Requirements Specification Document
Study Room Booker

Acrosoft

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Contents

List of Figures

Revision History

Name	Date	Reason for Changes	Version
Everyone	25 Sept 2019	Initial start to RD	RD 0.5
Everyone	28 Sept 2019	Completed first draft	RD 0.6
Everyone	29 Sept 2019	Glossary updated and formatting	RD 0.7
Ashley, Keegan	30 Sept 2019	Fixed page numbering	RD 1.0
Everyone	12 Oct 2019	Updated RSD with TA and Client feedback	RSD 0.5
Everyone	15 Oct 2019	Added Use Cases	RSD 0.6
Everyone	15 Oct 2019	Added Use Case Diagram, updated page numbering	RSD 1.0
Clients	17 Oct 2019	Client feedback.	RSD 1.1
Katherine	18 Oct 2019	Added all comments from the clients and TA to the document in each section.	RSD 1.2
Ashley, Cathy	21 Oct 2019	Fixed wording according to comments from TA and clients, added View Booking History feature.	RSD 1.3
Everyone	22 Oct 2019	Updated several sections of the document from client and TA feedback.	RSD 1.4
Everyone	23 Oct 2019	Added administrative capabilities feature and use cases: Add/Remove building, Add/Remove Study Room, View Building. Reworked Change Building Hours.	RSD 1.5
Filip	26 Oct 2019	Section 5 substantially reworked. Fixed requirements numbering, software quality attributes added/rephrased.	RSD 1.6
Katherine	29 Oct 2019	Replaced use case diagram with reworked version.	RSD 1.7
Vernon	29 Oct 2019	Section 4 and 5 modified for consistency.	RSD 1.8
Everyone	29 Oct 2019	Completed all revisions, added ERD, every DFD's, and data dictionary.	RSD 2.0
Katherine	09 Nov 2019	Updated ERD and Use Case Diagram	RSD 2.1
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Ashley	11 Nov 2019	Updated the use cases and revisions on the Data Flow Diagrams	RSD 2.3
Vernon	11 Nov 2019	Worked on sequence diagrams	RSD 2.4
Vernon	12 Nov 2019	Worked on sequence diagrams	RSD 2.5

Vernon	13 Nov 2019	Finished sequence diagrams	RSD 2.6
Katherine, Ashley	13 Nov 2019	Added all prototypes	RSD 2.7
Everyone	14 Nov 2019	Revised RSD with TA feedback.	RSD 3.0

1 Introduction

1.1 Purpose

This is a requirements specification document for Study Room Booker, a room reservation application for Green Meadows University (GMU). GMU is a post-secondary institution in Victoria, BC offering education in a variety of subjects including arts, sciences, and humanities. Study Room Booker will replace the current systems where study rooms located in different buildings on campus require users to navigate to different websites to book a study room.

This document will describe both functional and non-functional requirements of the Study Room Booker system.

1.2 Project Scope

Study Room Booker will be a web-based application that will support mobile accessibility. The design will utilize GMU's databases for storing all building, study room, and study room session data. Study Room Booker will also utilize GMU's login API.

The goals of Study Room Booker system are to provide the following:

- Stream-lined study room bookings across the GMU campus.
- Allow users to easily create, cancel, or modify study room sessions.
- Real-time information on room availability.

1.3 Glossary of Terms

Term	Definition
Access Token	A signed self-contained token retrieved from GMU's login API which contains information to differentiate users and their user roles (User, Administrator).
API (Application Program Interface)	A defined set of endpoints where a request can be sent for processing.
Booking	Reservation of an area and/or service by an individual or group.
Cancellation	The removal of a booking from the booking system.
Email Notification	An email automatically sent to a GMU user after booking a study room session, cancelling a study room session, or after a GMU administrator edits his or her study room session.

Double Booking	A booking error that arises when a GMU user attempts to book the same study room as another GMU user in the same time slot.
GMU	Abbreviation for Green Meadows University.
GMU Account	A Green Meadows University account for students and faculty.
GMU Username	An identification of a GMU account, which should be a GMU email address.
HTTPS (Hypertext Transfer Protocol Secure)	An extension of the Hypertext Transfer Protocol (HTTP). It is used for secure communication over a computer network[5].
Logged-in	The state of a GMU user after being authenticated with his or her GMU account. A logged-in GMU user is granted access to protected resources based on the GMU user's authorization level (either a GMU user or GMU administrator).
Sans Serif Fonts	Letterforms that do not have extending features called "serifs" at the end of strokes, such as Calibri and Arial.
SMTP (Simple Mail Transfer Protocol)	A communication protocol for electronic mail transmission[6].
Study Room Session	A study room session is a confirmed booking of a study room. It consists of a start time, an end time, and a location. Each GMU user must specify this information in order to book a study room session.
System Administrators	GMU staff who are tasked with maintaining computer systems and network infrastructure.
TLS (Transport Layer Security)	A cryptographic protocol designed to provide communications security over a computer network[7]

1.4 References

[1] Green Meadows University Team 7. (17 September 2019). *Green Meadows University*. [Webpage]. http://www.fromastera.com/321project/SENG321_Clients/

[2] Personal Information Protection Act. (11 September 2019). Retrieved 26 September 2019, from http://www.bclaws.ca/civix/document/id/complete/statreg/03063_01#part3

[5] HTTPS definition. Retrieved 26 September 2019, from https://en.wikipedia.org/wiki/HTTPS

[6] Simple Mail Transfer Protocol definition. Retrieved 26 September 2019, from https://en.wikipedia.org/wiki/Simple_Mail_Transfer_Protocol

[7] Transport Layer Security definition. Retrieved 26 September 2019, from https://en.wikipedia.org/wiki/Transport_Layer_Security

1.5 Overview

The requirements specification document has 4 main sections:

- *Overall Description* will discuss design constraints, assumptions, dependencies and a description of the operating environment.
- *System Features* breaks down each Study Room Booker feature into the following: description, functional requirements, and use cases.
- *External Interface Requirements* details the characteristics of each interface between the software and the users. This section will include descriptions of the user, hardware, software and communication interfaces and how these components will be utilized.
- *Other Functional Requirements* include details of software functionality such as performance, safety, and security requirements, along with the quality of software attributes.

Lastly, the appendix contains unresolved requirements such as pending decisions, background information, and conflict resolution.

2 Overall Description

This section of the RSD will provide a brief overview of the project.

2.1 Product Perspective

Study Room Booker will be a web application that is separate, but accessible, from the GMU website and will be accessible to the user classes that are listed in section 2.3. Study Room Booker will replace the university's current system, which consists of separate booking systems for different buildings that offer a booking service.

2.2 Product Features

Study Room Booker's features include a log-in system, booking and cancelling study rooms, and real-time scheduling. Once a GMU user has logged-in with his or her GMU username and password, Study Room Booker allows each GMU user to search for available rooms and book up to 2 hours per day. Once a booking is created, each GMU user will be able to view his or her upcoming bookings and may also cancel any bookings he or she has created. The application will also show each user his or her booking history. These features are further explained in section 3.

2.3 User Classes and Characteristics

Study Room Booker application will be used by the following two user classes:

GMU User

Each individual with a valid GMU username is considered a GMU user of the Study Room Booker application. Each GMU user must log-into the application using his or her GMU username and password to gain access to the other functions. Each GMU user will be able to search for available study rooms, book a room, and cancel a booking. GMU users will also be able to view his or her past room bookings, and upcoming bookings. GMU users' personal information must not be accessible by other GMU users.

GMU Administrator

A GMU administrator is a GMU user with additional administrative capabilities. The administrative capabilities include adding/removing buildings, adding/removing study rooms, and modifying building hours. Each GMU administrator must have access to the GMU username of each person that has booked a study room study room session.

2.4 Operating Environment

The Study Room Booker will be a web application and hosted on a GMU server. The web client must be supported on the following operating systems: Windows, Linux, Android, MacOS, and iOS and must be supported on Mozilla Firefox, Google Chrome, Safari, and Microsoft Edge. See section 4.3 for details on specific versions.

2.5 Design and Implementation Constraints

Study Room Booker must abide by British Columbia's Personal Protection Information Act [2].

2.6 Assumptions and dependencies

The main assumption that the Study Room Booker has is that all GMU users have the knowledge to use the basic functions of a web browser and navigate a website. Additionally, the primary language of GMU is English and the website is in English, therefore the application interface must be in English.

Study Room Booker is also dependant on the following:

- GMU's Log-in API

  Used to authenticate GMU users using his or her username and password, and grant authorization to access the Study Room Booker based on his or her user class.

- GMU's Building and Study Room Database

  The building and study room database from the former system, which includes existing buildings and room data, will be reused to cut on time and costs.

3 System Features

This section of the document describes the functional requirements of Study Room Booker. This section also includes a use case diagram, use cases, and system sequence diagrams for each system feature.

3.0.1 Use Case Diagram

The use case diagram below shows how the GMU users interact with Study Room Booker.

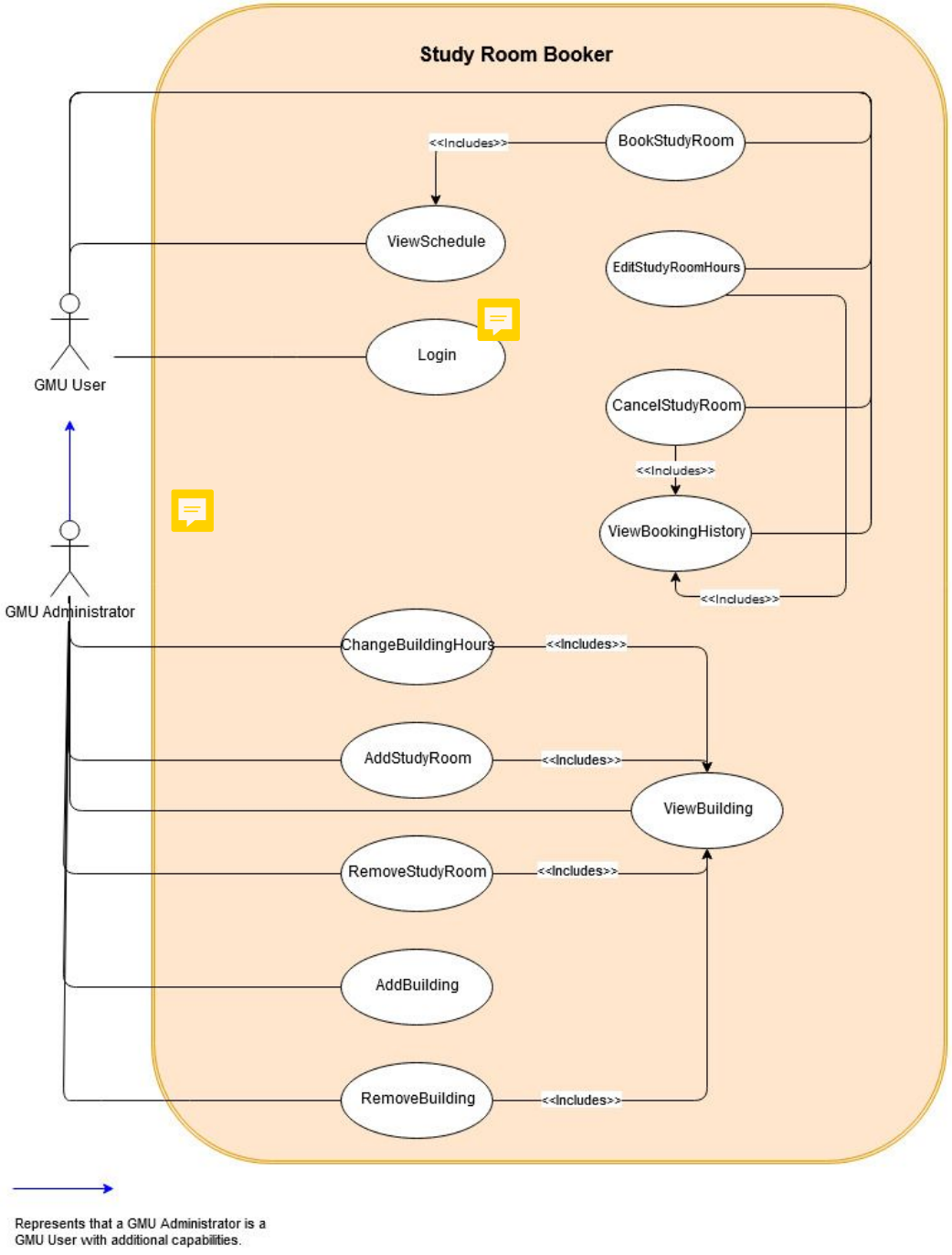

Diagram 1. Use Case Diagram

3.1 View Schedule

3.1.1 Description and Priority

The view schedule feature has a high priority in the Study Room Booker. This feature allows each GMU user to view all available study room sessions across campus. Each GMU user must view the schedule to see available study rooms.

3.1.2 Functional Requirements

REQ-1: Each GMU user must be able to view the operational hours of each building through the schedule.

REQ-2: Each GMU user must be able to view the availability of each study room through the schedule.

3.1.3 Use Cases

Use Case: ViewSchedule
ID: UC-1
Brief Description: A GMU user views the GMU study room schedule.
Actor: A GMU user
Preconditions 1. The GMU user has accessed the GMU Study Room Booker webapp.
Main Flow: 1. 2. The GMU user is displayed the schedule of the current day of every building by default 3. The GMU user can change the date and collapse or expand tabs of buildings in order to filter for different buildings or different days
Postconditions: 1. The GMU user has viewed the schedule.
Alternative Flow(s): None.

