Design Document

for

swimiNIT

Version 1.1

Prepared by Team 05:
(Based on SRS Version 1.1 prepared by Team 05)

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Project Owner: **Ms. Lekshmy P Chandran**

Course: **CS4096D Software Engineering Laboratory**

Date: **29/03/2022**

Glossary

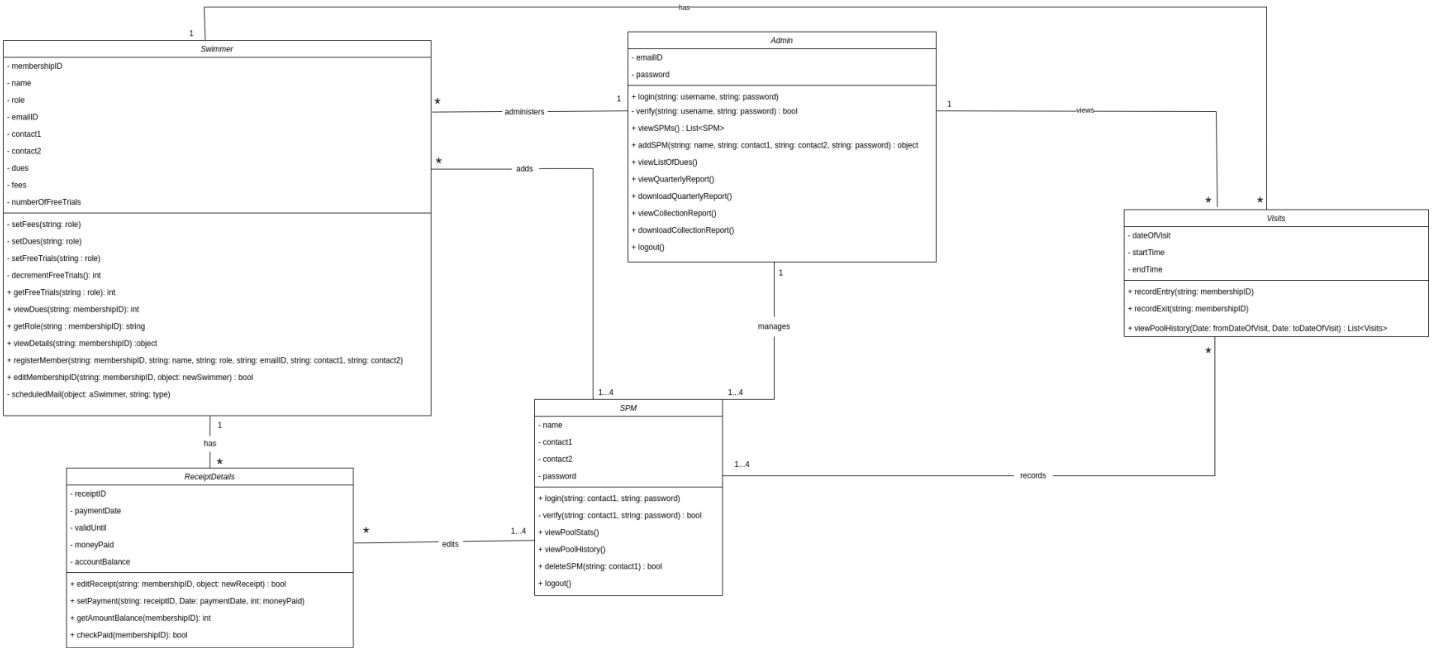
SPM	Swimming Pool Manager
SPO	Swimming Pool Office
UML	Unified Modelling Language

Table of contents

1. Detailed Design through UML diagrams

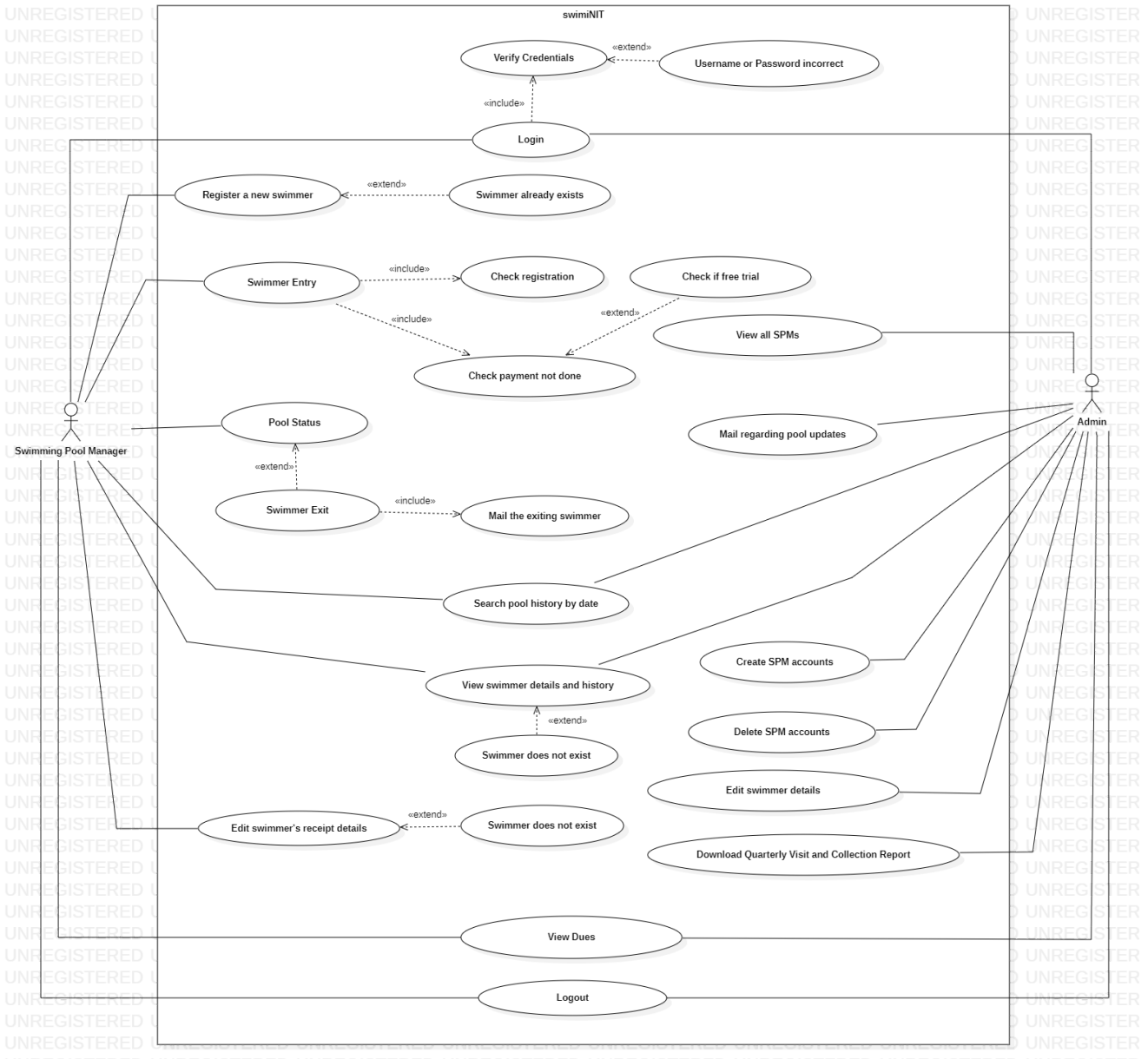
1.1 System model using Class Diagram

Class Diagram in the Unified Modelling Language is a type of static structure diagram that describes the structure of a system by showing the system's classes, their attributes, operations (or methods) and the relationships among classes.



1.2 Responsibilities - Usecase Diagram

Use case diagram graphically depicts the user's possible interactions with the system. It shows the different types of users (actors) and the use cases that the actors perform when they are using the system to solve the customer's problem. The actor is shown as a stick person and the use case is shown as an ellipse. Lines indicate which actors perform which use cases.

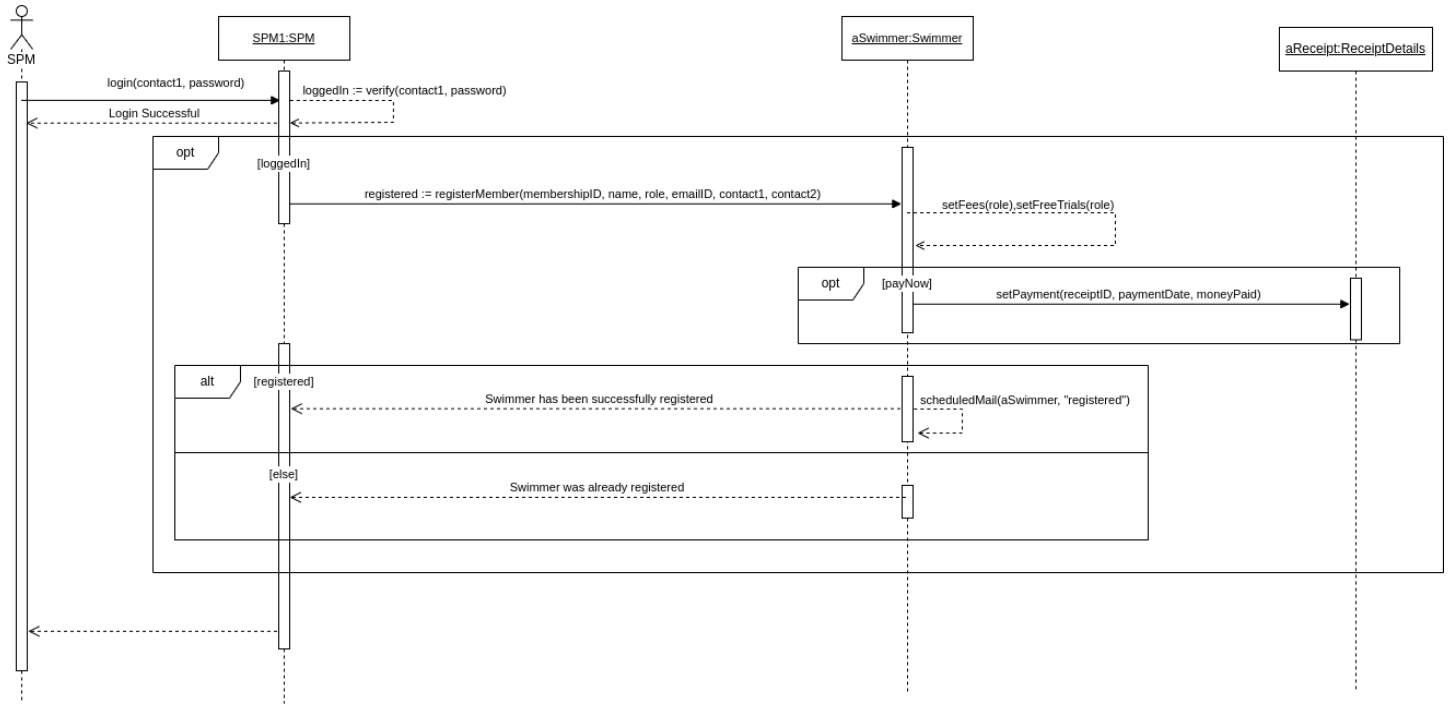


1.3 System Interactions through Sequence Diagrams

Sequence diagrams are interaction diagrams that show the sequence of messages exchanged by the set of objects performing a certain task. A sequence diagram shows, as parallel vertical lines (lifeline), different processes or objects that live simultaneously, and as horizontal arrows, the messages exchanged between them, in the order in which they occur.

