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I confirm that I understand my coursework needs to be submitted online via Google Classroom under the relevant module page before the deadline in order for my assignment to be accepted and marked. I am fully aware that late submissions will be treated as non-submission and a marks of zero will be awarded.

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1. Introduction

Sound Strong music institute has been providing musical instrument training and recording services for a decade. This institute has successfully been able to represent itself widely for its quality music recordings and productions. And, other than music recordings, it also has been providing able to practice rooms hiring services as well as musical instrument rental services. The music institute has admins and staffs to manage and execute different tasks of the institute. The staff should be handling the tasks according to the customer’s requirements. To execute the working processes more systematically and more efficiently, an online system is built for related processes.

This coursework’s requirement is building an online system to record customer details to have a systematic working management of Sound Strong music institute. The online system is handled by the staffs and the admins. It has kinds of different functions which helps to the staffs and the admin to manage heavy influx of customer’s requirements like booking rooms and instruments. The application can be used by customer once the customer logins their details either by user

ID or email. Any queries related the registration, booking rooms and instruments, music instruments trainings, discount packages etc. can be obtained easily with the help of this application. And, also the staff can generate report of any customer using their User ID and manages all the bookings of the customers.

2. Tools Used

2.1. Draw.io

Draw.io is a free online diagram software which provides simple tools to create flowchart, network diagram, UML online, ER diagram etc. It helps to import the diagram files in different extensions like .vsdx files, gliffy files, Lucid chart files etc. In this coursework, this software is used to make use-case diagram, class diagram, collaboration diagram and sequence diagram.

2.2. Adobe Illustrator

Adobe Illustrator is a graphic design software which provides different tools to create digital images, cartoons, diagrams, logos etc. In this coursework, this software is used to make the wireframe of user interface of Sound Strong application.

2.3. Match Ware

Match ware is a meeting management software product which is mainly used tracking processes, managing budgets, analyzing workloads, developing plans etc. In this coursework, this software is used to make Gantt Chart. (matchware, 2021)

3. Methodology -RUP

RUP which stands for Rational Unified Process, is a method for software development. This is designed using Unified Modeling Language (UML). This process is a very important software engineering task which is used to understand the requirement of the customer and to provide software in the form of solution while developing a software. This software development process consists of four phases which are as follows:

i) Inception phase:

In the first phase of development process, the team members working together for the certain project gets together to find the requirements of the project. With the proper communication and planning among the team members the information relating the necessity of the project is collected, which helps to identify the scope of the project. This will eventually allow the managers to build the use case diagram and estimate the budget and the members can involve the project within the estimated cost. In general, this phase holds the gathering and necessity of the project relating the financial status, project plans and requirements, use case model etc.

ii) Elaboration phase:

In the second phase of development process, the information gathered according to the requirement of the customer is analyzed and the information is expanded. The requirements are dramatically represented to refine the information from the customer and design the model systematically. In the inception phase, the information gathered not just consists of requirements but also consists of various problems which are widely analyzed, and the model design is planned. The skate holders are also identified in this phase and their viewpoints are recognized, skate holders are those persons who benefits in direct or indirect method from the system which is being developed.

iii) Construction phase:

In this phase of development process, the system is built. All the requirements of the customer, requirements of the skate holders etc. are all analyzed and according to the analyzed information the features that needs to be added in the system is identified which helps to construct the system with more benefits. This phase includes all the coding work to develop the system. Soon after the completion of the system, different kinds of testing is done. The testing is

done in different methods which also includes trial testing done by the developer themselves to check and solve for errors.

iv) Transition phase:

In this phase of development process, the final project is brought out in public. The beta testing of the system is done. At the end, if any error or changes is required based on the market review then the project is updated. Not just the raised problem but if any beneficial feedbacks from the users are collected and then it is analyzed to update the system or to add any additional features in the system.