3.1.4 Sequence Diagram

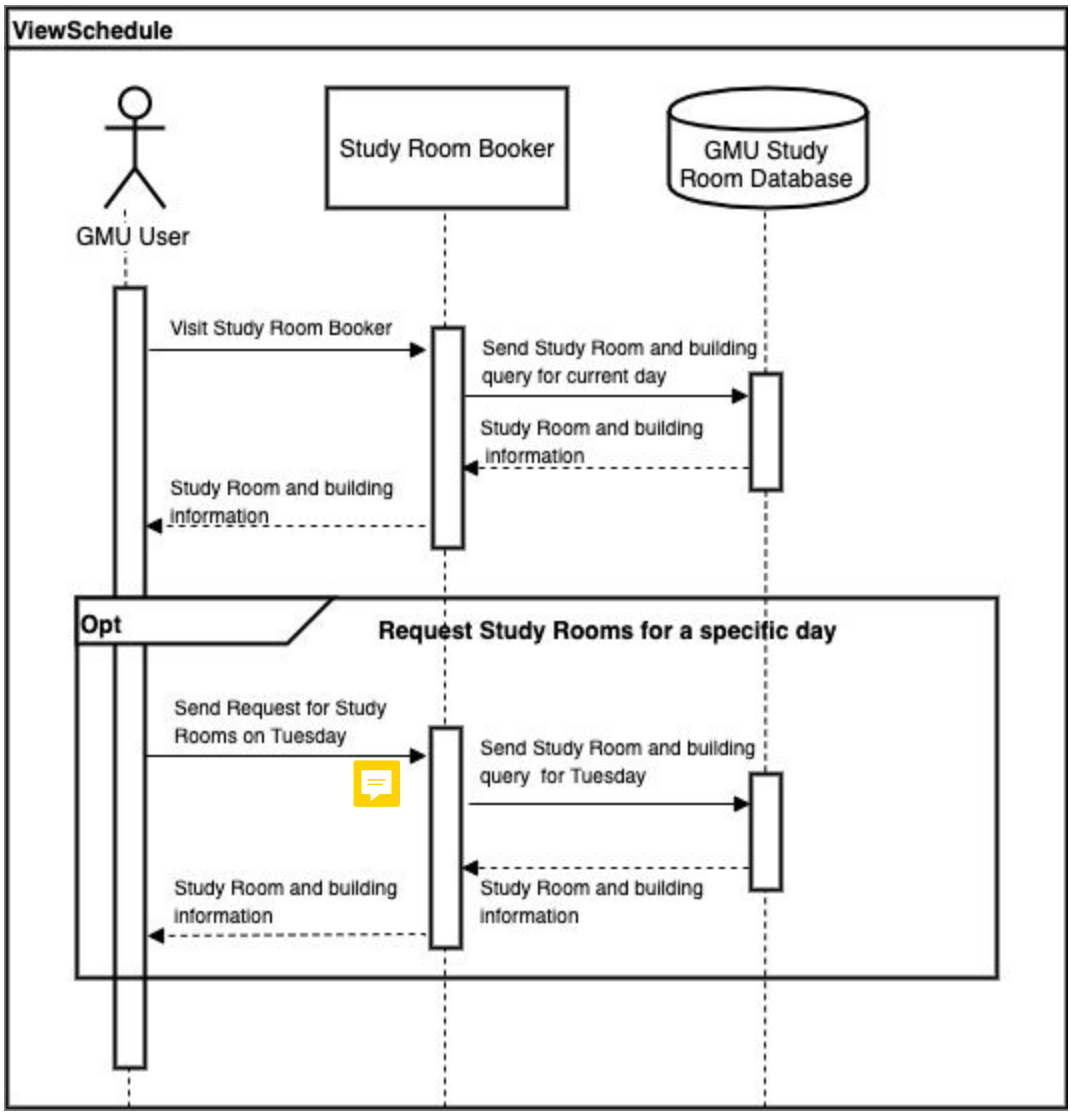

Figure 2: System Sequence Diagram: View Schedule

3.2 User Login

3.2.1 Description and Priority

The user login feature has a high priority in the Study Room Booker. A GMU user must be able to log in with a valid GMU username and its corresponding valid password. If a GMU user has forgotten his or her password, or provides an invalid GMU username, they will be provided a link to the GMU computer help desk web page.

3.2.2 Functional Requirements

REQ-3: Each GMU user must be able to log in to Study Room Booker with a valid GMU account.

REQ-4: Each GMU user must be able to log out of Study Room Booker at any time.

REQ-5: Each GMU user must be provided with a link to the GMU computer help desk web page if they forget his or her password or GMU username.

3.2.3 Use Cases

Use Case: Login
ID: UC-2
Brief Description: A GMU user logs in to Study Room Booker using his or her GMU username and password.
Actor: A GMU user
Preconditions: 1. The GMU user has a GMU account.
Main Flow: 1. The GMU user selects the login button. 2. The GMU user is prompted to enter his or her username and password. 3. The GMU user is logged-in to his or her GMU account.
Postconditions: 1. The GMU user can access functionality of Study Room Booker. 2. The GMU user is redirected to ViewSchedule.
Alternative Flow(s): 2.1 The GMU user enters a username that does not exist or a password that does not match the record for a username. 2.2 The GMU user receives an error message for login failure. 2.3 The GMU user is prompted with a link to the GMU computer help desk.

3.2.4 Sequence Diagram

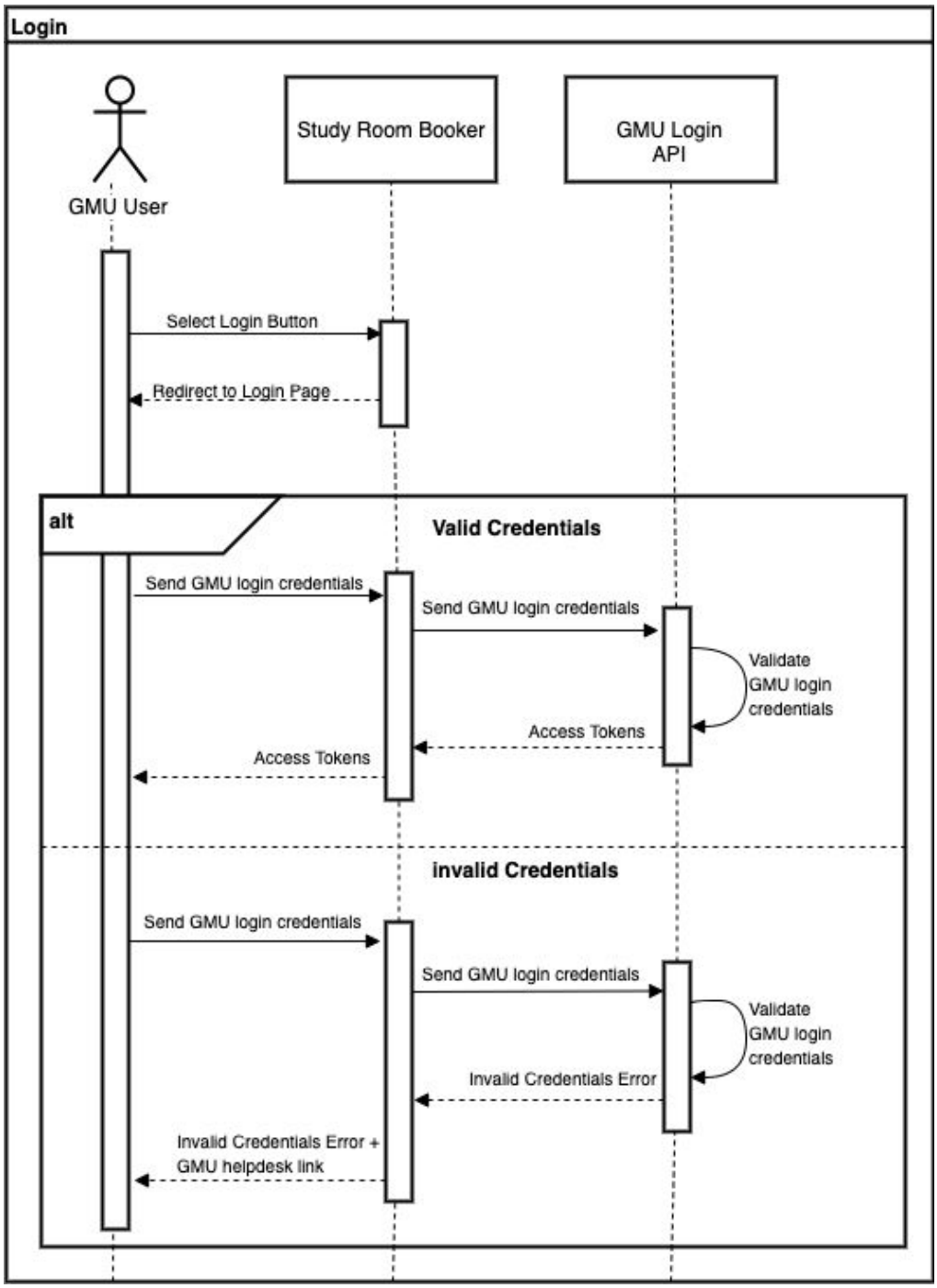

Figure 3: System Sequence Diagram: Login

3.3 View Booking History

3.3.1 Description and Priority

The view booking history feature has a high priority. Each GMU user must be able to view all of his or her study room sessions, and each GMU administrator must be able to view all study room sessions for a specific building.

3.3.2 Functional Requirements

REQ-6: Each logged-in GMU user must be able to view all of his or her study room session(s).

> REQ-6.1: Each logged-in GMU user must be able to view his or her study room session(s) in chronological order.

3.3.3 Use Cases

Use Case: ViewBookingHistory
ID: UC-3
Brief Description: A GMU user wants to view his or her booking history, or a GMU administrator wants to view all GMU users' booking histories for a specific building.
Actor: A GMU user
Preconditions: 1. The GMU user is logged-in.
Main Flow: 1. The GMU user selects the "Booking History" option. 2. The GMU user is displayed a list of all of his or her study room sessions in chronological order.
Postconditions: None.
Alternative Flow(s): None.

3.3.4 Sequence Diagram

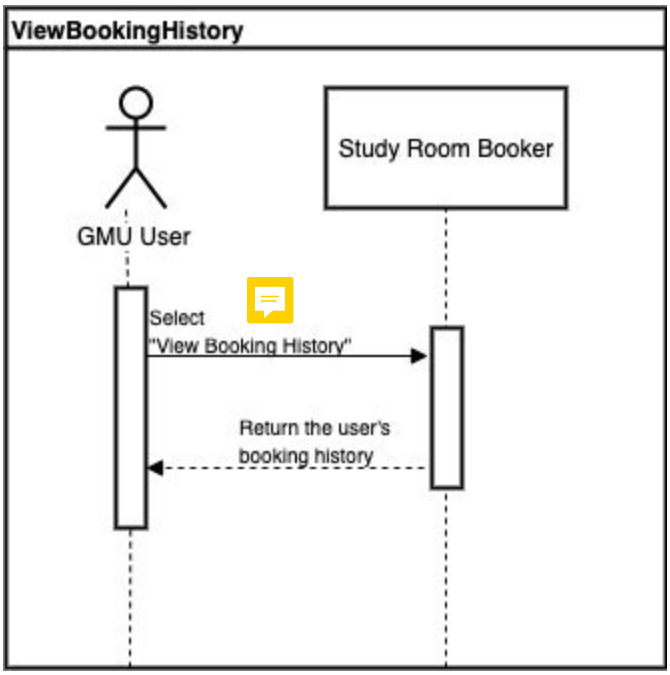

Figure 4: System Sequence Diagram: View Booking History

3.4 Booking a Study Room Session

3.4.1 Description and Priority

The booking a study room session feature has a high priority. A logged-in GMU user must be able to book an available study room session. If the GMU user books a session for less than the maximum time allowed per day (2 hours), the GMU user can book multiple rooms in increments of 15 minutes. Each GMU user must receive an email notification about his or her study room session 30 minutes before the start time. Additionally, GMU users must be notified of any changes made by an administrator to a study room session.

3.4.2 Functional Requirements

REQ-7: Each logged-in GMU user must be able to book a new study room session.

REQ-8: Each logged-in GMU user will have his or her study room session booking rejected if the study room session they are trying to book overlaps with an already existing study room session.

REQ-9: Each logged-in GMU user will receive an email notification of his or her upcoming booking sent to his or her GMU webmail (The GMU user does not need to be logged-in).

3.4.3 Use Cases

Use Case: BookStudyRoom
ID: UC-4
Brief Description: A GMU user wants to book a study room session.
Actor: A GMU user
Preconditions: 1. The GMU user is logged-in.
Main Flow: 1. Include (ViewSchedule). 2. The GMU user selects an available study room session. 3. The GMU user is shown the editable room booking form. 4. The GMU user specifies a start and end time for the study room session. 5. If the room is already booked: 6.1 The GMU user is prompted with an error message. 6. Else: 7.1 The study room session is booked.
Postconditions: 1. The GMU user has booked a study room session.
Alternative Flow(s): 5.1 Else if the GMU user tries to book a study room session longer than 2 hours 5.2 A message stating the study room duration is over the 2 hour limit, and returns the GMU user to the schedule.

3.4.4 Sequence Diagram

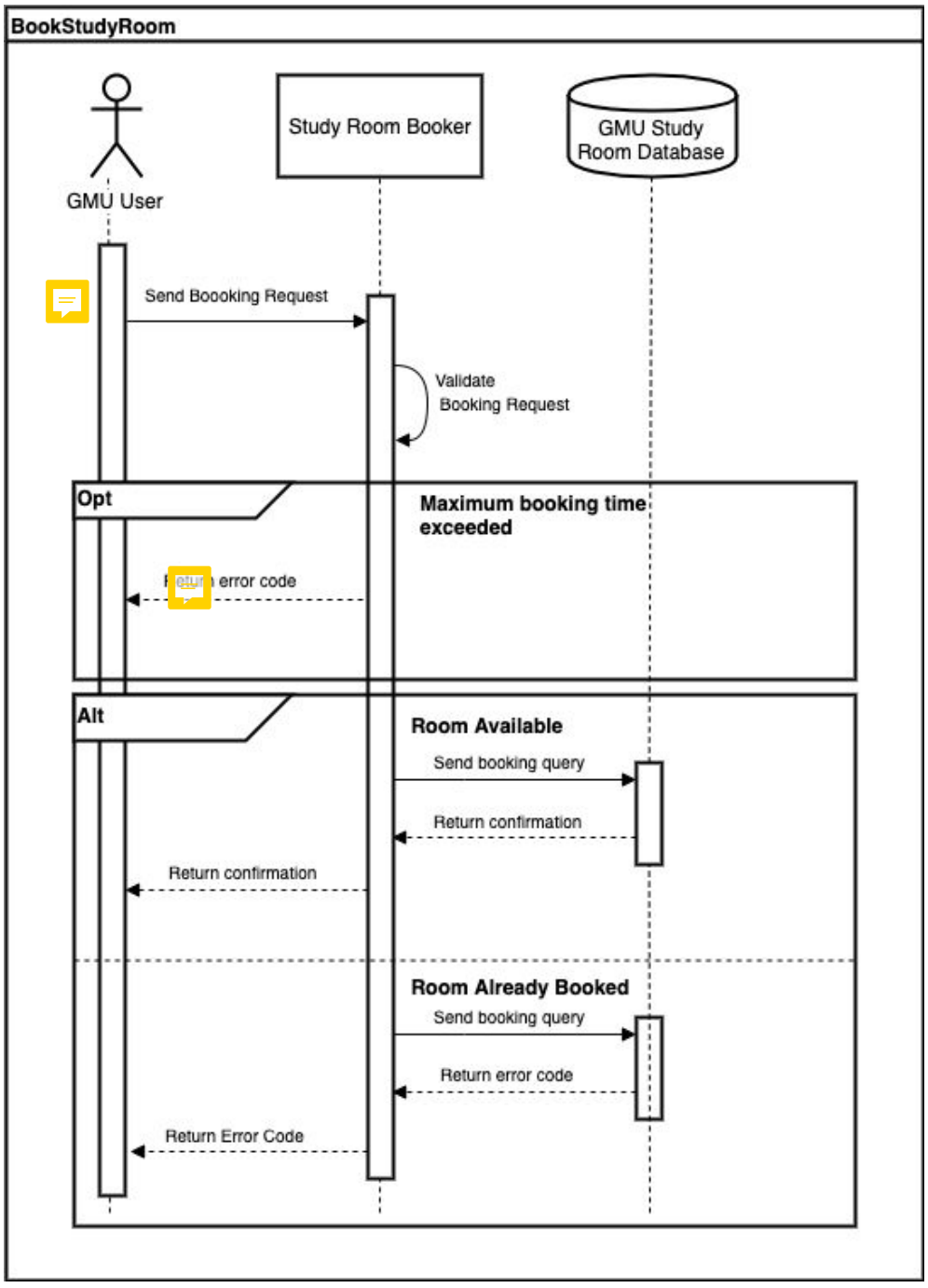

Figure 5: System Sequence Diagram: Book Study Room Session

3.6 Editing Study Room Session Hours

3.6.1 Description and Priority

The editing study room hours feature has a medium priority. A logged-in GMU user must have the ability to change the hours of any confirmed study room sessions that he or she created. A logged-in GMU administrator must be able to edit the duration hours of any confirmed study room session.