1.3.1 Registration of a new swimmer

The SPM logs in to the system after the verification of their login credentials and registers the swimmer after setting the payment option to ‘pay now’ or ‘pay later’. If the SPM chooses ‘pay now’, they will be prompted to register the receipt details of the payment made by the swimmer to the SPO. If the swimmer is already registered to the system, the SPM will be informed via a response message.



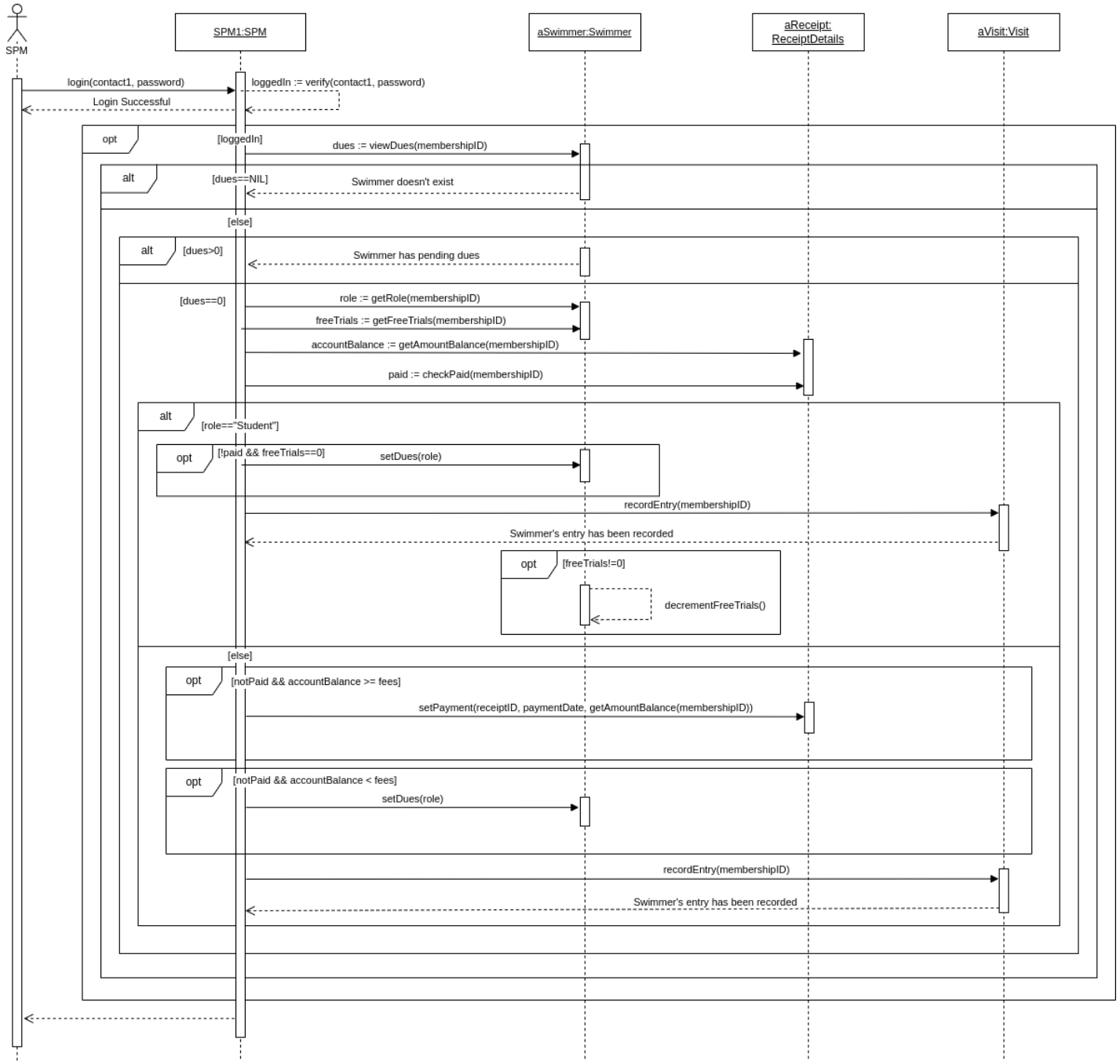
1.3.2 Swimmer Entry

After successfully logging in to the system, the SPM enters the membership ID of the swimmer. If the dues corresponding to the swimmer is NIL, the SPM is notified that the swimmer is not registered. If dues exist, and it is a numerical value, the system checks whether the swimmer has dues or not based on which they are allowed entry into the pool. If the swimmer has standing dues, they are not permitted to enter the pool.

If a student swimmer has not paid and doesn't have any free trials left then dues are recorded. They are permitted to enter the pool and their entry is recorded. Student

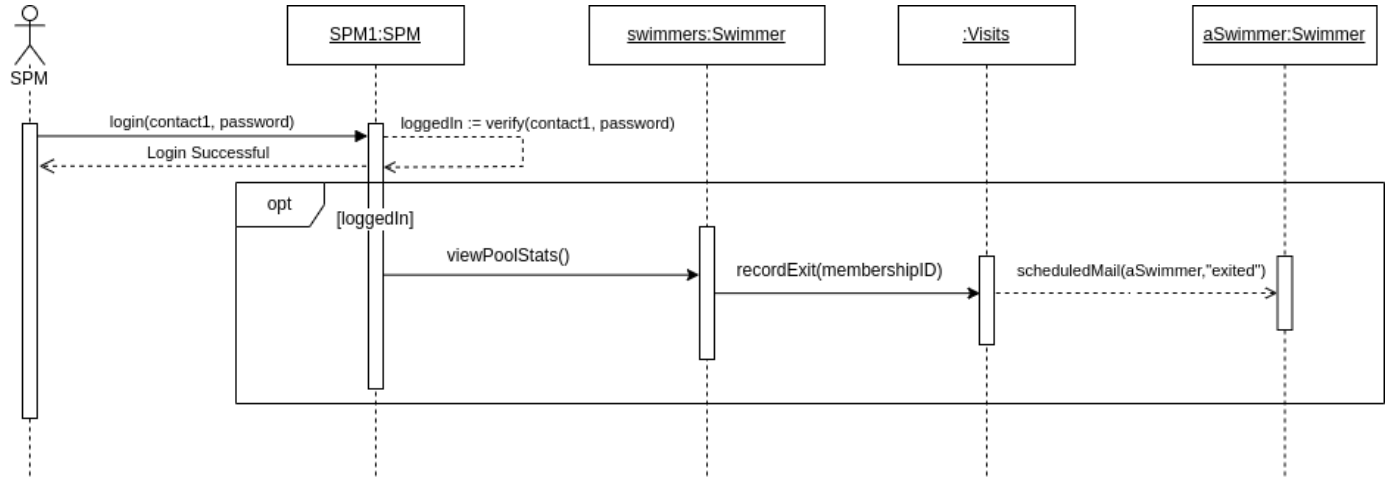
swimmers who have free trials left are permitted to enter the pool and their free trials will be decremented after their entry is recorded.

If a non-student swimmer has not paid and their account has a balance amount exceeding the fees for that quarter then the fees will be deducted from the account balance. They are permitted to enter the pool and their entry is recorded. If they have not paid and their account balance is less than the fees for that quarter then their dues are recorded. They are permitted to enter the pool and their entry is recorded.



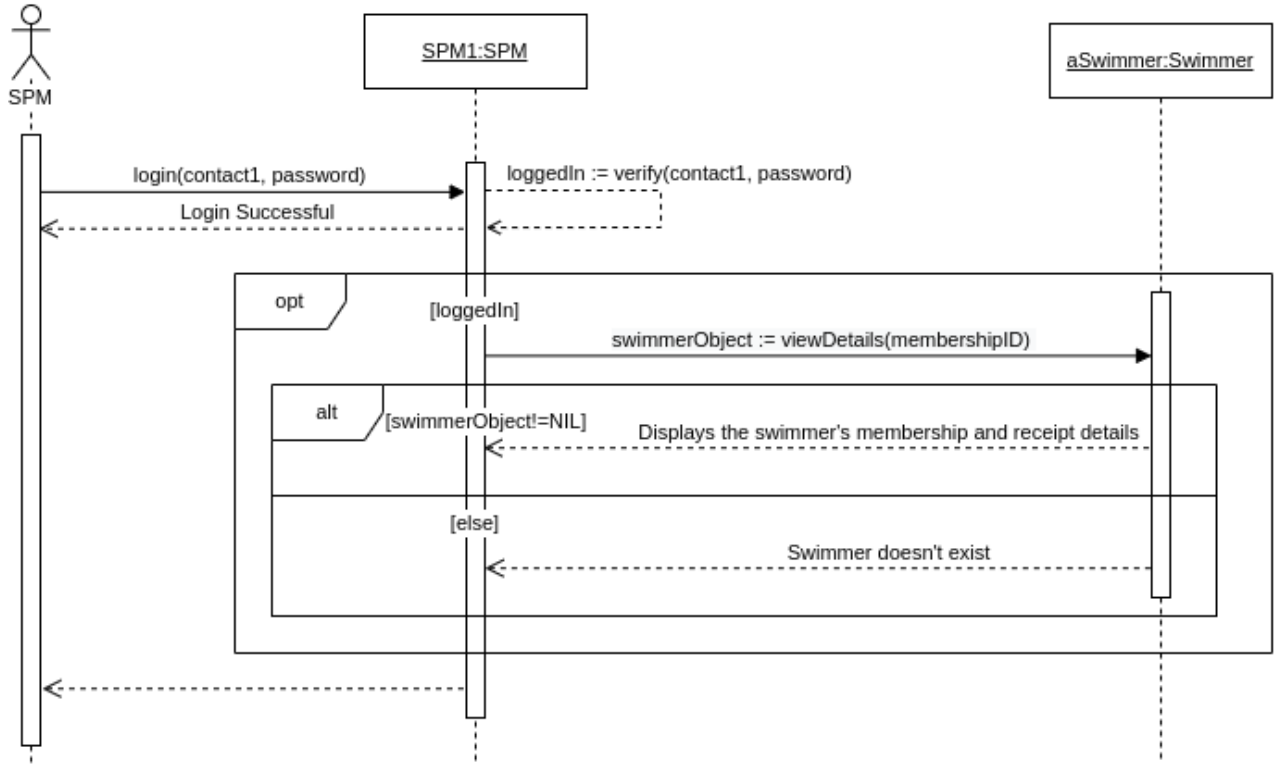
1.3.3 Swimmer Exit

After successfully logging in to the system, the SPM can view the list of swimmers currently in the pool and 'exit' a particular swimmer after confirmation. Simultaneously, a mail is automatically sent to the swimmer informing them about the visit.