4. GANTT CHART

Gantt chart can be simply referred as a bar chart which helps in showing the events, activities and tasks of an project displayed against time. The details relating date, starting time and ending time, activities, task name etc. are displayed. And, a graph is in the right side displaying the bar graph of all the tasks and the time of tasks do. It helps to schedule all the activities of the project. It shows what needs to be done and when to be done. (gantt, 2021)

	Task Name	Duration	Start	End
1	**Sound Strong Onlin...**	**177 days**	**12/30/2019**	**6/23/2020**
2	**⊟ Inception**	**63 days**	**12/30/2019**	**2/28/2020**
3	Scheduling Resou...	23 days	12/30/2019	1/21/2020
4	Cost and Time Esti...	19 days	1/13/2020	1/30/2020
5	Risk Management	18 days	1/27/2020	2/12/2020
6	Planning	21 days	1/20/2020	2/7/2020
7	Prototype Develop...	46 days	1/15/2020	2/28/2020
8	**⊟ Elaboration**	**29 days**	**2/24/2020**	**3/23/2020**
9	Project examinatio...	11 days	2/24/2020	3/4/2020
10	Preparing distributi...	9 days	3/2/2020	3/10/2020
11	Mounting equipment	14 days	3/9/2020	3/20/2020
12	**⊟ Construction**	**50 days**	**3/23/2020**	**5/11/2020**
13	System Build	12 days	3/23/2020	4/2/2020
14	System Operation ...	21 days	3/30/2020	4/17/2020
15	User Manual	21 days	4/10/2020	4/30/2020
16	Test Cases	33 days	4/6/2020	5/7/2020
17	**⊟ Transition**	**50 days**	**5/4/2020**	**6/22/2020**
18	Training	21 days	5/4/2020	5/22/2020
19	Beta Testing	42 days	5/11/2020	6/19/2020
20	Analysis of Users...	19 days	6/2/2020	6/19/2020
21	Supporting and M...	21 days	5/28/2020	6/17/2020

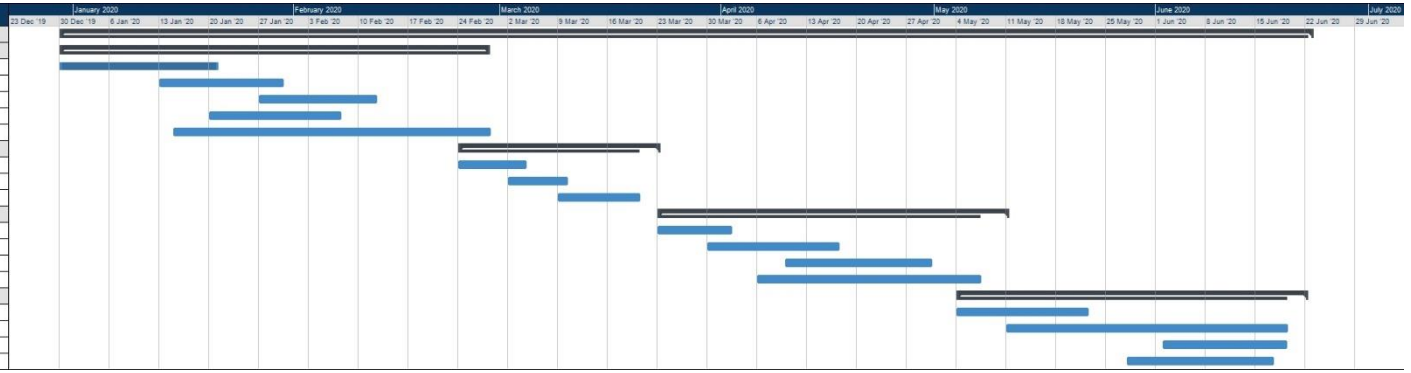

Figure 1: Gantt Chart

5. Use Case Diagram

UML which stands for Unified Modeling Language, is a standardized modeling language which is used for development processes. The design model of system software should be designed before developing the software. This complex design can be drawn easily with the help of UML diagram. It dramatically represents the user's point of view of functionality. This is drawn in the initial phase of designing after planning about the project. The use case diagram consists elements like actors, object and connectors between the object and the actor. This diagram helps to show the connection between the objects and actors which will help while implementation the codes for the system. The major use of class diagram is it can be easily modified so if any additional requirement is met then this can help to save lot of cost.