3.6.2 Functional Requirements

REQ-13: Each GMU user must be able to change the duration of any of his or her confirmed study room session(s) before the end-time.

REQ-14: Each GMU Administrator must be able to change the duration for any GMU users' study room session before the end-time.

REQ-15: Each GMU user must receive an email confirming the changes he or she made to the study room session.

REQ-16: Each GMU user must receive an email after a GMU administrator makes a change to a study room session the GMU user has booked.

3.6.3 Use Cases

Use Case: EditStudyRoomSessionHours
ID: UC-6
Brief Description: A GMU user wants to edit a study room session.
Actor: A GMU user
Preconditions: 1. The GMU user is logged-in. 2. The GMU user must have a confirmed study room session.
Main Flow: 1. Include (ViewBookingHistory). 2. The GMU user chooses the study room session and selects "edit". 3. The GMU user edits the hours for a study room session he or she has booked. 4. The GMU user receives an email notification that the study room session has been edited.
Postconditions:

1. The study room session hours have been changed.
Alternative Flow(s): 2. If the GMU Administrator edits the hours for a study room session then 2.1 The GMU user of the booked study room session receives an email notification that the study room session has been edited.

3.6.4 Sequence Diagram

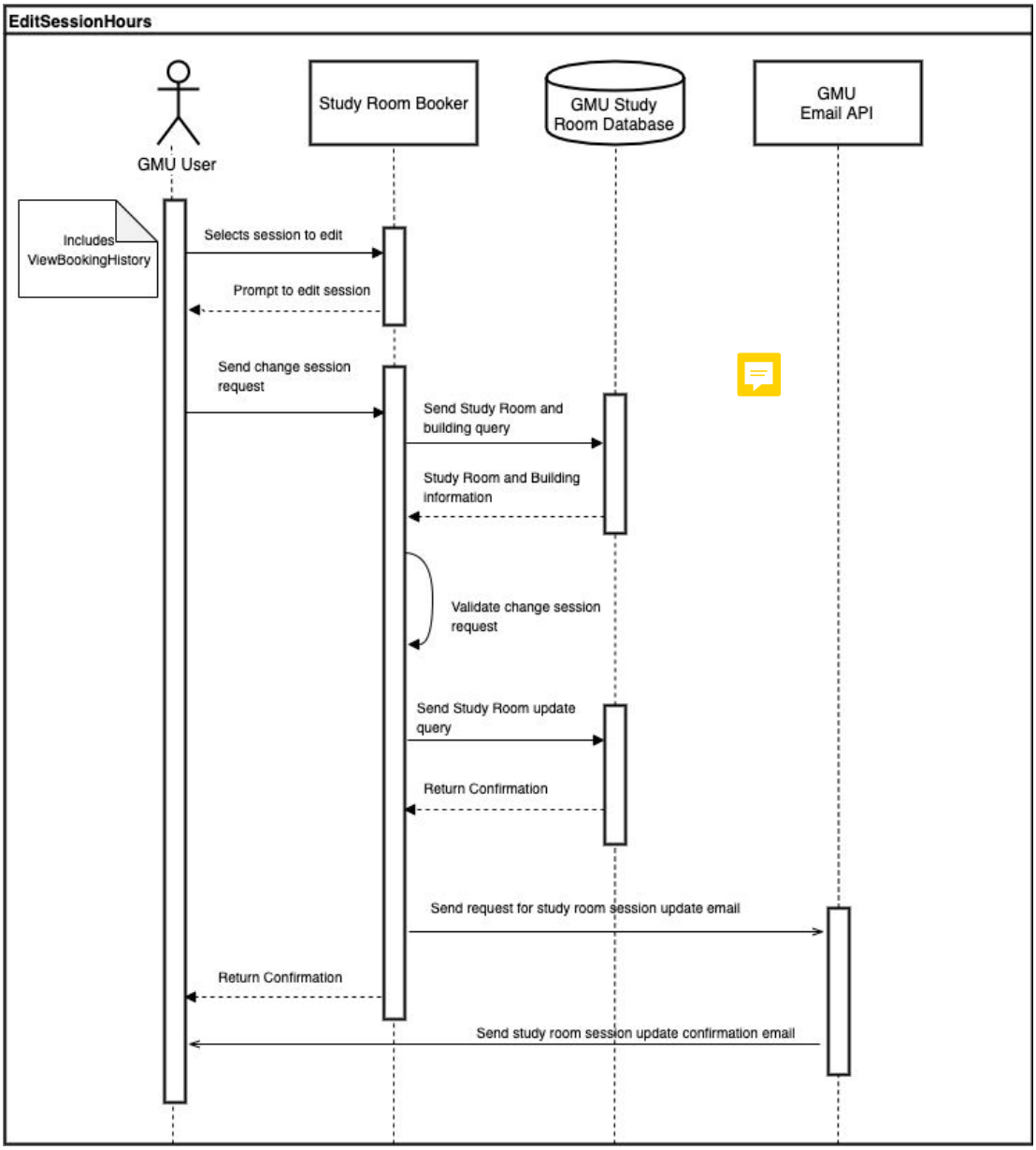

Figure 6: System Sequence Diagram: Edit Session Hours

3.5 Cancelling a Study Room Session

3.5.1 Description and Priority

The study room session cancellation feature has a high priority. A logged-in GMU user must have the ability to cancel any of his or her booked study room sessions. A logged-in GMU administrator must be able to cancel any study room session.

3.5.2 Functional Requirements

REQ-10: Each GMU user must be able to cancel his or her confirmed study room session before the end time.

REQ-11: Each GMU Administrator must be able to cancel any users' study room session.

REQ-12: Each GMU user must receive an email confirming the cancellation after he or she cancels a study room session.

3.5.3 Use Cases

Use Case: CancelStudyRoomSession
ID: UC-5
Brief Description: A GMU user wants to cancel a study room session.
Actor: A GMU user
Preconditions: 1. The GMU user is logged-in. 2. The GMU user has a confirmed study room session. 3. The study room session has not ended yet.
Main Flow: 1. Include (EditStudyRoomSessionHours). 2. The GMU user selects the 'cancel session' button. 3. A confirmation message is displayed on the page. 3.1 If confirmed a success message is displayed on the page. 4. The GMU user receives an email confirming the cancellation.
Postconditions: 1. The study room session is canceled.
Alternative Flow(s): 2. If the GMU user is a GMU administrator, he or she can select any study room session to cancel.

3.5.4 Sequence Diagram

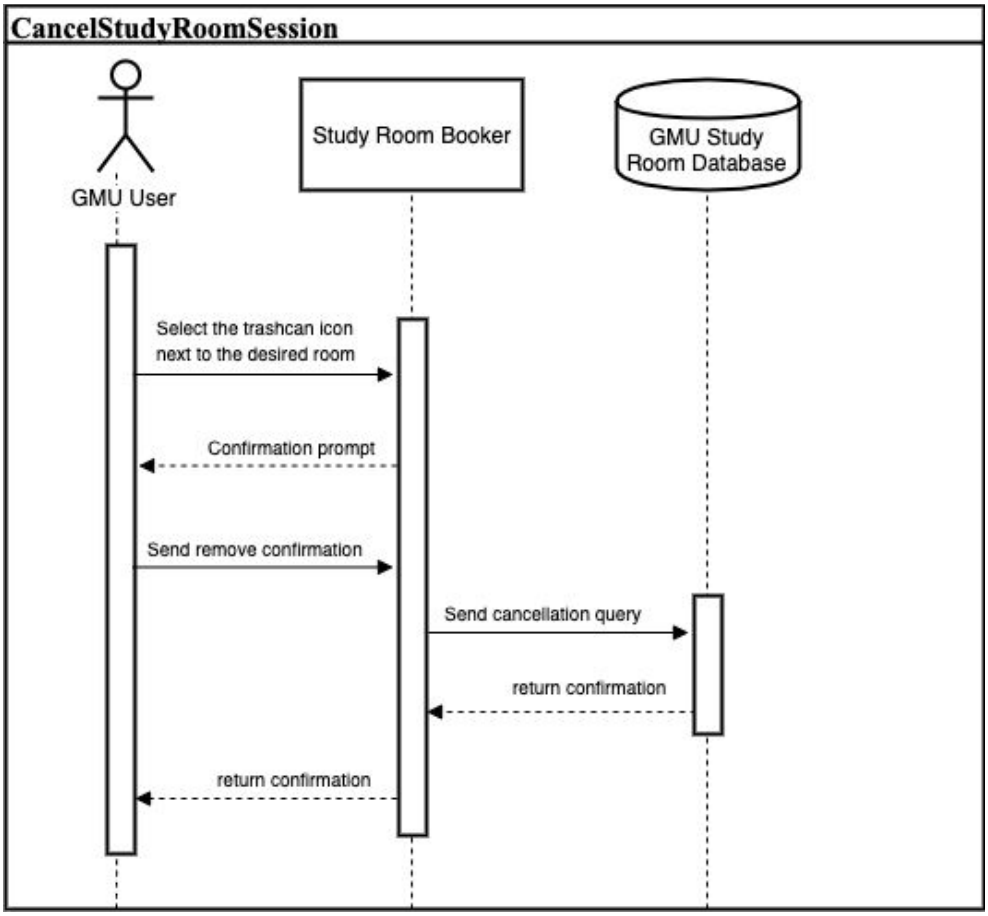

Figure 7: System Sequence Diagram: Cancel Study Room Session

3.7 Administrative Capabilities

3.7.1 Description and Priority

The administrative capabilities are high priority features in Study Room Booker. The GMU Administrator can add/remove a building(s), add/remove a study room(s), and change operation hours of an existing building in Study Room Booker. The GMU administrator can also view hours of operation and study rooms for each building.

3.7.2 Functional Requirements

REQ-17: Each GMU Administrator must be able to add a building to Study Room Booker.

REQ-18: Each GMU Administrator must be able to remove a building from Study Room Booker.

REQ-19: Each GMU Administrator must be able to see each building's information with a list of hours and rooms.

REQ-20: Each GMU Administrator must be able to add a study room to a building defined in Study Room Booker.

REQ-21: Each GMU Administrator must be able to remove a study room from a building defined in Study Room Booker.

REQ-22: Each Administrator must be able to change the operating hours of any building defined in Study Room Booker.

3.7.3 Use Cases

Use Case: ViewBuilding
ID: UC-8
Brief Description: A GMU Administrator must be able to see a building's hours of operation and the set of study rooms for that building.
Actor: GMU administrator
Preconditions: 1. The GMU administrator must be logged-in.
Main Flow: 1. The GMU administrator selects 'View Building'. 2. The GMU administrator is presented with a list of buildings in Study Room Booker. 3. The GMU administrator selects the drop-down arrow. 4. The GMU administrator is presented with a list of study rooms in that building and the building's hours of operation.
Postconditions: 1. The GMU administrator can view all the buildings listed in Study Room Booker.
Alternative Flow(s): None

Use Case: AddBuilding
ID: UC-7
Brief Description: A GMU Administrator adds a building to Study Room Booker.
Actor: A GMU Administrator
Preconditions: 1. The GMU Administrator must be logged-in.
Main Flow: 1. Include (ViewBuilding) 2. The GMU Administrator selects the “Add Building” button beside the table of buildings to add a new building. 3. The GMU Administrator is prompted to add a name for the building and enter hours of operation.
Postconditions: 1. The building is now visible on Study Room Booker.
Alternative Flow(s): None.

Use Case: EditBuilding
ID: UC-8
Brief Description: A GMU Administrator must be able to see a building’s hours of operation and the set of study rooms for that building with the option to edit.
Actor: A GMU administrator
Preconditions: 1. The GMU administrator must be logged-in.
Main Flow: 1. Include (ViewBuilding). 2. The GMU administrator is presented with a building’s set of study rooms and the hours of operation.
Postconditions: 1. The GMU administrator can view the set of study rooms in the building.
Alternative Flow(s): None

Use Case: RemoveBuilding
ID: UC-9
Brief Description: A GMU administrator must be able to remove a building.
Actor: GMU Administrator
Preconditions: 1. The GMU Administrator must be logged-in.
Main Flow: 1. Include (ViewBuilding). 2. The GMU Administrator selects ‘Remove Building’. 3. The GMU Administrator is prompted with a remove building warning. 4. If the GMU Administrator selects continue then 4.1 The building is removed from study room booker 5. Else 5.1 The GMU Administrator is returned to ViewBuilding 6. The GMU Administrator receives a message on the screen confirming the building was removed.
Postconditions: 1. The building is no longer available on Study Room Booker.
Alternative Flow(s): None

Use Case: AddStudyRoom
ID: UC-10
Brief Description: A GMU Administrator must be able to add a study room to the schedule.
Actor: A GMU Administrator
Preconditions: 1. The GMU Administrator must be logged-in. 2. The GMU Administrator must have selected a building.
Main Flow: 1. Include (EditBuilding). 2. The GMU Administrator selects the ‘Add Study Room’ button. 3. The GMU administrator enters the room number. 4. The GMU administrator enters the room capacity. 5. The GMU administrator receives a message on screen confirming the study room was

added.
Postconditions: 1. The study room is now available for booking.
Alternative Flow(s): None

Use Case: RemoveStudyRoom
ID: UC-11
Brief Description: A GMU administrator must be able to remove a study room from the schedule.
Actor: A GMU Administrator
Preconditions: 1. The GMU Administrator must be logged-in. 2. The GMU Administrator must have selected a building.
Main Flow: 1. Include (EditBuilding). 2. The GMU Administrator selects "X" icon. 3. The GMU Administrator is prompted with a remove study room warning. 4. The GMU Administrator receives a message on screen confirming the study room was removed.
Postconditions: 1. The study room is no longer available for the building.
Alternative Flow(s): None.

Use Case: ChangeBuildingHours
ID: UC-12
Brief Description: A GMU Administrator must have the ability to change operation hours for specific buildings.
Actor: A GMU Administrator
Preconditions: 1. The GMU Administrator must be logged-in. 2. The GMU Administrator must have selected a building.
Main Flow: 1. Include (EditBuilding). 2. The GMU Administrator enters the new hours of operation 3. The GMU Administrator selects the save button 4. The GMU Administrator receives a message on screen confirming the building change of hours.
Postconditions: 1. The hours of operation for the building are updated on Study Room Booker.
Alternative Flow(s): None.