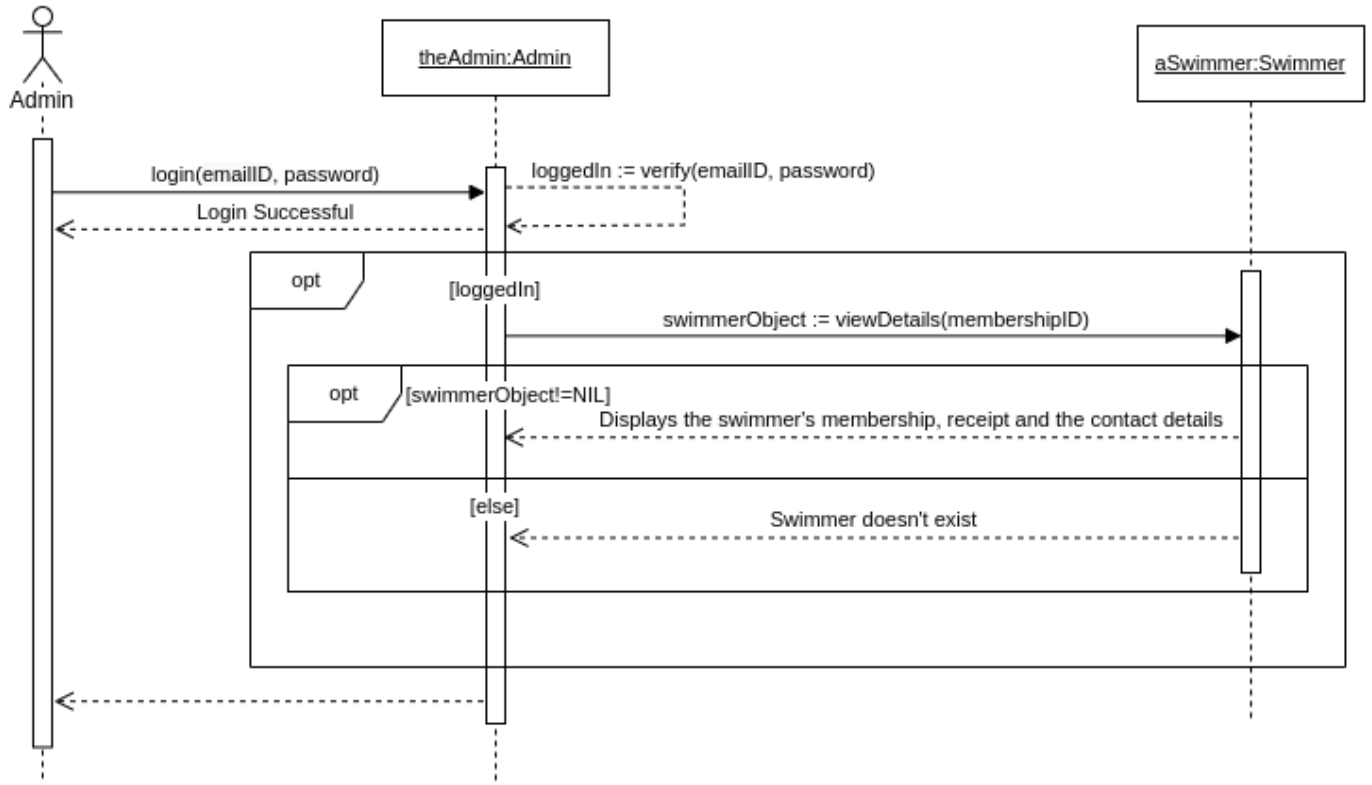
1.3.4 Search swimmer by membership ID - (for SPM)

After successfully logging in to the system, the SPM can view the details of a particular swimmer by entering the Membership ID of the respective swimmer. If the swimmer exists, details like name, role, dues (if any) and payment details will be displayed. Additionally, the visit history of the swimmer will be shown.



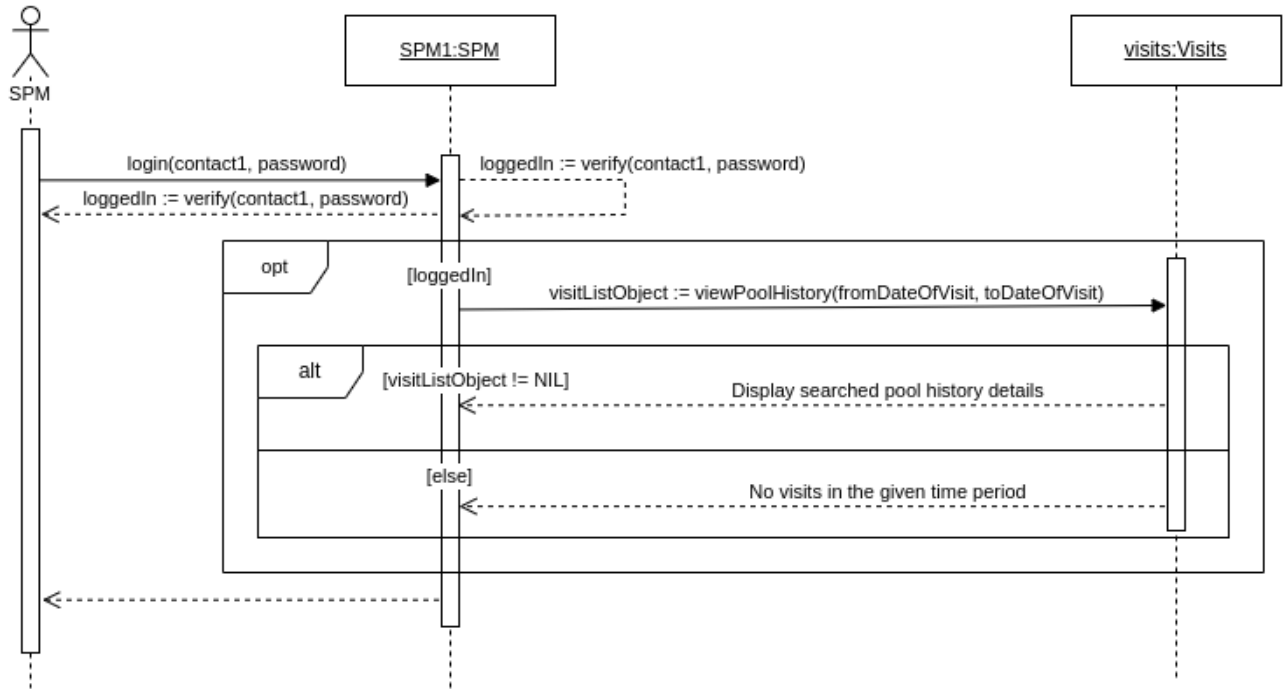
1.3.5 Search swimmer by membership ID - (for Admin)

After successfully logging in to the system, the Admin can view the details of a particular swimmer by entering the Membership ID of the respective swimmer. If the swimmer exists, details like name, role, dues (if any), contact information, email ID and payment details will be displayed. Additionally, the visit history of the swimmer will be shown.



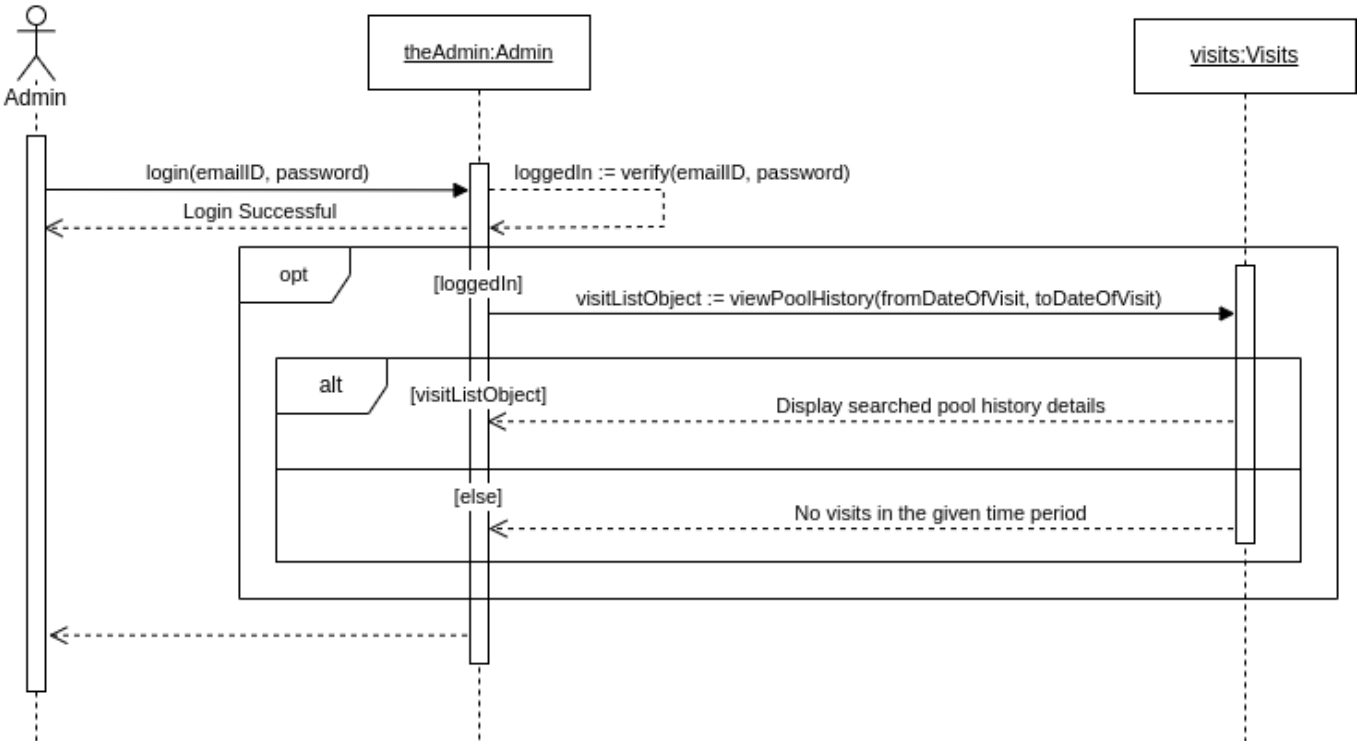
1.3.6 Search by date/date-range - (for SPM)

After successfully logging in to the system, the SPM can search for the swimmers who visited the pool on a particular date/date range. Details such as membership ID, date of visit and start-end time will be displayed.