(uml-unified-modeling-language, 2021)

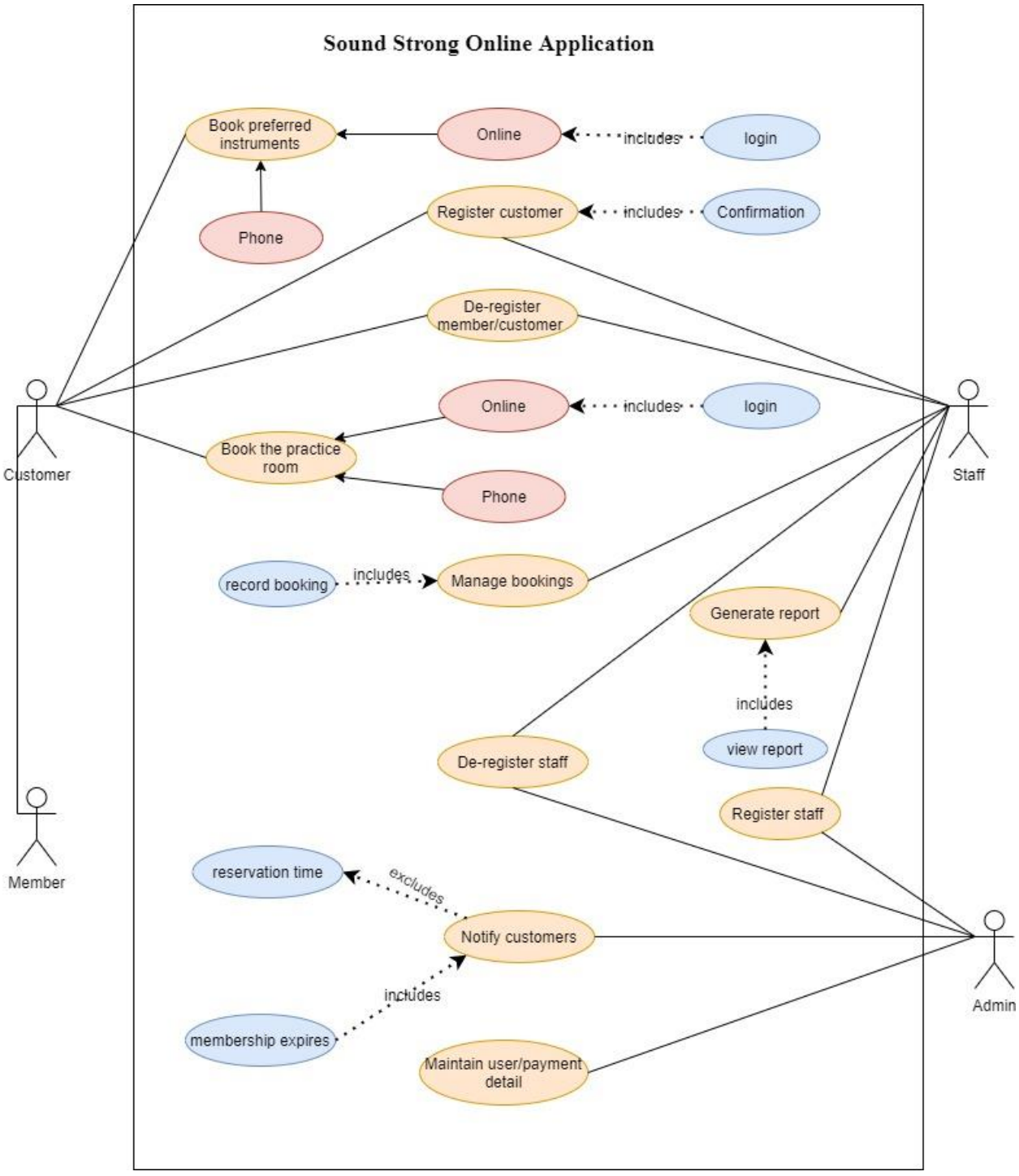

Figure 2: Use Case Diagram

5.1. HIGH LEVEL USE CASE

5.1.1. Register customer

Use case:	Register customer
Actor:	Customer (Primary) and Staff (Secondary)
Description:	The customer visits the website and registers their required details. If the registration is done with valid information, then it is confirmed by the staff.

