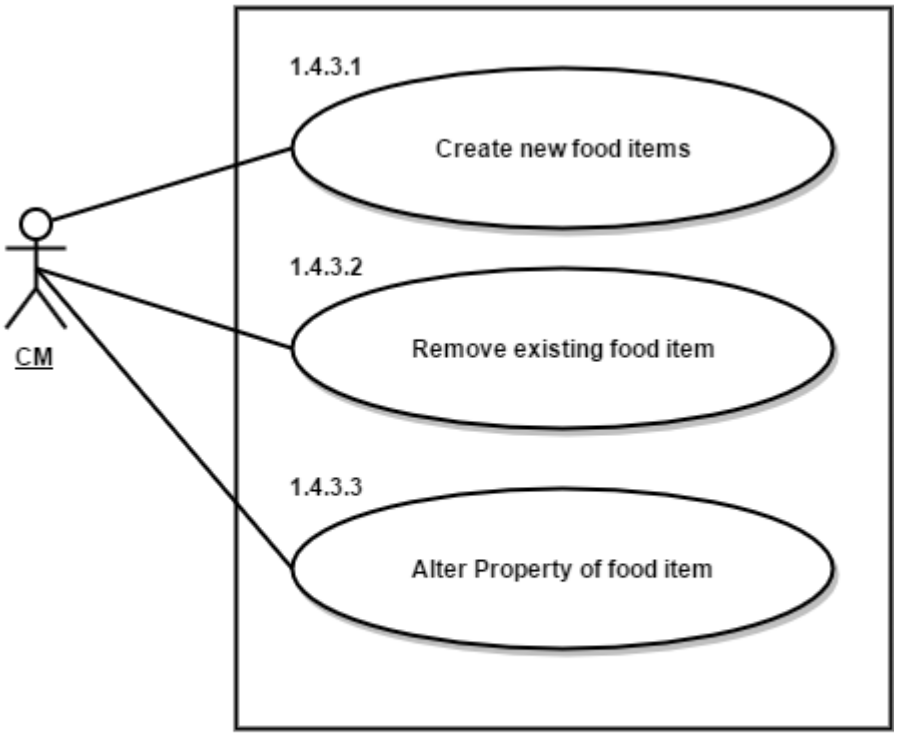


Figure 11: Level 1.4.3 Use case Diagram-Change Food Detail

Name:	**Change food detail**
ID:	**CMS-L-1.4.3**
Primary Actors:	**CM**

Description of Use Case Diagram Level 1.4.3:

CM can change name, picture, nutritional fact, price and available days of the week for existing food items served. She will also be able to add new food items to the list or remove existing ones.

Action-Reply of Use Case Diagram Level 1.4.3:

- Action: **CM** creates new food item
  Reply: New food item is stored. Food menu is updated.
- Action: **CM** removes existing food item
  Reply: Food item is deleted. Food menu is updated.
- Action: **CM** alters property of food item
  Reply: Changes are saved. Food menu is updated.

4.3.12 Level-1.5 Use Case Diagram-Member Activities

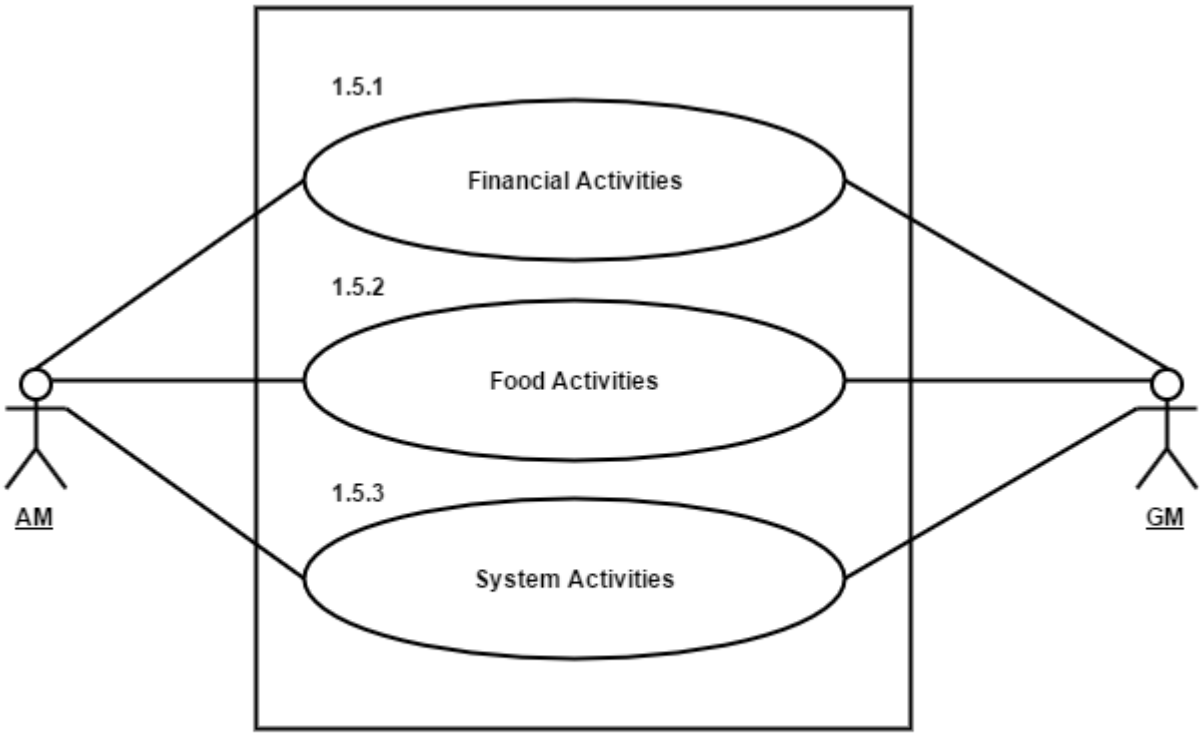


Figure 12: Level 1.5 Use Case diagram-Member Activities

Name:	**Member Activities**
ID:	**CMS-L-1.5**
Primary Actors:	**AM,GM**

Description of Use Case Diagram Level 1.5:

This subsystem manages the various tasks of a member (both GM and AM). These tasks can be categorized as:

1. Financial Activities
2. Food Activities
3. System Activities

4.3.13 Level-1.5.1 Use Case Diagram-Member's Financial Activities

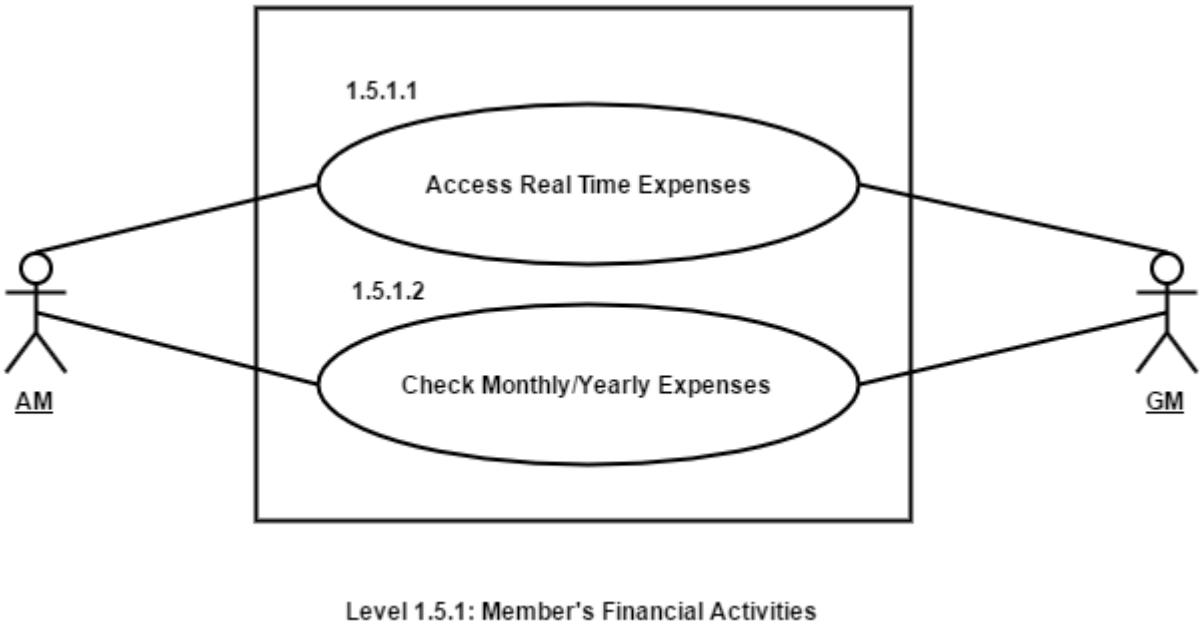


Figure 13: Level 1.5.1 Use Case diagram-Member's Financial Activities

Name:	**Member Activities**
ID:	**CMS-L-1.5**
Primary Actors:	**AM,GM**

Description of Use Case Diagram Level 1.5.1:

Members will be able to access their real time expense reports at any given time through the web interface. Here they will be able to find details for their every transaction:

1. Date
2. List of Items ordered
3. Quantity of each item ordered
4. Bill amount

Members will also be able check their total expense for the current month and past twelve months at any given time. At the end of each month members will be notified by SMS of the total bill incurred during the month.

Action-Reply of Use Case Diagram Level 1.5.1:

- Action: **Members** access Real time expenses
  Reply: Display transactions and total bill for the current month.
- Action: **Members** access monthly and yearly expense report
  Reply: Display transaction and total bill for specified month/year.

4.3.14 Level-1.5.2 Use Case Diagram-Member's Food Activities

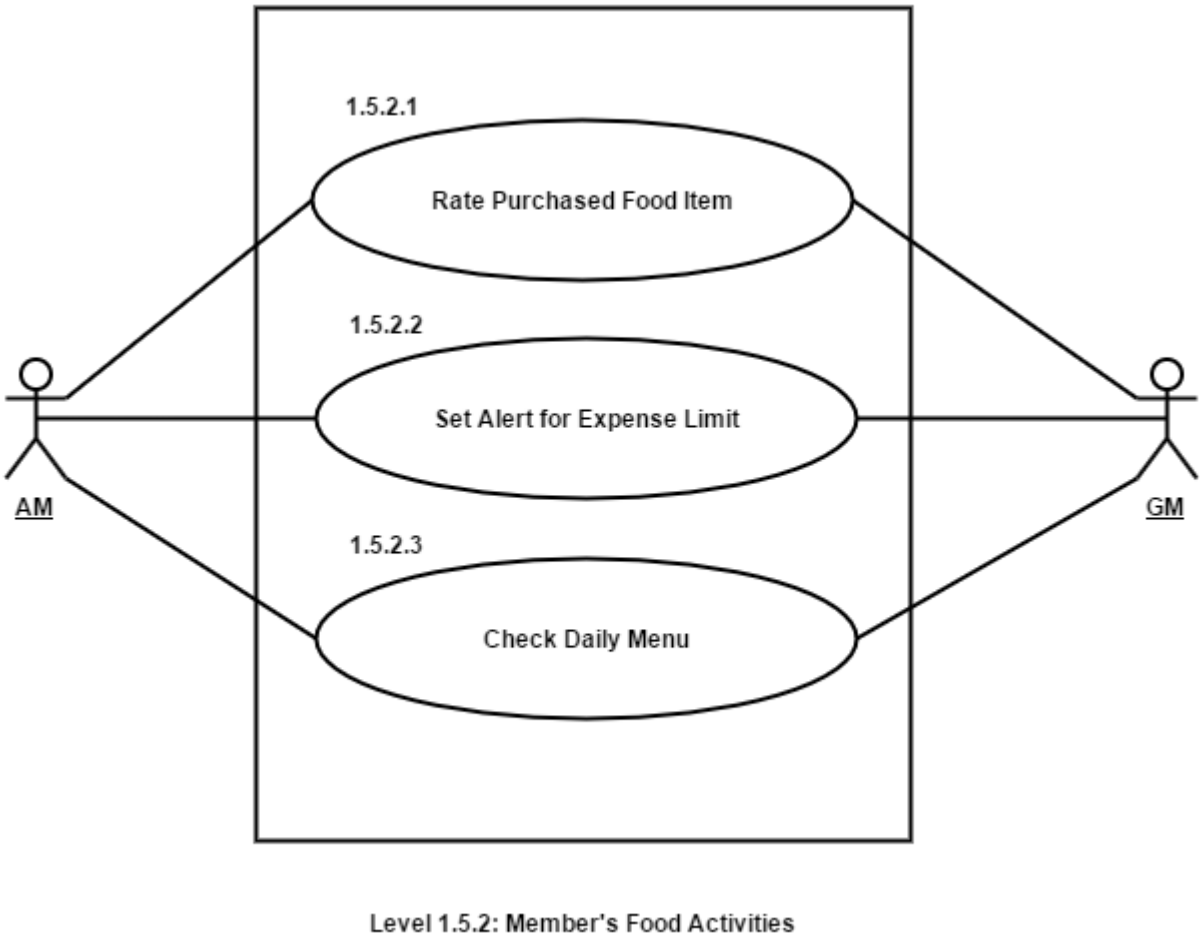


Figure 14: Level 1.5.2 Use Case diagram-Member's Food Activities

Name:	**Member Activities**
ID:	**CMS-L-1.5**
Primary Actors:	**AM, GM**

Description of Use Case Diagram Level 1.5.2:

Members will be able to view a graphical list of food items served for every day of the week. Each food item will have:

1. Food Name
2. Multiple Pictures of the food item (up to five pictures)
3. User daily rating
4. Nutritional Facts (carbohydrate, protein, fat and calorie count per serving)
5. Price
6. Quantity added to cart

Members can also rate their food out of 5 from their dashboard. The rating feature will be available for the member after the first food she purchases. She can also change her rating for a food later on.

The member will be prompted to rate purchased but unrated food items each month. She can choose to ignore it for the time being and rate it later.

The following components will be present for the rating:

1. List of Food
2. Rating (out of 5) from other users
3. The member's rating

Members can also set alerts for expense limits during a month, where a member will be notified by SMS if and when they exceed their aforementioned expense limits.

Action-Reply of Use Case Diagram Level 1.5.2:

- Action: **Members** rate food item.
  Reply: Store user rating; calculate and update average user rating
- Action: **Members** set Alert for Expense limit
  Reply: Member is notified when current month's bill exceeds expense limit
- Action: **Members** Check daily menu
  Reply: Display menu

4.3.15 Level-1.5.3 Use Case Diagram-Member's System Activities

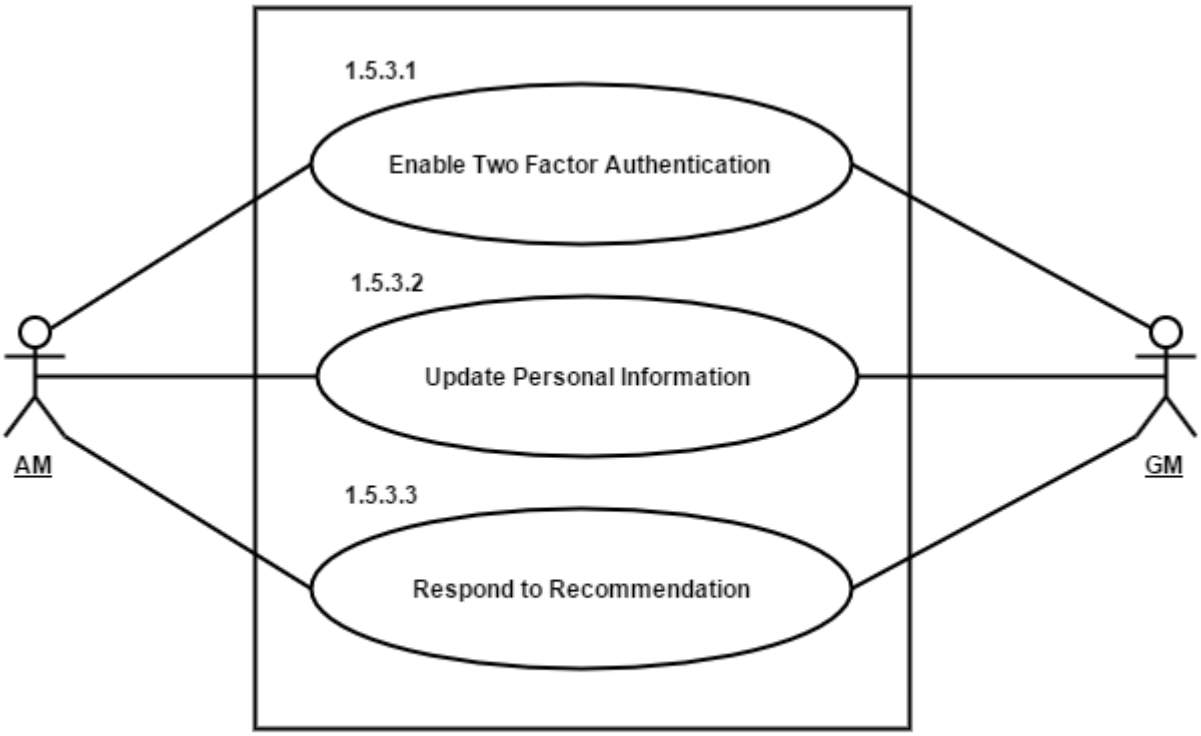


Figure 15: Level 1.5.3 Use Case Diagram-Member's System Activities

Name:	**Member's System Activities**
ID:	**CMS-L-1.5.3**
Primary Actors:	**AM, GM**

Description of Use Case Diagram Level 1.5.3:

Club members will also be able to enable two factor authentication. If two factor authentication is enabled, a session PIN, a four-digit number, will be generated, for each attempted login with correct credentials, and sent via SMS to the user's mobile phone.

A member will also receive automated request if she is considered as a recommender by non-member applying to rent community space or registering as an AM. The message will have the following information:

1. Recommendation Purpose
2. Booking purpose (if renting out community space)
3. Applicant Name
4. Present Address
5. Contact Number

The member will have the option to approve or decline the request.

Members will also be able to update the following information they provided during registration:

1. Photo
2. Password
3. Contact Number
4. Present Address
5. Permanent Address
6. Department (only for GMs)
7. Designation (only for GMs)
8. Occupation (only for AMs)
9. Bank A/C number (only for AMs)
10. Expense limit

Action-Reply of Use Case Diagram Level 1.5.3:

- Action: **Member** changes personal information
  Reply: Changes are saved and stored in member database
- Action: **Member** enables two-factor authentication
  Reply: Member is sent 4-digit session PIN every time she tries to log in
- Action: **Member** responds to recommendation
  Reply: Response saved, **CM** and applicant **non-member** is notified