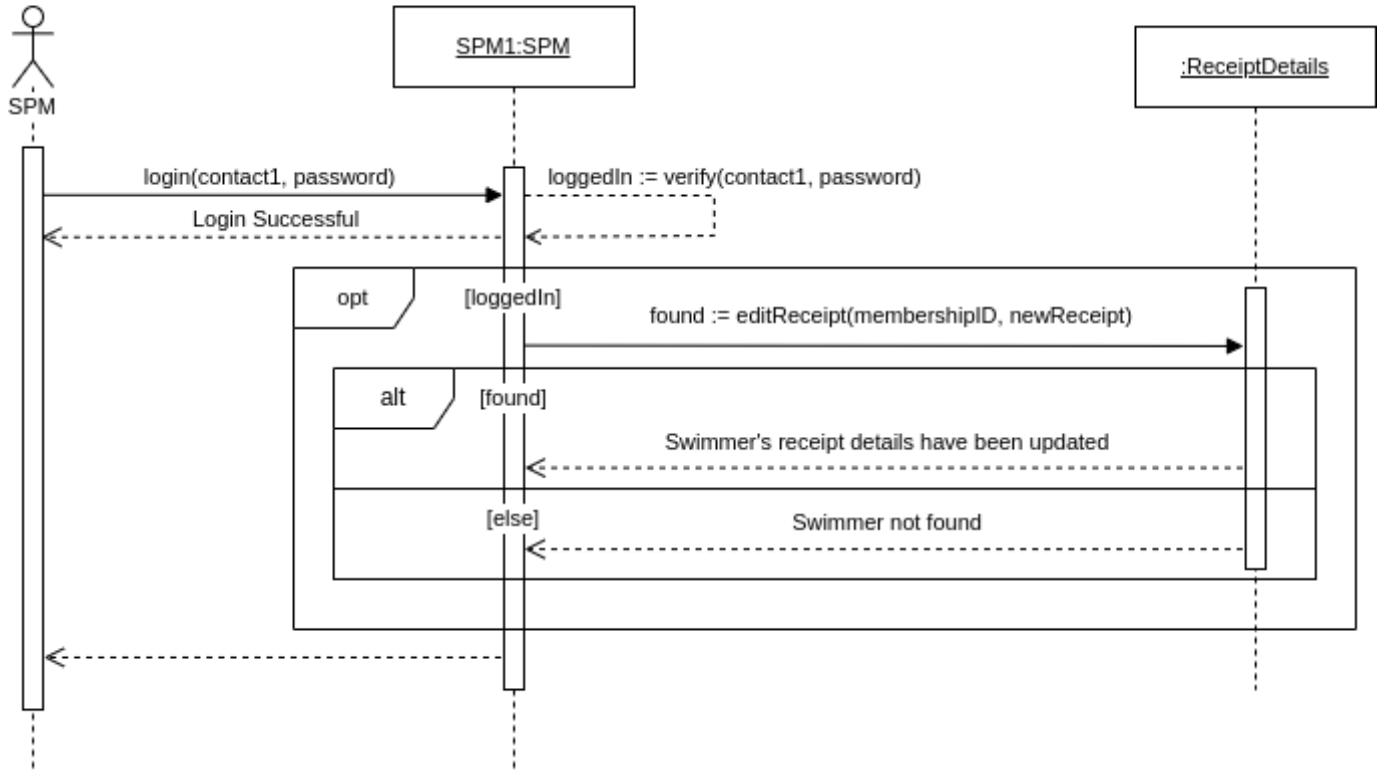
1.3.7 Search by date/date-range - (for Admin)

After successfully logging in to the system, the Admin can search for the swimmers who visited the pool on a particular date/date range. Details such as membership ID, date of visit and start-end time will be displayed.



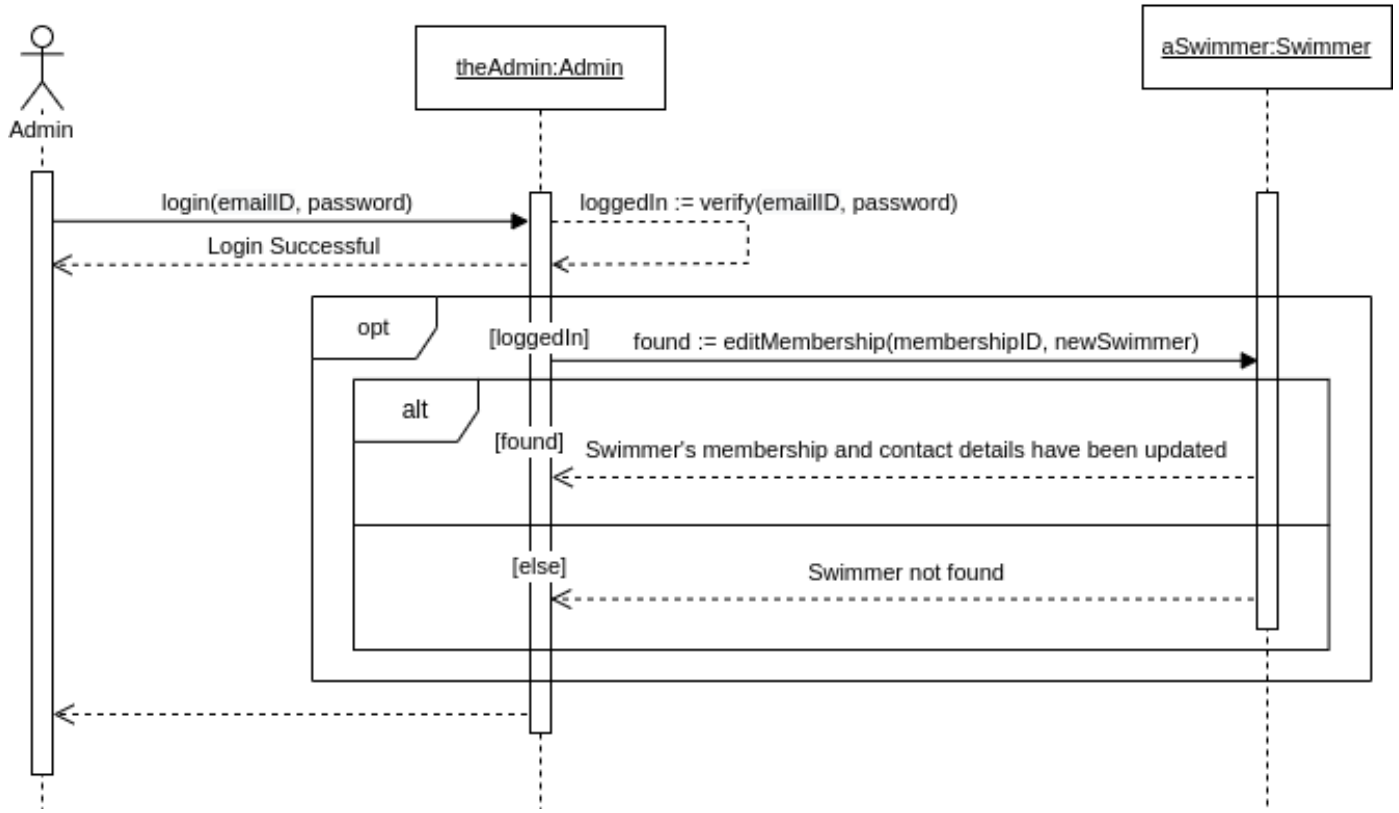
1.3.8 Edit receipt details

After successfully logging in to the system, the SPM can edit the receipt details of a particular swimmer. Initially, they have to search if the particular swimmer is registered to the system, using their membership ID. If the swimmer exists, the membership and receipt details will be displayed of which the receipt details will be made available for editing. The SPM will be informed that the required changes have been made.



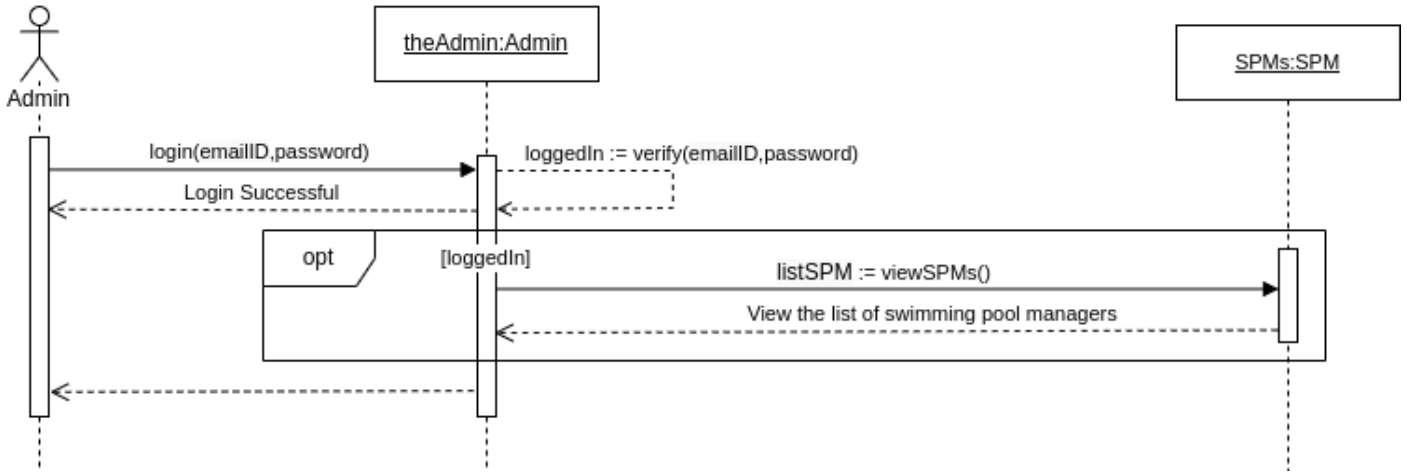
1.3.9 Edit swimmer details

After successfully logging in to the system, the Admin can edit the membership and contact details of a particular swimmer. Initially, they have to search if the particular swimmer is registered to the system, using their membership ID. If the swimmer exists, all the details of a particular swimmer will be displayed and everything except the receipt details and the membership ID can be edited. The Admin will be informed that the required changes have been made.