Table 1: Register customer

5.1.2. Register Staff

Use case:	Register staff
Actor:	Staff (Primary) and Admin (Secondary)
Description:	The registration of the staff members can be handled by admin as well as the other staff members. But the admin works in upper position than the staff.

Table 2: Register Staff

5.1.3. De-register member/customer

Use case:	De-register member/customer
Actor:	Customer(Primary) and Staff(Secondary)
Description:	The details of the customer is removed by the staff members when the membership expires.

Table 3: De-register member/customer

5.1.4. De-register staff

Use case:	De-register staff
Actor:	Admin(Secondary) and Staff(Primary)
Description:	When the staff no longer works as a staff member then the admin deregulates staff from the system.

Table 4: De-register staff

5.1.5. Book the practice room

Use case:	Book the practice room
Actor:	Customer
Description:	The customer either visits the website or makes a phone call

	to book the practice room. But, a login system is required for the customer to book the practice room via online.

Table 5: Book the practice room

5.1.6. Book preferred instruments

Use case:	Book preferred instruments
Actor:	Customer
Description:	The customer either visits the website or makes a phone call to book the preferred instruments. But, a login system is required for the customer to book the preferred instruments via online.

Table 6: Book preferred instruments

5.1.7. Maintain user/payment detail

Use case:	Maintain user/payment detail
Actor:	Admin
Description:	The admin records all the information of the customers who registered their details in the system and also the payment details of the

	customers.

Table 7: Maintain user/payment detail

5.1.8. Generate report

Use case:	Generate report
Actor:	Staff
Description:	The registered staff members has the report generation facility for organization purpose. So, staffs are not only able to generate the report of the customer from the system but also view the details of the report.

Table 8: Generate report

5.1.9. Notify customers

Use case:	Notify customers
Actor:	Admin
Description:	The admin is updated about the details related to the customer like the membership expiry date and reservation time. The customer is notified by the admin about those details.

Table 9: Notify customers

5.1.10. Manage bookings

Use case:	Manage bookings
Actor:	Staff
Description:	The booking time and date are managed by the staff members. According to the requirement of the customer and also the booking timing is set and also the staff holds the authority to cancel the booking if any problem arises.

Table 10: Manage bookings

5.2. Expanded Use Case

5.2.1. Expanded Use Case Level Description for "Register Customer"

Use Case Name: Register Customer

Purpose: To register customers details

Description: the customer visits the website and should login into the system with proper ID and password. If the registration is done with valid information then it is confirmed by the staff.

Primary Actors: Customer

Secondary Actors: Staff

Pre-Condition: Customer should login in the system.

Post Condition: None

Main Flow/ Typical Course of Events	
Actor Action	**System Response**
1.Customer logins with their ID/email and password.	
2.Customer should accept terms and conditions of the organizations.	
3.Customer fills the required input field with their details.	
	4.The system validates and verifies the login ID and password. 5.The systems logins the customer. 6.The system displays the homepage for the customer. 7.The use case ends.

Table 11: Expanded Use Case Level Description for "Register Customer"

Alternative Flow

Actor Action	System Response
4.a. Invalid or empty ID/email and password.	1. The system prompts for valid ID/email and password. 2. Use case resume at the main flow step 1.
4.b. Not agreeing to the terms and conditions.	1. The system prompts for agreeing terms and conditions. 2. Use case resume at the main flow step 2.
4.c. Invalid or empty input fields in the	1. The system prompts for entering valid

registration form.	details in the required input fields. 2. Use case resume at the main flow step 3.