3.7.3 Sequence Diagrams

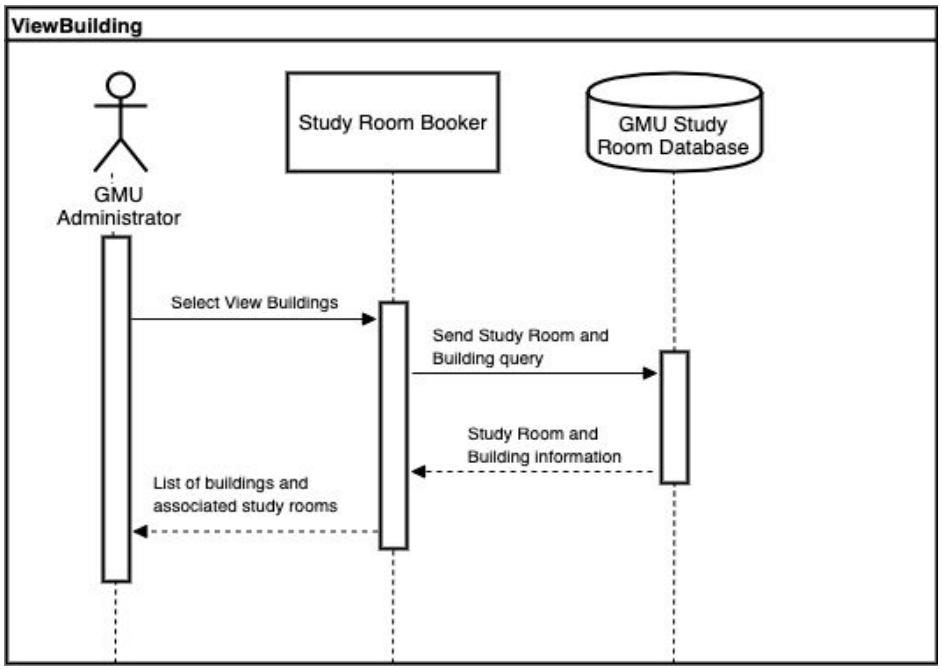

Figure 8: System Sequence Diagram: View Building

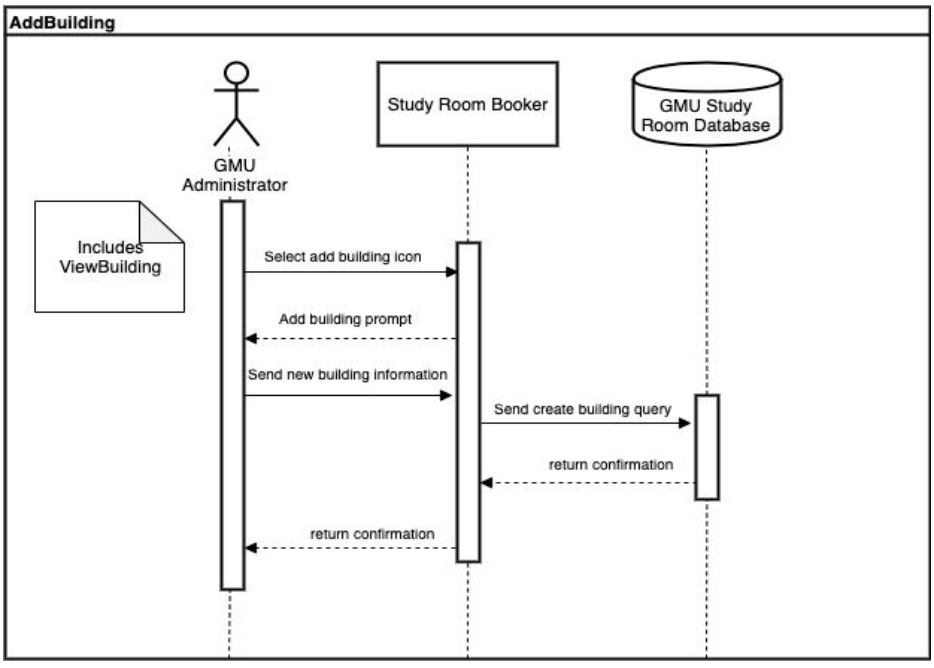

Figure 9: System Sequence Diagram: Add Building

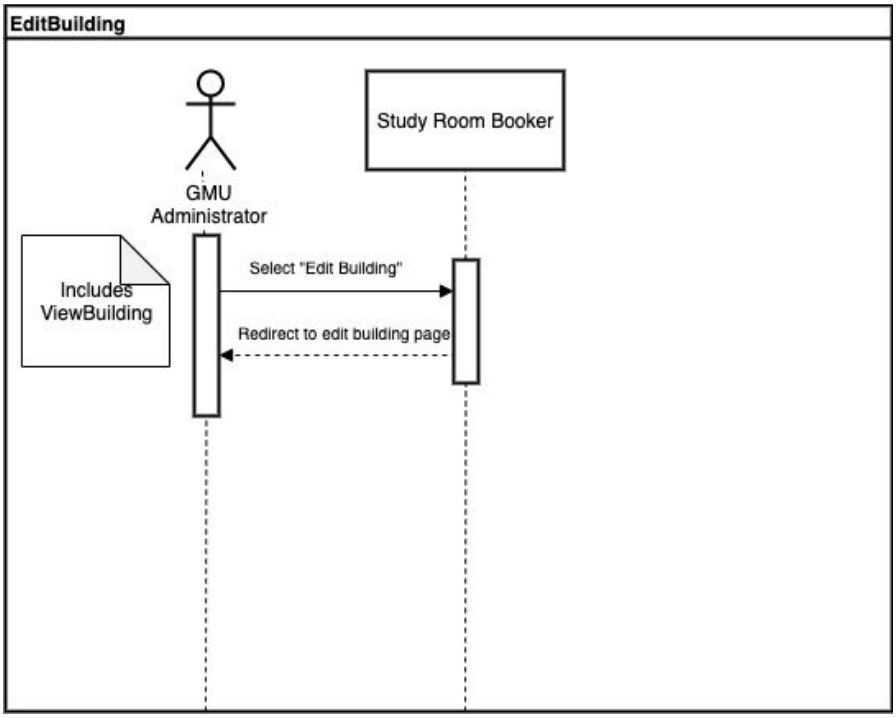

Figure 10: System Sequence Diagram: Edit Building

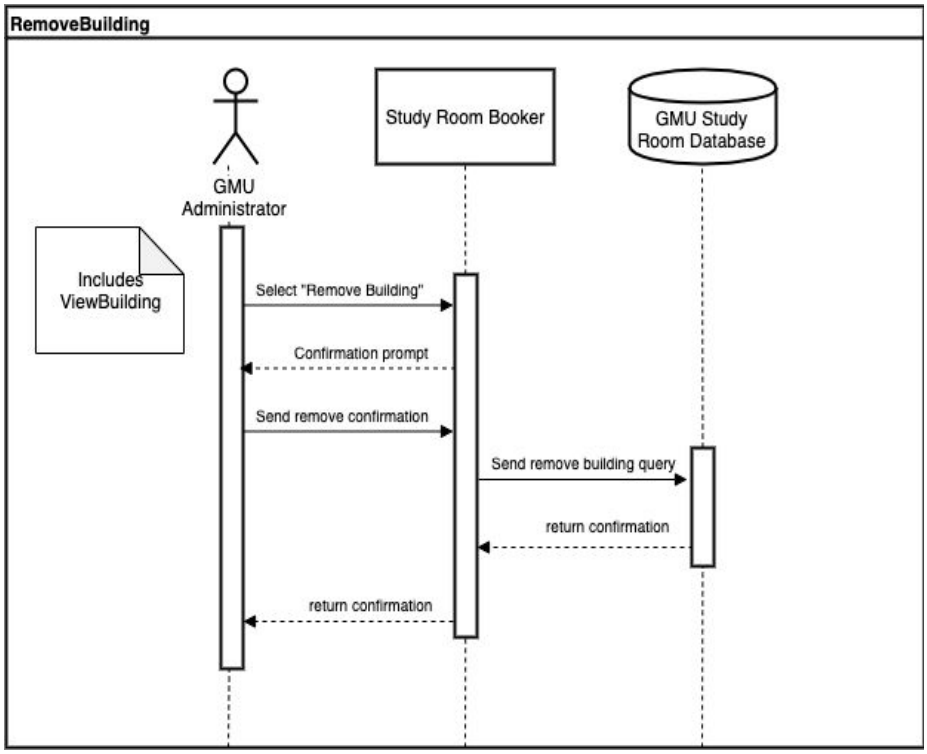

Figure 11: System Sequence Diagram: Remove Building

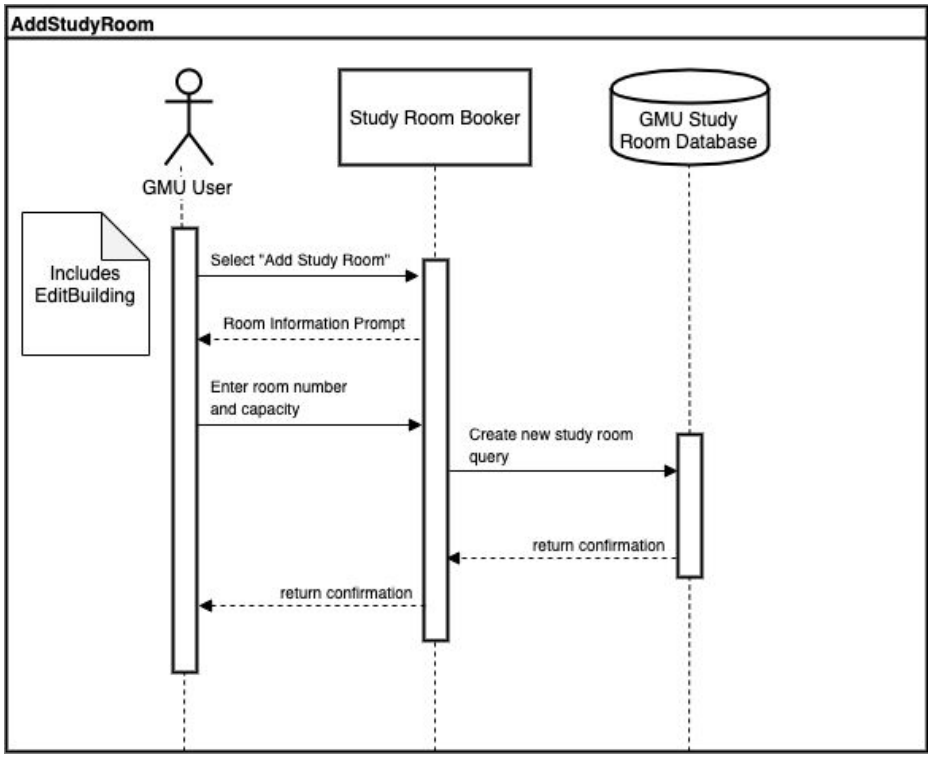

Figure 12: System Sequence Diagram: Add Study Room

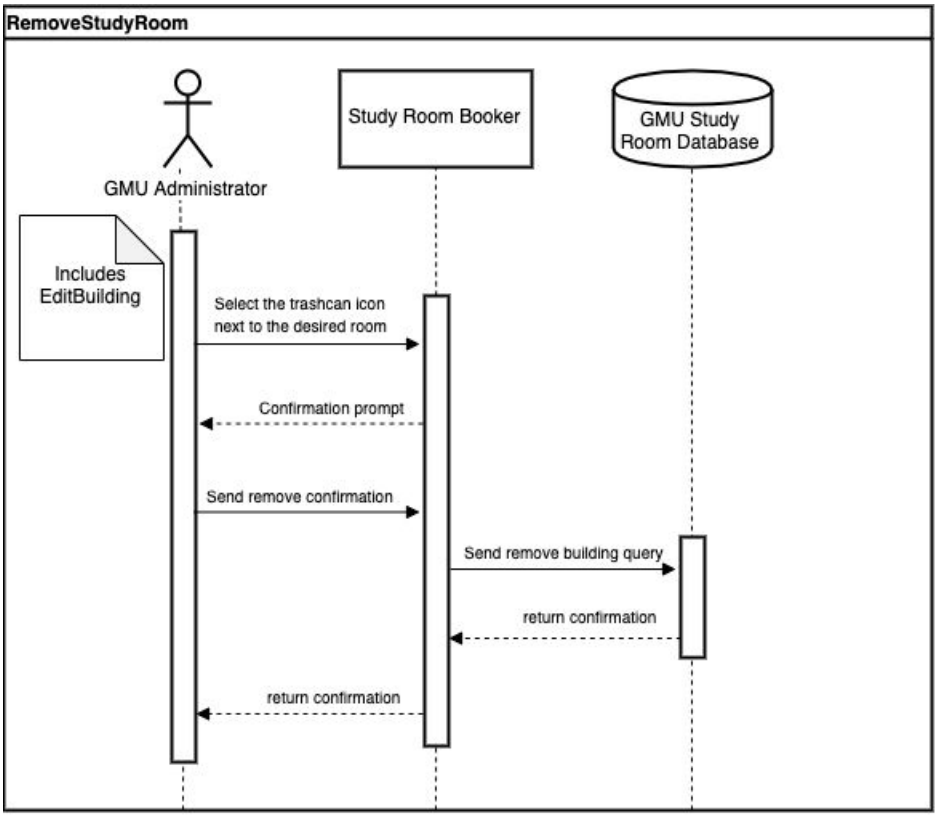

Figure 13: System Sequence Diagram: Remove Study Room

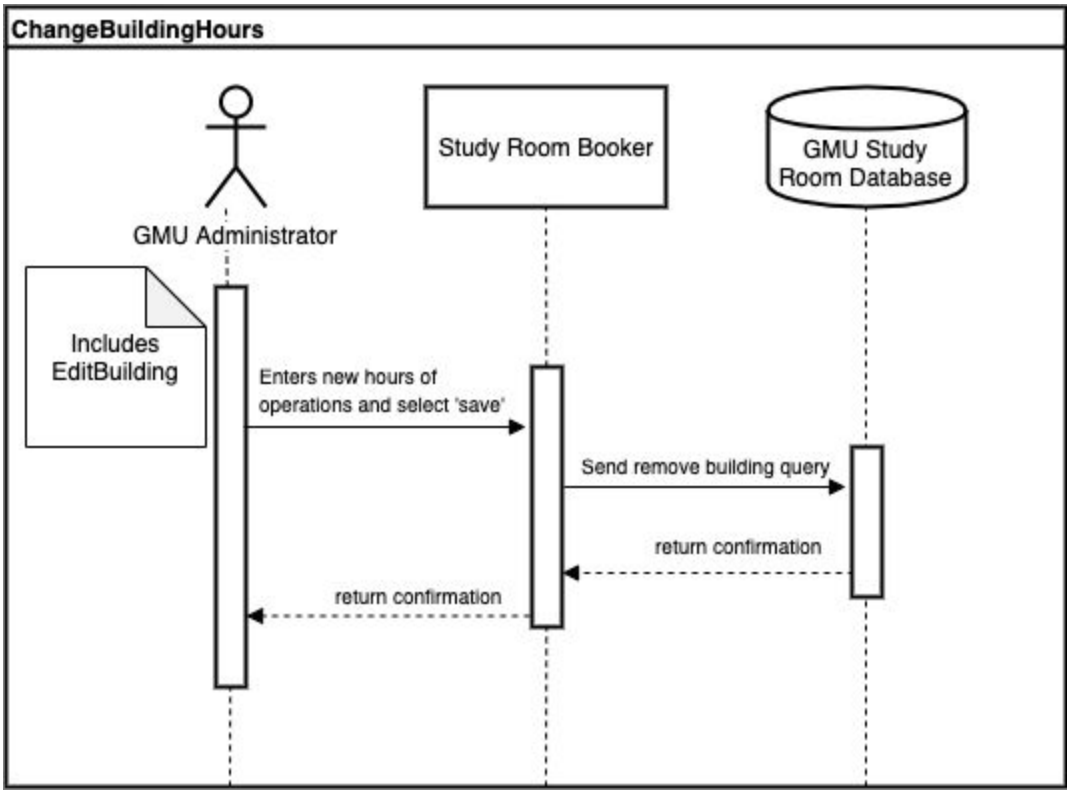

Figure 14: System Sequence Diagram: Change Building Hours

4 Entity Relationship Diagram and Data Dictionary

This section of the RSD contains the Entity Relationship Diagram (ERD) and a Data Dictionary. The ERD models relationships between entities of Study Room Booker, and the Data Dictionary describes each entity of the ERD.