4.4 Activity Diagrams of DUCMS

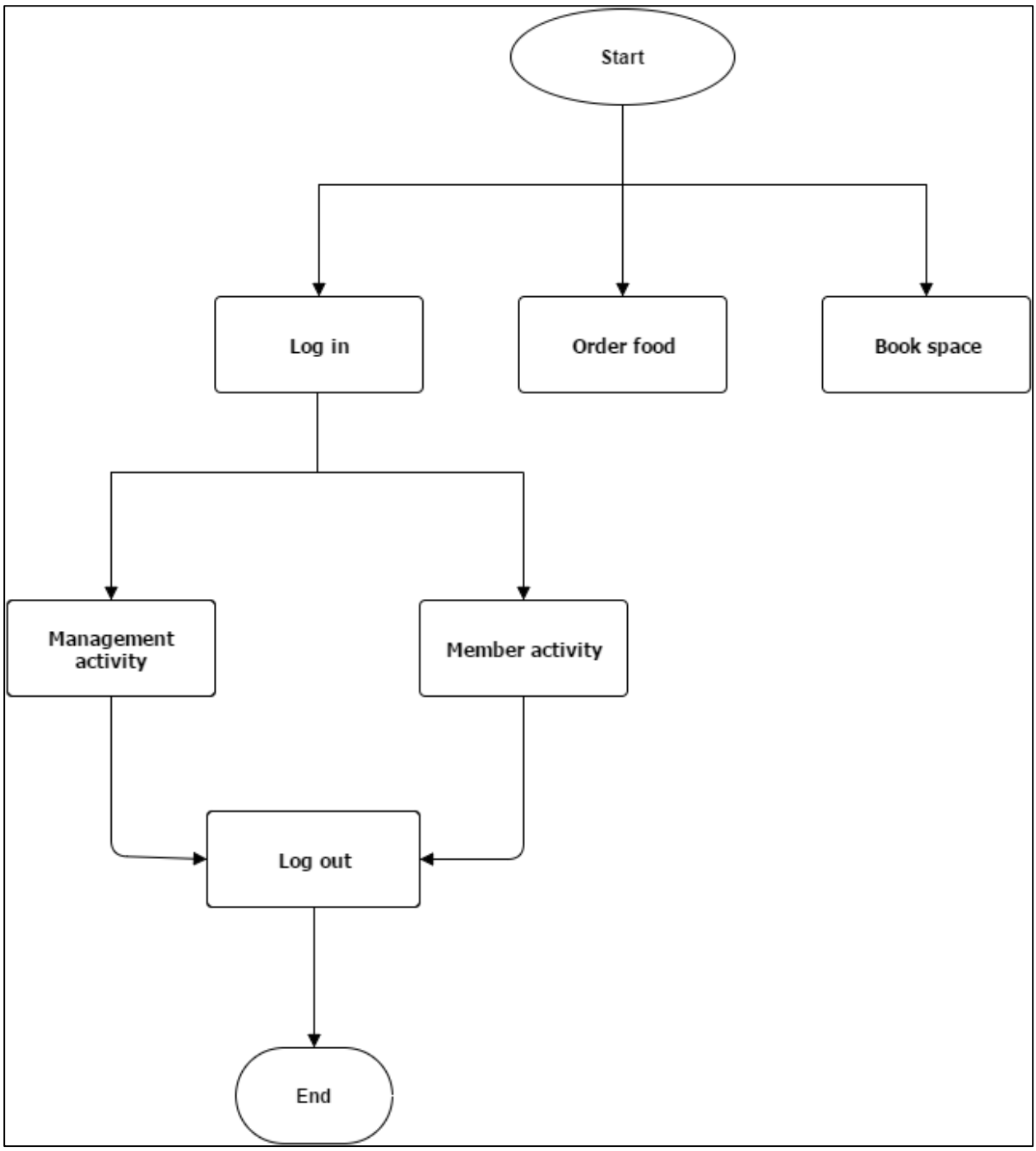


Figure 16: Activity Diagram 1: Club Management System

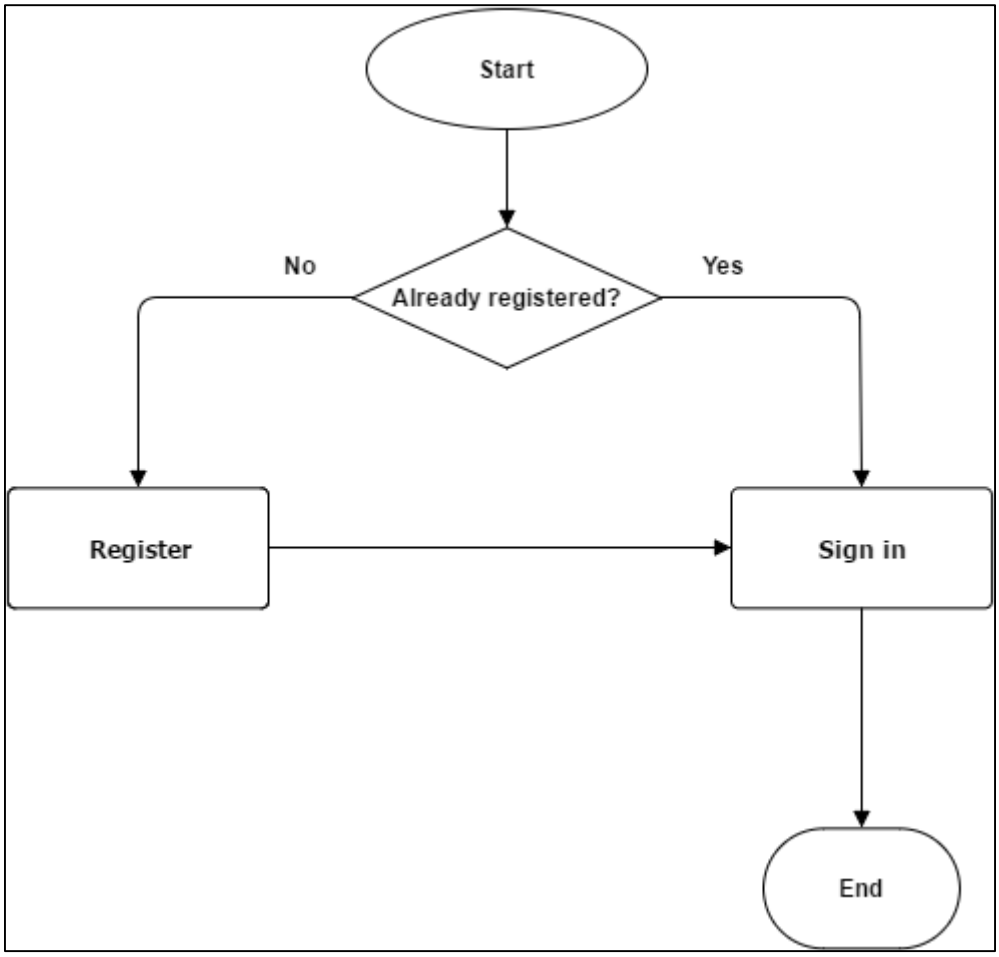


Figure 17: Activity Diagram 1.1: Authentication

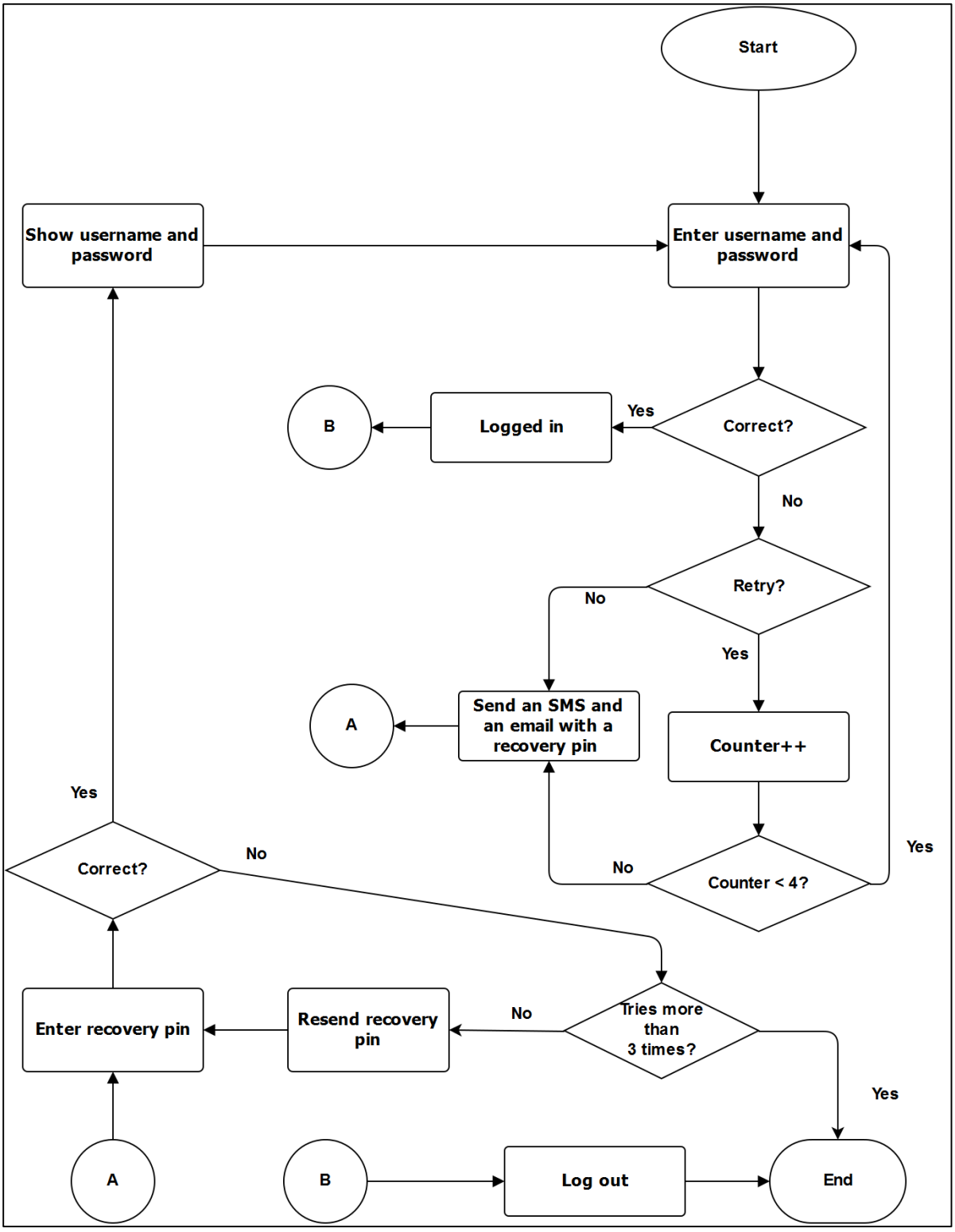


Figure 18: Activity Diagram 1.1.1: Sign in

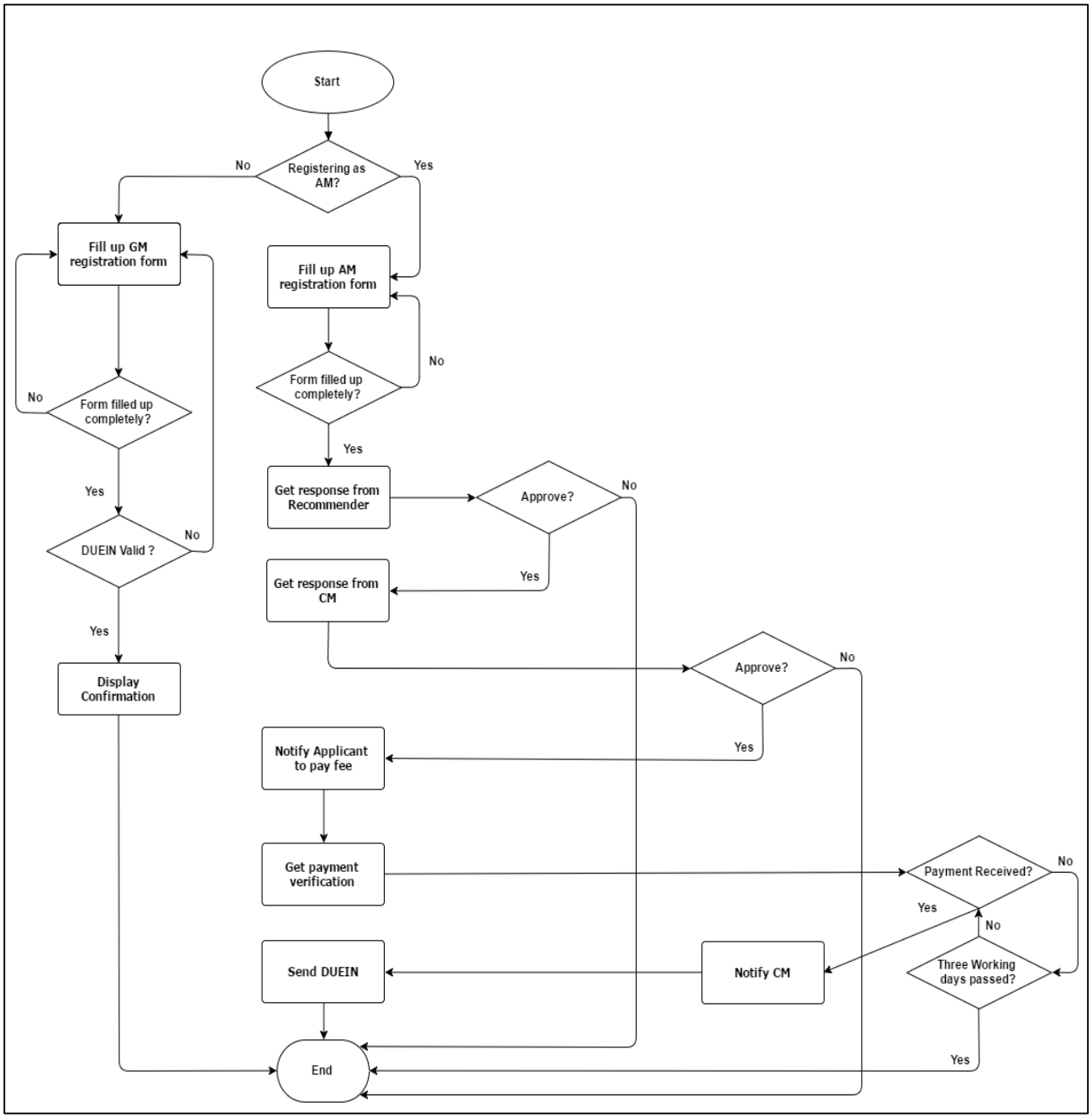


Figure 19: Activity Diagram 1.1.2: Registration

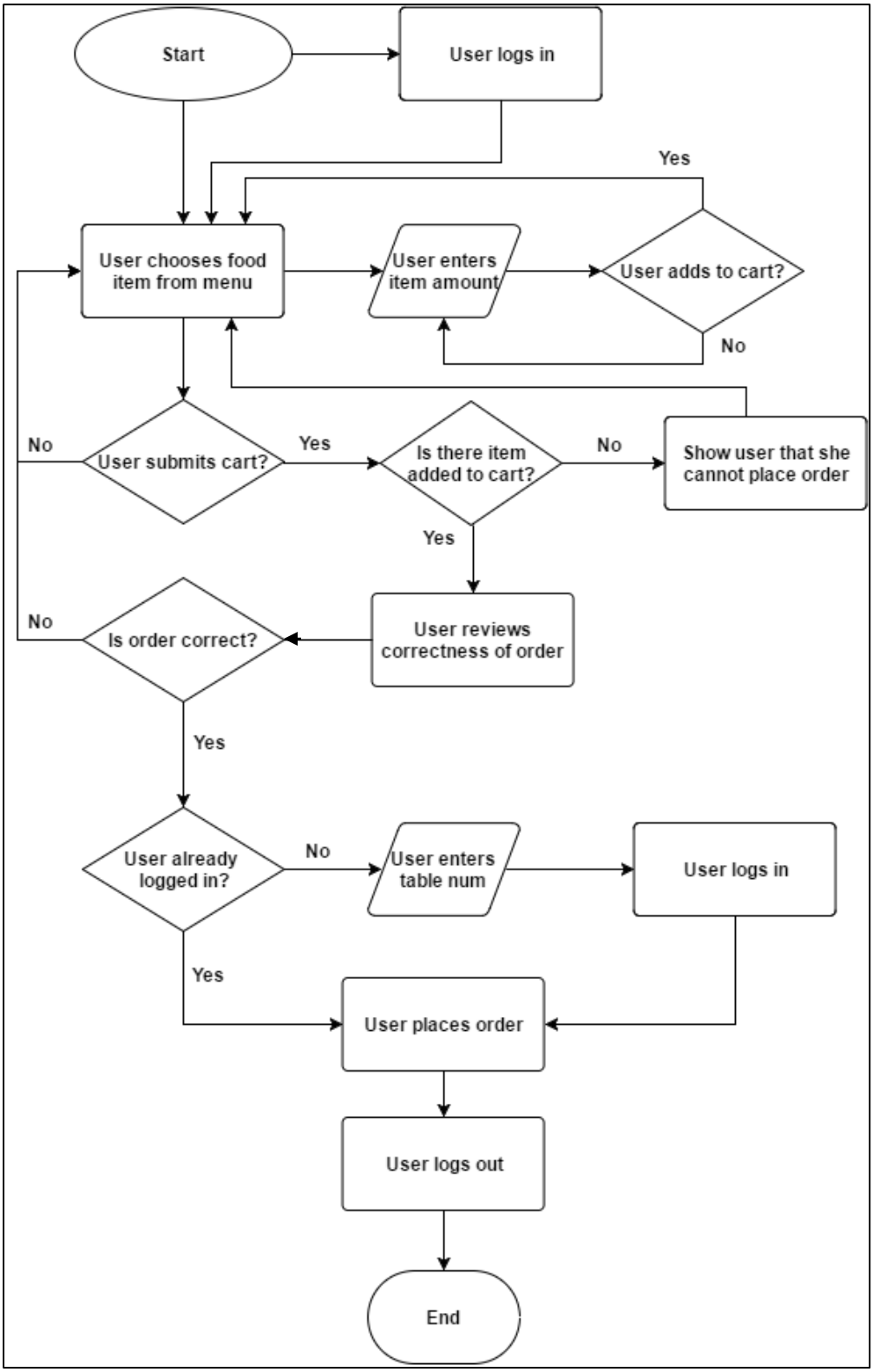


Figure 20: Activity Diagram 1.2: Ordering Food

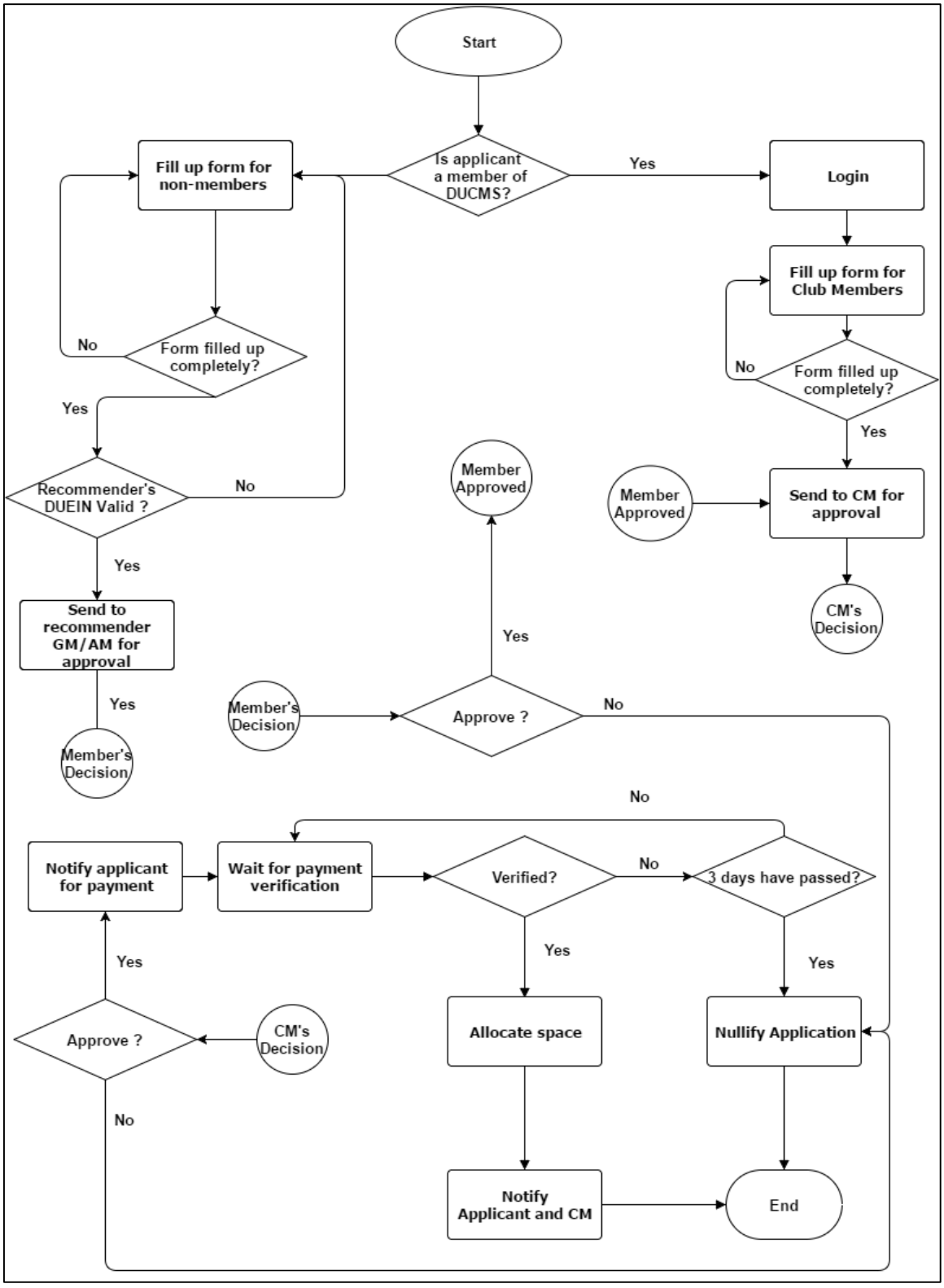


Figure 21: Activity Diagram 1.3: Booking Space

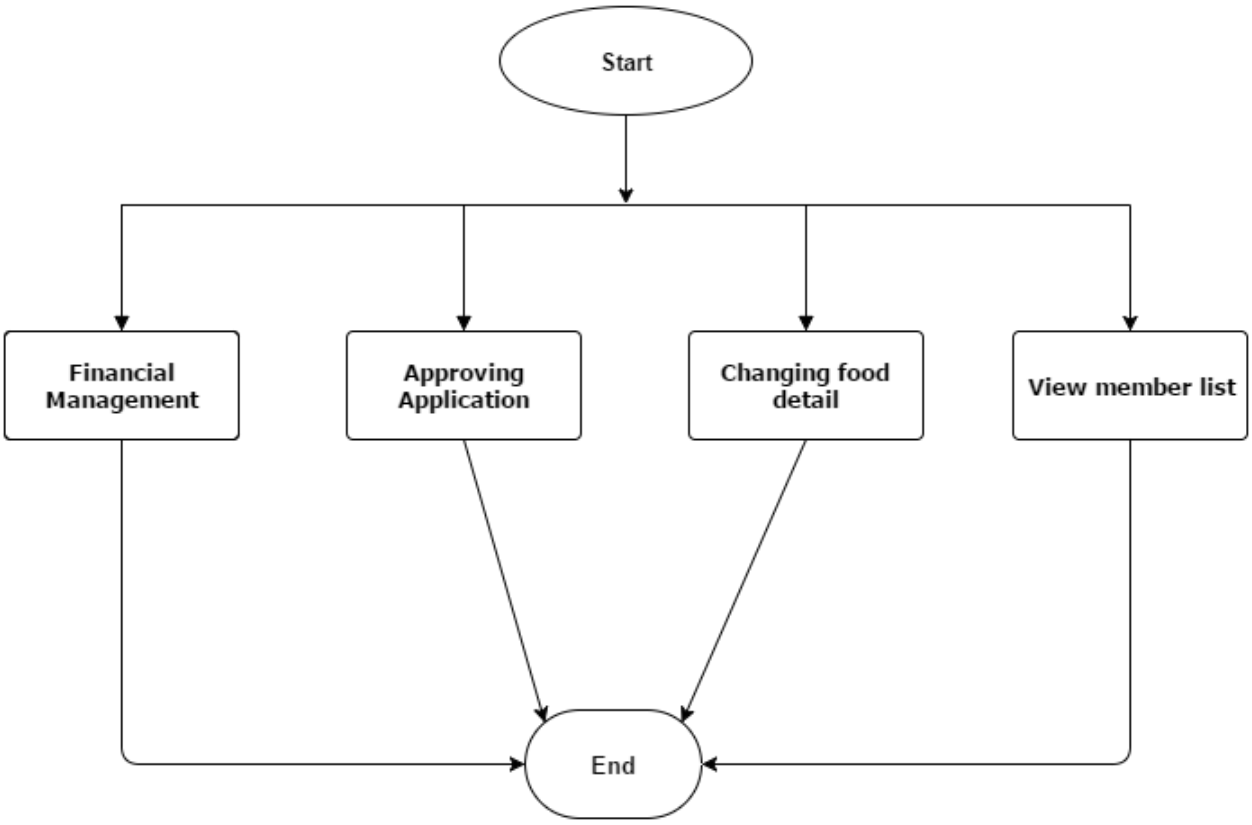


Figure 22: Activity Diagram 1.4: Management Activities

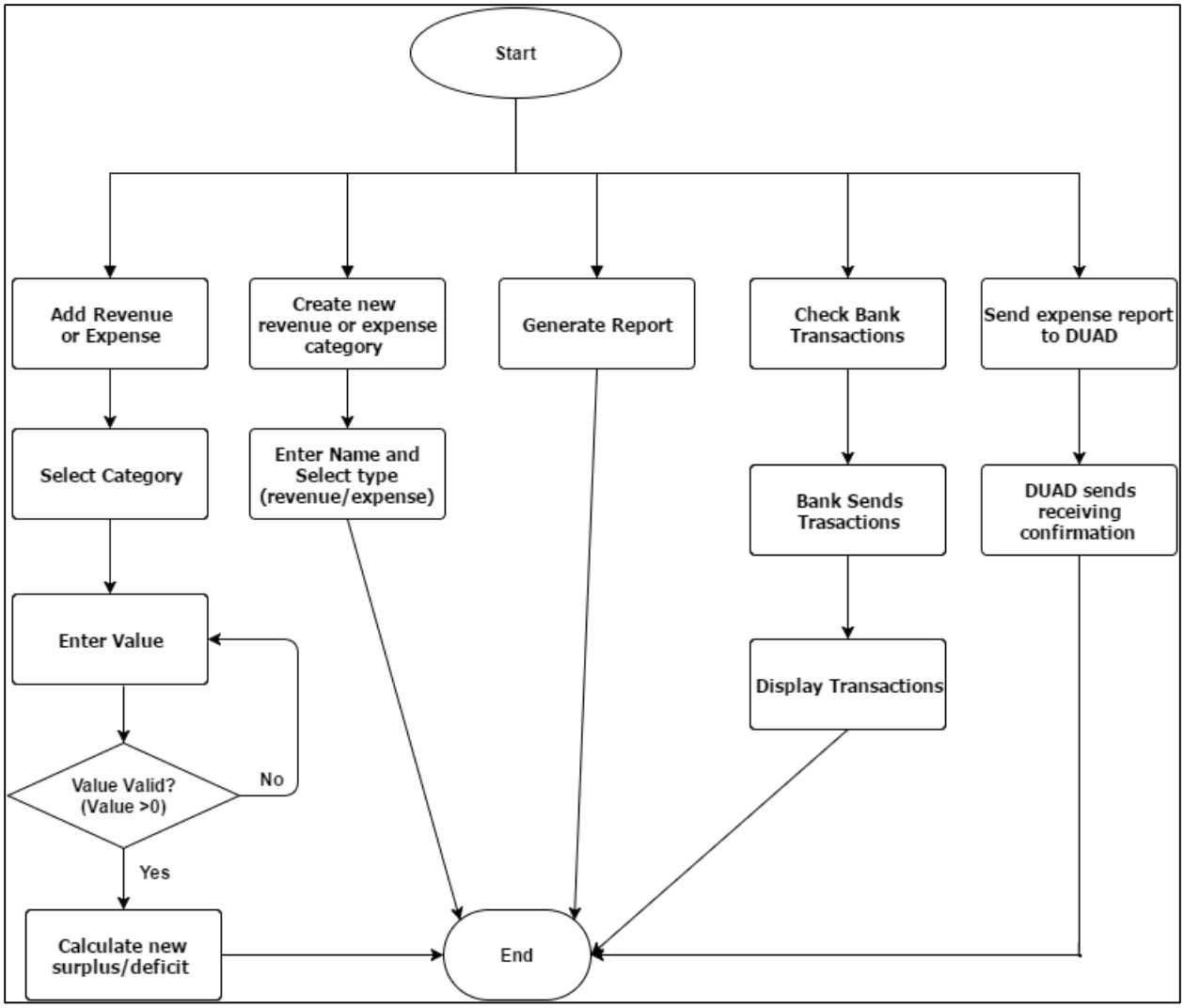


Figure 23: Activity Diagram 1.4.1: Financial Management

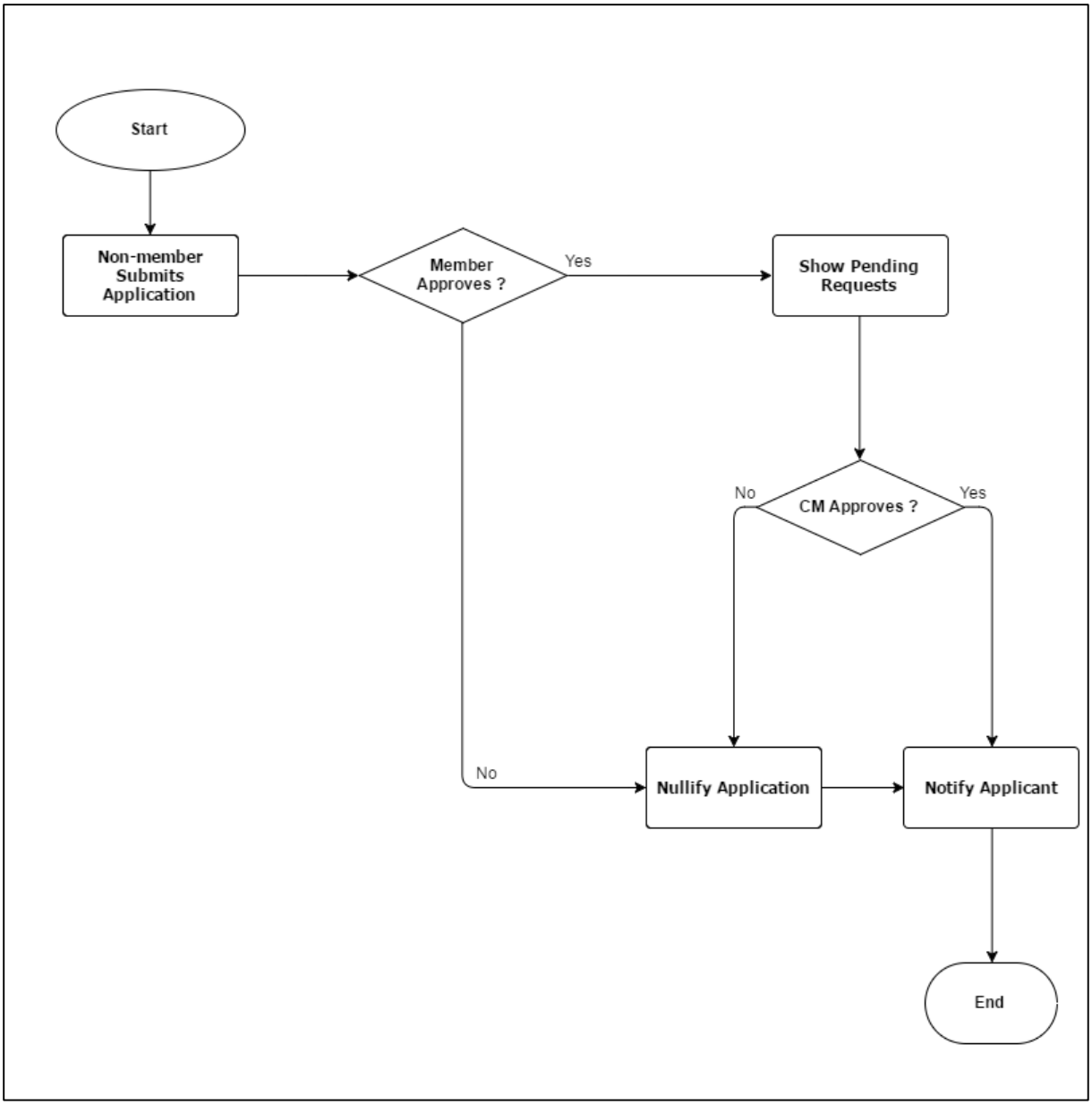


Figure 24: Activity Diagram 1.4.2: Approve Pending Requests

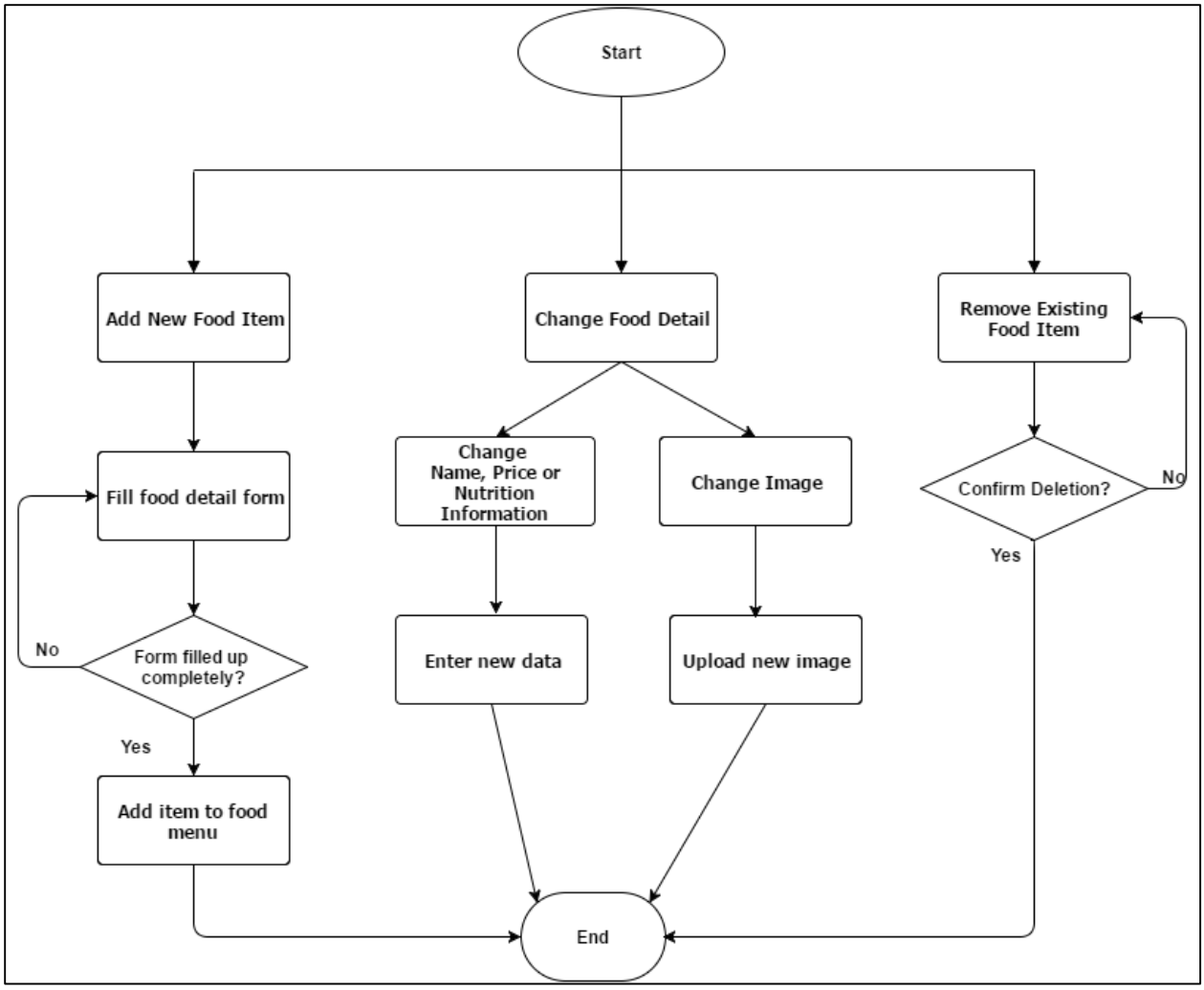


Figure 25: Activity Diagram 1.4.3: Changing Food Detail

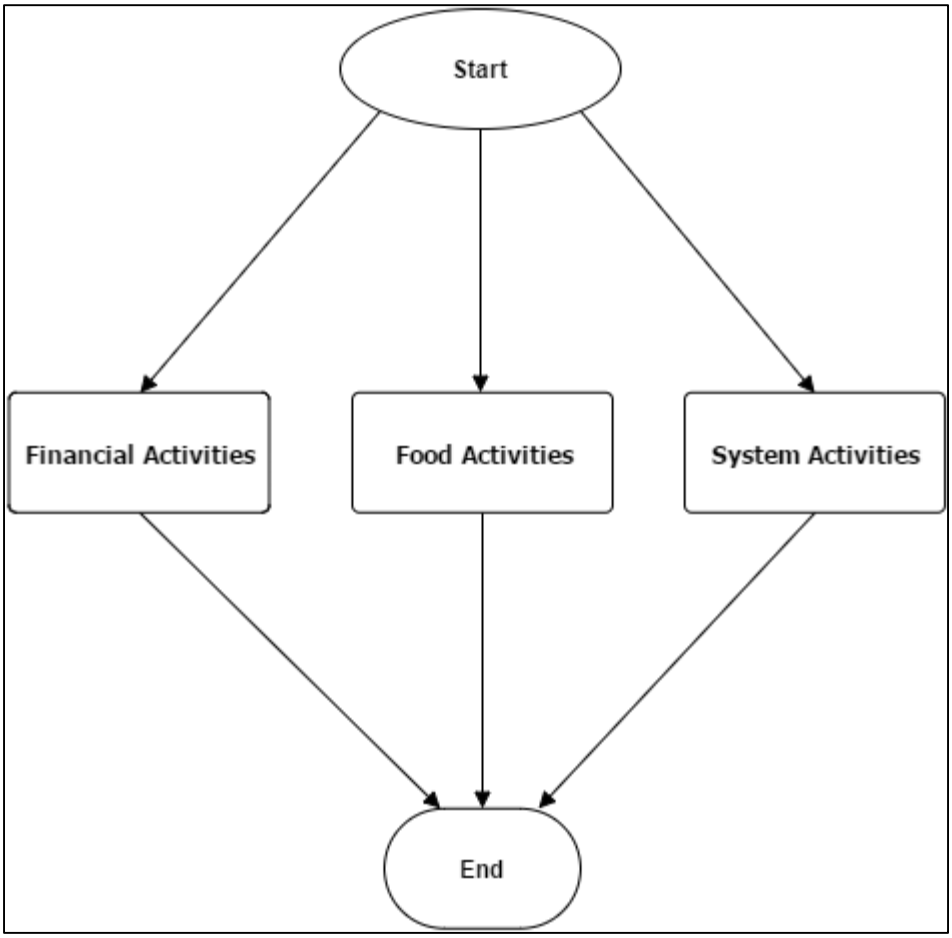


Figure 26: Activity Diagram 1.5: Member Activities

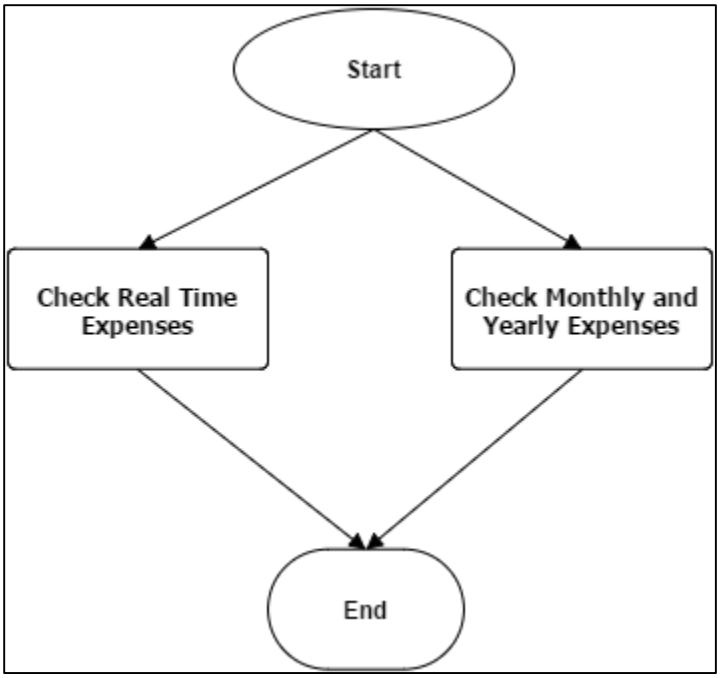


Figure 27: Activity Diagram 1.5.1: Financial Activities

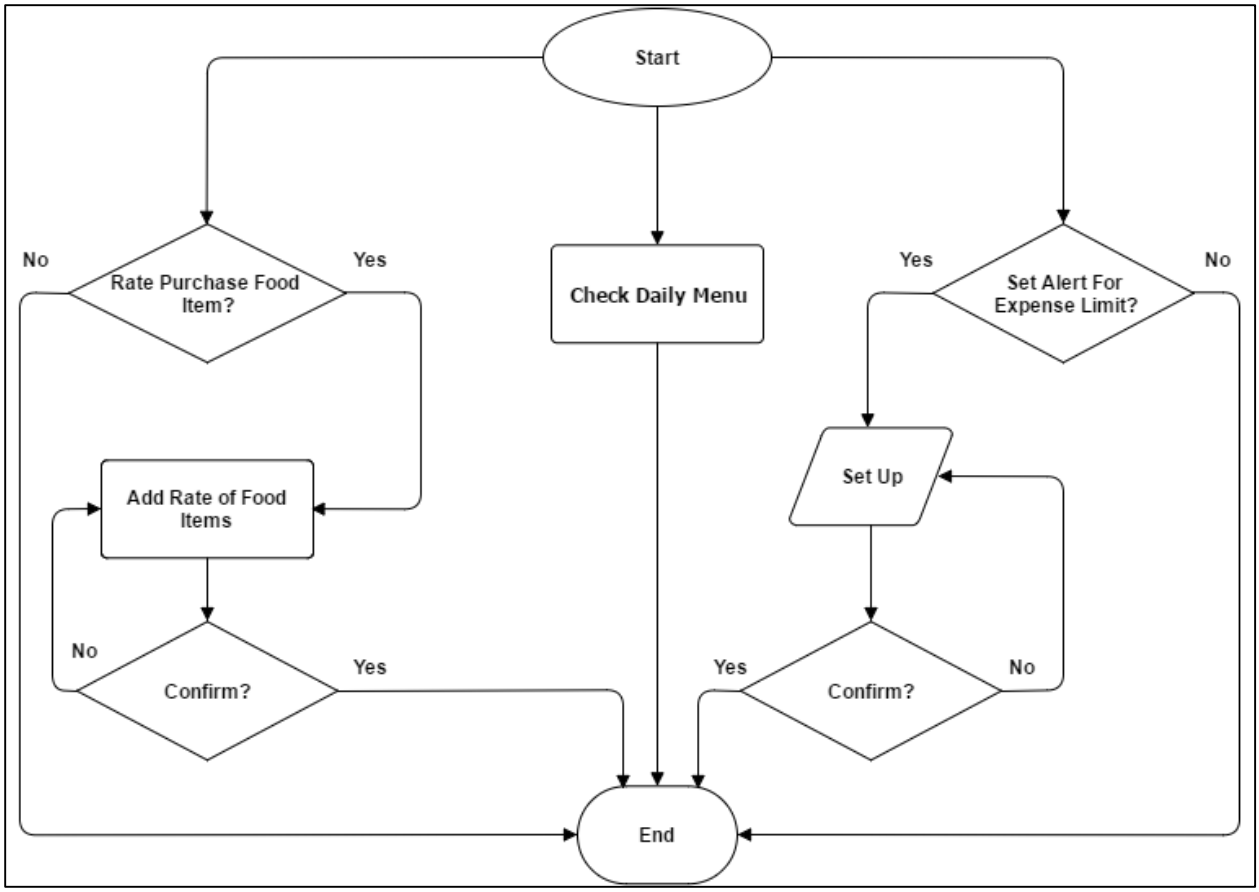


Figure 28: Activity Diagram 1.5.2: Food Activities

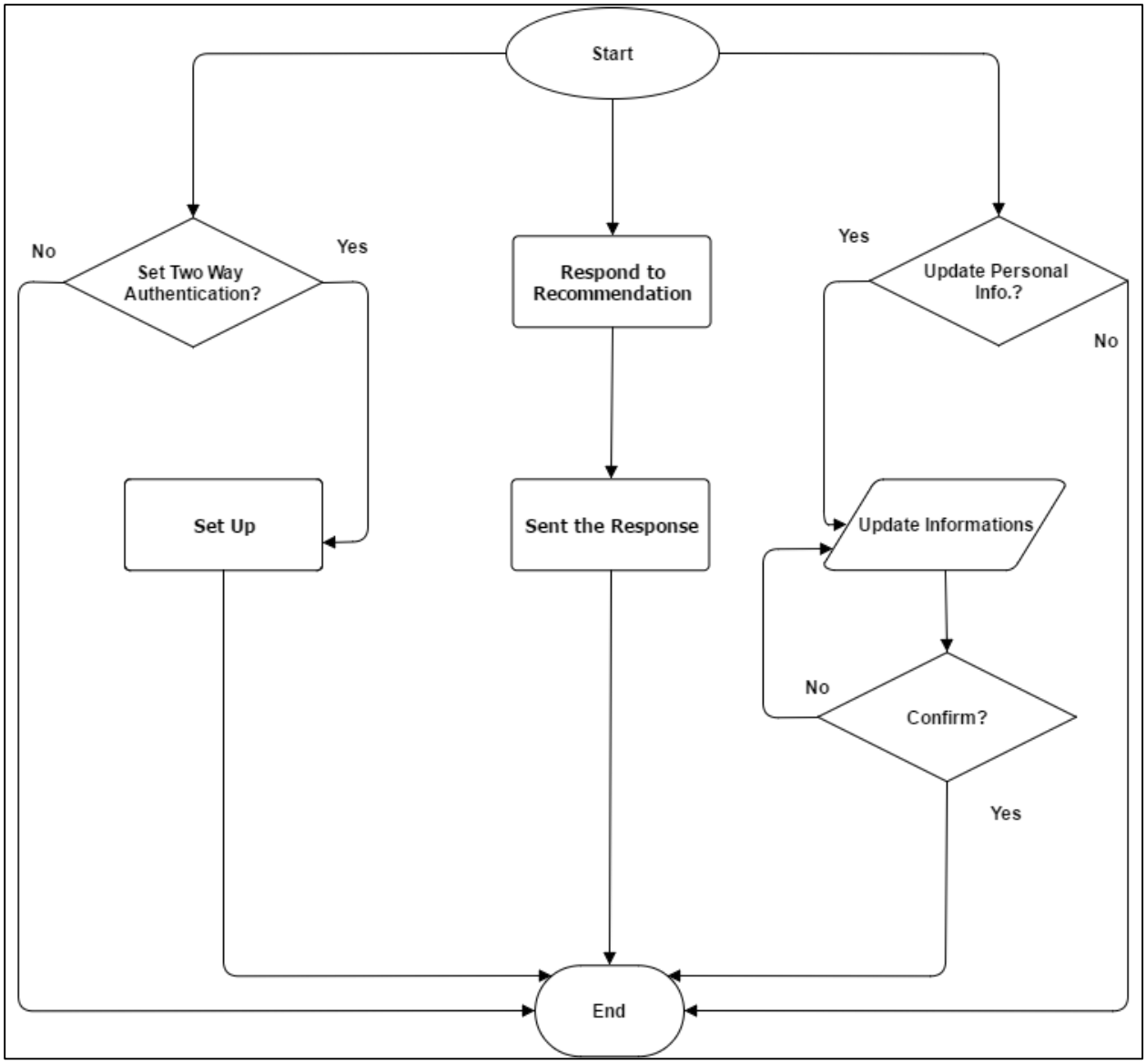


Figure 29: Activity Diagram 1.5.3: System Activities

4.5 Swimlane Diagrams of DUCMS

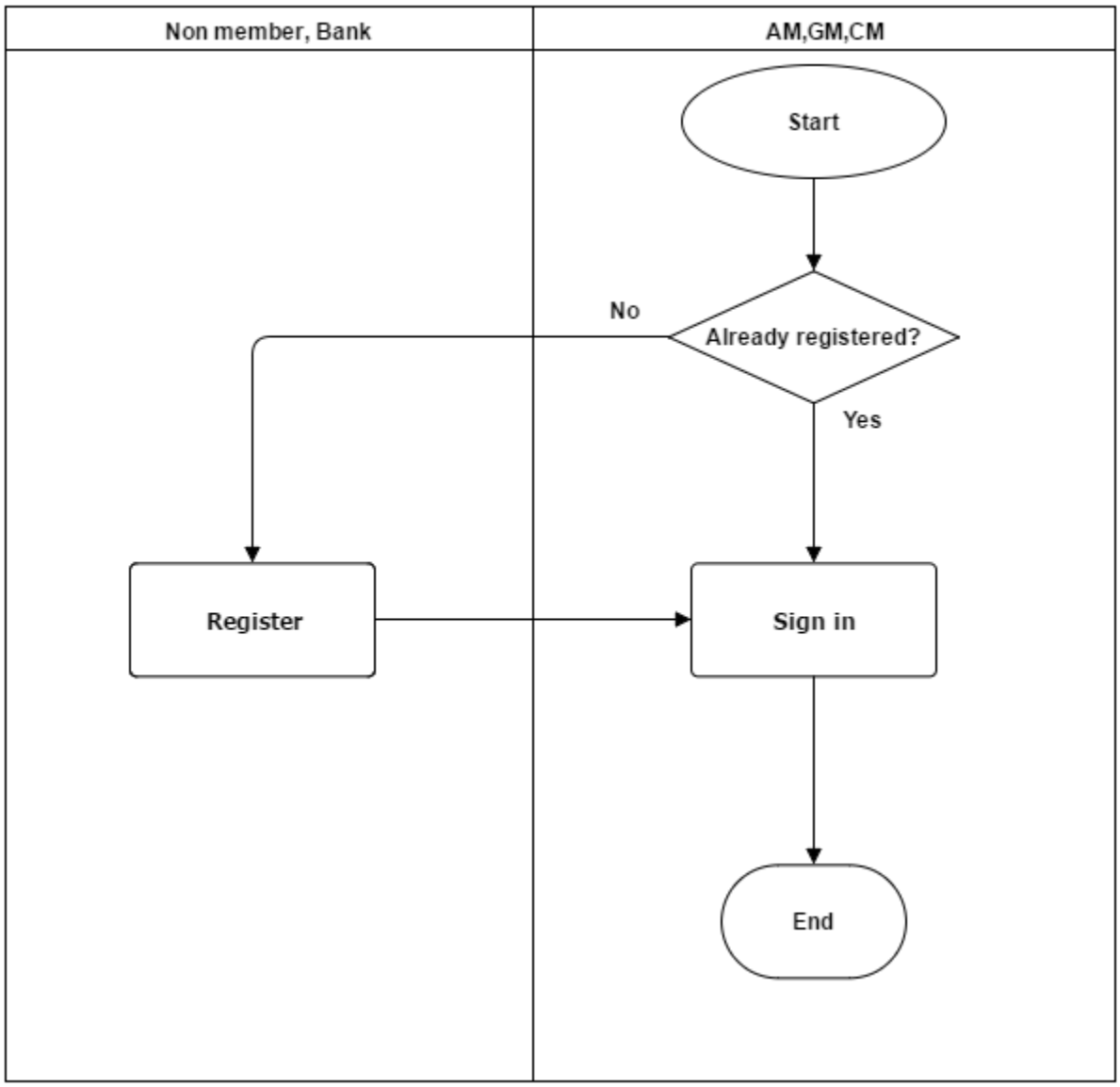


Figure 30: Swimlane Diagram 1.1: Authentication

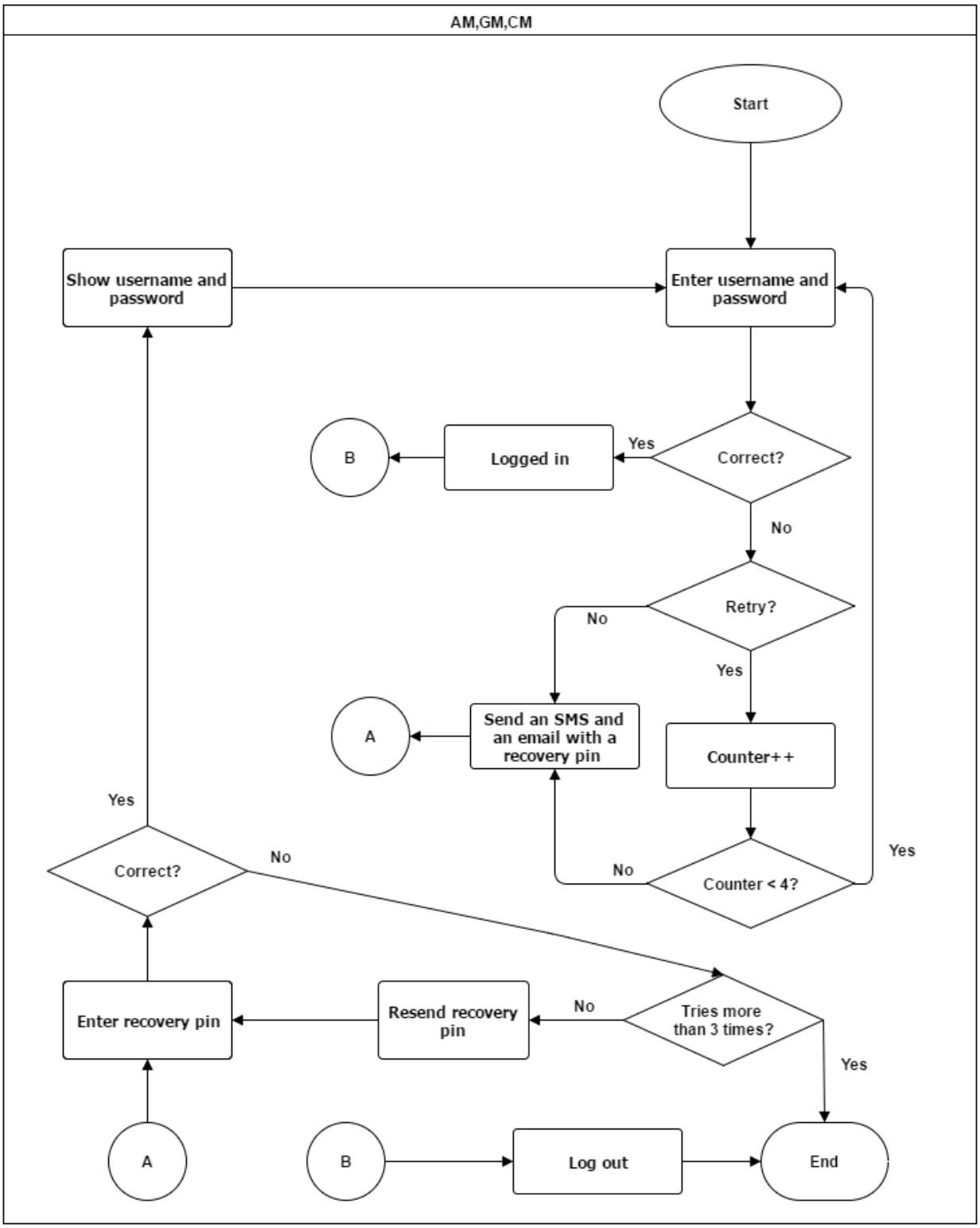


Figure 31: Swimlane Diagram 1.1.1: Sign in

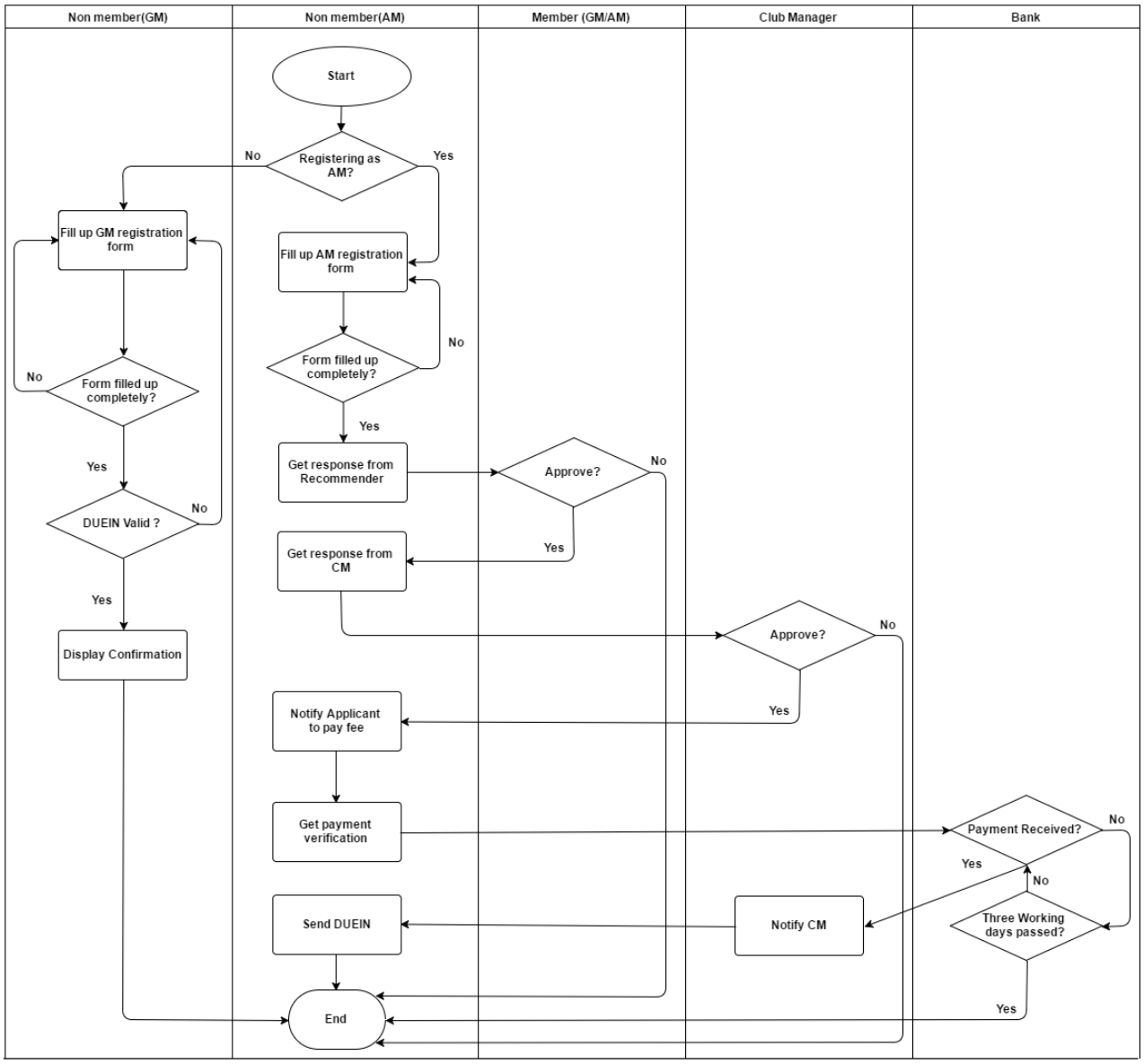


Figure 32: Swimlane Diagram 1.1.2: Registration

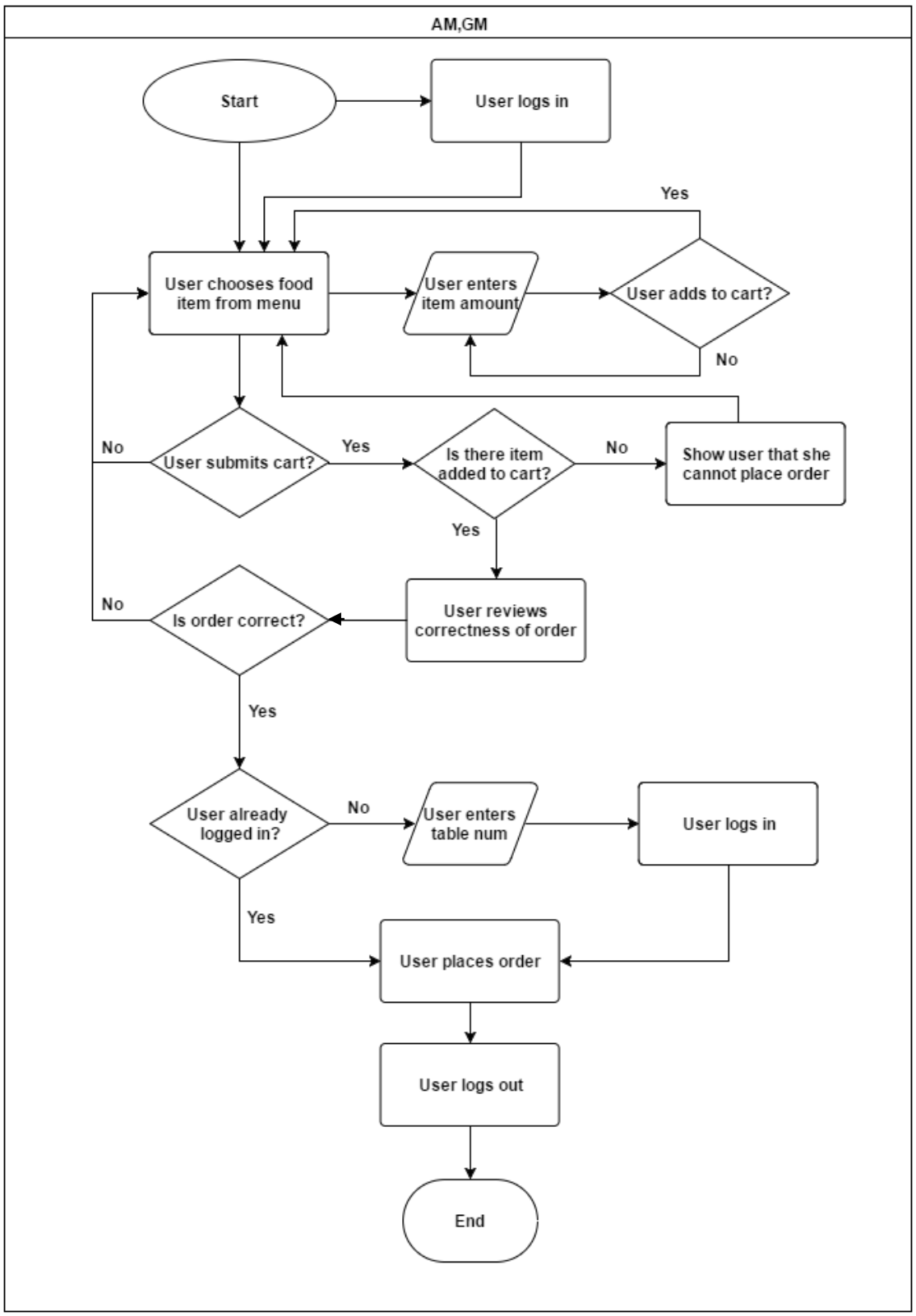


Figure 33: Swimlane Diagram 1.2: Ordering Food

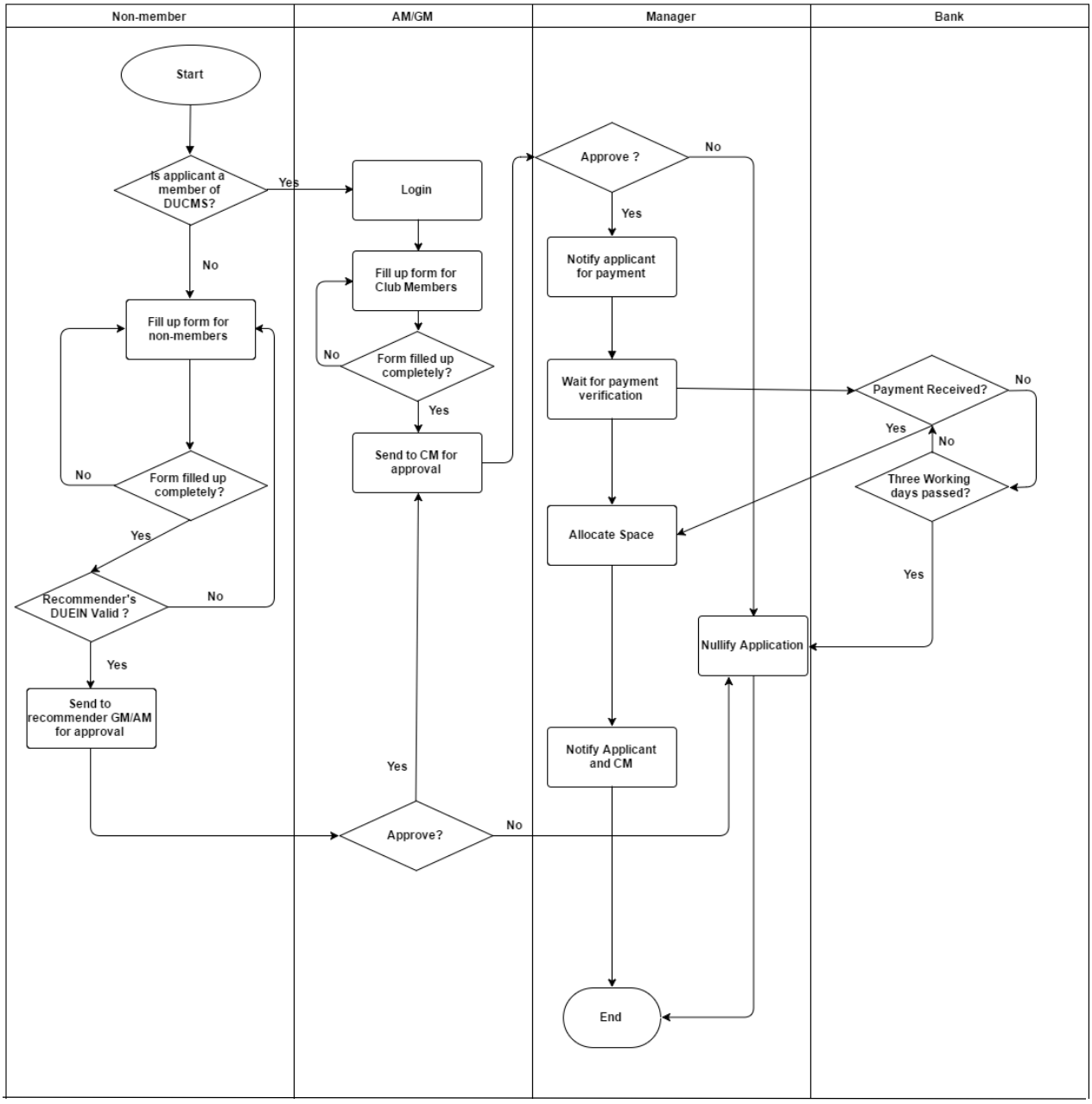


Figure 34: Swimlane Diagram 1.3: Booking Space

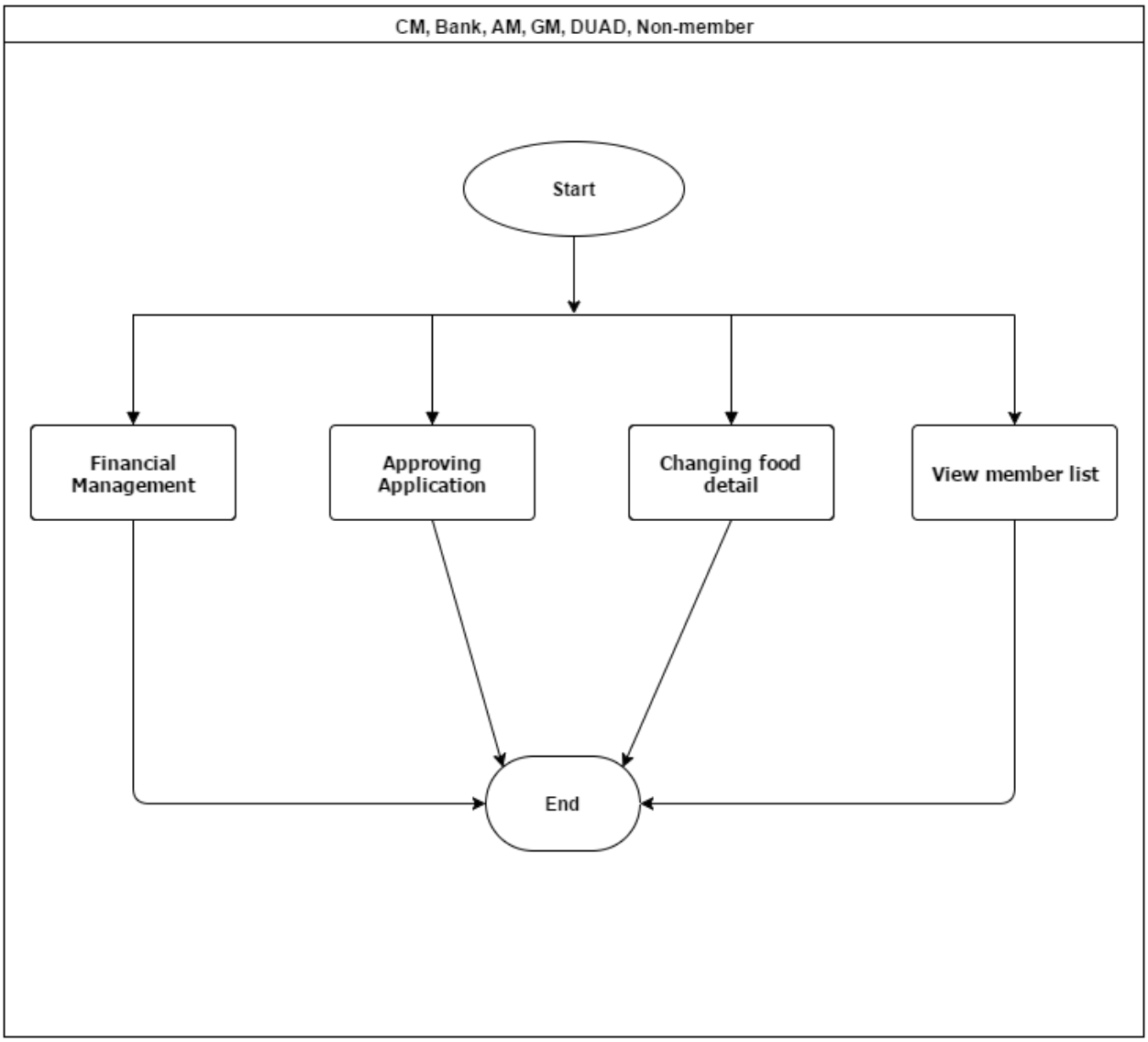


Figure 35: Swimlane Diagram 1.4: Management Activities

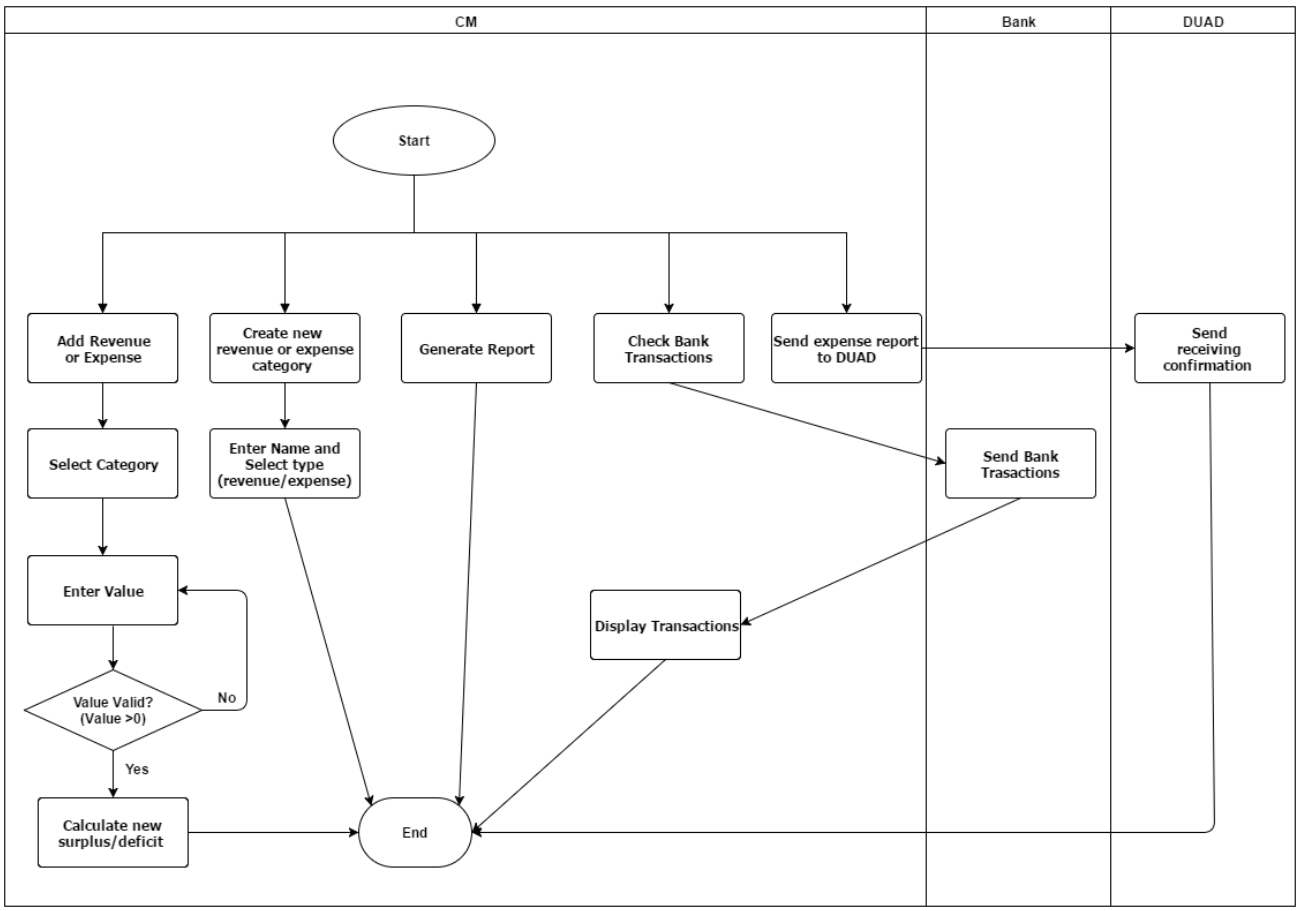


Figure 36: Swimlane Diagram 1.4.1: Financial Management

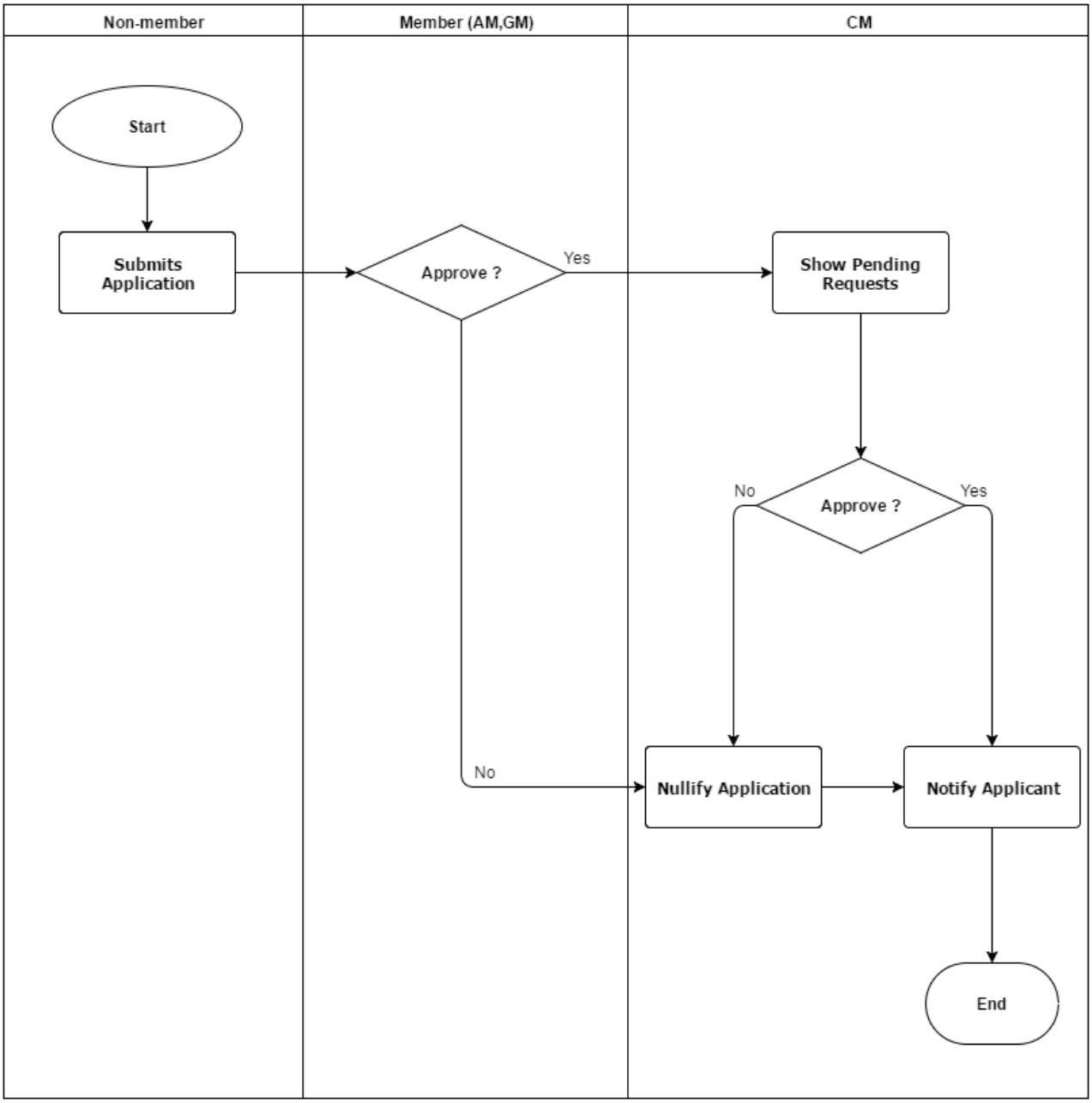


Figure 37: Swimlane Diagram 1.4.2: Approve Pending Requests

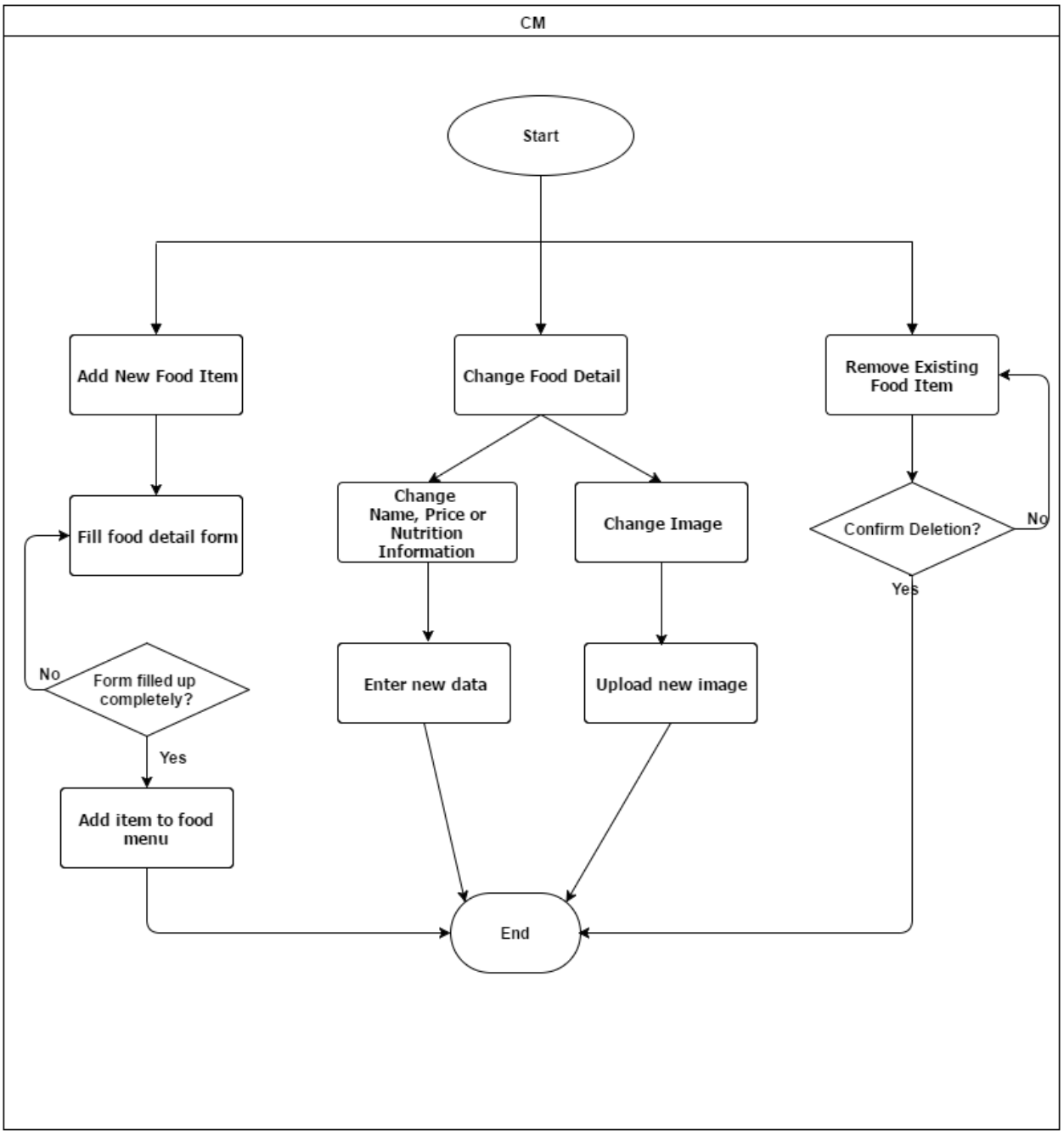


Figure 38: Swimlane Diagram 1.4.3: Changing Food Detail

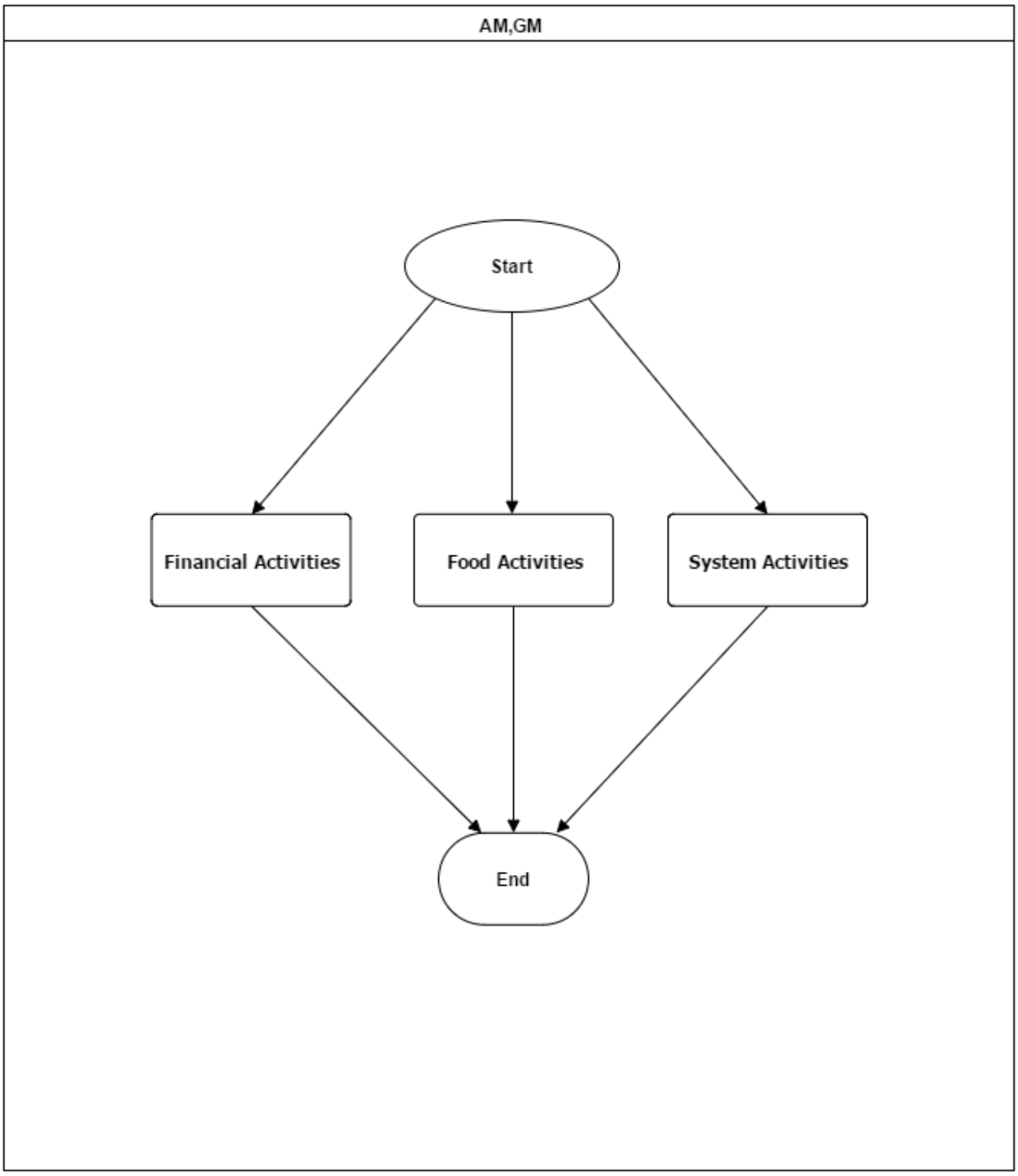


Figure 39: Swimlane Diagram 1.5: Member Activities

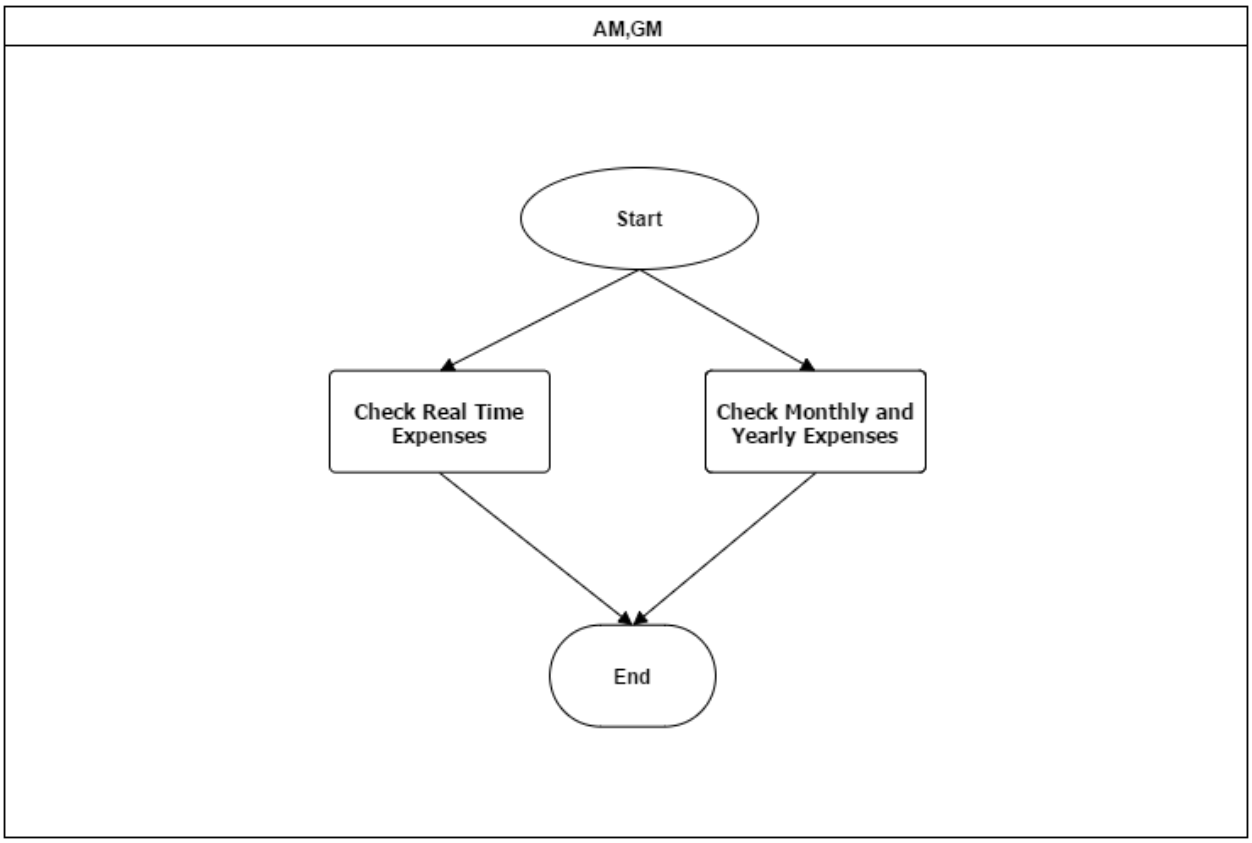


Figure 40: Swimlane Diagram 1.5.1: Financial Activities

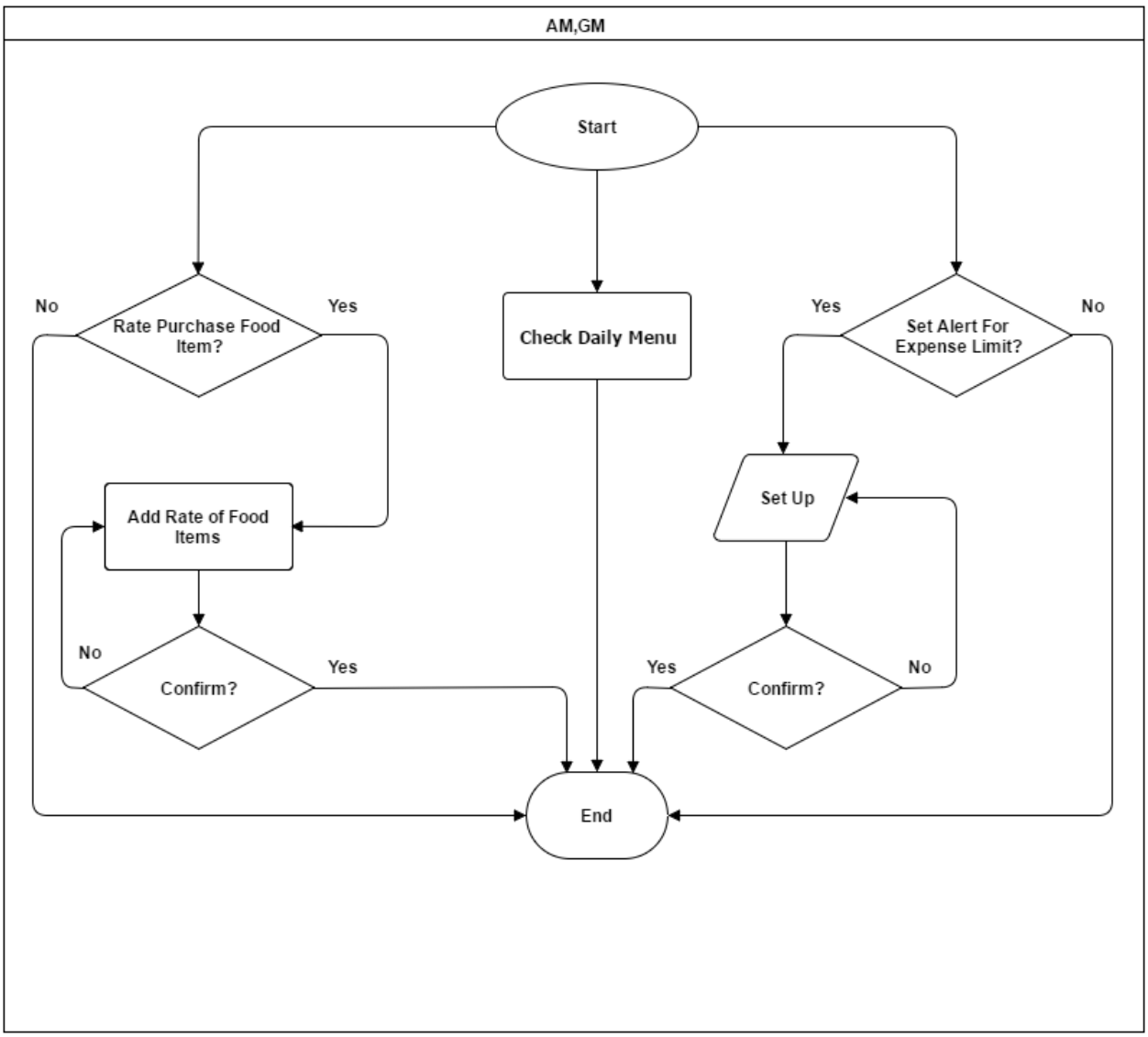


Figure 41: Swimlane Diagram 1.5.2: Food Activities

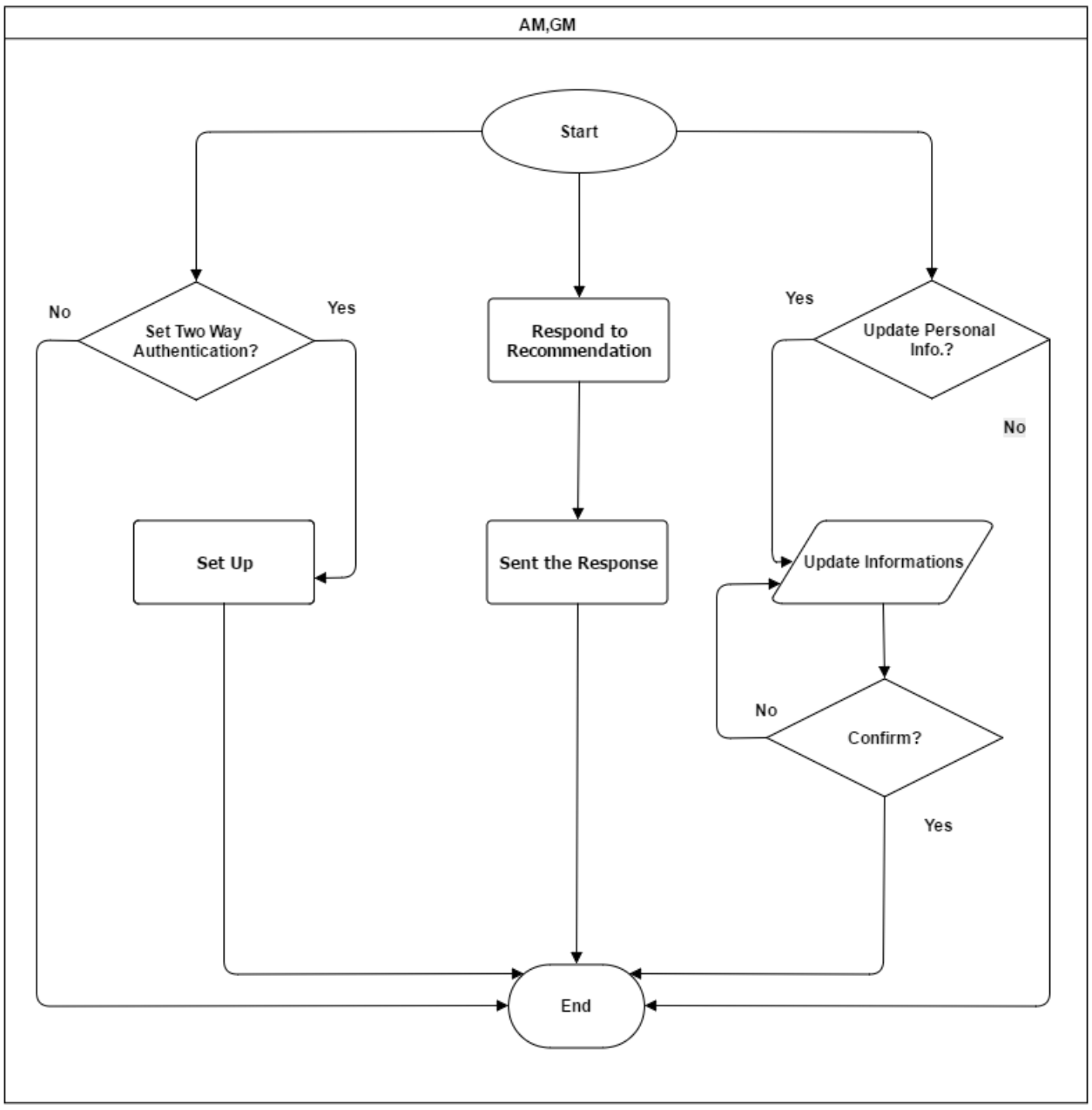


Figure 42: Activity Diagram 1.5.3: System Activities

CHAPTER 5: DATA MODELING OF DUCMS

5.1 DATA MODELING CONCEPT

If software requirements include the necessity to create, extend or interact with a database or complex data structures need to be constructed and manipulated, then the software team chooses to create data models as part of overall requirements modeling. The entity-relationship diagram (ERD) defines all data objects that are processed within the system, the relationships between the data objects and the information about how the data objects are entered, stored, transformed and produced within the system.