Table 12: Alternative flow Expanded Use Case Level Description for "Register Customer"

5.2.1. Expanded Use Case description for "Manage Bookings"

Use Case Name: Manage Bookings

Purpose: To manages the room and instruments bookings

Description: The booking time and date are managed by the staff members. According to the requirement of the customer and also the booking timing is set and also the staff holds the authority to cancel the booking if any problem arises.

Primary Actors: Customer

Secondary Actors: Staff

Pre-Condition: Staff should login in the system before managing bookings.

Post Condition: None

Main Flow/ Typical Course of Events	
Actor Action	**System Response**
1.Staff logins with their ID/email and password.	
2. Staff checks the customer records and searches for the customer ID.	
3. Staff checks for the available rooms and instruments.	

	4.The system validates and verifies the login ID and password. 5.The systems displays the customer details about the searched customer ID. 6.The system displays the available rooms and instruments. 7.The use case ends.

Table 13: Expanded Use Case description for "Manage Bookings"

Alternative Flow

Actor Action	System Response
4.a. Invalid or empty ID/email and password.	1. The system prompts for valid ID/email and password. 2. Use case resume at the main flow step 1.
4.b. Missing Customer ID in the customer details record.	1. The system prompts for valid customer ID from the records. 2. Use case resume at the main flow step 2.
4.c. No availability of empty rooms and instruments.	1. The system will display " No any room or instrument is available at the moment. " 2. Use case resume at the main flow step 3.

Table 14: Alternative Flow Expanded Use Case description for "Manage Bookings"

6. Collaboration Diagram

A collaboration diagram is also known as communication diagram which helps to show the communication between the objects and to represent the behavior of the use case or part of the use case. It is used to show the structured working mechanism of the system which includes the messages transmitted and received.

(GeeksforGeeks, 2020)

Step-1:

In the first step to draw a collaboration diagram, the domain classes should be identified. The following figure consists of the domain classes which are the Registration and User.

Figure 3: Step-1 of Collaboration Diagram

Step-2:

In the second step to draw a collaboration diagram the necessary structured object are identified according to the system. The control object, boundary object and actor are identified which are represented as User, Registration UI, Registration, System, Staff and the Customer.

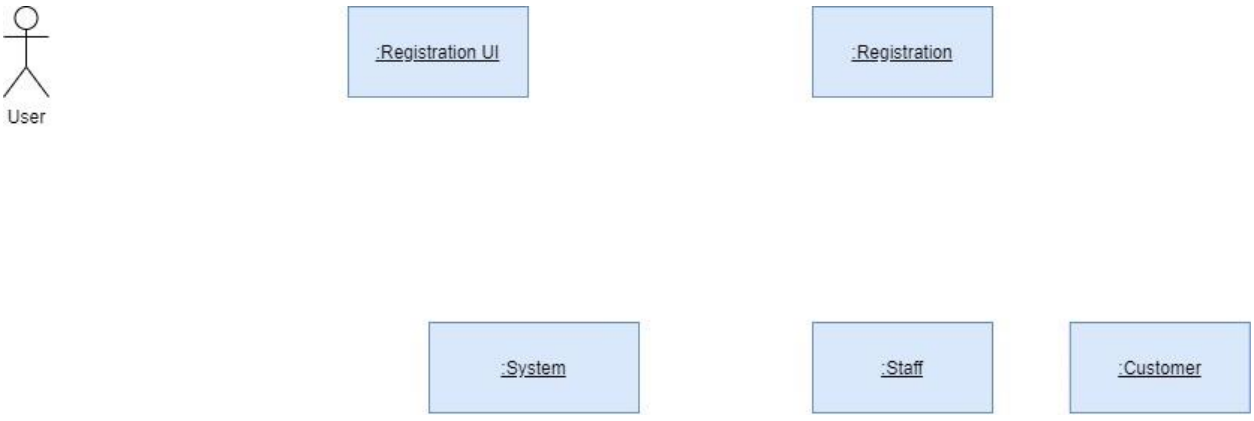

Figure 4 Step-2 of Collaboration Diagram

Step-3:

In the third step to draw a collaboration diagram, the control object, boundary object and actor are connected using a straight line which shows the context of the interaction between these objects.