4.1 Entity Relationship Diagram

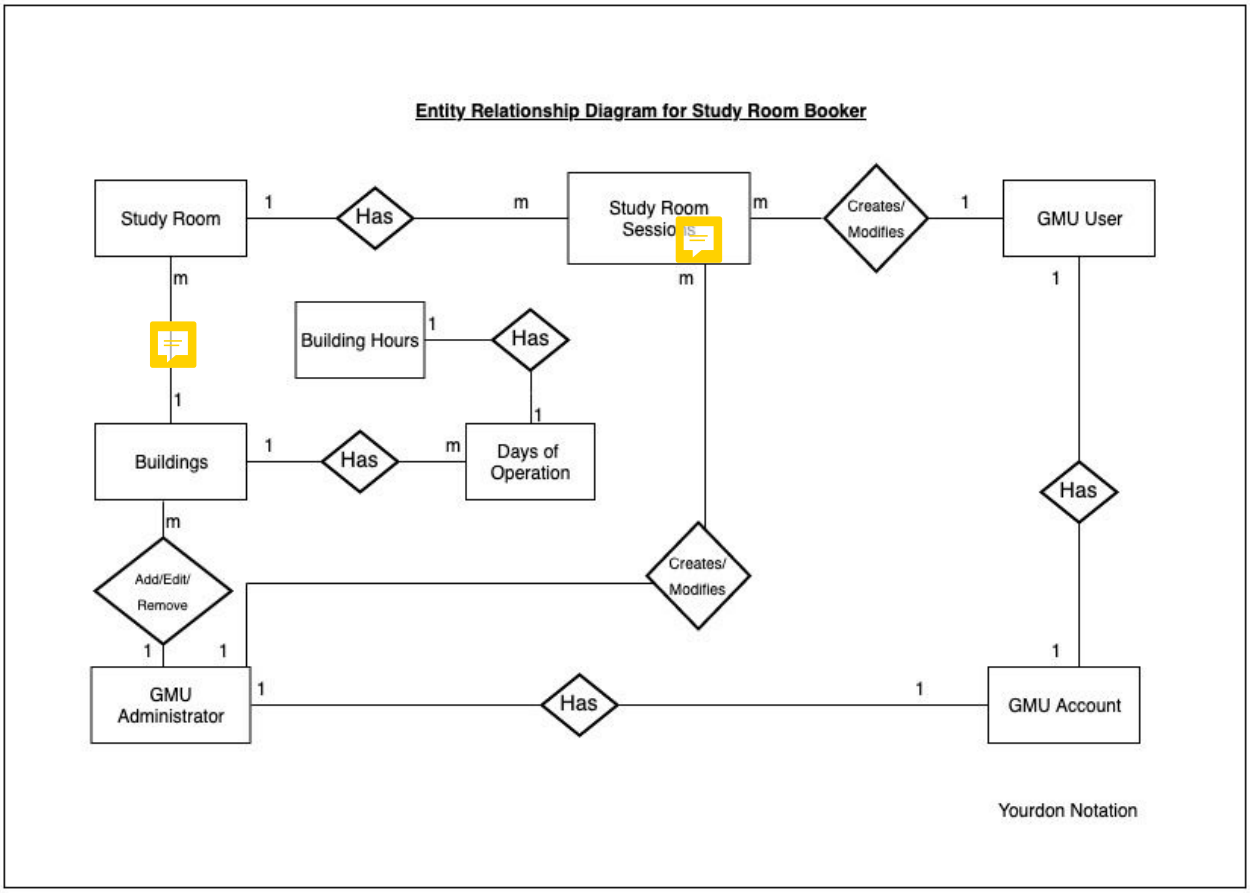

Figure 15. Entity-Relationship Diagram

4.2 Data Dictionary

```
Confirmation ::= email_notification;

Schedule_Information ::= total_number_bookings, Study_Room_Session_Information
Total_Number_Of_Bookings ::= integer;
Study_Room_Session ::= start_time, end_time, Study_Room;
Start_Time ::= hour, minute;
Hour ::= integers;
Minute ::= integers;

Building ::= building_name, building_hours;
Building_Name ::= string;
Open_Time ::= hour, minute;
Close_Time ::= hour, minute;
Building_Hours ::= Open_Time, Close_Time;
Room_Number ::= integer;
Room_Name ::= string;
Days_Of_Operation ::= Days
Days ::= string

GMU_Administrator ::= first_name, last_name, GMU_employee-ID;
GMU_Account ::= account_id, account_password;

GMU_User ::= first_name, last_name, GMU_username, GMU_password;
First_Name ::= string;
Last_Name ::= string;
GMU_Username ::= GMU_email_address;
GMU_Email_Address ::= string;
GMU_Password ::= string;
```

Figure 16. Data Dictionary

5 Data Flow Diagrams (DFD)

This section of the RSD contains the Data Flow Diagrams (DFD). The DFD's model how data moves within Study Room Booker.

5.1 Data Flow Diagram Level 0 (Context Diagram)

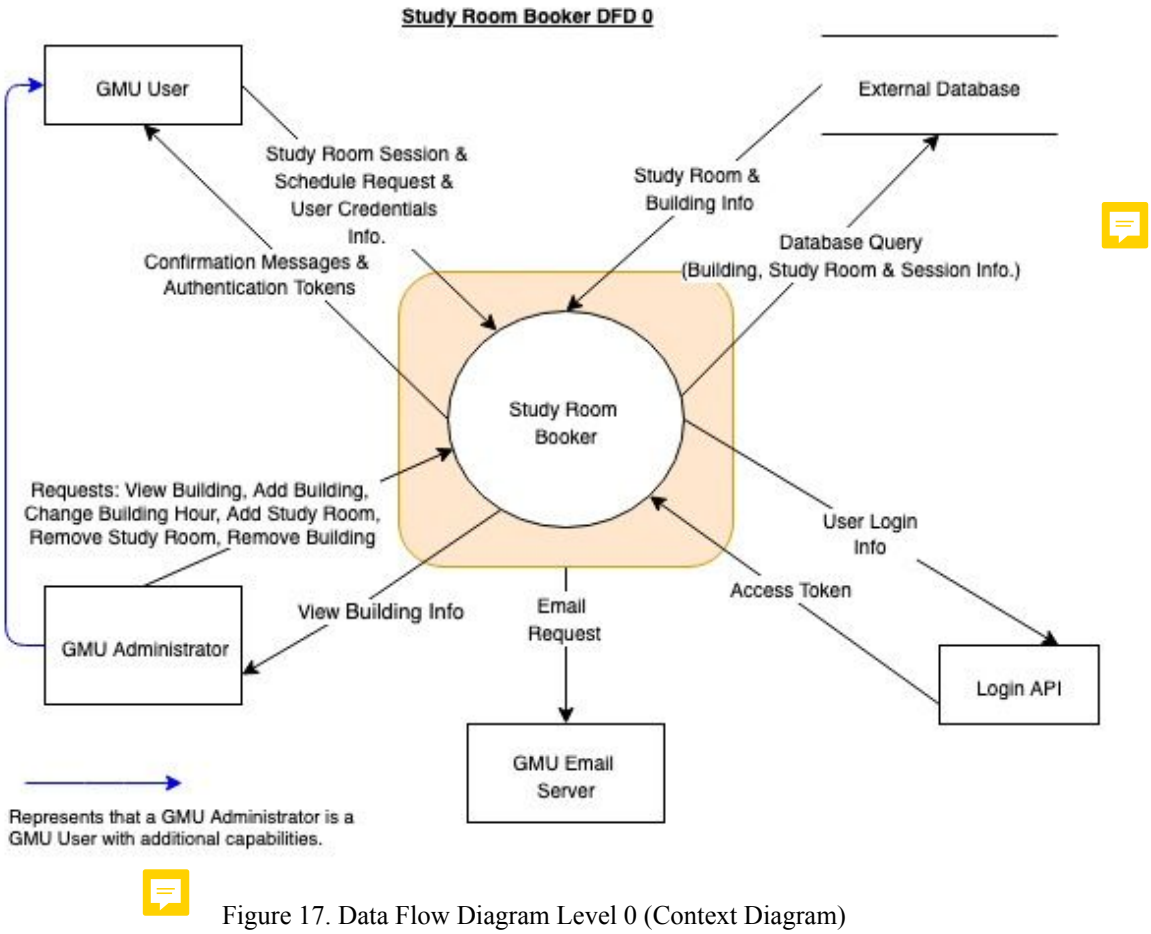

Figure 17. Data Flow Diagram Level 0 (Context Diagram)

5.2 Data Flow Diagram Level 1

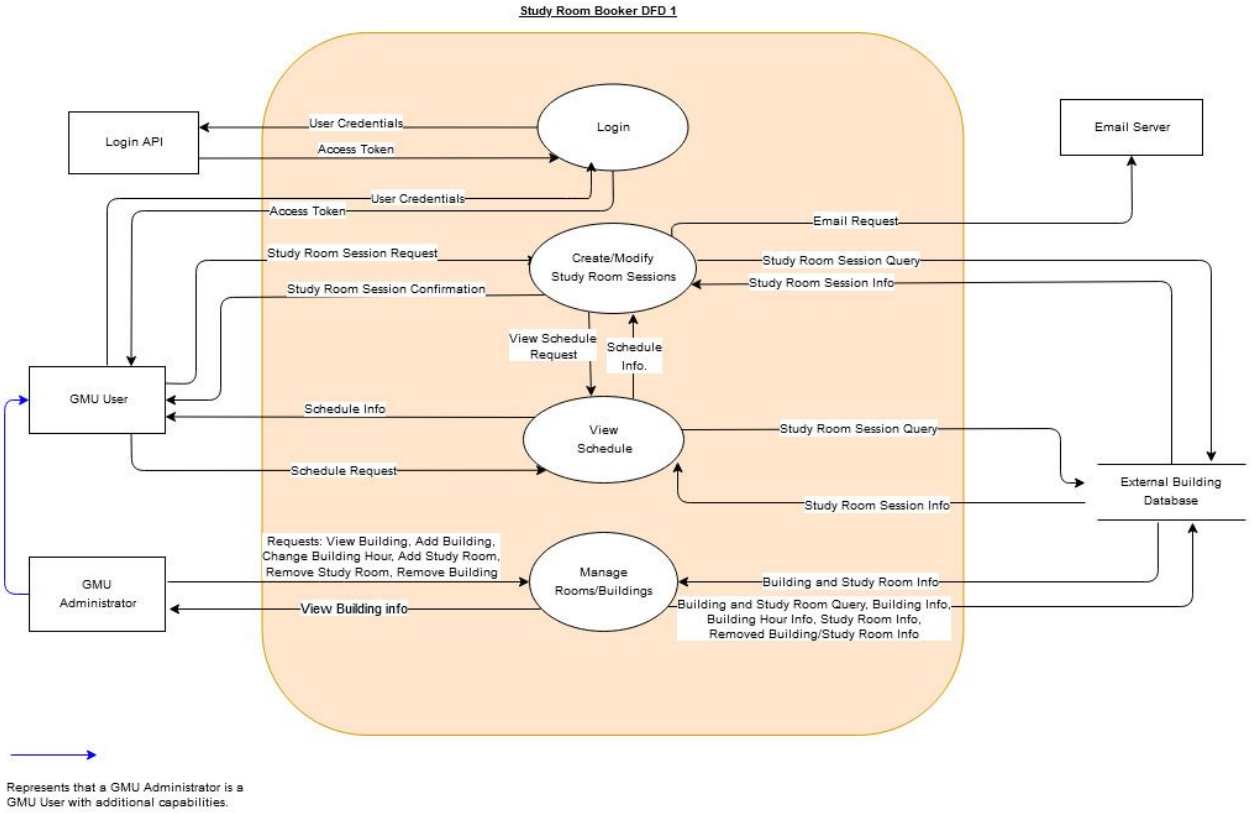

Figure 18. Data Flow Diagram Level 1

5.3 Data Flow Diagram Level 2: Manage Buildings/Rooms

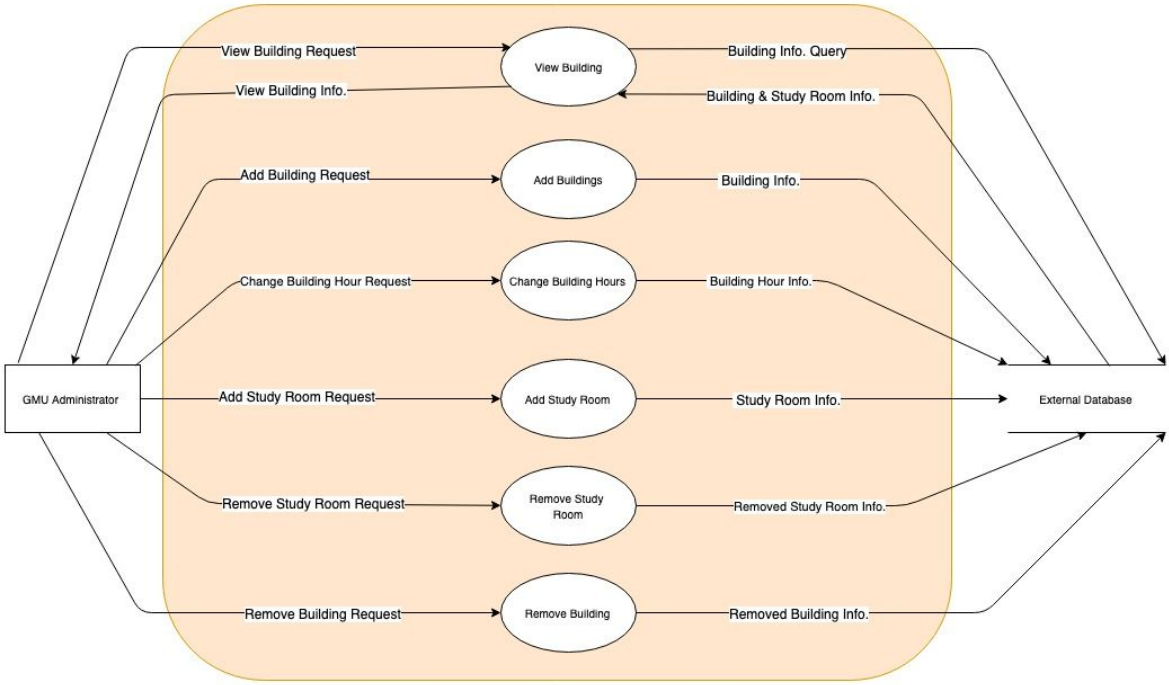

Figure 19. Data Flow Diagram Level 2

6 External Interface Requirements

This section of the RSD contains external interface requirements. External interface requirements describe how the GMU user will be able to use and interact with Study Room Booker.

6.1 User Interfaces

The user interface features a study room booking page on the GMU website. A new webpage will be designed to replace the current websites and accommodate the new system. If the GMU login API or Study Room Booker API is malfunctioning, an error page will be shown to the GMU user instead.

UI-1: The Study Room Booker web pages must be the only user interface, i.e. no mobile or desktop app will be developed.

UI-2: The Study Room Booker web pages must use sans serif font for any text.

UI-3: The Study Room Booker web pages must scale to fit on the screen of a mobile device if needed.

UI-4: Each GMU user must be shown an error page if the GMU login API is malfunctioning.

UI-5: Each GMU user must be shown an error page if the Study Room Booker API is malfunctioning

6.2 Hardware Interfaces

The Study Room Booker needs to be accessible to all students/faculty on campus. As a result, the application must be accessible on many different forms of hardware, including, but not limited to, mobile phones, tablets, laptop computers, and desktop computers. For a list of supported operating systems for each of the listed devices, refer to section 4.3.