5.2 DATA OBJECTS

A data object is a representation of composite information that must be understood by the software. Here, composite information means an information that has a number of different properties or attributes. A data object can be an external entity, a thing, an occurrence, a role, an organizational unit, a place or a structure.

5.2.1 Noun identification

We identified all the nouns whether they are in problem space or in solution space from our usage scenario.

Table 1: Noun Identification for Data Modeling

NO	Nouns	Problem domain/Solution space	Attributes
1	Dhaka University Club Management System	P	
2	System	P	
3	Purpose	P	
4	Club	P	
5	Member	S	23,26-32, 76,134,135,

6	Registration	P	
7	General Member	S	23-32,134,135,76
8	Associate Member	S	23,26-32,38,45,48,134, 135,76
9	Dhaka University	P	
10	Faculty	P	
11	Officer	P	
12	Outsider	P	
13	Executive Committee	P	
14	President	P	
15	Vice President	P	
16	Treasurer	P	
17	Secretary	P	
18	Additional Secretary	P	
19	Election	P	
20	Non-member	S	23,26-28,45
21	Member registration form	S	23,26-32
22	GM registration form	S	23-32
23	Name	S	
24	Department	S	
25	Designation	S	
26	Contact Number	S	
27	Permanent Address	S	
28	Present Address	S	
29	DUEIN	S	
30	Photo	S	
31	Username	S	
32	Password	S	
33	Booking Application	S	38,46,47,85,88,89,91
34	AM Registration form	S	23,26-32,38,45,48
35	AM Registration Application	S	38,46,47,85
36	Vacant Position	P	
37	Recommender	S	23,26-32,133,134
38	Recommender's User ID	S	
39	List	P	
40	Successful Candidates	P	
41	Club Manager	S	23,26-32
42	Applicant	S	23,26-28,37
43	Membership fees	P	
44	Bank	P	
45	Bank A/C Number	S	
46	Application Reference ID	S	

47	Fee Amount	S	
48	Occupation	S	
49	SMS	P	
50	Email	P	
51	Member's Information	P	
52	Database	P	
53	Table	S	53,138
54	Table Number	S	
55	Club Premises	P	
56	Porch	P	
57	Lounge	P	
58	Reading Room	P	
59	Ordering Counter	P	
60	Device	P	
61	Web Interface	P	
62	Credentials	S	31, 32
63	Menu	S	65-69, 132
64	Food	S	65-69, 127, 132
65	Food Name	S	
66	Food Picture	S	
67	Food Rating	S	
68	Food Nutritional Facts	S	
69	Price	S	
70	Quantity in cart	S	
71	Panel	P	
72	User	S	23,26-32
73	Cart	S	64, 70
74	Order	S	64, 70
75	Confirmation	P	
76	Two Factor Authentication	S	
77	Session PIN	P	
78	Attempted Login	P	
79	Mobile Phone	P	
80	Receipt	S	64, 70
81	Community Space	P	
82	Event	P	
83	Friday	P	
84	Week	P	
85	Approval Status	S	
86	Booking Fees	P	
87	Working day	P	

88	Date	S	
89	Time	S	
90	Payment	P	
91	Booking Purpose	S	
92	Notification	P	
93	Revenue Source	P	
94	University Grants	P	
95	Donation	P	
96	Club Space Rent	P	
97	Interest on Savings Bank Account	P	
98	Raffle Draw	P	
99	Club Rent Received in Advance	P	
100	Souvenir Contribution	P	
101	Club Premises Rent	P	
102	Security Deposit	P	
103	Miscellaneous Receipts	P	
104	Subscription from AM	P	
105	Subscription from GM	P	
106	Catering Sales	P	
107	Expense	P	
108	Staff Salaries and Benefits	P	
109	Catering Expenses	P	
110	Repairing and Maintenance	P	
111	Cleaning Supplies	P	
112	Stationary	P	
113	Newspaper	P	
114	Recreational Expenses	P	
115	Bank Charge	P	