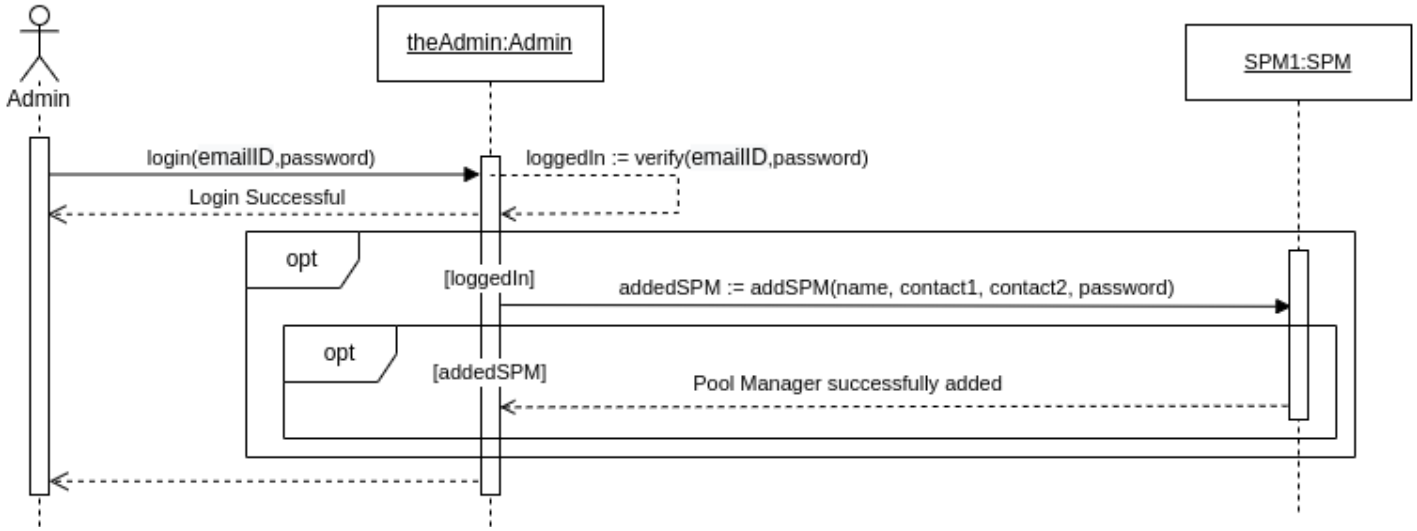
1.3.10 View SPM

After successfully logging in to the system, the Admin can view the list of SPMs.



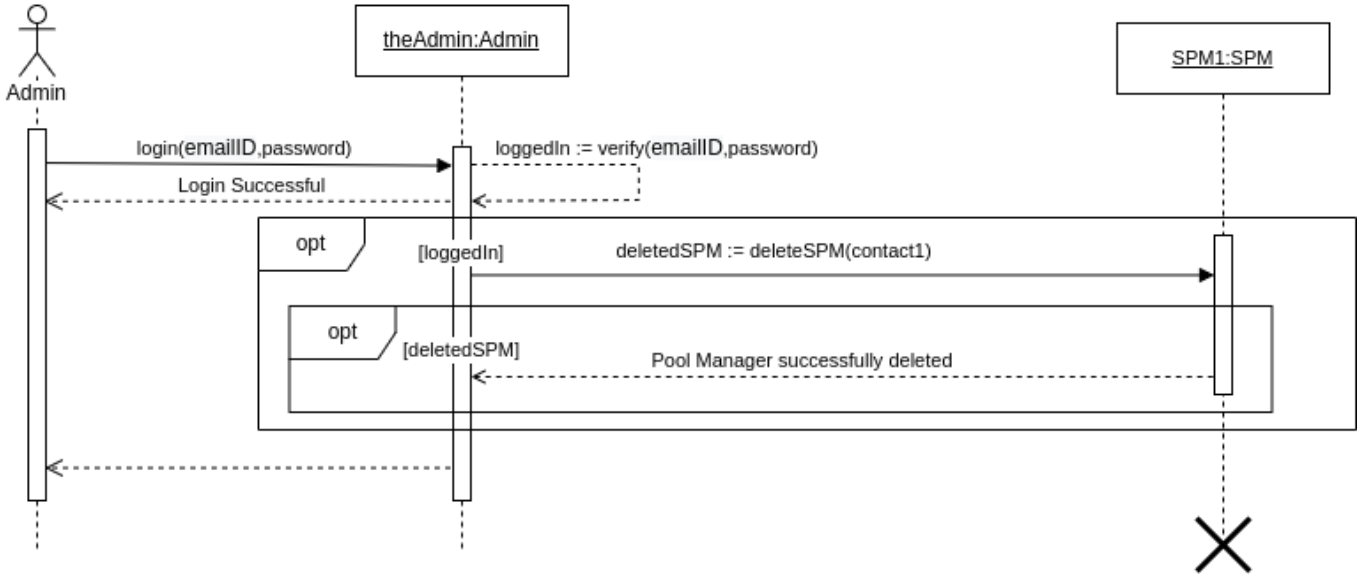
1.3.11 Add SPM

After successfully logging in to the system, the Admin can add an SPM by entering their name, contact details and password. Once the SPM has been added, the Admin will be able to view the SPM.



1.3.12 Delete SPM

After successfully logging in to the system, the Admin can view the list of SPMs, select the SPM that they wish to remove and delete them.

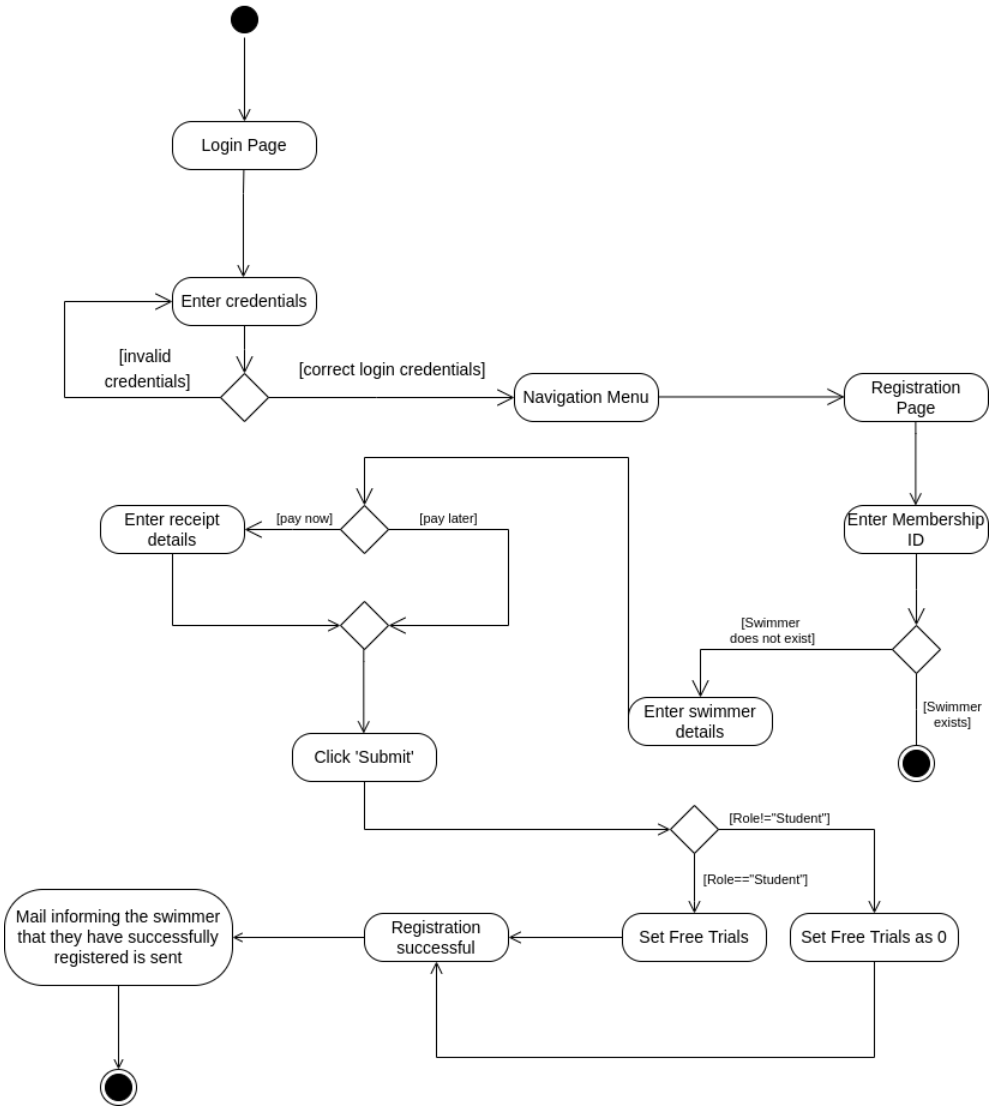


1.4 Control and Data Flows through Activity Diagrams

Activity diagrams graphically represent step-wise activities and actions involved in the workflow within a specific scenario, and helps to understand the flow of work that an object or component performs. Activity diagram uses rounded rectangles to represent a specific system function, arrows to represent flow through the system, decision diamonds to depict a branching decision, and solid horizontal lines to indicate that parallel activities are occurring.

1.4.1 Registration of a new swimmer

The SPM logs in to the system after the verification of their login credentials and registers the swimmer. The SPM will have two options: 'pay now' and 'pay later'. If the SPM chooses 'pay now', they can enter the receipt details of the swimmer. Otherwise, they can click submit to register the swimmer. The system will display to the SPM that the swimmer has been registered if they have been added to the system before.