HI-1: Each GMU user must be able to access the Study Room Booker on a mobile phone. (High Priority)

HI-2: Each GMU user must be able to access the Study Room Booker on an electronic tablet. (High Priority)

HI-3: Each GMU user must be able to access the Study Room Booker on a laptop. (High Priority)

HI-4: Each GMU user must be able to access the Study Room Booker on a desktop computer. (High Priority)

6.3 Software Interfaces

The data that flows between software interfaces in Study Room Booker consists of authentication data, study room database queries, and email notifications in which the GMU user receives a booking reminder . For authentication, the Study Room Booker will rely on GMU's existing accounts, therefore the Study Room Booker must connect with GMU's login API. In addition, GMU currently has a study room database but does not have an API that handles database transactions, so the Study Room Booker must connect directly to the study room database. Finally, email notifications will leverage GMU's existing email service so the Study Room Booker must connect to GMU's email API. In addition to the external API's, a GMU user must be able to access the study room booker on a variety of hardware as mentioned in section 4.2 (SI-4 to SI-8).

SI-1: The Study Room Booker must use the GMU's login API for GMU user authentication. (High Priority)

SI-2: The Study Room Booker must connect to the GMU's study room database. (High Priority)

SI-3: The Study Room Booker must connect to the GMU's email API. (High Priority)

SI-4: Each GMU user must be able to access the Study Room Booker on Android 5.0 and above. (High Priority)

SI-5: Each GMU user must be able to access the Study Room Booker on iOS 9.0 and above. (High Priority)

SI-6: Each GMU user must be able to access the Study Room Booker on Windows XP and above.
(High Priority)

SI-7: Each GMU user must be able to access the Study Room Booker on macOS Yosemite and above.
(High Priority)

SI-8: Each GMU user must be able to access the Study Room Booker on Ubuntu 16.04 and above. (Low Priority)

6.4 Communications Interfaces

The Study Room Booker requires that a GMU user sends personal information including, but not limited to, GMU account credentials for user authentication. In order to protect GMU users, the Study Room Booker must transmit all data through a secure communication channel such as HTTPS over TLS. In addition, the system must be able to operate on various web browsers as described below.

CI-1: The Study Room Booker must send all GMU user data using HTTPS over TLS.
(High Priority)

CI-2: The Study Room Booker must receive all GMU user data using HTTPS over TLS.
(High Priority)

CI-3: Each GMU user must be able to access the Study Room Booker on Internet Explorer 11 and above.
(Low Priority)

CI-4: Each GMU user must be able to access the Study Room Booker on Microsoft Edge 44.18362.1.0.
(High Priority)

CI-5: Each GMU user must be able to access the Study Room Booker on Firefox 69.0.1 and above.
(High Priority)

CI-6: Each GMU user must be able to access the Study Room Booker Google Chrome 77.0.3865 and above.

(High Priority)

CI-7: Each GMU user must be able to access the Study Room Booker on Safari 12.1.2 and above.
(High Priority)

7 User Interface Prototypes

This section of the RSD contains the prototype for the user interface. The user interface was created using Figma and shows a storyboard of the features Study Room Booker offers. Since GMU administrators have the same capabilities as a GMU user, after Figure 22 all top right corners of further prototypes will be displayed as GMU administrator.

7.1 Homepage and Login

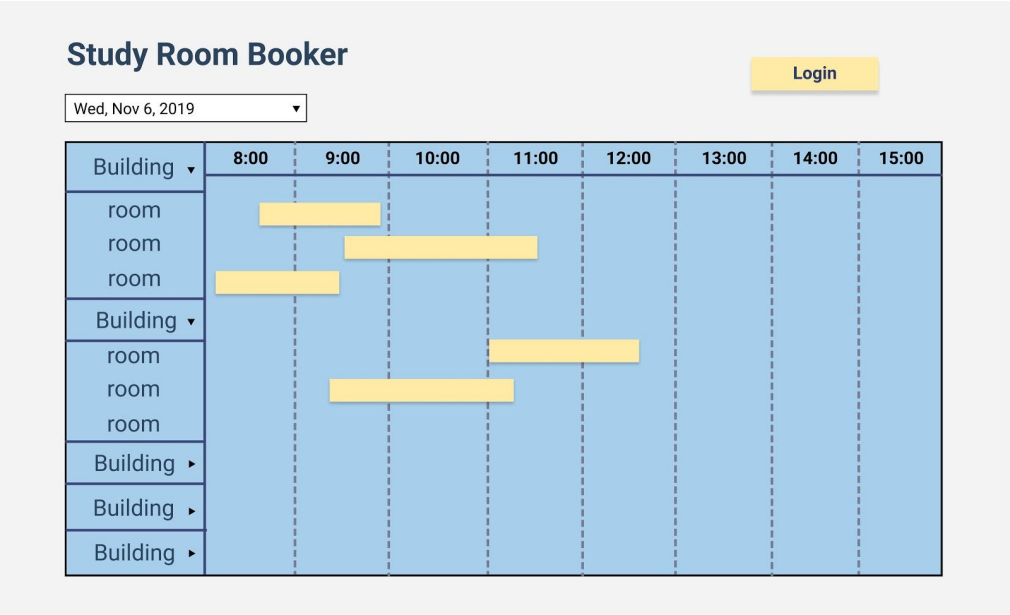

Figure 20: UI Prototype Main Page

Clicking on the login button will bring the GMU user to the login page below.

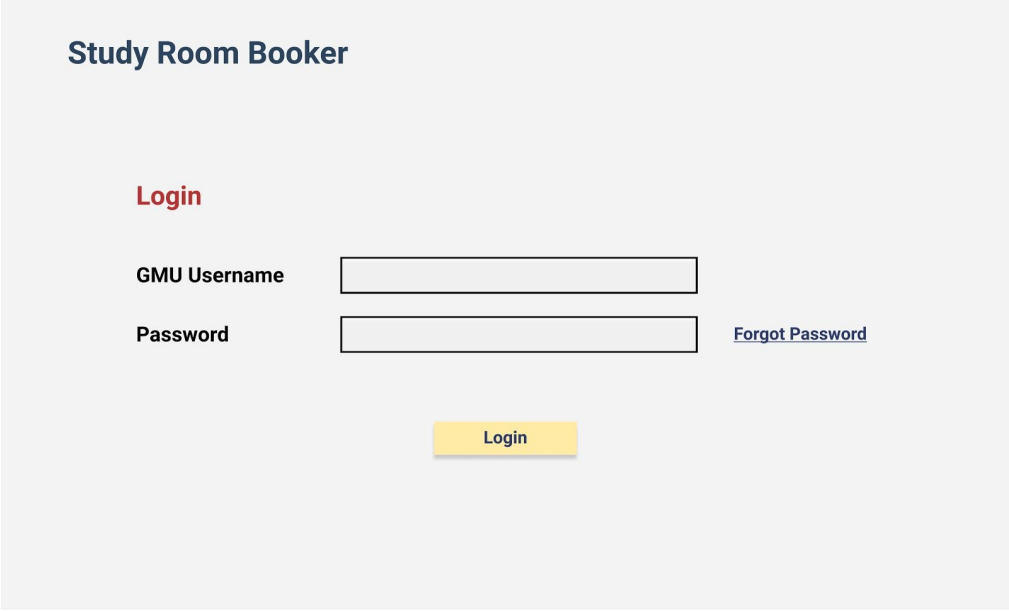

Figure 21: UI Prototype Login Page

7.2 Book a Study Room Session

After logging into Study Room Booker the GMU user is brought back to the view schedule page.

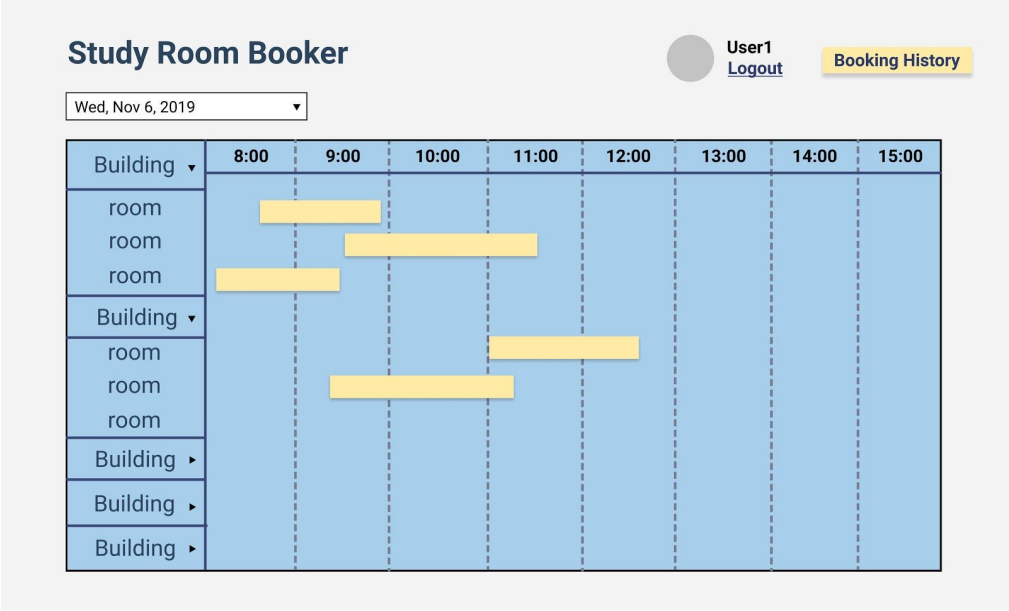

Figure 22: UI Prototype GMU User View Schedule

To book a study room session the GMU user clicks a time on the schedule, and a ‘Book a Room’ pop-up appears on the screen.

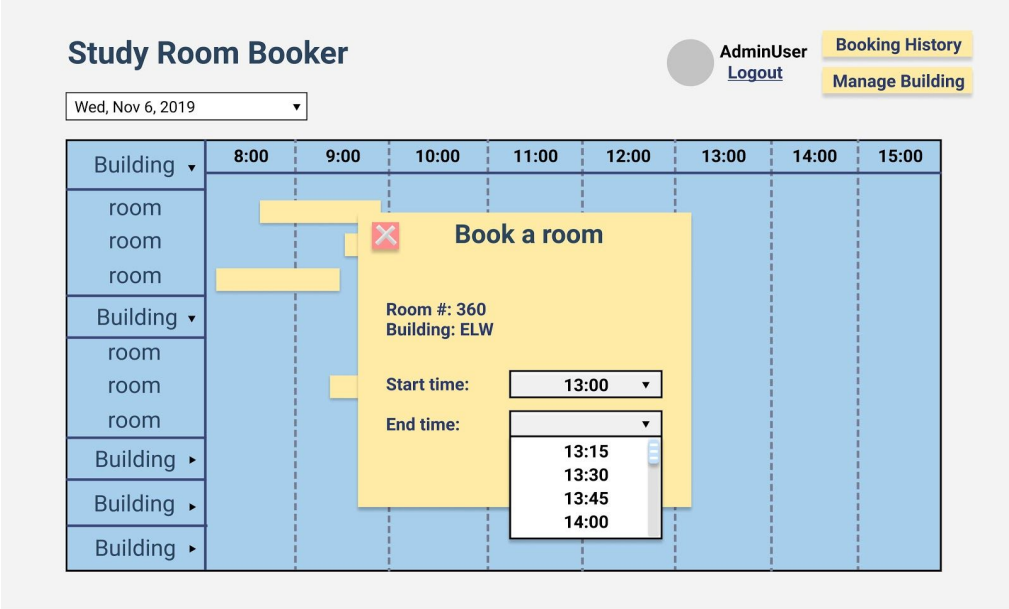

Figure 23: UI Prototype Book a Study Room

Once the GMU user has selected an end time and the ‘OK’ button, they will receive a message on screen that the booking was successful.

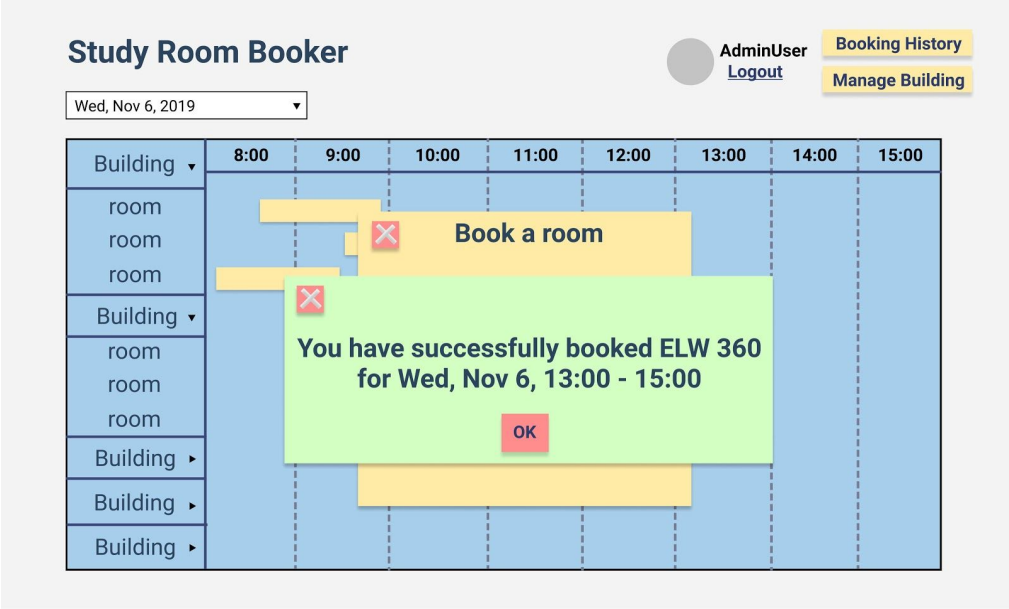

Figure 24: UI Prototype Book a Study Room Session Success

If the GMU user selected a time that is already booked, they will receive a message on screen that selected time is invalid, and the GMU user will be returned to the schedule (Figure 22).

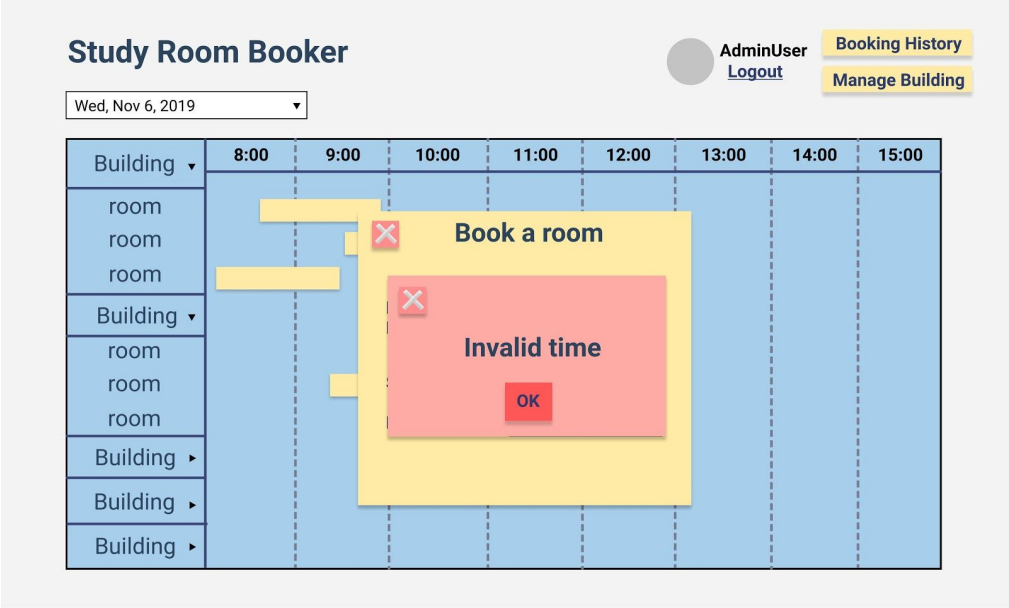

Figure 25: Book Study Room Session Error

7.3 Edit and Cancel a Study Room Session

From the schedule (Figure 22) the GMU user selects Booking History. Upcoming study room sessions are in blue text and selectable, while past study room sessions are greyed out and unselectable.