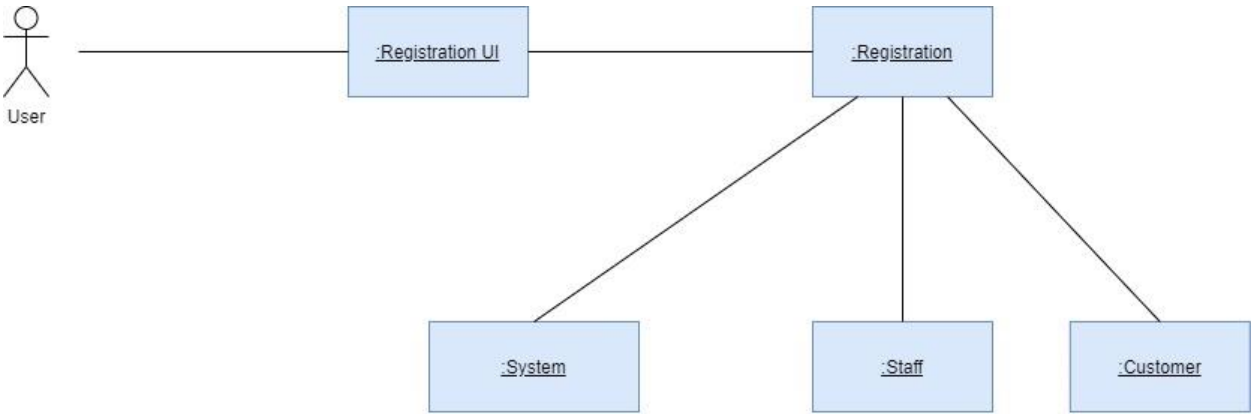

Figure 5: Step-3 of Collaboration Diagram

Step-4:

The fourth step of collaboration diagram is the final collaboration diagram. It shows all the connection between the control object, boundary object and actor together with links and messages which helps to explain how these elements are related and how does this elements interacts. The elements are shows with their messages sent and also received.

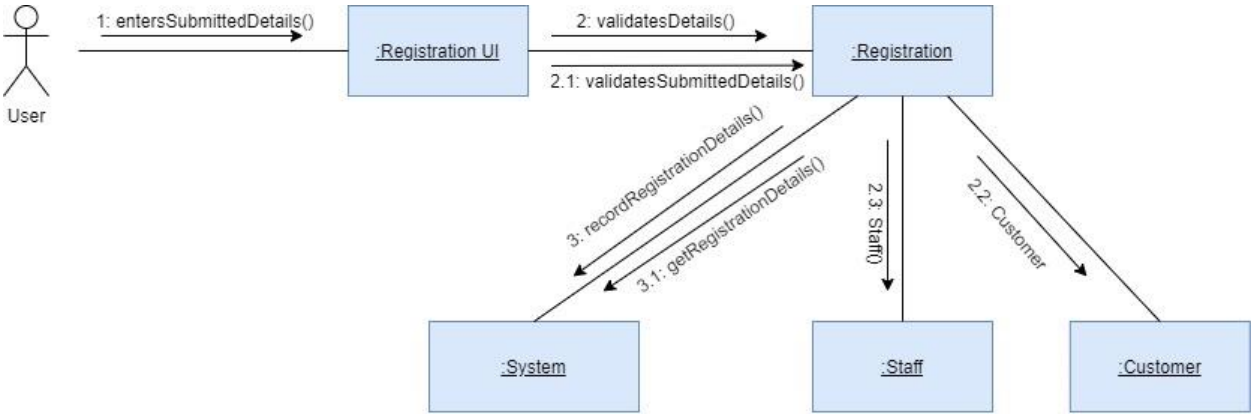

Figure 6: Step-1 of Collaboration Diagram (Final Collaboration Diagram)