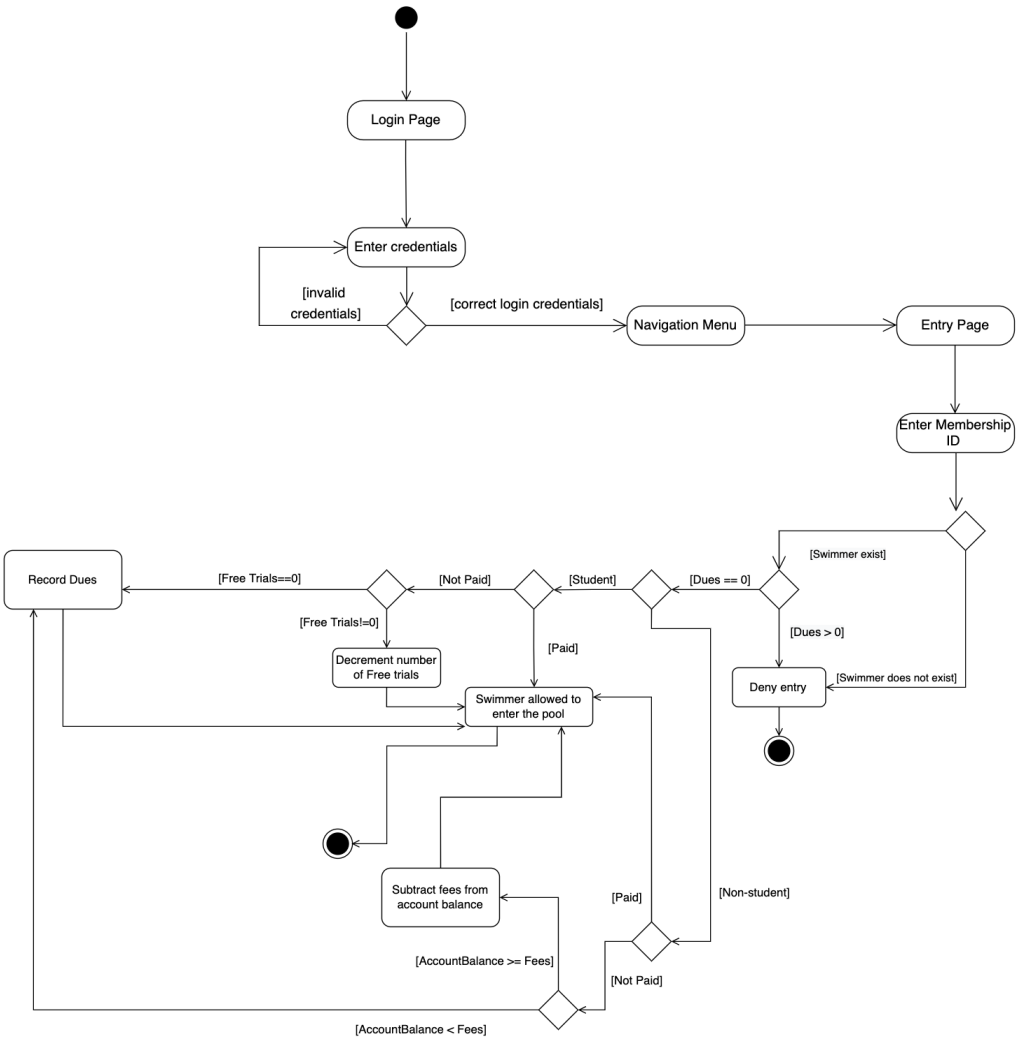


1.4.2 Swimmer Entry

The SPM logs in to the system after the verification of their login credentials. They proceed to the entry page and enter the membership ID of the swimmer. If the membership ID does not exist, the swimmer is denied entry into the pool and if it exists the system checks if the swimmer has dues or not. If they have dues, they are denied entry and if they don't have dues, the system checks if they are a student or non-student.

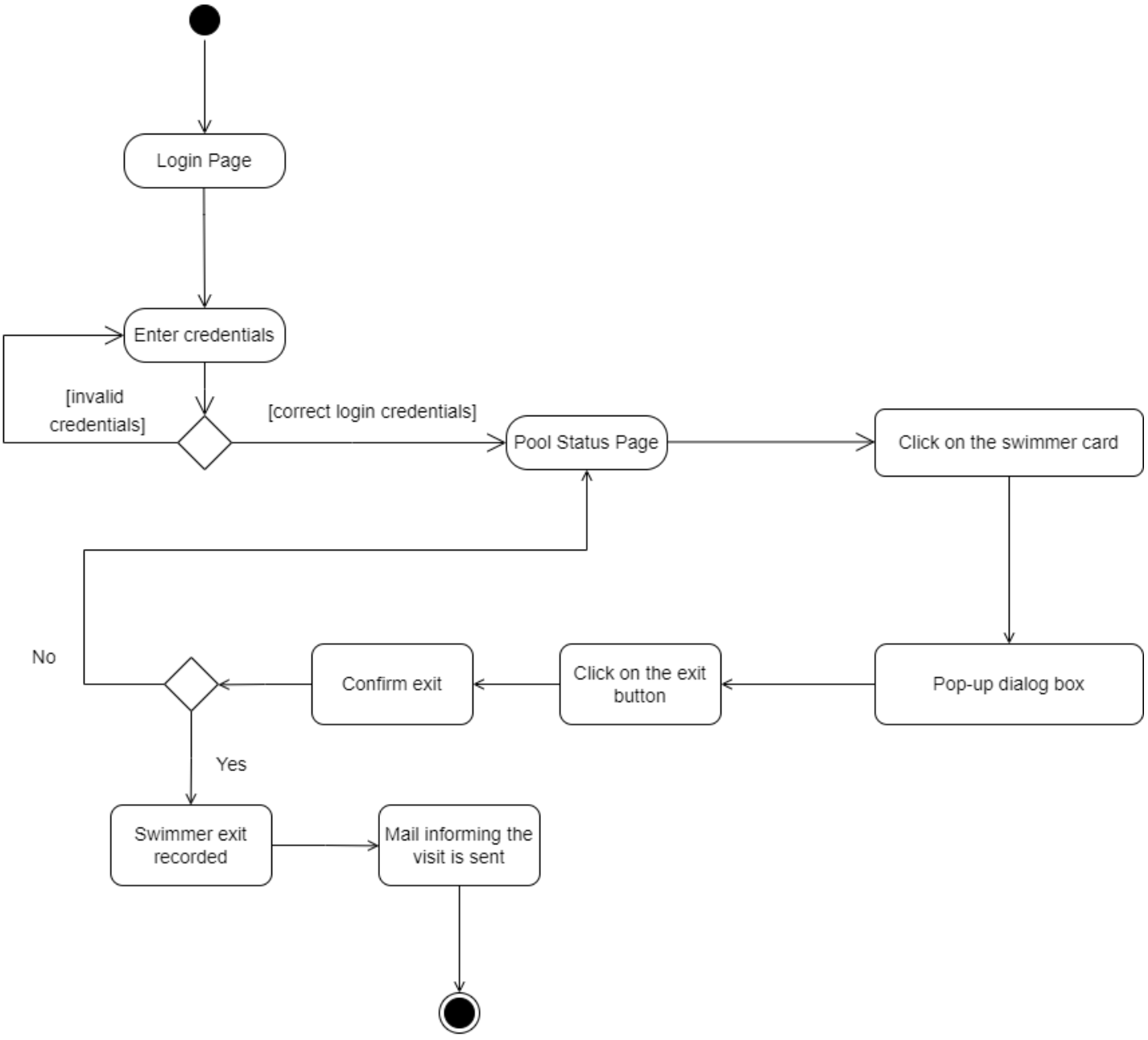
If they are a student, the swimmer is allowed to enter the pool if they have paid. If the student has not paid then the remaining number of free trials is checked. If the number of free trials is zero then the dues are recorded and the swimmer is permitted to enter the pool. If the student has free trials then the swimmer is allowed to enter the pool.

If they are a non-student swimmer and they have paid, the swimmer is allowed to enter the pool. If they have not paid, then the system checks their account balance and if it exceeds the quarterly fees, the fees are deducted from the account balance and the swimmer is allowed to enter the pool. If the account balance is less than the quarterly fees then the dues are recorded and the swimmer is allowed to enter the pool.