116	Audit Fees	P	
117	Club Booking Return	P	
118	Miscellaneous Expenses	P	
119	Transaction Category	S	
120	Transaction	S	119,121,139-141
121	Amount	S	
122	Managerial Report	P	
123	Receipts	P	
124	Payment	P	
125	Surplus	P	
126	Deficit	P	
127	Number sold (Food Item)	S	
128	Reimbursement Report	P	

129	Dhaka University Accounting Department	P	
130	Responsibility	P	
131	Dashboard	P	
132	Available days of the week	S	
133	Status of Payment	P	
134	Total Monthly Expense	S	
135	Expense limit	S	
136	Recommendation Request	P	
137	Recommendation Purpose	P	
138	MAC Address	S	
139	Transaction Source (Cash/Bank)	S	
140	Transaction Type (Revenue/Expense)	S	
141	Transaction Comment	S	

5.2.2 Potential Data Objects

- ✓ Member: 23, 26-32, 76, 134, 135
- ✓ General Member: 23-32, 76, 134, 135
- ✓ Associate Member: 23, 26-32, 38, 45, 48, 76, 134, 135
- ✓ Non-member: 23, 26-28, 45
- ✓ Member Registration Form: 23, 26-32
- ✓ GM Registration Form: 23-32
- ✓ AM Registration form: 23, 26-32, 38, 45, 48
- ✓ AM Registration Application: 38, 46, 47, 85
- ✓ Booking Application: 38, 46, 47, 85, 88, 89, 91
- ✓ Recommender: 23, 26-32, 134, 135
- ✓ Club Manager: 23, 26-32
- ✓ Applicant: 23, 26-28, 38
- ✓ Table: 54, 138
- ✓ Credentials: 31, 32
- ✓ Food: 65-69, 127, 132
- ✓ Menu: 65-69, 132
- ✓ User: 23, 26-32
- ✓ Cart: 64, 70
- ✓ Order: 64, 70
- ✓ Virtual Receipt: 64, 70
- ✓ Transaction: 119, 121, 139-141

5.2.3 Analysis for finalizing Data Objects:

- Member, CM and non-members are all users of DUCMS and hence have their common attributes stored as data object **user**.
- AM, GM and CM are all members of DUCMS and hence have their common attributes stored as data object **member**.
- Credentials are just username and password which is possessed by all members so these are stored in **member**.
- **Application** is submitted by user with additional attributes such as application type (AM registration or Booking Application), booking date, time and purpose.
- Recommender is a **member** of the club.
- Details of food are stored in the **Food** data object. Menu is just a list of **Food** object.
- Cart stores food ordered by a member with the help of data object **food ordered**. Order is cart submitted by member. Virtual Receipts are prior carts submitted by member. Hence these are represented altogether by **Cart** data object.
- **Days served** keeps track of which food item is served at a particular day of the week.
- **Food rating** stores ratings of every food item given by every member.
- **Transaction** stores financial transactions occurred while operating the club. Reports can be generated from **Transactions** and hence need not be stored.
- **Transaction** stores the Transaction Source (Cash or Bank), Transaction Type (Revenue or Expense) and any additional comments.
- **Table** stores the mac address of electronic devices and the table number they are attached to.

5.2.4 Final Data Objects

Table 2 : Final Data Objects

1	**User**: User ID, Name, Contact Number, Present Address, Permanent Address, Bank Account Number
2	**Member**: Photo, Username, Password, DUEIN, Monthly Bill, Expense Limit, Two Factor status, Department, Designation/Occupation, User ID