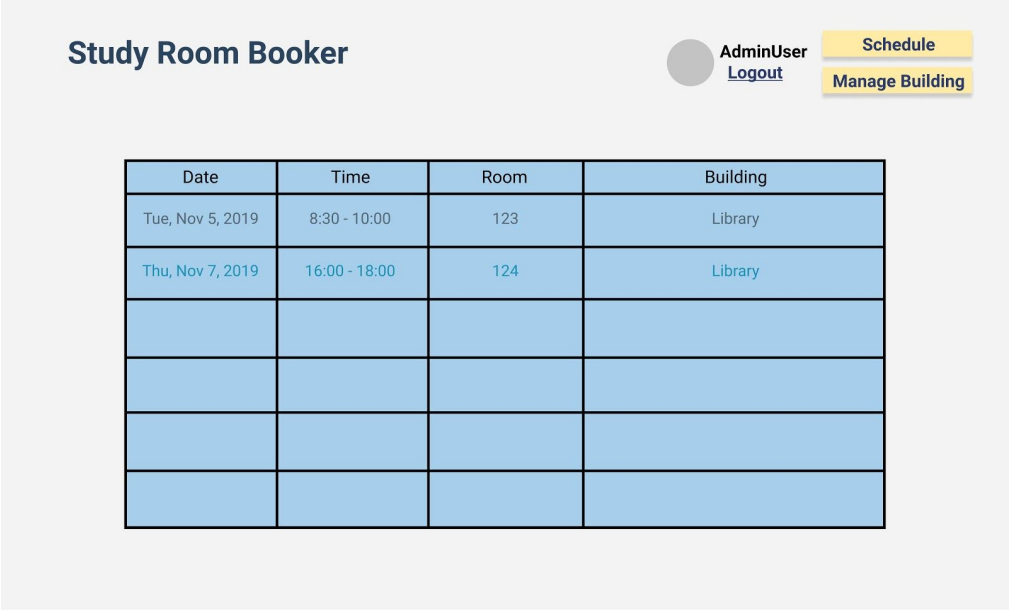

Figure 26: UI Prototype Booking History

The GMU user selects a study room session to edit, and is able to change the start and end times.

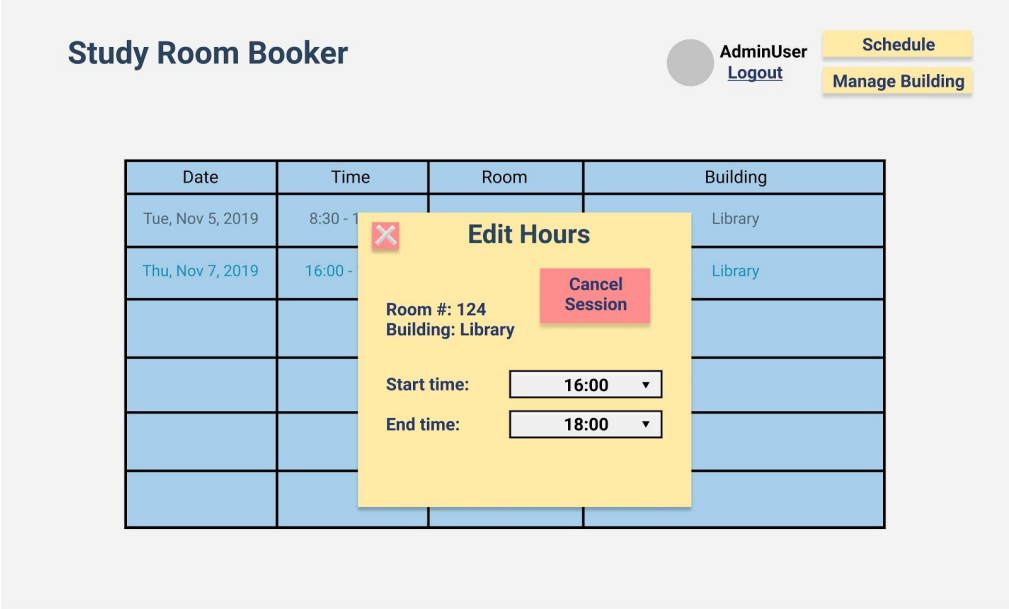

Figure 27: UI Prototype Edit Study Room Session Hours

If the GMU user has selected new times that are still available, the GMU user is presented with a confirmation on screen.

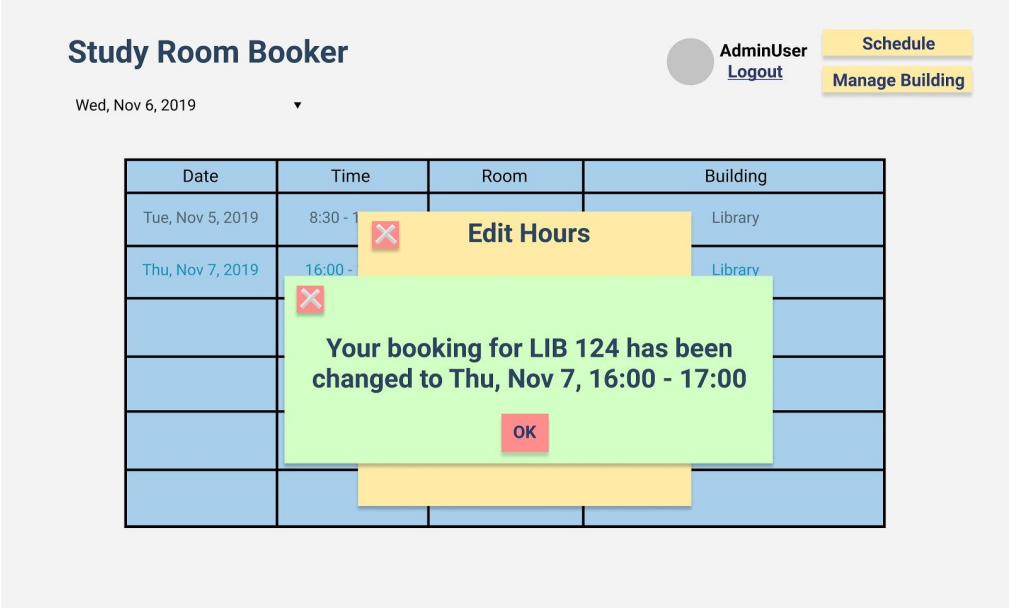

Figure 28: UI Prototype Edit Study Room Session Hours Success

If the GMU user selected times that are not available, they are presented with an ‘Invalid Time’ pop-up.

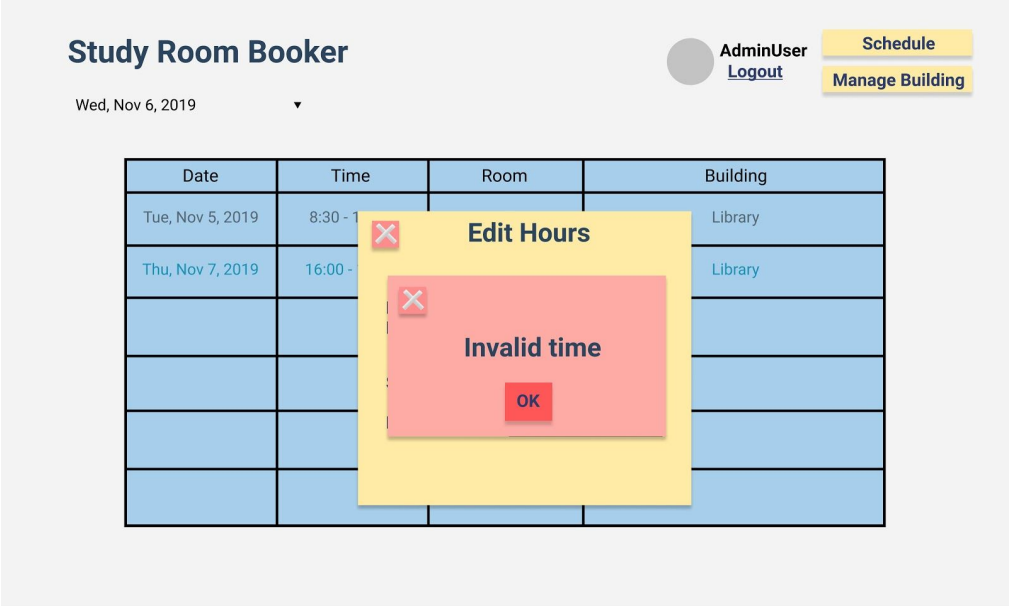

Figure 29: UI Prototype Edit Study Room Session Hours Error

If the GMU user wants to cancel a study room session, from Edit Hours (Figure 27) he or she can select cancel room. They are prompted with a yes or no pop-up.

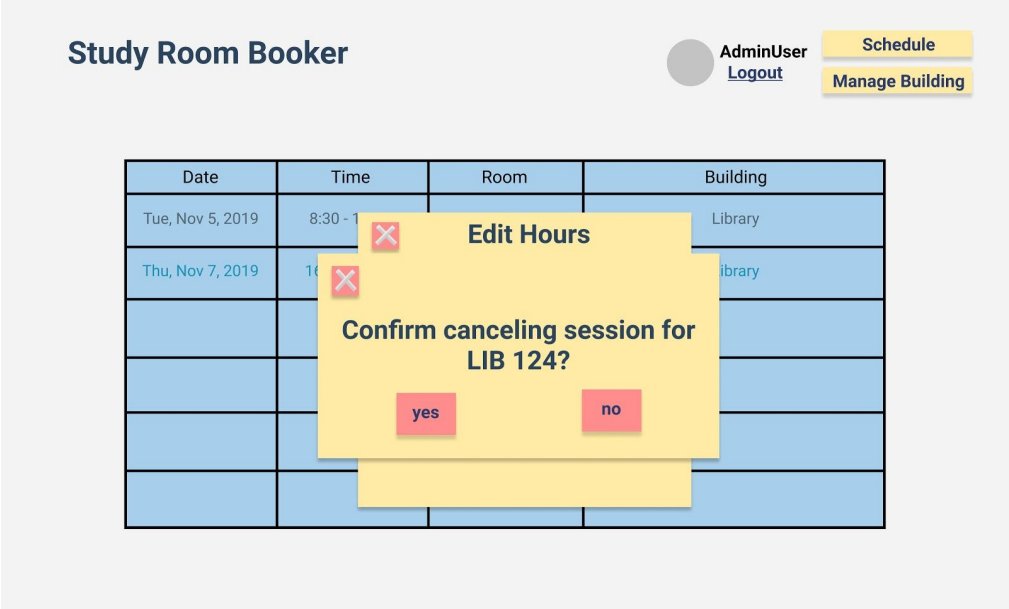

Figure 30: UI Prototype Edit Study Room Session Hours Error

If the GMU user selects yes, they will be prompted with the following pop-up, else they are brought back to Edit Hours (Figure 27).

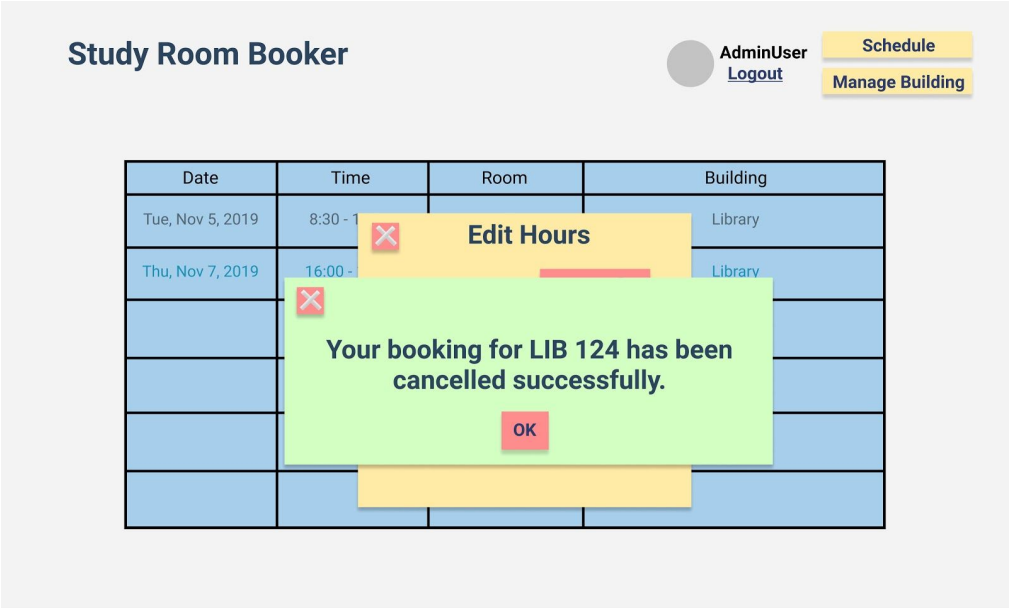

Figure 31: UI Prototype Cancel Study Room Session

7.4 Add and Remove a Building

To add or remove a building, the GMU administrator selects ‘Manage Building’ from the schedule.

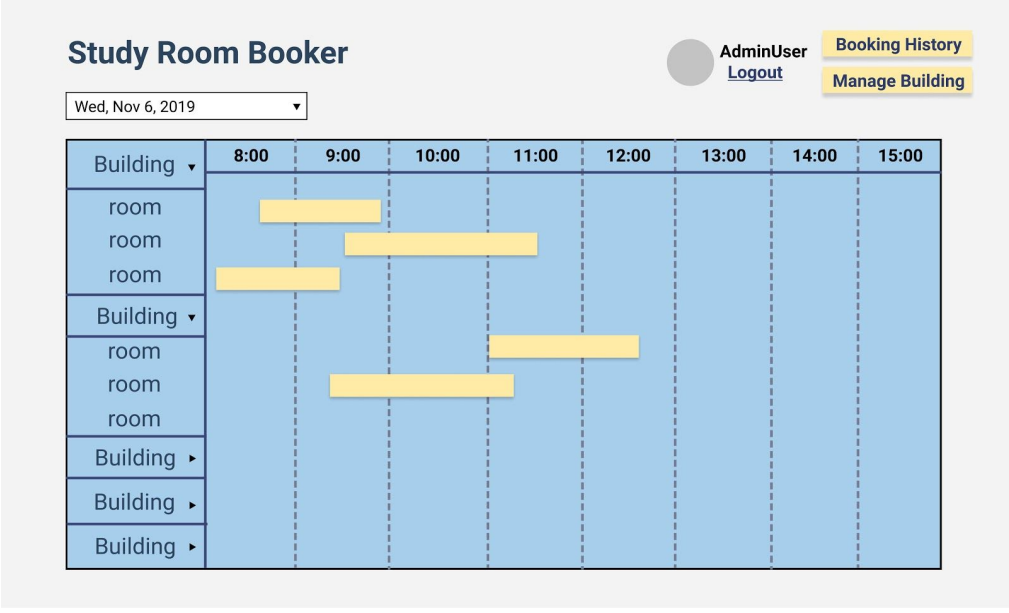

Figure 32: GMU Administrator View Schedule

The GMU user is presented with a new page containing all the buildings in Study Room Booker.