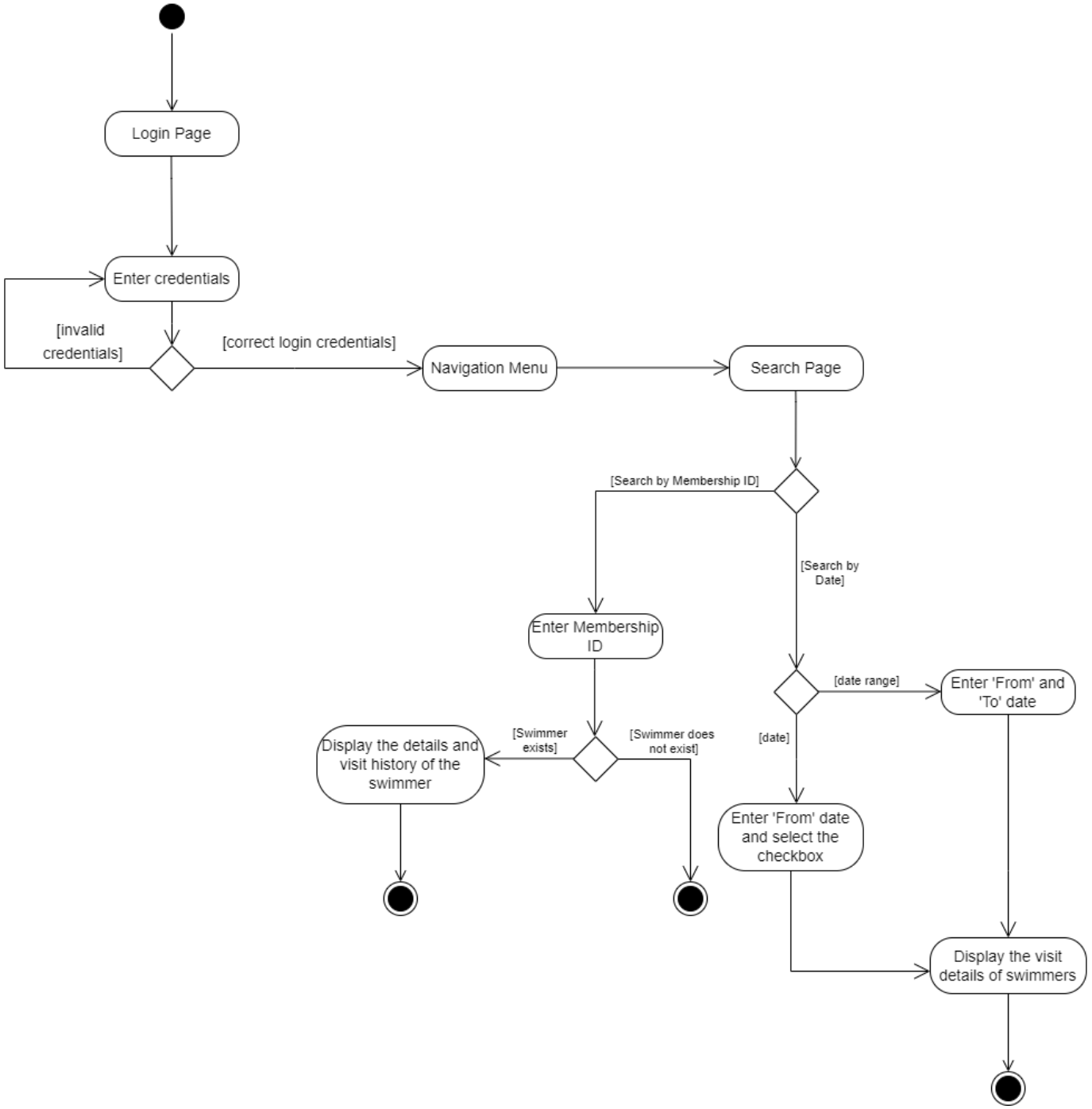
1.4.3 Swimmer Exit

After successfully logging in to the system, the SPM can view the list of swimmers currently in the pool and ‘exit’ a particular swimmer after clicking on the card containing the details of that swimmer and clicking on the ‘Exit’ button. A pop-up dialog box asking for confirmation will be displayed and if the SPM clicks ‘Yes’, the swimmer will be removed from the pool status page and their exit time will be recorded. Simultaneously, a mail is automatically sent to the swimmer informing them about the visit.



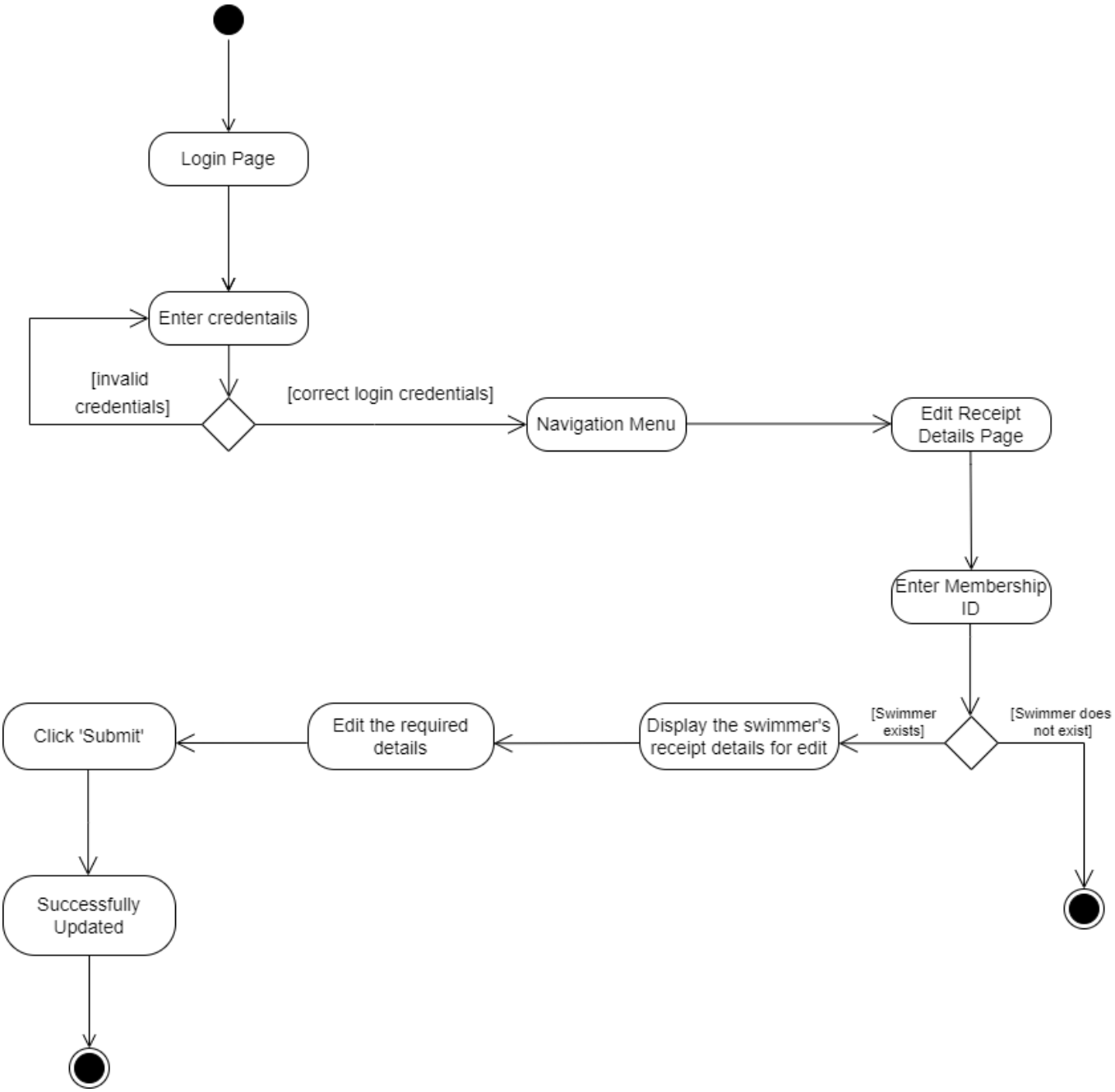
1.4.4 Search swimmer by date/date-range and Membership_ID

After successfully logging in to the system, the SPM and Admin can search for the swimmers who visited the pool on a particular date/date range. Details such as membership ID, date of visit and start-end time will be displayed. They can also find the details of a particular swimmer by entering the membership ID of the respective swimmer. If the swimmer exists, details like name, role, dues (if any) and payment details will be displayed to the SPM. Additionally, the visit history of the swimmer will be shown. For the Admin, contact details will also be visible.



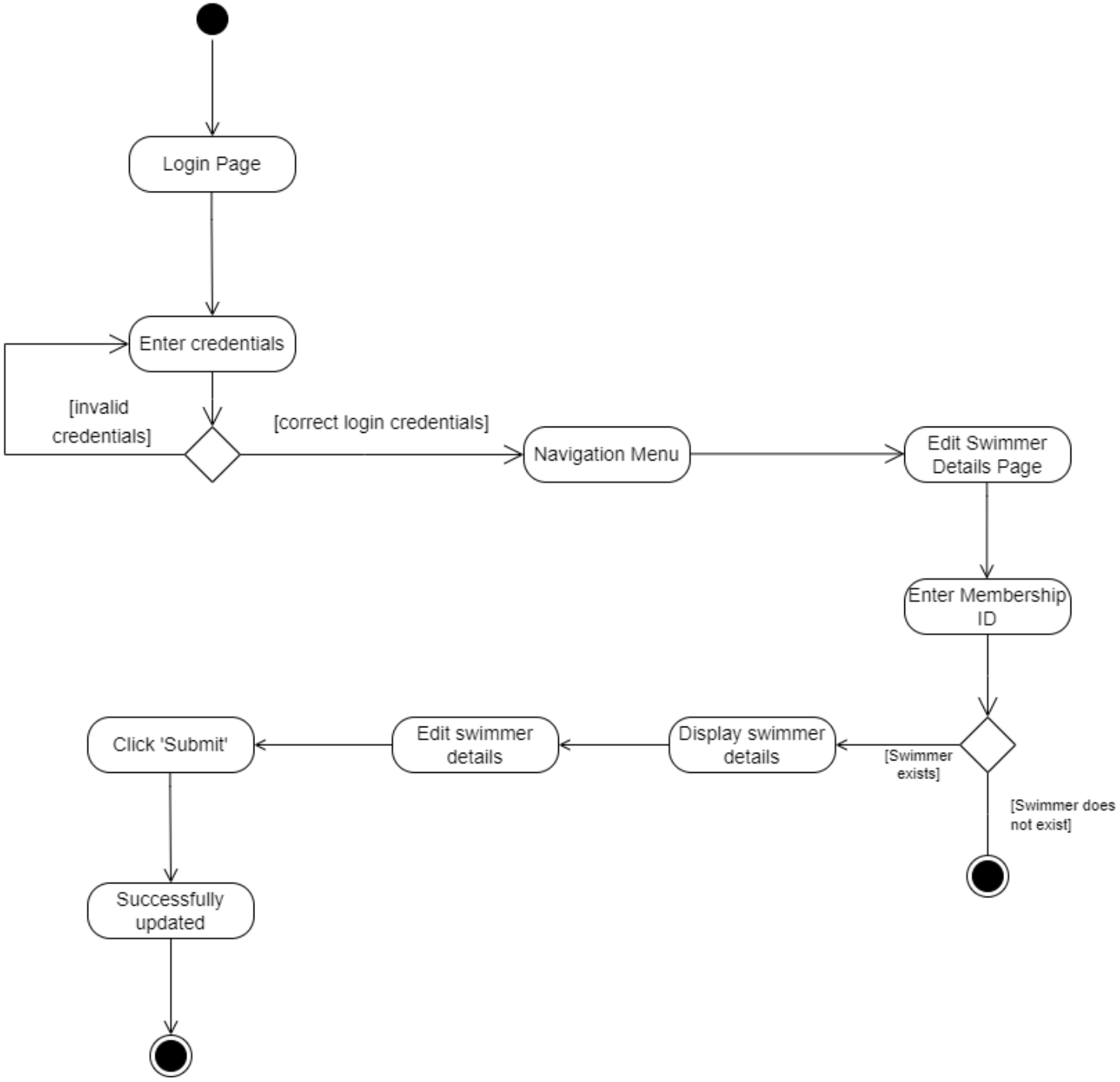
1.4.5 Edit receipt details

The SPM logs in to the system after the verification of their login credentials and proceeds to the edit receipt details page. The SPM enters the membership ID of the swimmer whose receipt details are to be edited. If the membership ID does not exist, the system displays an error message stating that the swimmer does not exist. If the membership ID does exist, all the details of the particular swimmer will be displayed and the receipt details will be made available for editing. The SPM makes the necessary changes and clicks the submit button. The SPM will be informed that the required changes have been made.