3	**Application:** Application Reference ID , Application Type, Approval Status, Fee, Booking Purpose, Booking Date and Time, Application Submission Date, Recommender's User ID, User ID
4	**Food:** Food ID, Name, Picture, Rating, Nutritional Facts, Price, Quantity Sold
5	**Cart:** Cart ID, User ID, Date, Bill Amount
6	**Food Ordered**: Cart ID, Food ID, Quantity, Table Number
7	**Days Served**: Food ID, Day Of The Week
8	**Food Rating:** User ID, Food ID, Rating
9	**Table:** Table Number, Mac Address
10	**Transaction:** Transaction ID, Category Name, Transaction Type, Amount, Date and Time, Transaction Source, Bank Account Number, Application Reference ID, Comment

5.3 Data Object Relations

Data objects are connected to one another in different ways.

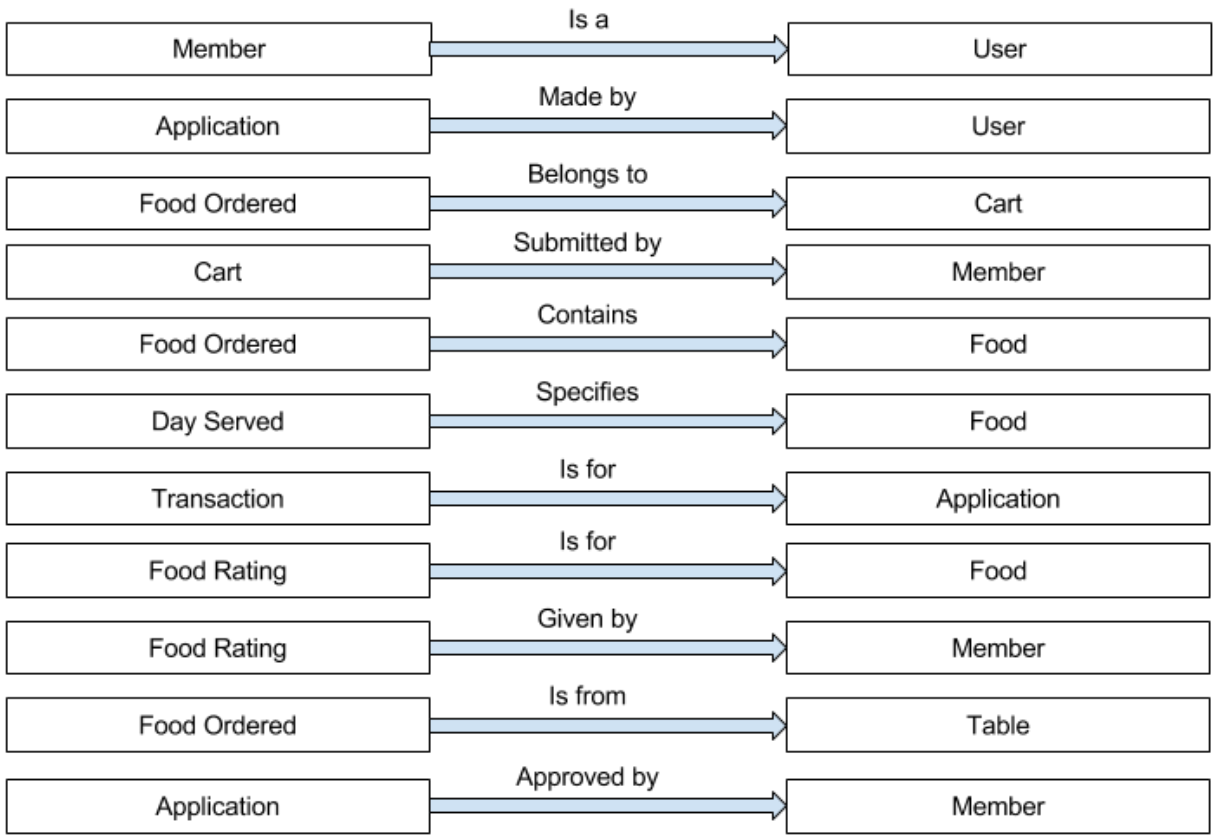


Figure 43: Relationships between Data Objects

5.3 ENTITY RELATIONSHIP DIAGRAM

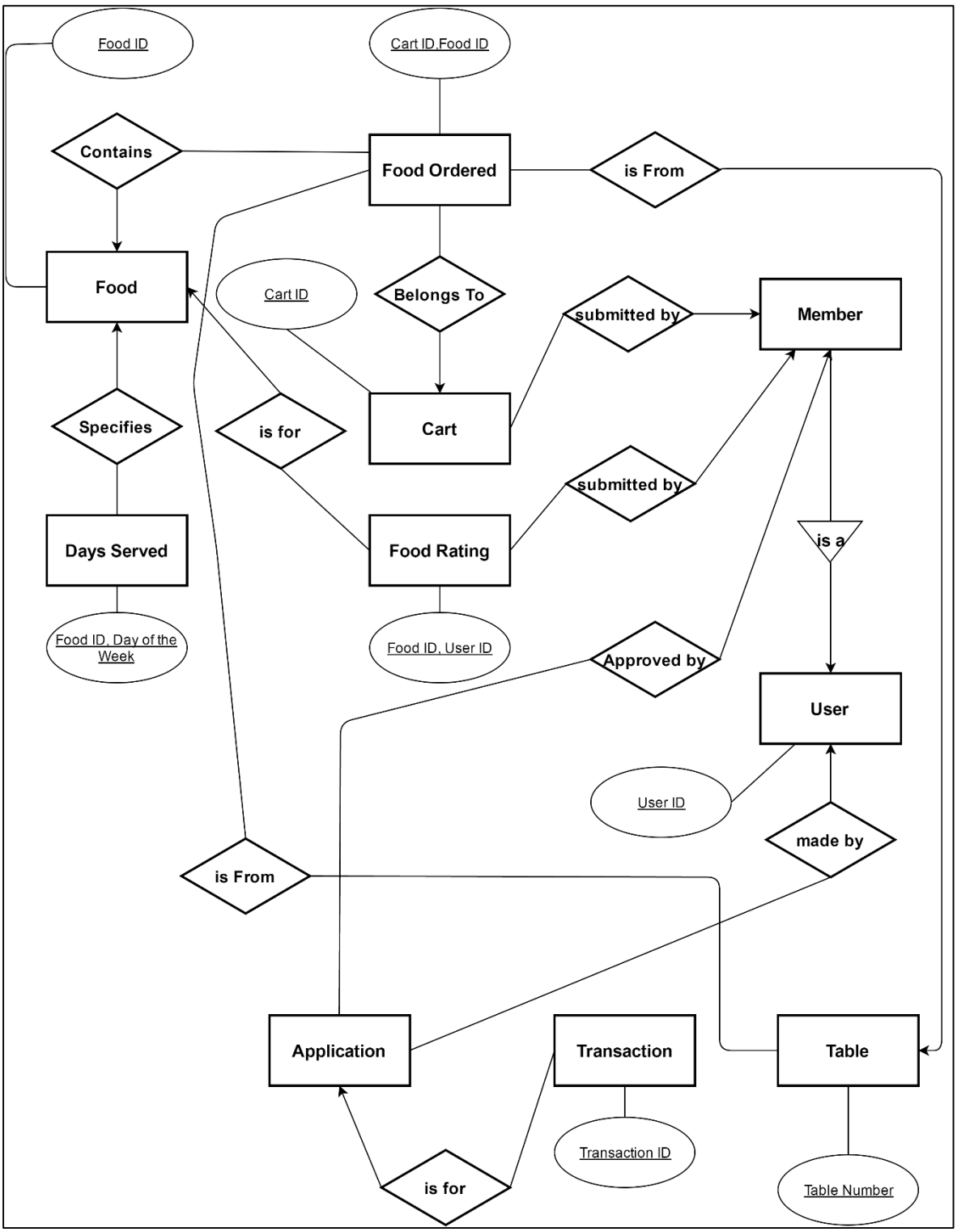


Figure 44: ER Diagram of DUCMS

5.4 SCHEMA DIAGRAMS

Table 3: Schema for User

1. User		
Attributes	Type	Size
User ID	NUMBER	15
Name	VARCHAR2	15
Contact Number	NUMBER	11
Present Address	VARCHAR2	15
Permanent Address	VARCHAR2	15
Bank Account Number	VARCHAR2	15

Table 4: Schema for Member

2. Member		
Attributes	Type	Size
User ID	NUMBER	15
DUEIN	NUMBER	10
Username	VARCHAR2	15
Password	VARCHAR2	10
Photo	VARCHAR2	512
Monthly Bill	NUMBER	10
Expense Limit	NUMBER	10
Two Factor Status	VARCHAR2	5
Member Type	VARCHAR2	5
Department	VARCHAR2	10
Designation/Occupation	VARCHAR2	15

Table 5: Schema for Application

3. Application		
Attributes	Type	Size
Application Reference ID	NUMBER	15
Application Type	VARCHAR2	10
Approval Status	VARCHAR2	10
Application Fee	NUMBER	5,2
Booking Purpose	VARCHAR2	15
Booking Date and Time	DATE	15
Submission Date	DATE	15
User ID	NUMBER	15
Recommender's User ID	NUMBER	15

Table 6: Schema for Food

4. Food		
Attributes	Type	Size
Food ID	NUMBER	10
Name	VARCHAR2	15
Picture	VARCHAR2	512
Rating	NUMBER	2,2
Nutritional Facts	VARCHAR2	15
Price	NUMBER	5,2
Quantity Sold	NUMBER	10

Table 7: Schema for Cart

5. Cart		
Attributes	Type	Size
Cart ID	NUMBER	10
User ID	NUMBER	15
Date	DATE	10
Bill Amount	NUMBER	10

Table 8: Schema for Food Ordered

6. Food Ordered		
Attributes	Type	Size
Cart ID	NUMBER	10
Food ID	NUMBER	10
Quantity	NUMBER	5
Table Number	NUMBER	5

Table 9: Schema for Days Served

7. Days Served		
Attributes	Type	Size
Food ID	NUMBER	10
Day Of The Week	VARCHAR2	4

Table 10: Schema for Food Rating

8. Food Rating		
Attributes	Type	Size
User ID	NUMBER	15
Food ID	NUMBER	10
Rating	NUMBER	5,2

Table 11: Schema for Table

9. Table		
Attributes	Type	Size
Table Number	NUMBER	5
Mac Address	VARCHAR2	15

Table 12: Schema for Transaction

10. Transaction		
Attributes	Type	Size
Transaction ID	NUMBER	10
Category Name	VARCHAR2	15
Transaction Type	VARCHAR2	10
Amount	NUMBER	10
Date and Time	DATE	15
Transaction Source	VARCHAR2	10
Bank Account Number	NUMBER	15
Application Reference ID	NUMBER	10
Comment	VARCHAR2	140

CHAPTER 6: CLASS BASED MODELING OF DUCMS

This Chapter is intended to describe class based modeling of Dhaka University Club Management System.