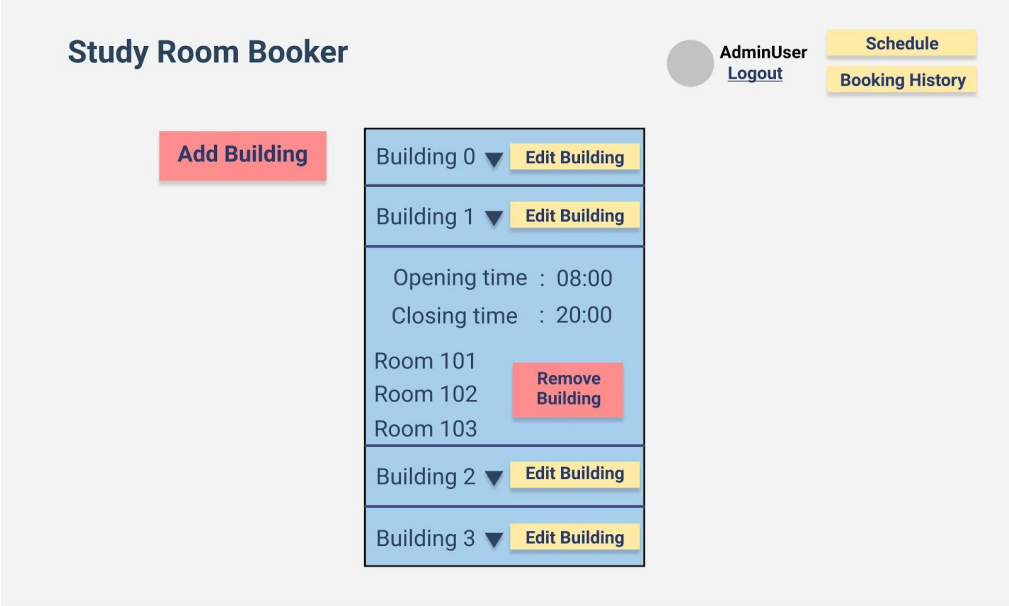

Figure 33: UI Prototype View Building

The GMU administrator selects ‘Add Building’ and is presented with a pop-up.

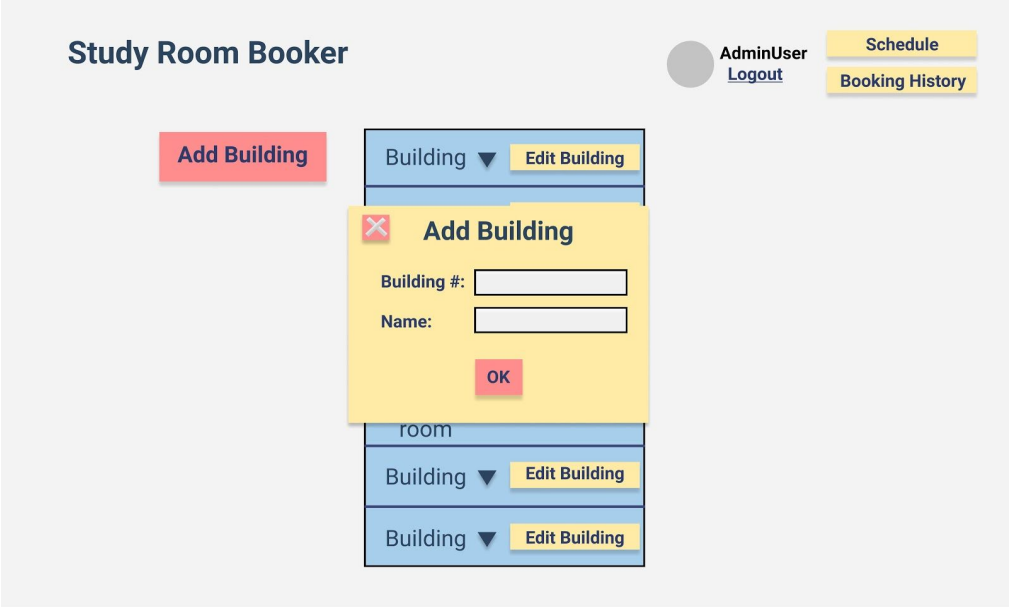

Figure 34: UI Prototype Add Building

If the GMU administrator wants to remove a building, from view building (Figure 33), he or she selects the drop down arrow besides the desired building and then selects ‘Remove Building’. He or she is presented with a confirmation pop-up.

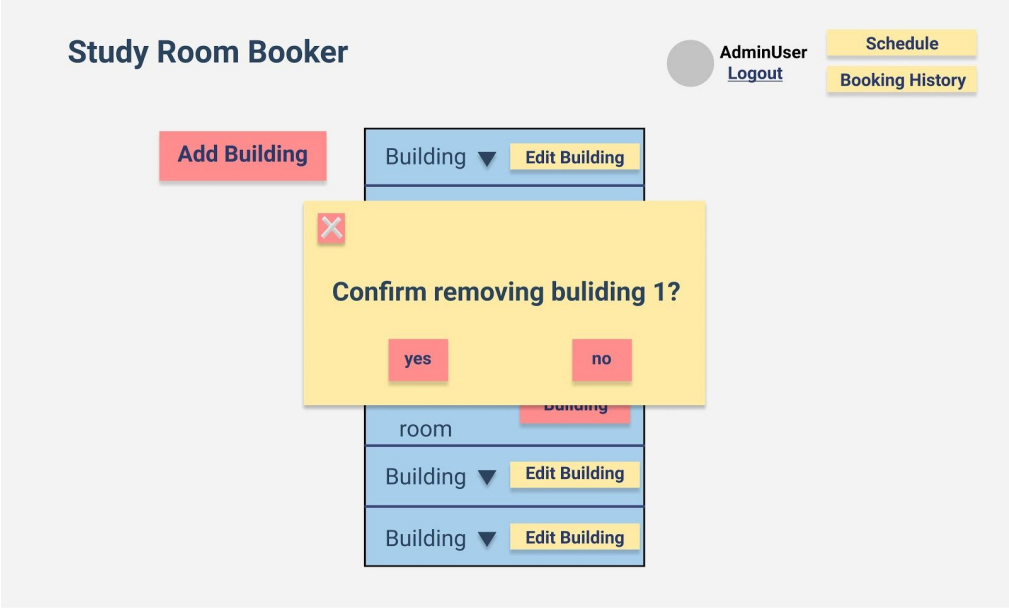

Figure 35: UI Prototype Remove Building

7.5 Edit Building Hours

If the GMU administrator wants to edit buildings hours, from the view building page (Figure 33), he or she selects edit building. The GMU user is brought to the edit building page and can change the opening and closing time.

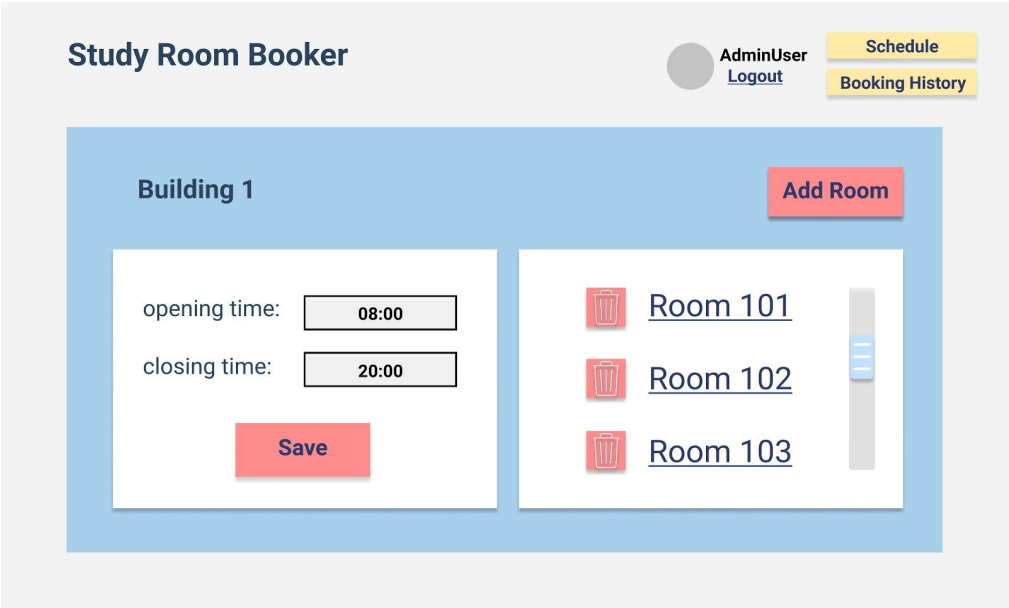

Figure 36: UI Prototype Edit Building

7.6 Add and Remove a Study Room

To add a study room from a building, the GMU administrator selects ‘Edit Building’ from the view building page (Figure 33). He or she can then select ‘Add Room’.

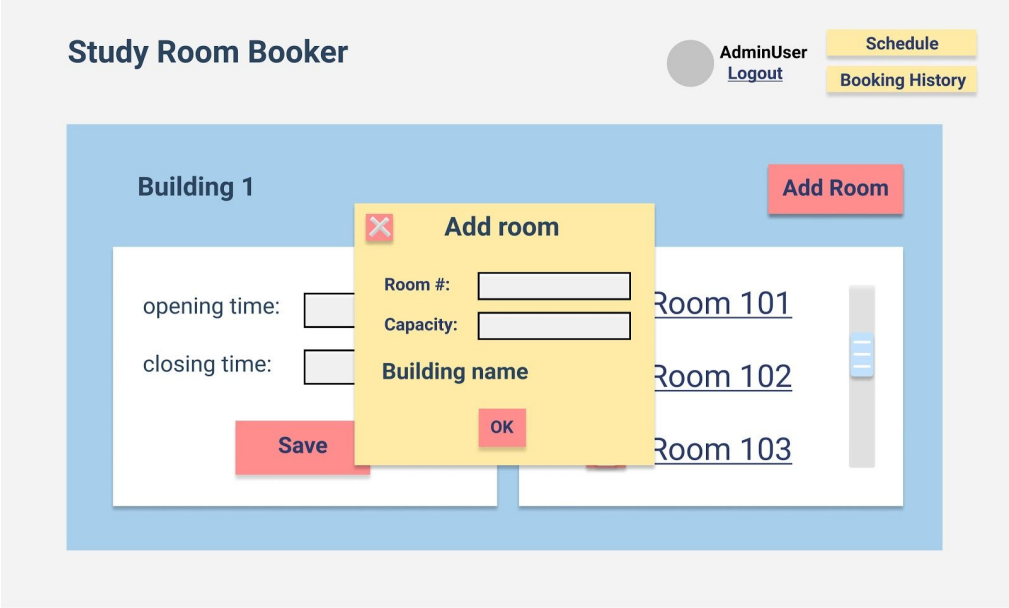

Figure 37: UI Prototype Add Room

If the GMU administrator wants to remove a room from a select building, from the edit building page (Figure 36) he or she can select the garbage can icon beside the room to be deleted and will be prompted by a pop-up to confirm the deletion.

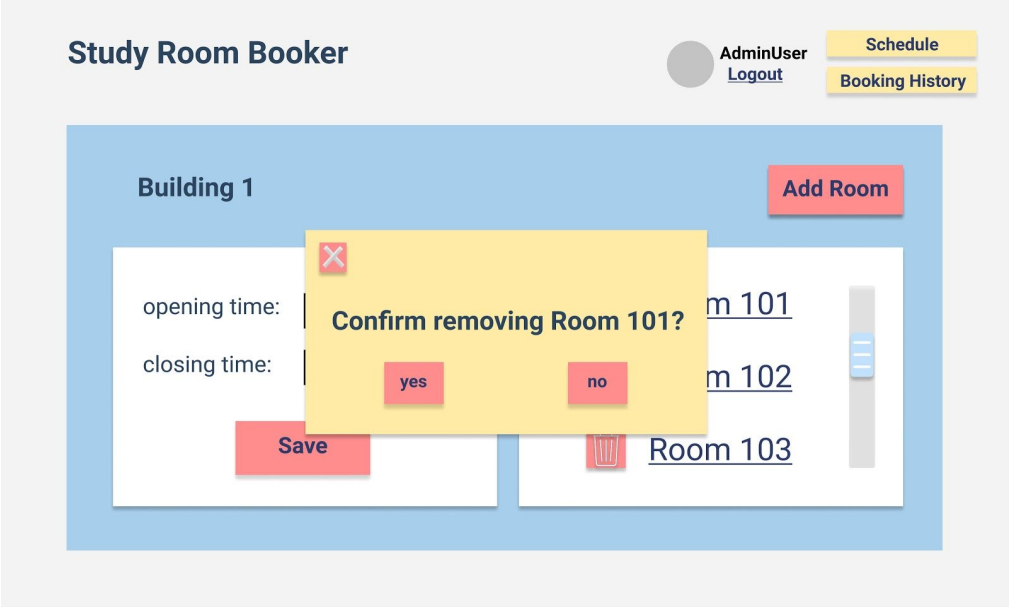

Figure 38: UI Prototype Remove Room

8 Other Non-Functional Requirements

This section of the RSD contains other non-functional requirements. The non-functional requirements describe how Study Room Booker will perform as well as how the security will be handled.

8.1 Performance Requirements

Meeting the following performance requirements will ensure that a GMU user's experience with Study Room Booker is free of faults and other undefined behaviours. Providing a GMU user with an experience that is free of faults and undefined behaviour is beneficial in gaining the trust of the GMU user and provides the GMU user with reassurance that the system is being used correctly.

PR-1: New study room bookings are to be reflected in the schedule in real-time.
(High Priority)

PR-2: Cancellations of existing bookings are to be reflected in the schedule in real-time.
(High Priority)

8.2 Security Requirements

SR-1: Only a user who possesses a GMU account may book a study room.
(High Priority)

SR-2: Each GMU user must enter his or her GMU username and password into the Study Room Booker login page in order to gain access to Study Room Booker.
(High Priority)

SR-3: Only GMU administrators (GMU accounts which have been assigned elevated permissions in GMU's login API by GMU staff administration) will be able to access administrative functionality.
(High Priority)

8.3 Software Quality Attributes

SQA-1: The Study Room Booker must have 99% uptime.
(High Priority)

SQA-2: When a GMU user accesses Study Room Booker on mobile or on desktop, the GMU user must not experience a significant difference in usability.
(High Priority)

SQA-3: Study Room Booker must be able to be placed into a maintenance mode in which maintenance/upgrades are able to be undertaken.

(High Priority)

SQA-4: The login feature must ensure good integrity of Study Room Booker, by only allowing each authorized GMU user to access the booking page and book study room sessions.
(High Priority)

9 Other Requirements

This section of the RSD contains other requirements. The other requirements describe what will happen after release.

Current methods to gather user data in the existing Green Meadows University study room booking system will be reused in Study Room Booker. Study Room Booker will utilize the personal information saved on GMU servers of both students and faculty. Post-release, Acrosoft will be responsible for the maintenance of the system.

OR-1: Study Room Booker must only have access to the room booking and building information part of the GMU database.

OR-2: Maintenance of Study Room Booker post-release will be maintained by Acrosoft.

> OR-2.1: Non-software requirements including staffing for study room maintenance are to be managed by GMU.

A1: Issues List

At this time, there are no requirements that require further clarification from GMU.