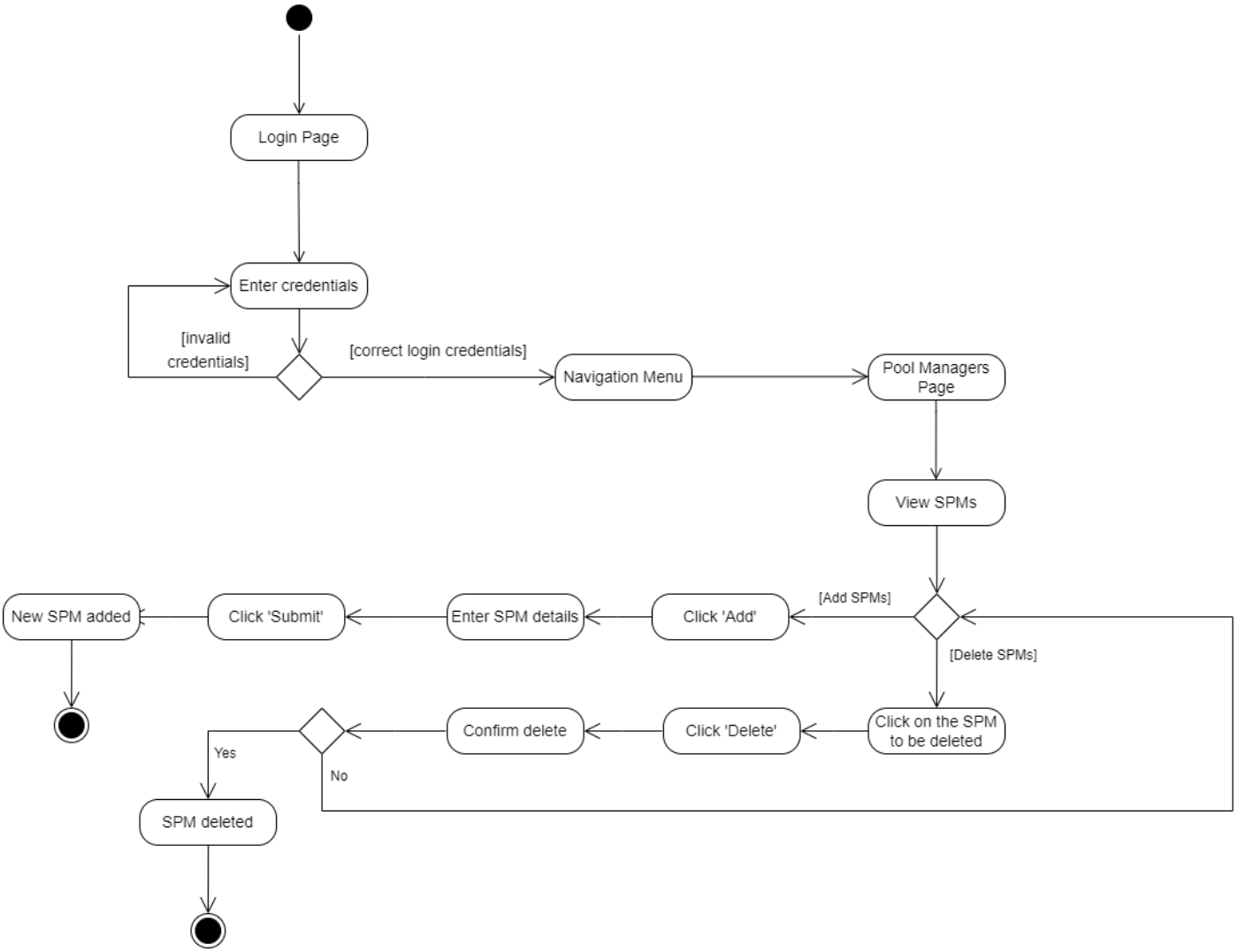
1.4.6 Edit swimmer details

The Admin logs in to the system after the verification of their login credentials and proceeds to the edit swimmer details page. The Admin enters the membership ID of the swimmer whose details are to be edited. If the membership ID does not exist, the system displays an error message stating that the swimmer does not exist. If the membership ID does exist, all the details of the particular swimmer will be displayed and all the details except the receipt details and the membership ID will be made available for editing. The Admin makes the necessary changes and clicks the submit button. The Admin will be informed that the required changes have been made.



1.4.7 Manage SPMs

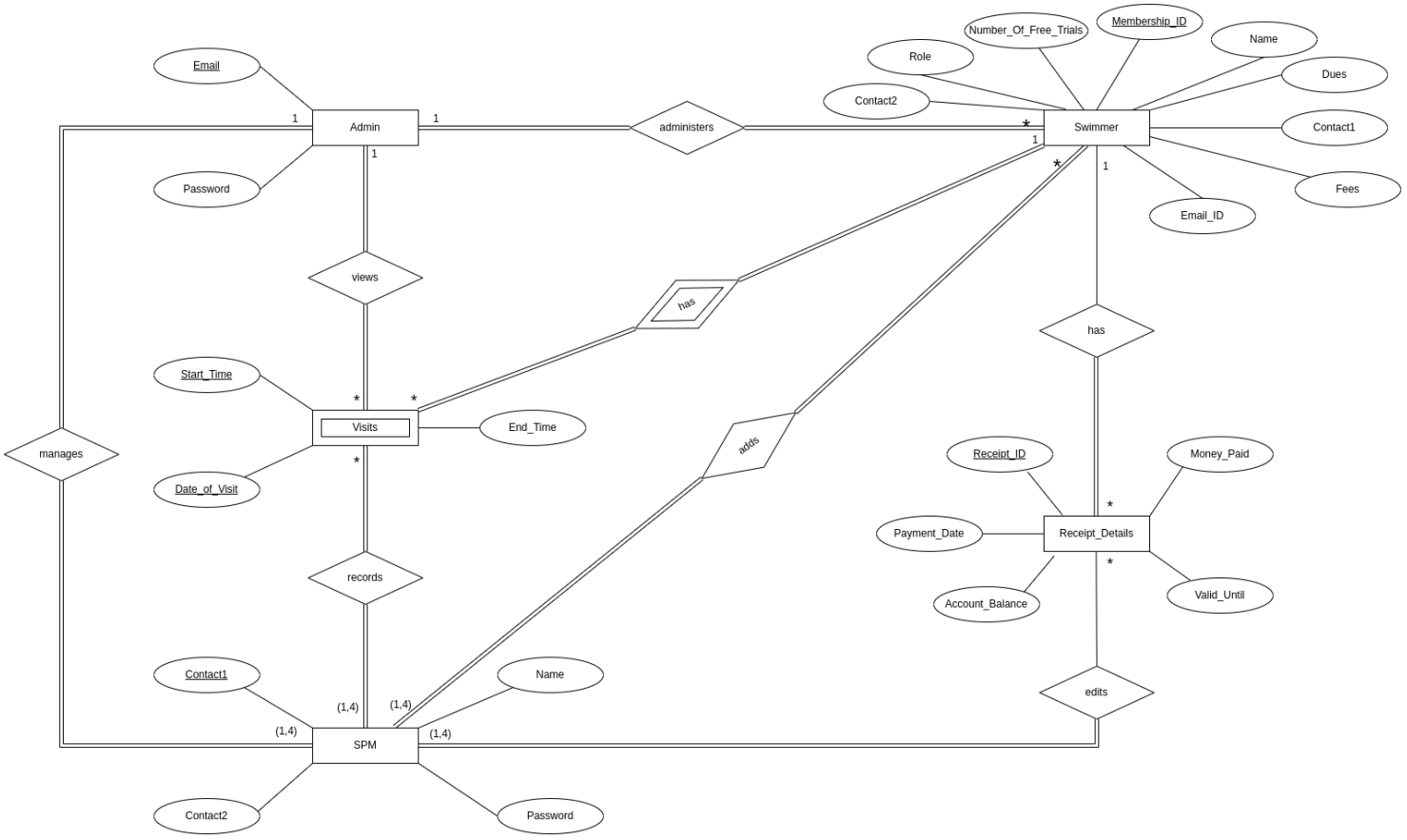
After successfully logging in, the Admin can view the SPMs that have been added. They can add SPMs by entering their name, contact details and password. If the SPM wishes to delete a particular SPM, the Admin has to click on the card of the SPM that they wish to delete and click the ‘Delete’ button. A confirmation dialog box will be displayed. If they click ‘yes’, the SPM will be deleted from the system. Otherwise, they will be redirected to the SPM view screen.



2. Database Design

2.1 ER Diagram

ER (Entity-Relationship) model is designed to represent the things that a system needs to remember in order to perform the system functionalities. It graphically represents the data model that defines the information structure which should be implemented in the database. The data objects (entity) are represented by a labelled rectangle and the relationships are indicated with a labelled line connecting objects.



3. Implementation Plans

3.1 Technology Stack

Framework	Flutter [Dart]
Interface design tool	Figma
Cloud platform [Database Management System]	Firebase
Collaboration tool	Trello
Version Control	Git
Diagram drawing tool	app.diagrams.net, StarUML

3.2 Work Estimates

Description	**Time Estimate (Hours)**	**Team Members Involved**	**Date of Completion**
Landing Page	30 minutes	Lenoah	15.03.22
Login and Navigation menu	2 hours	Pavithra, Varun	16.03.22
Pool Managers Screen (Admin View)	1 hour	Akshay	17.03.22
Add and Delete SPMs (Admin View)	3 hours	Abin, Joseph, Lenoah	18.03.22
Edit swimmer details (Admin View)	4 hours	Akshay, Pavithra, Abin	19.03.22
Display of swimmer details (common view with additional details displayed for Admin)	3 hours	Joseph, Lenoah, Akshay	20.03.22
Search page for membership ID and date/date range (common view)	2 hours	Lenoah, Varun	21.03.22
Display visit details for date range search (common view with download option for Admins)	4 hours	Pavithra, Akshay, Joseph, Abin	22.03.22
Display pending dues (Admin View)	2 hours	Joseph, Akshay	24.03.22
Download Quarterly Collection and Visit Report (Admin View)	2 hours	Varun, Abin	25.03.22

Registration for swimmer (SPM View)	4 hours	Pavithra, Lenoah, Varun	26.03.22
Pool status page with exit functionality (SPM View)	5 hours	Pavithra, Joseph, Akshay, Abin, Varun	27.03.22
Edit receipt details (SPM View)	2 hours	Lenoah, Joseph	28.03.22
Entry swimmer page with warning dialogue boxes (SPM View)	3 hours	Pavithra, Varun, Abin	29.03.22

References

1. T. C. Lethbridge and R. Laganiere (2004), *Object Oriented Software Engineering*, 1/e, Tata McGraw Hill.
2. Massimo Felici (2004), *Sequence Diagram Notes,* School of Informatics.