6.1 CLASS BASED MODELING CONCEPT

Class-based modeling represents the objects that the system will manipulate, the operations that will applied to the objects, relationships between the objects and the collaborations that occur between the classes that are defined.

6.2 General Classifications

To identify the potential classes we have first selected the nouns from the solution space of the story. These were then characterized in seven general classifications. The seven general characteristics are as follows:

1. External entities
2. Things
3. Events
4. Roles
5. Organizational units
6. Places
7. Structures

Following are the specifications of the nouns according to the general classifications:

Table 13: General Classifications of Nouns

No	Noun	P/S	General Classification
1	Dhaka University Club Management System	P	
2	System	P	
3	Purpose	P	
4	Club	P	
5	Member	S	4
6	Registration	S	3
7	General Member	S	4
8	Associate Member	S	4
9	Dhaka University	P	
10	Faculty	P	
11	Officer	P	
12	Outsider	P	
13	Executive Committee	P	
14	President	P	
15	Vice President	P	
16	Treasurer	P	
17	Secretary	P	
18	Additional Secretary	P	
19	Election	P	
20	Non-member	S	4
21	Member registration form	S	2
22	GM registration form	S	2
23	Name	S	
24	Department	S	
25	Designation	S	
26	Contact Number	S	
27	Permanent Address	S	
28	Present Address	S	
29	DUEIN	S	
30	Photo	S	
31	Username	S	
32	Password	S	
33	Booking Application	S	2
34	AM Registration form	S	2
35	Vacant Position	P	
36	Recommender	P	
37	Recommender's DUEIN	S	
38	List	P	

39	Successful Candidates	P	
40	Club Manager	S	4
41	Applicant	P	
42	Membership fees	P	
43	Bank	S	1
44	Bank A/C Number	S	
45	Application Reference Number	S	
46	Fee Amount	S	
47	Occupation	S	
48	SMS	S	
49	Email	S	
50	Member's Information	P	
51	Database	S	7
52	Table	P	
53	Table Number	S	
54	Club Premises	P	
55	Porch	P	
56	Lounge	P	
57	Reading Room	P	
58	Ordering Counter	P	
59	Device	S	2
60	Web Interface	P	
61	Credentials	S	
62	Menu	S	2
63	Food	S	
64	Food Name	S	
65	Food Picture	S	
66	Food Rating	S	
67	Food Nutritional Facts	S	
68	Price	S	
69	Quantity in cart	S	
70	Panel	P	
71	User	S	
72	Cart	S	2
73	Order	S	2
74	Confirmation	P	
75	Two Factor Authentication	P	
76	Session PIN	P	
77	Attempted Login	P	
78	Mobile Phone	P	
79	Receipt	S	2

80	Community Space	P	
81	Event	P	
82	Friday	P	
83	Week	P	
84	Approval	S	
85	Booking Fees	S	
86	Working day	P	
87	Date	S	
88	Time	S	
89	Payment	S	
90	Booking Purpose	S	
91	Notification	P	
92	Revenue Source	S	
93	University Grants	P	
94	Donation	P	
95	Club Space Rent	P	
96	Interest on Savings Bank Account	P	
97	Raffle Draw	P	
98	Club Rent Received in Advance	P	
99	Souvenir Contribution	P	
100	Club Premises Rent	P	
101	Security Deposit	P	
102	Miscellaneous Receipts	P	
103	Subscription from AM	P	
104	Subscription from GM	P	
105	Catering Sales	P	
106	Expense	S	
107	Staff Salaries and Benefits	P	
108	Catering Expenses	P	
109	Repairing and Maintenance	P	
110	Cleaning Supplies	P	
111	Stationary	P	
112	Newspaper	P	
113	Recreational Expenses	P	
114	Bank Charge	P	
115	Audit Fees	P	
116	Club Booking Return	P	
117	Miscellaneous Expenses	P	
118	Category	S	
119	Transaction	S	2
120	Amount	S	

121	Managerial Report	S	2
122	Receipts	S	
123	Payment	S	
124	Surplus	S	
125	Deficit	S	
126	Number sold (Food Item)	S	
127	Reimbursement Report	S	
128	Dhaka University Accounting Department	S	1
129	Responsibility	P	
130	Dashboard	P	
131	Available days of the week	S	
132	Status of Payment	S	
133	Total Monthly Expense	S	
134	Expense limit	S	
135	Expense report	S	2
136	Recommendation Request	S	
137	Recommendation Purpose	P	
138	MAC Address	S	

6.3 Selection Criteria

The potential classes were then selected as classes by six Selection Criteria. A potential class becomes a class when it fulfills all six characteristics.

1. Retained Information

2. Needed Services

3. Multiple Attributes

4. Common attributes

5. Common operations

6. Essential requirements

Table 14: Selection Criteria of Potential Classes

No	Potential Class	Accepted Criteria
1	Member	1,2,3,4,5
2	Registration	2,6
3	General Member	1,2,3,4,5
4	Associate Member	1,2,3,4,5
5	GM registration form	1,3,4
6	AM registration form	1,3,4
7	Bank	2,6
8	Club Manager	1,2,3
9	SMS	-
10	E-mail	-
11	Database	2,6
12	Device	1,6
13	Menu	1,3
14	Cart	1,2,3,4,5
15	Receipt	1,3,4
16	Non-member	1,2,3,4,5
17	Booking Application	1,3,4
18	Transaction	3,4
19	Managerial Report	1,3
20	DUAD	2,6
21	Expense Report	1,3,4

6.4 Associate Noun and Verb Identification

We now identify the nouns and verbs associated with the potential classes to better find out the attributes and methods of each class.

Table 15: Associate Noun and Verb Identification

No	Potential Class	Nouns	Verbs
1	Member	Name, Contact Number, Email Address, Present Address, Permanent Address, DUEIN, Photo, Username, Password	approves, adds to cart, submits cart, cancels order, identifies table, views food detail, rates food, sets expense limit, enables two factor authentication, updates basic information, checks expense report
2	Registration		receive application, check application status, check applicant type, send application, receive payment verification, send notification, notify manager
3	General Member	Name, Department, Designation, Contact Number, Email Address, Present Address, Permanent Address, DUEIN, Photo, Username, Password	approves, adds to cart, submits cart, cancels order, identifies table, views food detail, rates food, sets expense limit, enables two factor authentication, updates basic information, checks expense report
4	Associate Member	Name, Occupation, Contact Number, Email Address, Present Address, Permanent Address, DUEIN, Photo, Bank A/C Number, Username, Password	approves, adds to cart, submits cart, cancels order, identifies table, views food detail, rates food, sets expense limit, enables two factor authentication, updates basic information, checks expense report
5	GM registration form	Name, Department, Designation, Contact Number, Email Address, Present Address, Permanent Address,	stores information, updates information, shows status

		DUEIN, Photo, Username, Password, Application Status, Application Type	
6	AM registration form	Name, Occupation, Contact Number, Email Address, Present Address, Permanent Address, Recommender's DUEIN, Photo, Bank A/C Number, Username, Password, Application Status, Application Type	stores information, updates information, shows status
7	Bank	Bank ID, Bank Name, Application ID	sends verification
8	Club Manager	Name, Contact Number, Email Address, Present Address, Permanent Address, Photo, DUEIN, Username, Password	logs in, approves, updates basic information, records transactions, views managerial report, updates food detail, sends monthly report, logs out
9	Database	DB_Name, Password, DB_User	updates information, gets information
10	Device	Table Number, Mac Address	identifies table
11	Menu	List of Food, Day, Ratings of Food, Expense of Foods, Photos of Foods, Nutritional Facts of Foods	updates food detail
12	Cart	Date, Bill Amount, DUEIN, List of Food	updates cart
13	Receipt	Date, Bill Amount, DUEIN, List of Food	
14	Non-member		fills application, sends application
15	Booking Application	Name of Applicant, Present Address, Permanent Address, Contact Number, Email Address, Photo, Booking Purpose, Booking Date and Time, DUEIN of Recommender, Application Status, Application Type	stores information, updates information, shows status
16	Transaction	Category Name, Date, Amount	records transaction
17	Managerial Report	Receipts, Payments, Current Surplus/Deficit, Summary of Members, Food Items Served	
18	DUAD		receives monthly report
19	Expense Report	Date, List of Food, Quantity of Items, Bill Amount	

6.5 Attribute Selection

After identifying the classes, we have specified their attributes and methods.

Table 16: Attribute Selection of Classes

No	Class	Attributes
1	Member	Name Contact Number Present Address Permanent Address DUEIN Photo Username Password
2	Registration	Contact Number Application ID
3	General Member	Name Department Designation Contact Number Email Address Present Address Permanent Address DUEIN Photo Username Password
4	Associate Member	Name Occupation Contact Number Email Address Present Address Permanent Address DUEIN Photo Bank A/C Number Username Password
5	GM registration form	Name Department Designation Contact Number Email Address

		Present Address Permanent Address DUEIN Photo Username Password Application Status Application Type
6	AM registration form	Name Occupation Contact Number Email Address Present Address Permanent Address Recommender's DUEIN Photo Bank A/C Number Username Password Application Status Application Type
7	Bank	Bank ID Bank Name Application ID
8	Club Manager	Name Contact Number Email Address Present Address Permanent Address Photo DUEIN Username Password
9	Database	DB_Name, Password, DB_User
10	Device	Table Number Mac Address
11	Menu	List of Food Day Ratings of Food Expense of Foods Photos of Foods Nutritional Facts of Foods
12	Cart	Date

		Bill Amount DUEIN List of Food
13	Receipt	Date Bill Amount DUEIN List of Food
14	Non-member	
15	Booking Application	Name of Applicant Present Address Permanent Address Contact Number Email Address Photo Booking Purpose Booking Date and Time DUEIN of Recommender Application Status Application Type
16	Transaction	Category Name Date Amount
17	Managerial Report	Receipts Payments Current Surplus/Deficit Summary of Members Food Items Served
18	DUAD	
19	Expense Report	Date List of Food Quantity of Items Bill Amount

6.6 Method Identification

Table 17: Methods of Classes

No	Class	Methods
1	Member	inputLoginCredentials() inputPIN() viewOptions() chooseOption() approve() fillApplication() sendApplication() addToCart() submitCart() cancelOrder() identifyTable() viewFoodDetail() rateFood() setExpenseLimit() enableTwoFactorAuthentication() updateBasicInformation() checkExpenseReport() logout()
2	Registration	receiveApplication() checkApplicationStatus() checkApplicantType() sendApplication() receivePaymentVerification() sendNotification() notifyManager()
3	General Member	inputLoginCredentials() inputPIN() viewOptions() chooseOption() approve() fillApplication() sendApplication() addToCart() submitCart() cancelOrder() identifyTable() viewFoodDetail() rateFood() logout()

		setExpenseLimit() enableTwoFactorAuthentication() updateBasicInformation() checkExpenseReport()
4	Associate Member	inputLoginCredentials() inputPIN() viewOptions() chooseOption() approve() fillApplication() sendApplication() addToCart() submitCart() cancelOrder() identifyTable() viewFoodDetail() rateFood() setExpenseLimit() enableTwoFactorAuthentication() updateBasicInformation() checkExpenseReport() logout()
5	GM registration form	storeInformation() updateInformation() showStatus()
6	AM registration form	storeInformation() updateInformation() showStatus()
7	Bank	sendVerification()
8	Club Manager	inputLoginCredentials() inputPIN() viewOptions() chooseOption() approve() updateBasicInformation() recordTransactions() viewManagerialReport() updateFoodDetail() sendMonthlyReport() logout()
9	Database	create() retrieve() updateInformation()

		delete() getInformation()
10	Device	identifyTable()
11	Menu	updateFoodDetail()
12	Cart	updateCart()
13	Receipt	
14	Non-member	fillApplication() sendApplication()
15	Booking Application	storeInformation() updateInformation() showStatus()
16	Transaction	recordTransaction()
17	Managerial Report	
18	DUAD	receiveMonthlyReport()
19	Expense Report	

6.7 Finalizing Classes

To identify the final classes we need to check if there can be any hierarchies or merges. These identifications are given below:

1. ‘Member’ has common attributes and methods with ‘General Member’ and ‘Associate Member’ so we merge them as ‘Member’ and add the common and unique attributes and methods to ‘Member’.
2. ‘General Member Registration Form’ and ‘Associate Member Registration Form’ have some common attributes so we create a new class ‘Member Registration Form’ and merge them as ‘Member Registration Form’ and add the common and unique attributes and methods to it.
3. ‘Member Registration Form’ and ‘Booking Application’ have some common attributes and methods so we create a new class ‘Application’ and merge them as ‘Application’ and add the unique attributes and methods to it.
4. ‘SMS’ and ‘Email’ have the same attributes so we merge them as ‘Notification’
   Notification:
   a. Applicant’s Name
   b. SMS Subject/Purpose
   c. Text
   d. Contact Information
5. ‘Receipt’ and ‘Cart’ have the same attributes so we merge them as ‘Order’
   Order:
   a. Date
   b. Bill Amount
   c. DUEIN
   d. List of Food
6. ‘Member’ and ‘CM’ classes both have methods and responsibilities on authentication that directly accesses the Database so we create a new class ‘Authentication’ with these methods.
7. The classes ‘Receipt’, ‘Cart’ and ‘Menu’ and a few methods from classes ‘Member’ and ‘CM’ have responsibilities that can be identified as a different sub system so we create a new class ‘Food’ and merge the stated classes and methods into it.
8. The classes ‘Managerial Report’, ‘Expense Report’ and ‘Transaction’ and a few methods from classes ‘Member’ and ‘CM’ have responsibilities that can be identified as a different sub system so we create a new class ‘Accounting’ and merge the stated classes and methods into it.

6.8 Class Cards

After identifying our final classes we have generated the following class cards.

Table 18: Class Card of Member

Member	
Attributes	**Methods**
Name Department Designation Contact Number Email Address Present Address Permanent Address DUEIN Photo Username Password Bank A/C No.	inputLoginCredentials () inputPIN() viewOptions() chooseOption() approve() fillApplication() sendApplication() addToCart() submitCart() cancelOrder() identifyTable() viewFoodDetail() rateFood() setExpenseLimit() enableTwoFactorAuthentication() updateBasicInformation() checkExpenseReport() logout()
Responsibilities	**Collaborative Class**
Authentication	Authentication
Recommendation	Registration, Application
Booking Space	Application, Registration

Order Food	Food
View and Update Food Details	Food
Update Basic Information	Database
Check Expense Report	Accounting

Table 19: Class Card of CM

CM	
Attributes	**Methods**
Name Contact Number Present Address Permanent Address Photo DUEIN Username Password	inputLoginCredentials () viewOptions() chooseOption() approve() updateBasicInformation() recordTransactions() viewManagerialReport() updateFoodDetail() logout()
Responsibilities	**Collaborative Class**
Authentication	Authentication
Recommendation	Registration, Application
Update Basic Information	Database
Update Food Details	Food
Check Managerial Report	Accounting

Table 20: Class Card of Application

Application	
Attributes	**Methods**
Application ID Name Department Designation Contact Number Email Address Present Address Permanent Address DUEIN Photo Username Password Bank A/C No. Application Purpose Applicant Type Application Status	storeInformation() updateInformation() showStatus()
Responsibilities	**Collaborative Class**
Member Registration	Non Member, Registration, Member, CM
Booking for Event Space	Non Member, Registration, Member, CM

Table 21: Class Card of Authentication

Authentication	
Attributes	**Methods**
Username Password PIN No.	verifyInput() checkTwoFactorEnabled() sendPIN() verifyPIN() logInUser()
Responsibilities	**Collaborative Class**
Authentication	Member, CM, Database

Table 22: Class Card of Food

Food	
Attributes	**Methods**
Date Day Bill Amount DUEIN List of Food Ratings of Food Expense of Foods Photos of Foods Nutritional Facts of Foods Category Name Amount Table Number Mac Address	updateCart() recordTransaction() updateFoodDetail()

Responsibilities	Collaborative Class
Ordering Food	Member, Database
Updating Food Details	Member, CM, Database

Table 23: Class Card of Database

Database	
Attributes	**Methods**
DB_Name Password DB_User	create() retrieve() updateInformation() delete() getInformation()
Responsibilities	**Collaborative Class**
Store Information	Registration, Accounting, Food, Authentication, Member, CM
Display Information	Registration, Accounting, Food, Authentication, Member, CM

Table 24: Class Card of Accounting

Accounting	
Attributes	**Methods**
Receipts Payments Current Surplus/Deficit Summary of Members Food Items Served Date List of Food	getReport() showReport() sendMonthlyReport() recordTransaction()

Quantity of Items Bill Amount	
Responsibilities	**Collaborative Class**
Show Expense Report	Member, Database
Show Managerial Report	CM, Database
Send Monthly report	DUAD, Database
Record Transaction	CM, Database

Table 25: Class Card of Non Member

Non Member	
Attributes	**Methods**
	fillApplication() sendApplication()
Responsibilities	**Collaborative Class**
Member Registration	Application, Registration
Booking for Event Space	Application, Registration

Table 26: Class Card of Registration

Registration	
Attributes	**Methods**
Contact Number Application ID	receiveApplication() checkApplicationStatus() checkApplicantType() sendApplication() receivePaymentVerification() sendNotification() notifyManager()

Responsibilities	Collaborative Class
Receive Application	Application
Approve Application	Application, Member, CM
Verify Payment	Non Member, Member, Bank
Finalize Registration	Non Member, Member, CM

Table 27: Class Card of Bank

Bank	
Attributes	**Methods**
Bank ID Bank Name Application ID	sendVerification()
Responsibilities	**Collaborative Class**
Payment Verification	Registration

Table 28: Class Card of DUAD

DUAD	
Attributes	**Methods**
	receiveMonthlyReport()
Responsibilities	**Collaborative Class**
Monthly Report	Accounting

6.9 CRC Diagram

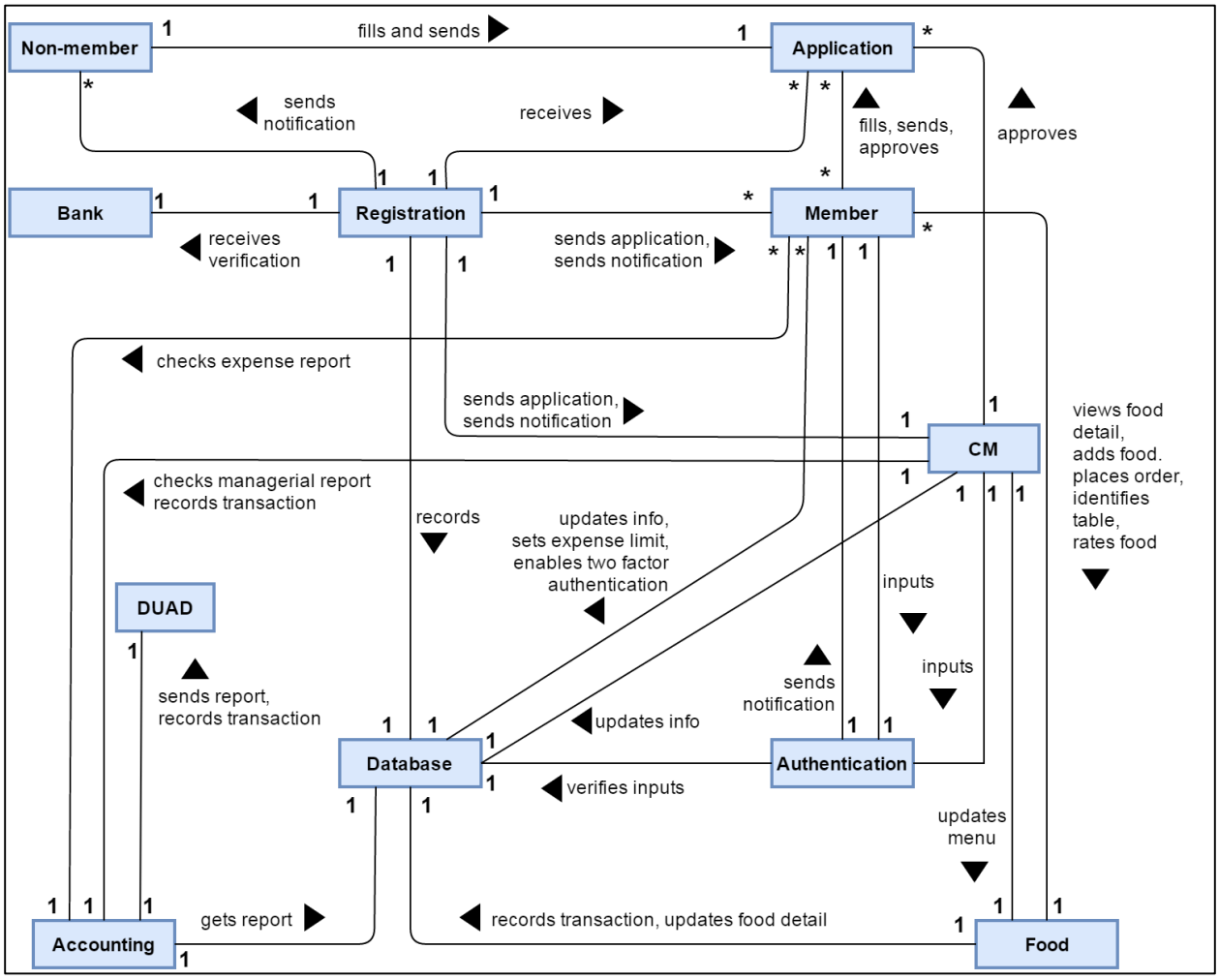


Figure 45: CRC Diagram of DUCMS

CHAPTER 7: BEHAVIORAL MODELING OF DUCMS

7.1 STATE TRANSITION DIAGRAM

State diagram represents active states for each class the events (triggers). For this we identified all the events, their initiators and collaborators.

Identifying Events

Table 29: Event Identification

No	Events	Initiator	Collaborator
1	Input login credentials	Member	Authentication
2	Input login credentials	CM	Authentication
3	Request for login information	Authentication	Database
4	Request for two factor authentication	Authentication	Database
5	Log in information given	Database	Authentication
6	Two factor authentication info given	Database	Authentication
7	Input PIN incorrect	Authentication	-
8	Input PIN verified	Authentication	-
9	Member logged in	Authentication	Member
10	CM logged in	Authentication	CM
11	Applied for registration/booking space	Non-member	Application
12	Application info stored	Application	Registration
13	Application status checked	Registration	-
14	Request for member approval	Registration	Member
15	Approved by member	Member	Application
16	Application updated	Application	Registration
17	Request for CM approval	Registration	CM
18	Applied for booking space	Member	Application
19	Notified for payment	Registration	Non-member
20	Payment verified	Bank	Registration
21	Notified CM for payment verification	Registration	CM
22	Food item ordered	Member	-

23	Order cancelled	Member	-
24	Order submitted	Member	Food
25	Updated food information	Food	-
26	Request for update transaction	Food	Database
27	Request for update food rating	Member	Database
28	Request for food detail	Member	Food
29	Request for food detail	Food	Database
30	Food detail given	Database	Food
31	Request for updating member info	Member	Database
32	Request for checking expense report	Member	Accounting
33	Request for member expense report	Accounting	Database
34	Member expense report given	Database	Accounting
35	Request for updating CM info	CM	Database
36	Request for manager report	CM	Accounting
37	Request for manager report	Accounting	Database
38	Managerial report given	Database	Accounting
39	Updating food detail	CM	Food
40	Request for updating food detail	Food	Database
41	Monthly report sent	Accounting	DUAD
42	Option chosen	Member	-
43	Option chosen	CM	-
44	Logged in	Authentication	Member
45	Logged in	Authentication	CM
46	Logged out	Member	-
47	Logged out	CM	-

Authentication

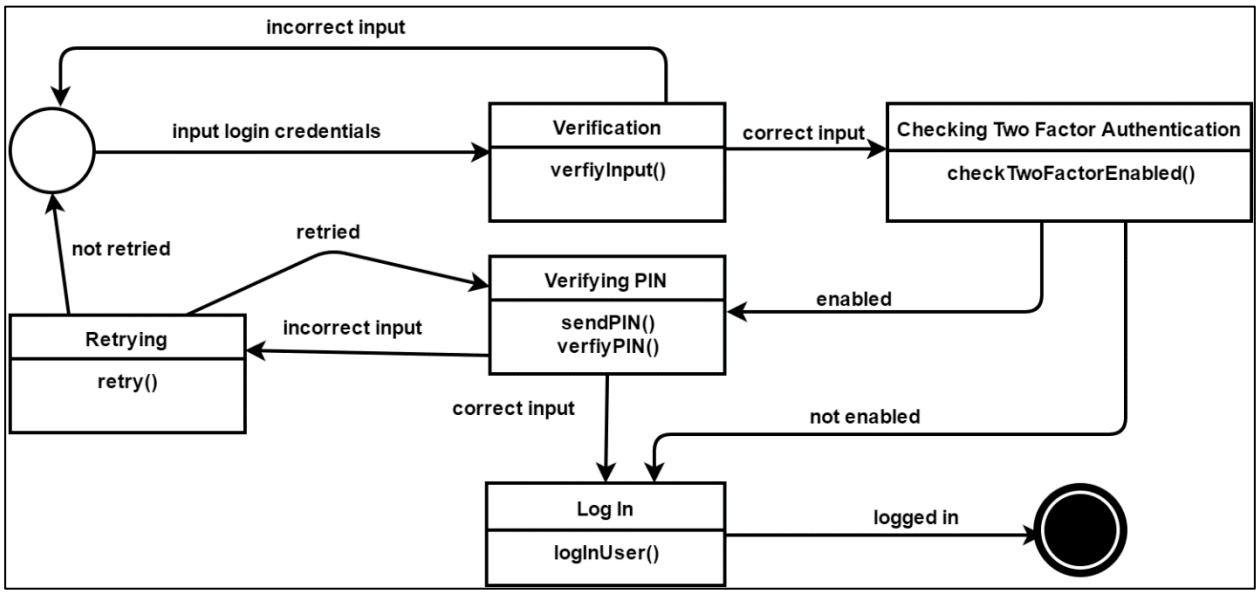


Figure 46: State Transition Diagram – Authentication

Registration

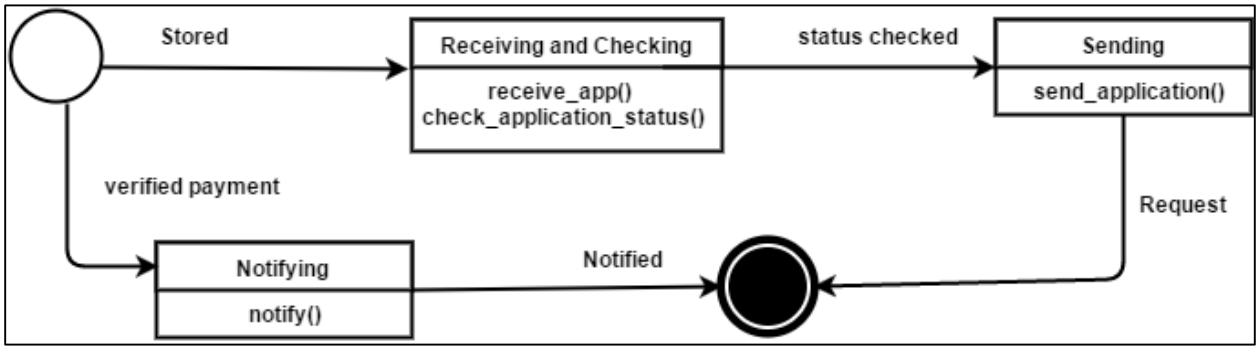


Figure 47: State Transition Diagram – Registration

Member

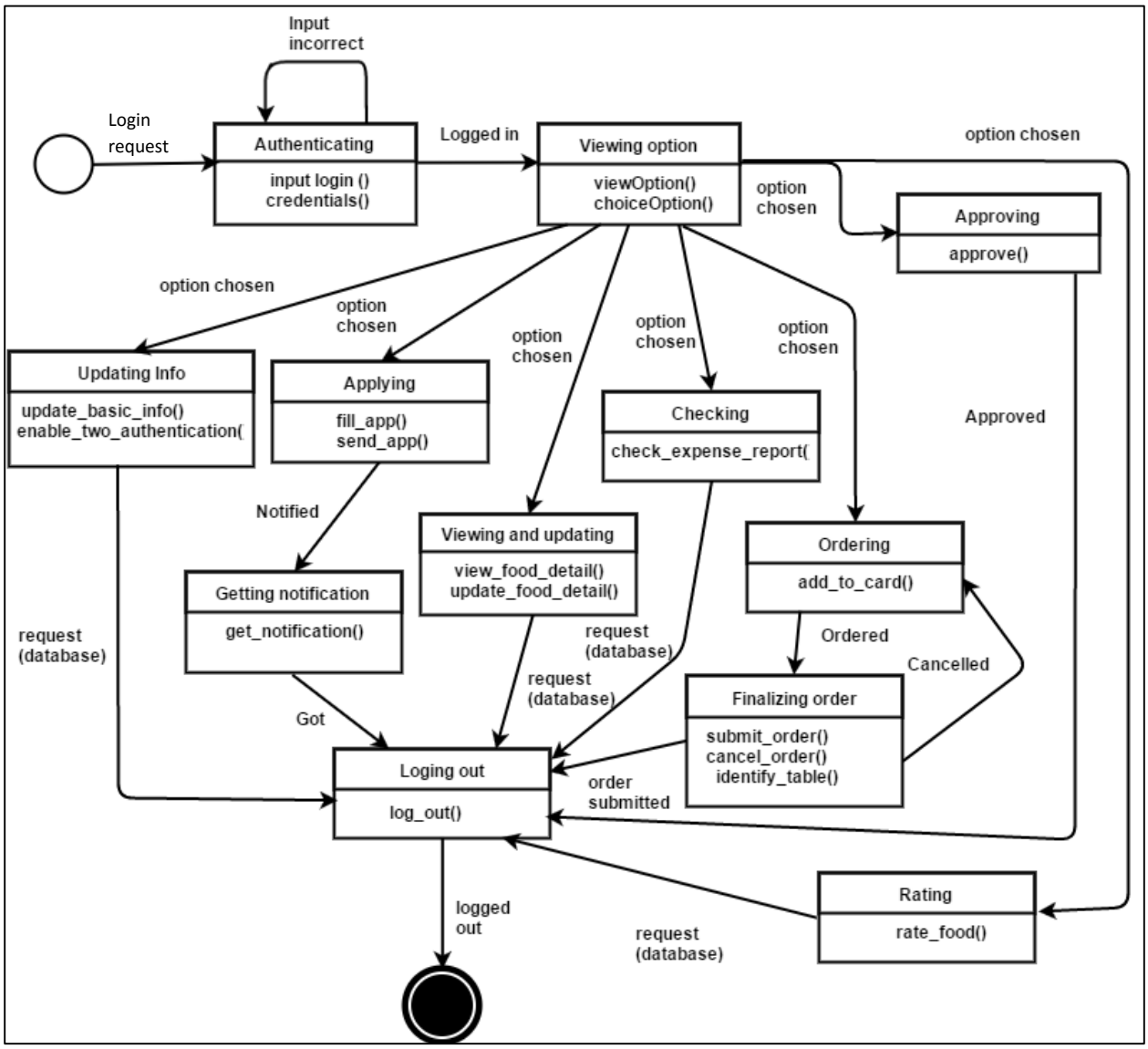


Figure 48: State Transition Diagram – Member

Non Member

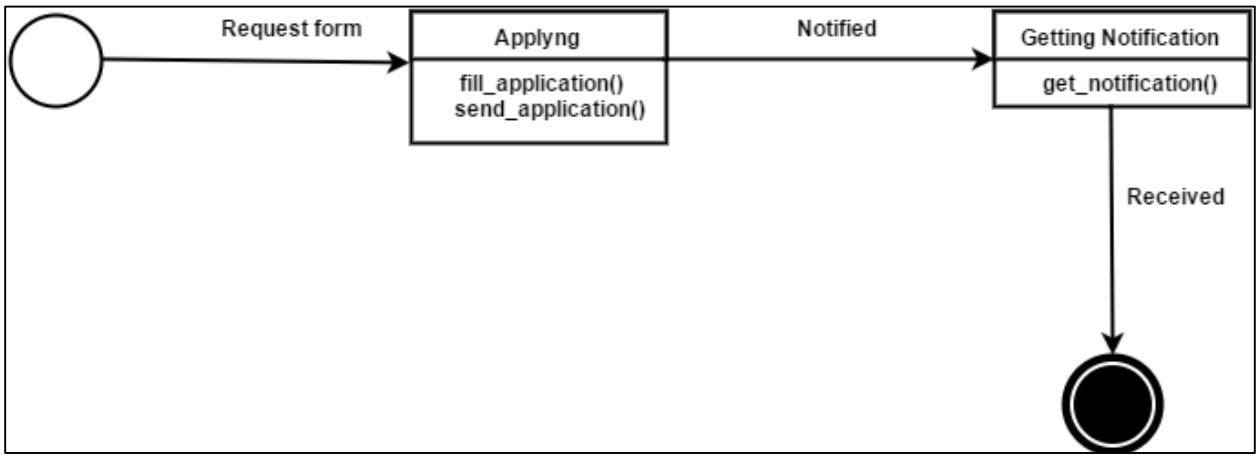


Figure 49: State Transition Diagram – Non Member

Database

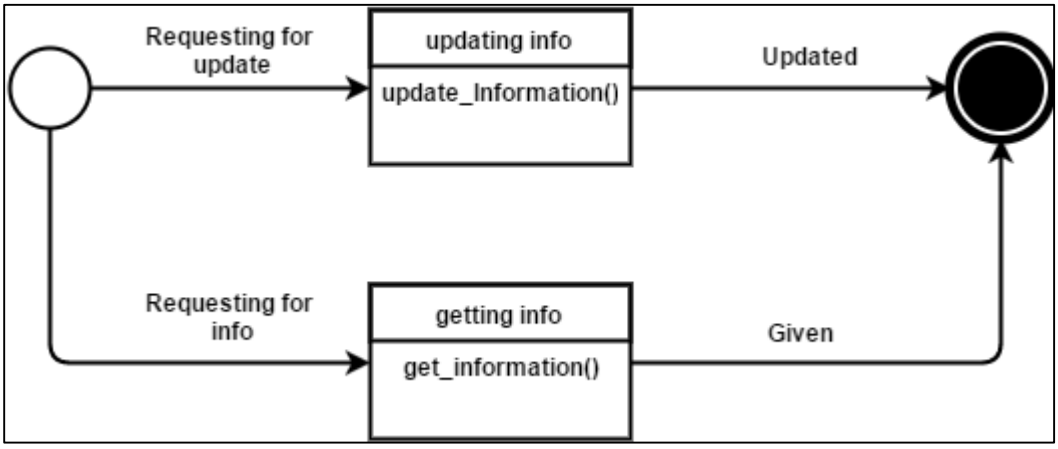


Figure 50: State Transition Diagram – Database

Club Manager

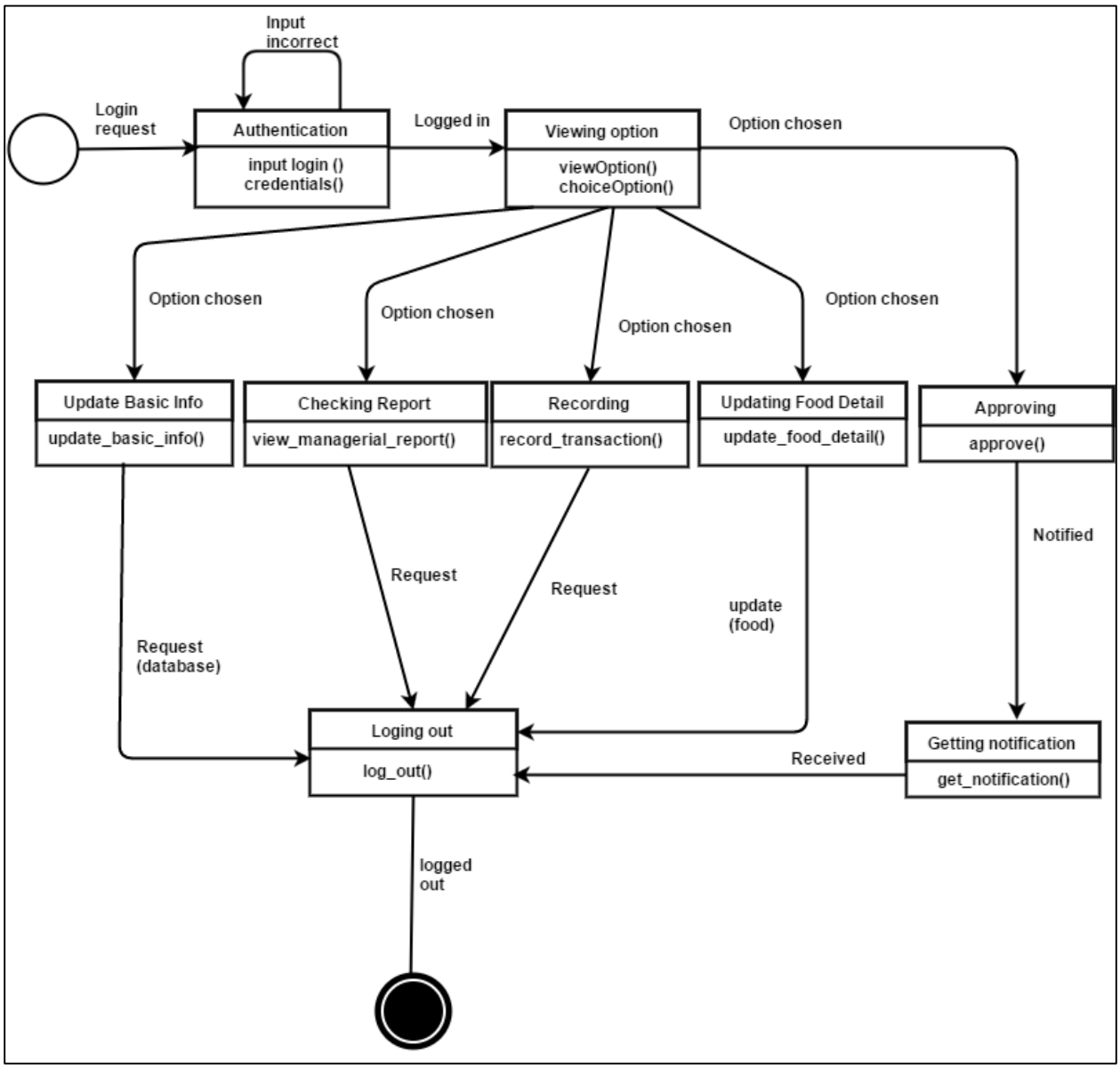


Figure 51: State Transition Diagram – Club Manager

Food

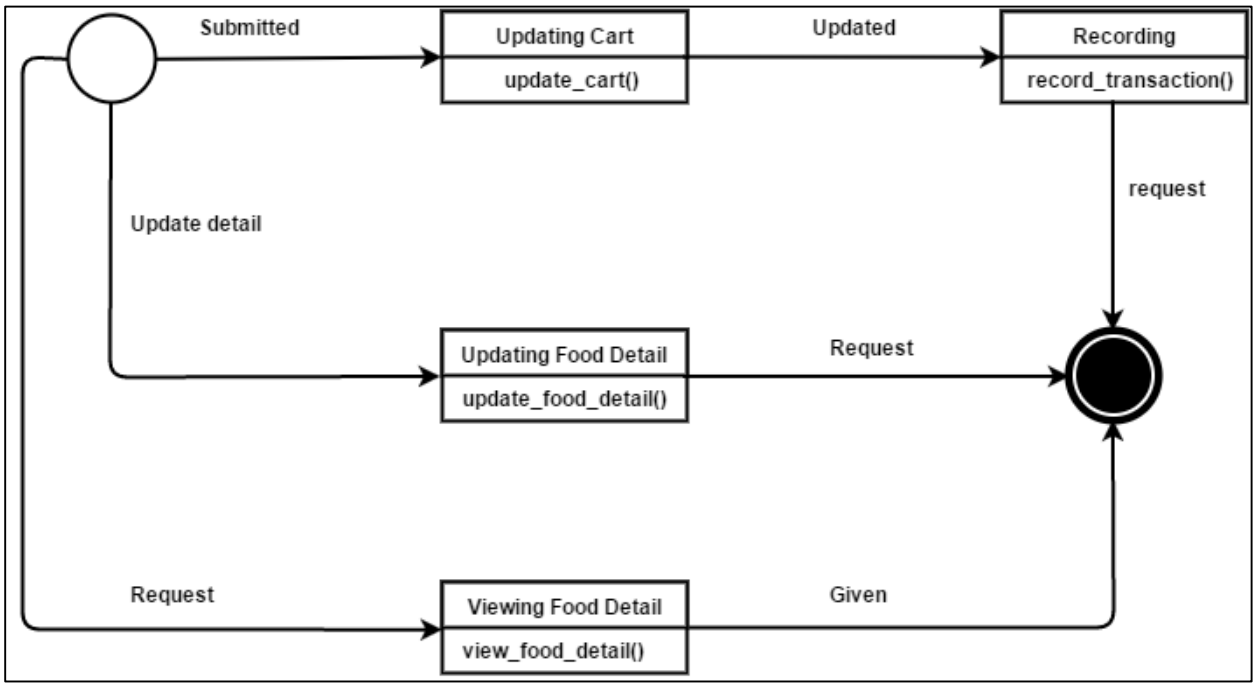


Figure 52: State Transition Diagram – Food

Bank

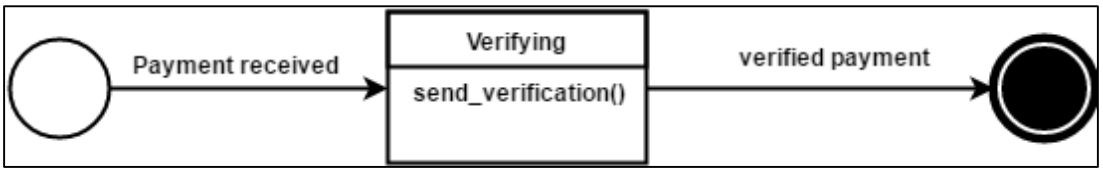


Figure 53: State Transition Diagram – Bank

DUAD

Figure 54: State Transition Diagram – DUAD

Accounting

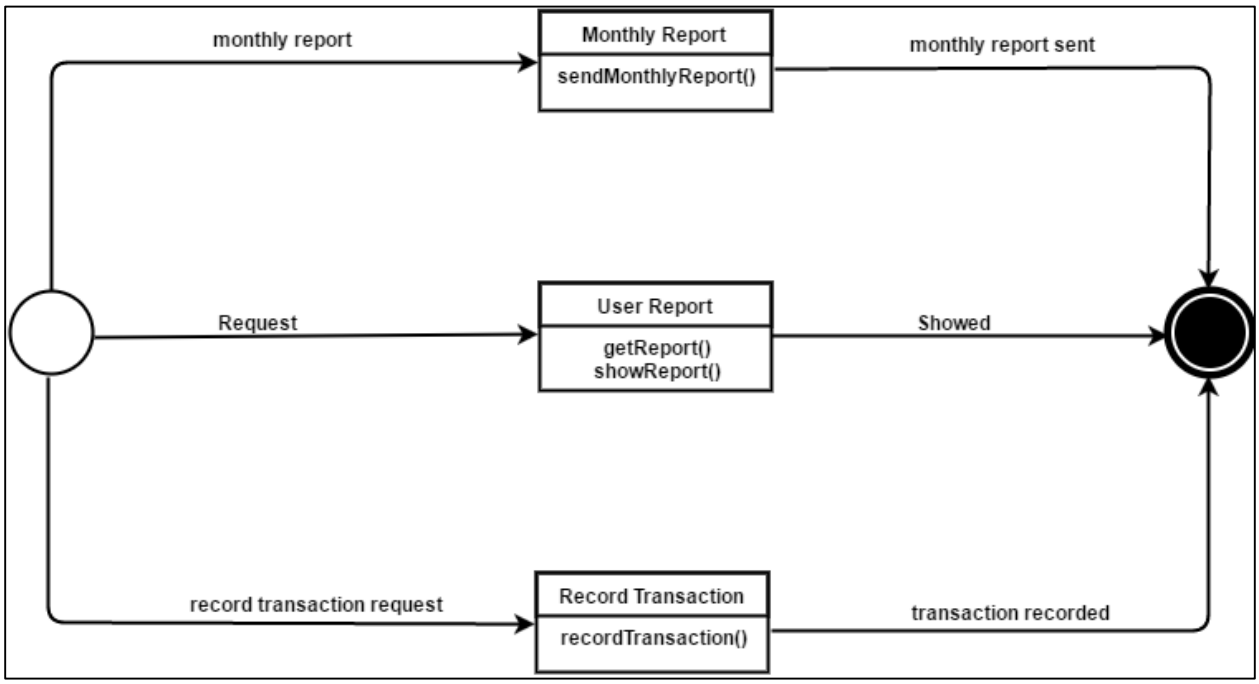


Figure 55: State Transition Diagram – Accounting

Application

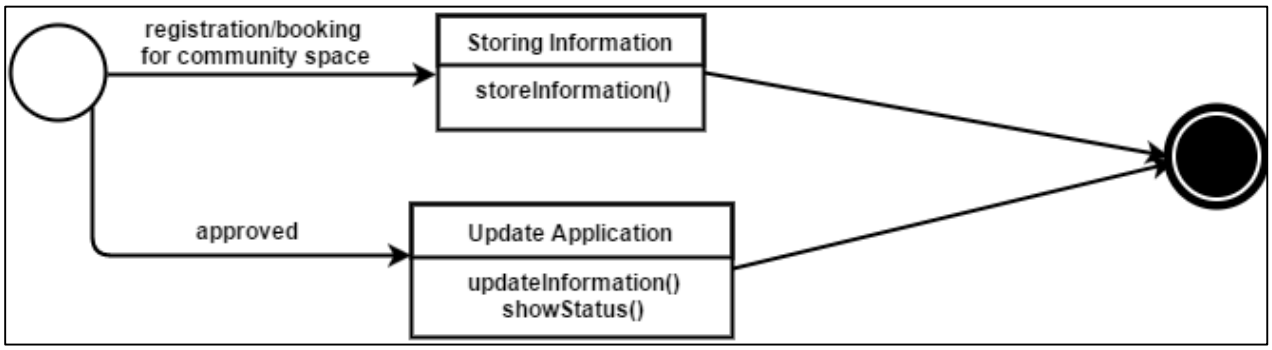


Figure 56: State Transition Diagram – Application

7.2 Sequence Diagrams of Modules of DUCMS

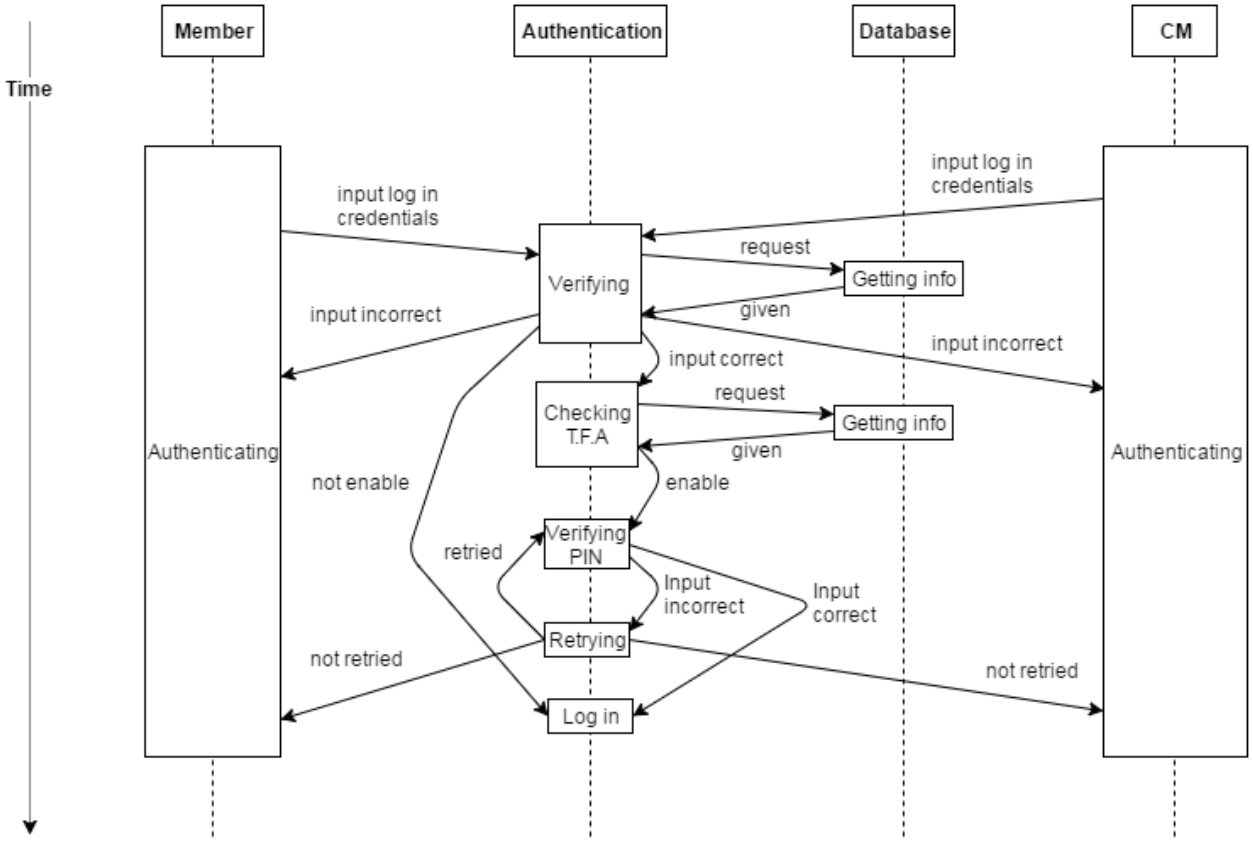


Figure 57: Sequence Diagram of Module-Sign in

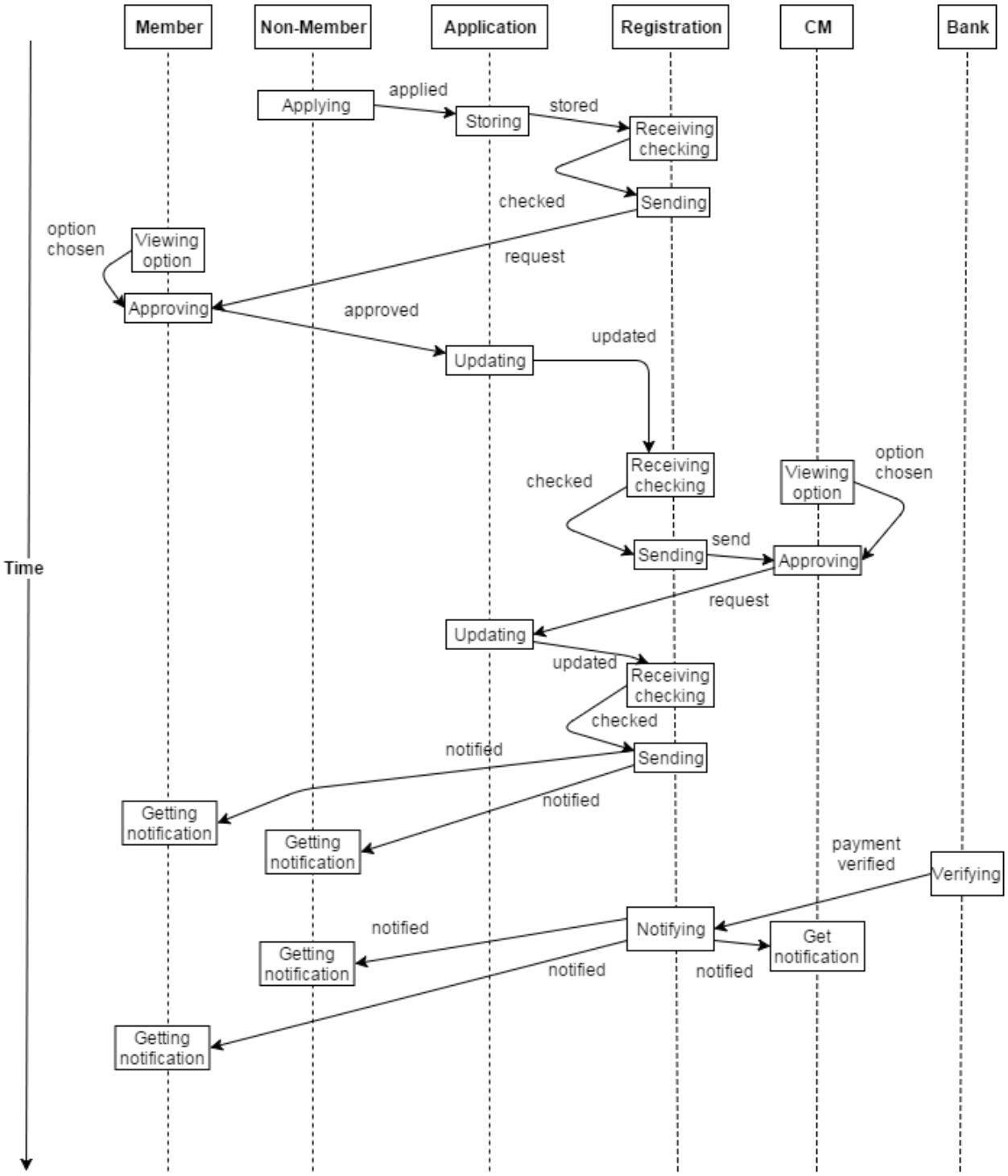


Figure 58: Sequence Diagram of Module-Registration

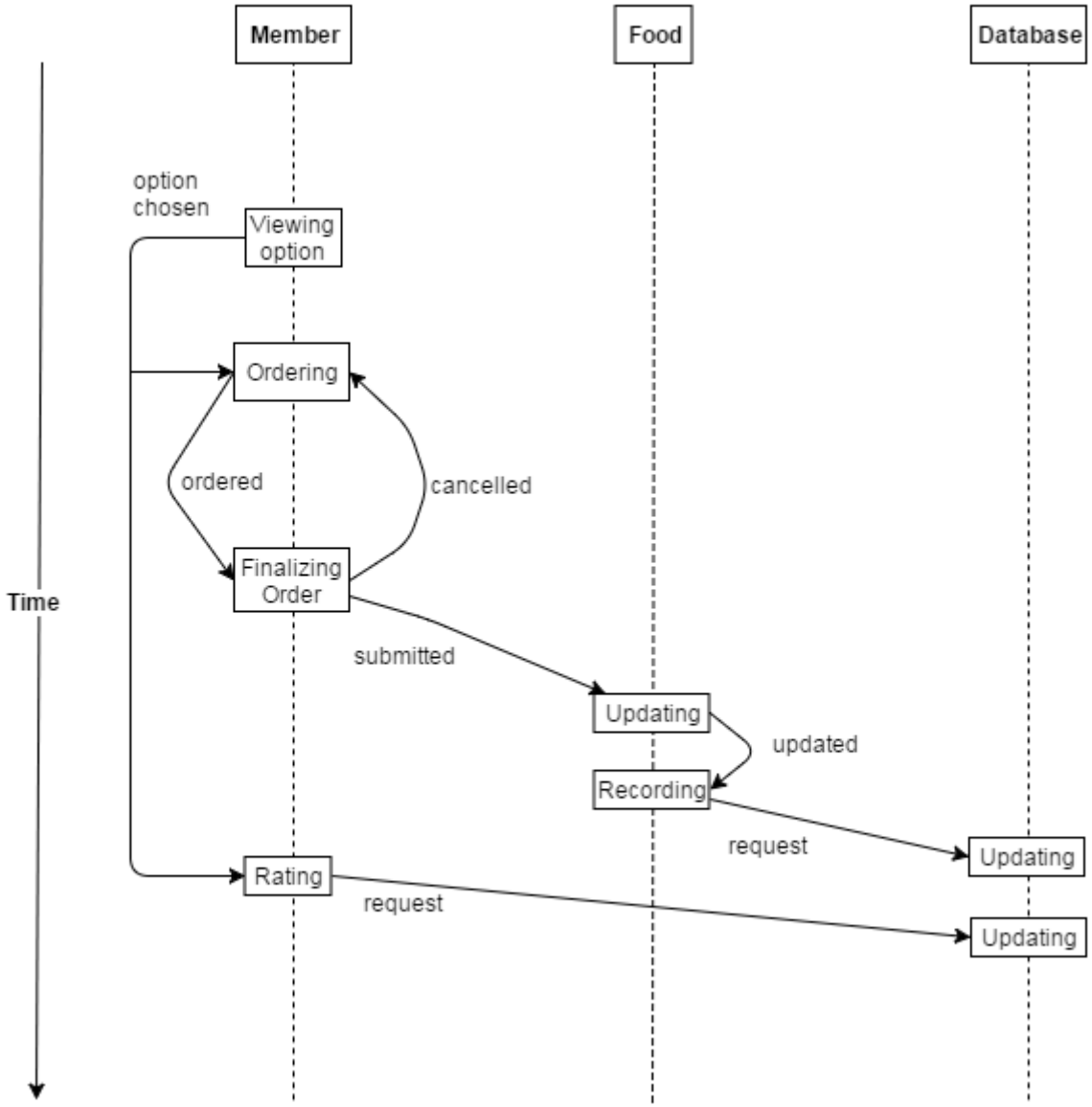


Figure 59: Sequence Diagram of Module-Ordering Food

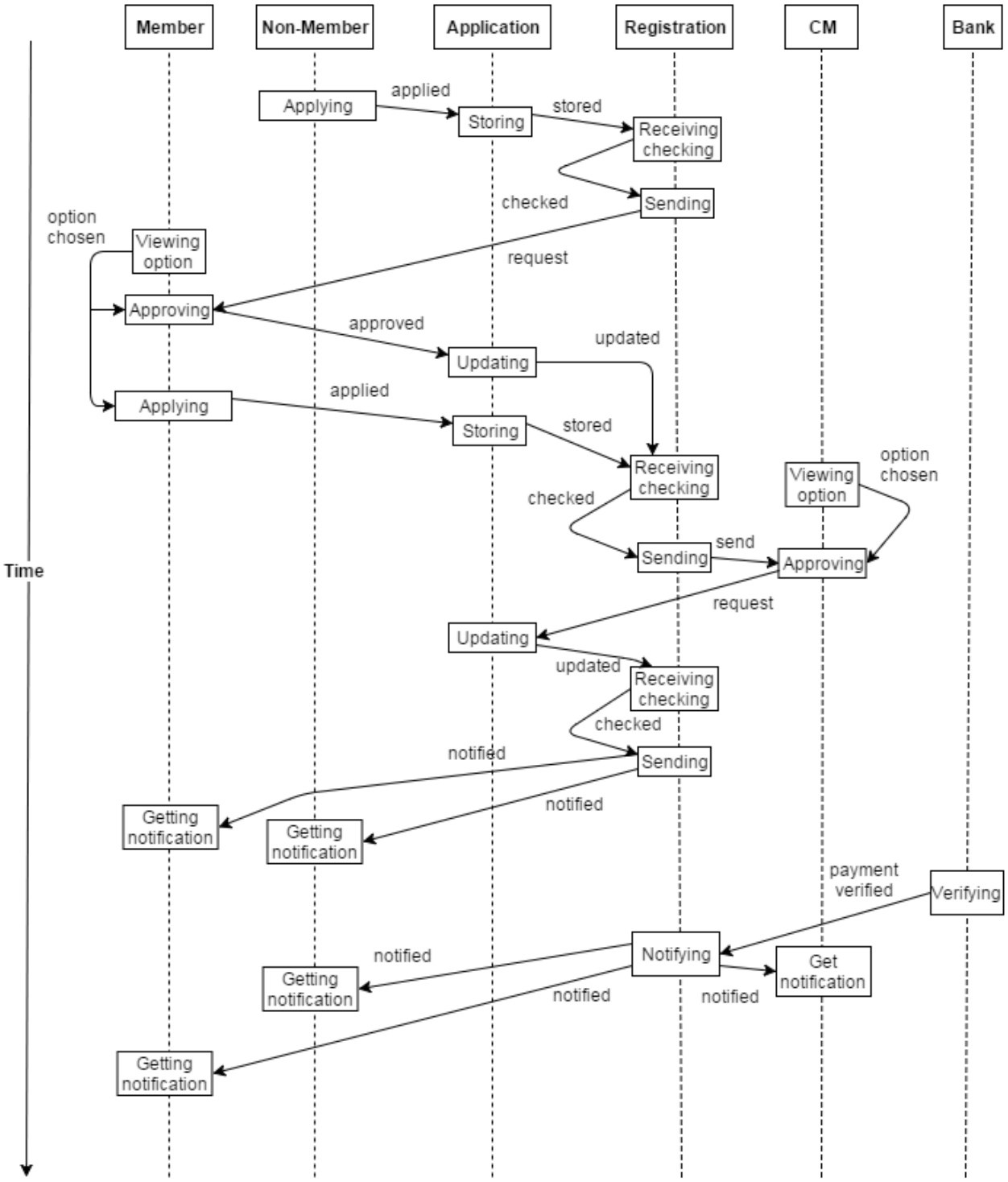


Figure 60: Sequence Diagram of Module-Booking Space

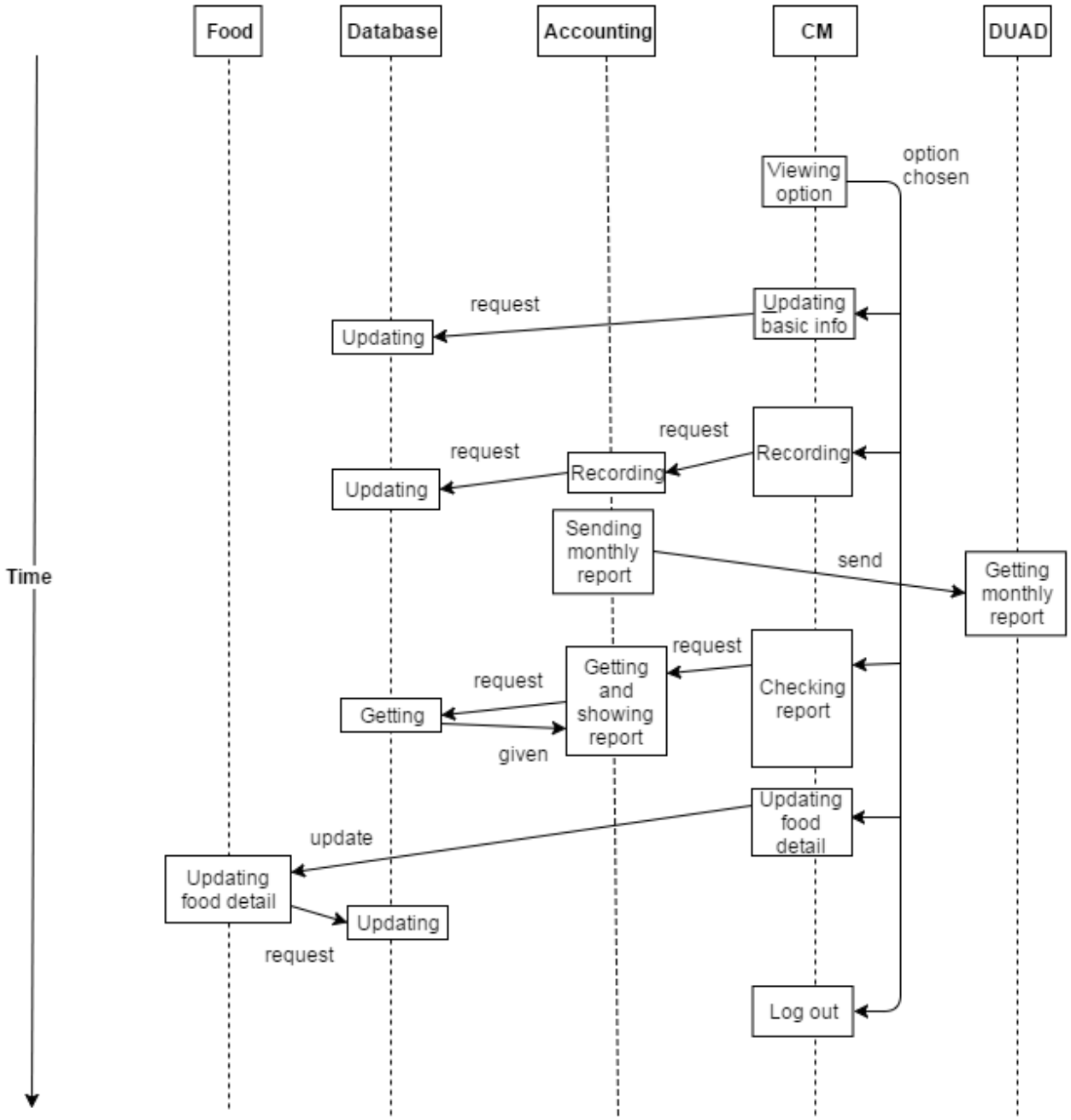


Figure 61: Sequence Diagram of Module-Management Activity

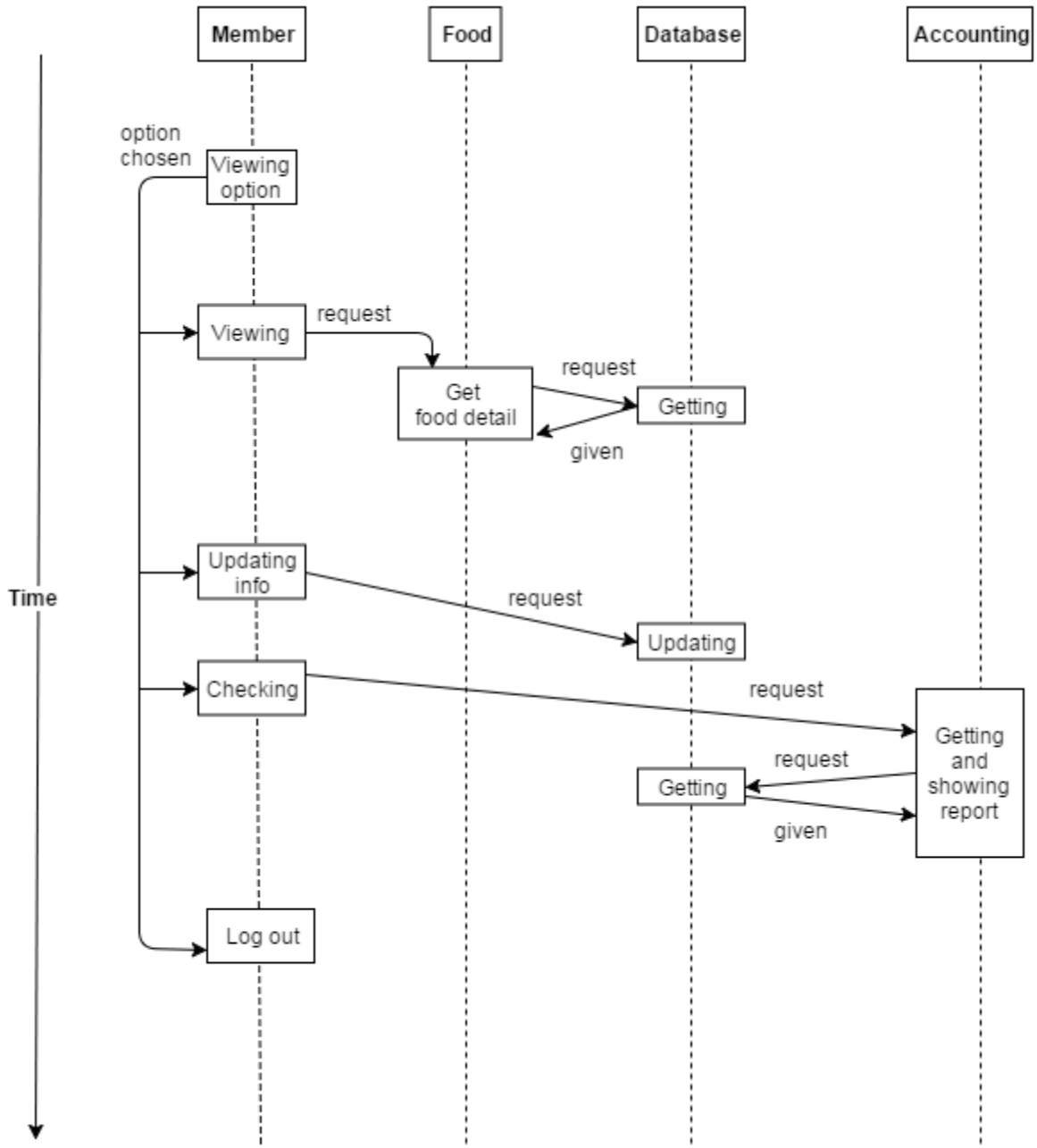


Figure 62: Sequence Diagram of Member Activity

7.3 SEQUENCE DIAGRAM OF DUCMS

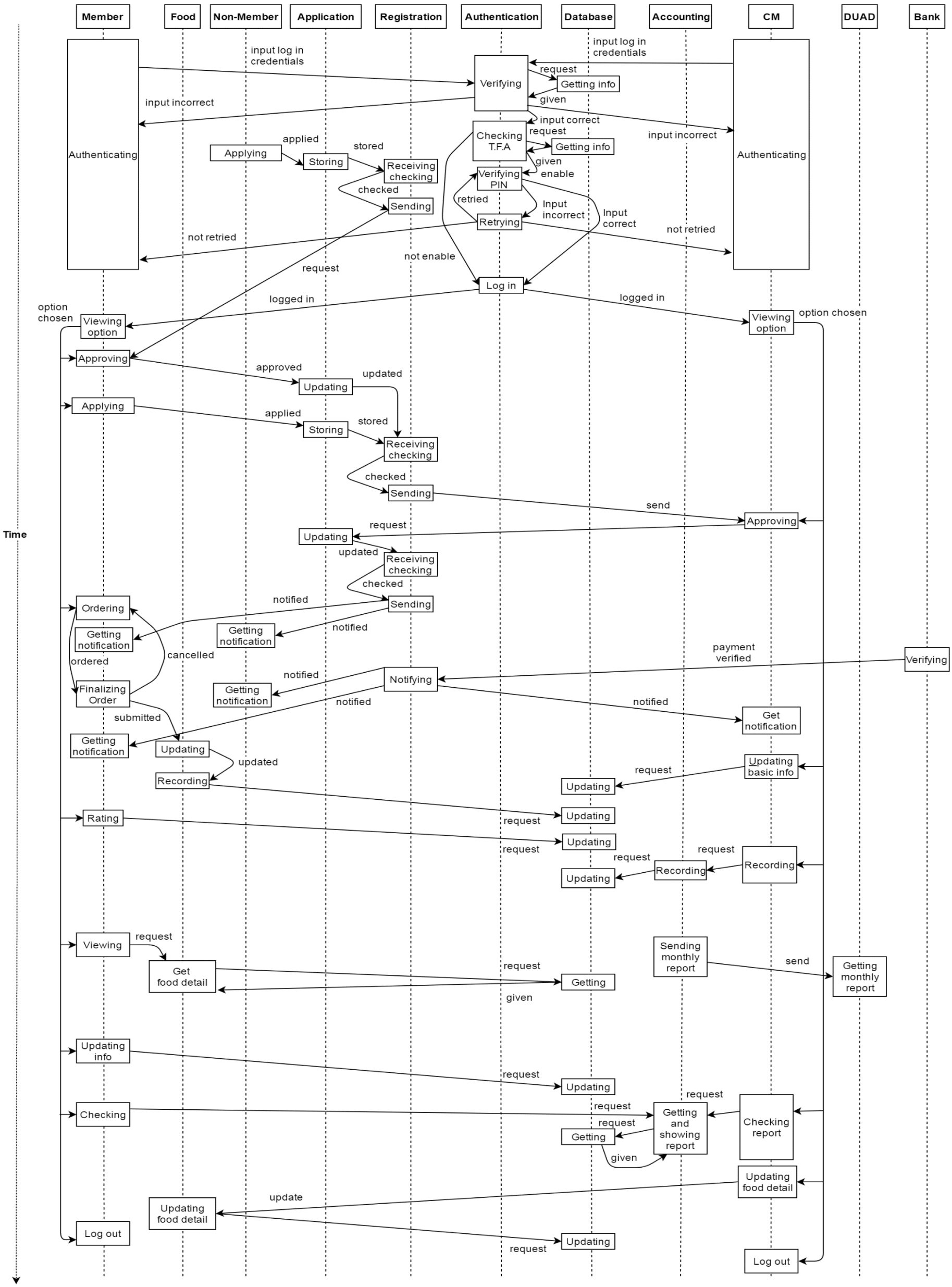


Figure 63: Sequence Diagram of DUCMS

CHAPTER 8: CONCLUSION

We are pleased to submit the final SRS report on Dhaka University Club Management System. From this, the readers will get a clear and easy view of the overall system of Dhaka University Club. This SRS document can be used effectively to maintain the software development cycle. It will be very easy to conduct the whole project using this SRS. Hopefully, this document can also help our junior BSSE batch students. We tried our best to remove all dependencies and make an effective and fully designed SRS. We believe that the reader will find it in order.–

CHAPTER 9: REFERENCES

- Pressman, Roger S. Software Engineering: A Practitioner's Approach (7th Edition)

APPENDIX

GROUP MEETINGS

1.
Date: 9.08.16
Place: IIT, DU
Subject: Discussing about the group

Shuvo Saha	BSSE0705
Jarifa Khatun Moitry	BSSE0710
Md. Aquib Azmain	BSSE0718
Abu Rafe Md. Jamil	BSSE0722
Sabbir Hussain Meraj	BSSE0726
Syed Fatiul Huq	BSSE0732

2.
Date: 11.08.16
Place: IIT, DU
Subject: Meeting with Dr. Muhammad Asif Hossain Khan, Associate Professor, CSE, DU

Shuvo Saha	BSSE0705
Jarifa Khatun Moitry	BSSE0710
Md. Aquib Azmain	BSSE0718
Abu Rafe Md. Jamil	BSSE0722
Sabbir Hussain Meraj	BSSE0726
Syed Fatiul Huq	BSSE0732

3.
Date: 14.08.16
Place: Dhaka University Club
Subject: Meeting with Club Manager

Shuvo Saha	BSSE0705
Jarifa Khatun Moitry	BSSE0710
Md. Aquib Azmain	BSSE0718
Abu Rafe Md. Jamil	BSSE0722
Sabbir Hussain Meraj	BSSE0726
Syed Fatiul Huq	BSSE0732

4.
Date: 18.08.16
Place: IIT, DU
Subject: Defining QFD

Shuvo Saha	BSSE0705
Jarifa Khatun Moitry	BSSE0710
Md. Aquib Azmain	BSSE0718
Abu Rafe Md. Jamil	BSSE0722
Sabbir Hussain Meraj	BSSE0726
Syed Fatiul Huq	BSSE0732

5.
Date: 20.08.16
Place: IIT, DU
Subject: Defining QFD

Shuvo Saha	BSSE0705
Jarifa Khatun Moitry	BSSE0710
Md. Aquib Azmain	BSSE0718
Abu Rafe Md. Jamil	BSSE0722
Sabbir Hussain Meraj	BSSE0726
Syed Fatiul Huq	BSSE0732

6.
Date: 21.08.16
Place: IIT, DU
Subject: Preparing the usage scenario

Shuvo Saha	BSSE0705
Jarifa Khatun Moitry	BSSE0710
Md. Aquib Azmain	BSSE0718
Abu Rafe Md. Jamil	BSSE0722
Sabbir Hussain Meraj	BSSE0726
Syed Fatiul Huq	BSSE0732

7.
Date: 27.08.16
Place: Online Communication
Subject: Preparing the usage scenario

Shuvo Saha	BSSE0705
Jarifa Khatun Moitry	BSSE0710
Md. Aquib Azmain	BSSE0718
Abu Rafe Md. Jamil	BSSE0722
Sabbir Hussain Meraj	BSSE0726
Syed Fatiul Huq	BSSE0732

8.
Date: 4.09.16
Place: IIT, DU
Subject: Preparing the usage scenario

Shuvo Saha	BSSE0705
Jarifa Khatun Moitry	BSSE0710
Md. Aquib Azmain	BSSE0718
Abu Rafe Md. Jamil	BSSE0722
Sabbir Hussain Meraj	BSSE0726
Syed Fatiul Huq	BSSE0732

9.
Date: 22.09.16
Place: IIT, DU
Subject: Discussing about Use Case diagrams

Shuvo Saha	BSSE0705
Jarifa Khatun Moitry	BSSE0710
Md. Aquib Azmain	BSSE0718
Abu Rafe Md. Jamil	BSSE0722
Sabbir Hussain Meraj	BSSE0726
Syed Fatiul Huq	BSSE0732

10.
Date: 30.09.16
Place: IIT, DU
Subject: Preparing activity diagram

Shuvo Saha	BSSE0705
Jarifa Khatun Moitry	BSSE0710
Md. Aquib Azmain	BSSE0718
Abu Rafe Md. Jamil	BSSE0722
Sabbir Hussain Meraj	BSSE0726
Syed Fatiul Huq	BSSE0732

11.
Date: 7.10.16
Place: Online communication
Subject: Preparing Swimlane diagram

Shuvo Saha	BSSE0705
Jarifa Khatun Moitry	BSSE0710
Md. Aquib Azmain	BSSE0718
Abu Rafe Md. Jamil	BSSE0722
Sabbir Hussain Meraj	BSSE0726
Syed Fatiul Huq	BSSE0732

12.
Date: 17.10.16
Place: IIT, DU
Subject: Discussing about data model

Shuvo Saha	BSSE0705
Jarifa Khatun Moitry	BSSE0710
Md. Aquib Azmain	BSSE0718
Abu Rafe Md. Jamil	BSSE0722
Sabbir Hussain Meraj	BSSE0726
Syed Fatiul Huq	BSSE0732

13.
Date: 25.10.16
Place: IIT, DU
Subject: Preparing class based model

Shuvo Saha	BSSE0705
Jarifa Khatun Moitry	BSSE0710
Md. Aquib Azmain	BSSE0718
Abu Rafe Md. Jamil	BSSE0722
Sabbir Hussain Meraj	BSSE0726
Syed Fatiul Huq	BSSE0732

14.
Date: 04.11.16
Place: Online communication
Subject: Preparing CRC model

Shuvo Saha	BSSE0705
Jarifa Khatun Moitry	BSSE0710
Md. Aquib Azmain	BSSE0718
Abu Rafe Md. Jamil	BSSE0722
Sabbir Hussain Meraj	BSSE0726
Syed Fatiul Huq	BSSE0732

15.
Date: 14.11.16
Place: Online communication
Subject: Preparing CRC model

Shuvo Saha	BSSE0705
Jarifa Khatun Moitry	BSSE0710
Md. Aquib Azmain	BSSE0718
Abu Rafe Md. Jamil	BSSE0722
Sabbir Hussain Meraj	BSSE0726
Syed Fatiul Huq	BSSE0732

16.
Date: 16.11.16
Place: IIT, DU
Subject: Preparing Behavioral model

Shuvo Saha	BSSE0705
Jarifa Khatun Moitry	BSSE0710
Md. Aquib Azmain	BSSE0718
Abu Rafe Md. Jamil	BSSE0722
Sabbir Hussain Meraj	BSSE0726
Syed Fatiul Huq	BSSE0732

17.
Date: 16.11.16
Place: IIT, DU
Subject: Preparing Behavioral model

Shuvo Saha	BSSE0705
Jarifa Khatun Moitry	BSSE0710
Md. Aquib Azmain	BSSE0718
Abu Rafe Md. Jamil	BSSE0722
Sabbir Hussain Meraj	BSSE0726
Syed Fatiul Huq	BSSE0732

18.
Date: 19.11.16
Place: IIT, DU
Subject: Discussing about the report

Shuvo Saha	BSSE0705
Jarifa Khatun Moitry	BSSE0710
Md. Aquib Azmain	BSSE0718
Abu Rafe Md. Jamil	BSSE0722
Sabbir Hussain Meraj	BSSE0726
Syed Fatiul Huq	BSSE0732

19.
Date: 20.11.16
Place: IIT, DU
Subject: Discussing about the report

Shuvo Saha	BSSE0705
Jarifa Khatun Moitry	BSSE0710
Md. Aquib Azmain	BSSE0718
Abu Rafe Md. Jamil	BSSE0722
Sabbir Hussain Meraj	BSSE0726
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