7. Sequence Diagram

The purpose of sequence diagram is same as collaboration diagram i.e. both represents the interaction between the objects, but the interaction is in sequence order in sequence diagram. More specifically, sequence diagram is referred as visual representation of collaboration diagram. This diagram shows the message flows from one object to another in specific. (GeeksforGeeks, 2020)

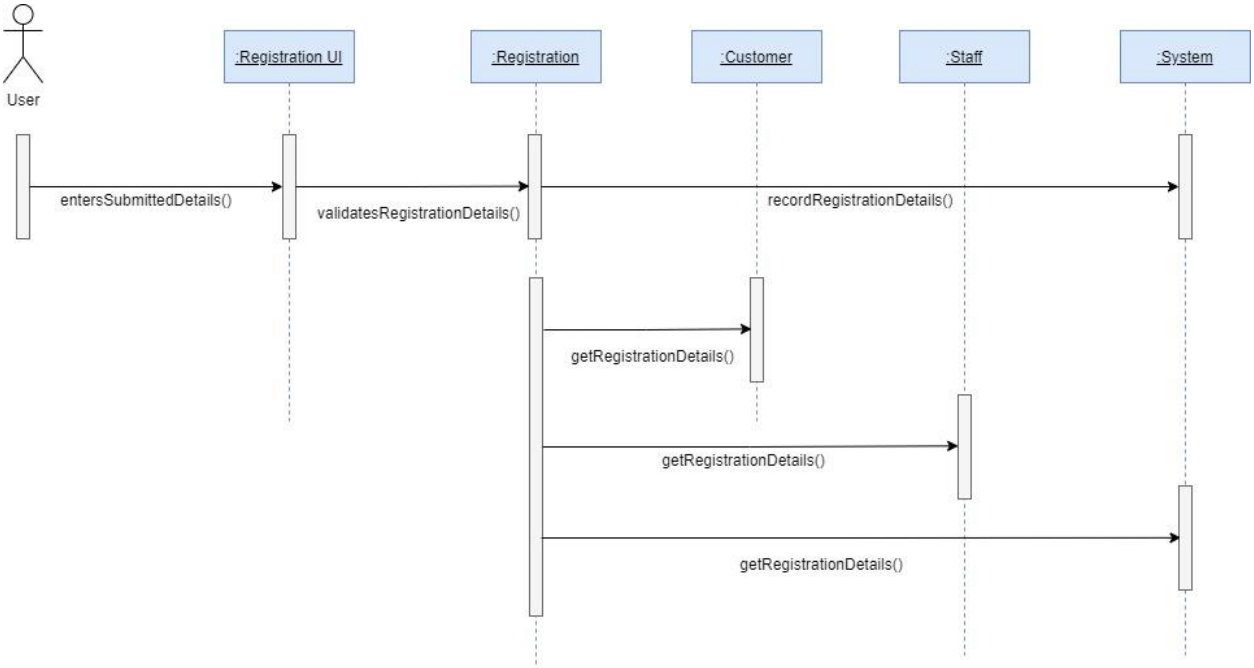

Figure 7: Sequence Diagram

8. Class Diagram

A class diagram is static structured diagram that represents the structure of the system containing all the systems details including classes, object, attributes, methods and also shows

the interactions between these elements. It contains messages and notes attached to any classes or relationships. This shows the relationship between each use case in complete details. It clearly visualizes the system which helps the developer to implement his/her code for the system and also helps to clear out the system to the client.

Use Cases	Domain classes
Book preferred instrument	Customer
Register Customer	Customer, Staff, Registration
De-register member/customer	Customer, Staff
Book the practice room	Customer
Manage bookings	Staff
De-register staff	Staff, Admin
Generate report	Staff
Register staff	Staff, Admin, Registration
Notify customer	Admin
Maintain user/payment detail	Admin, Payment

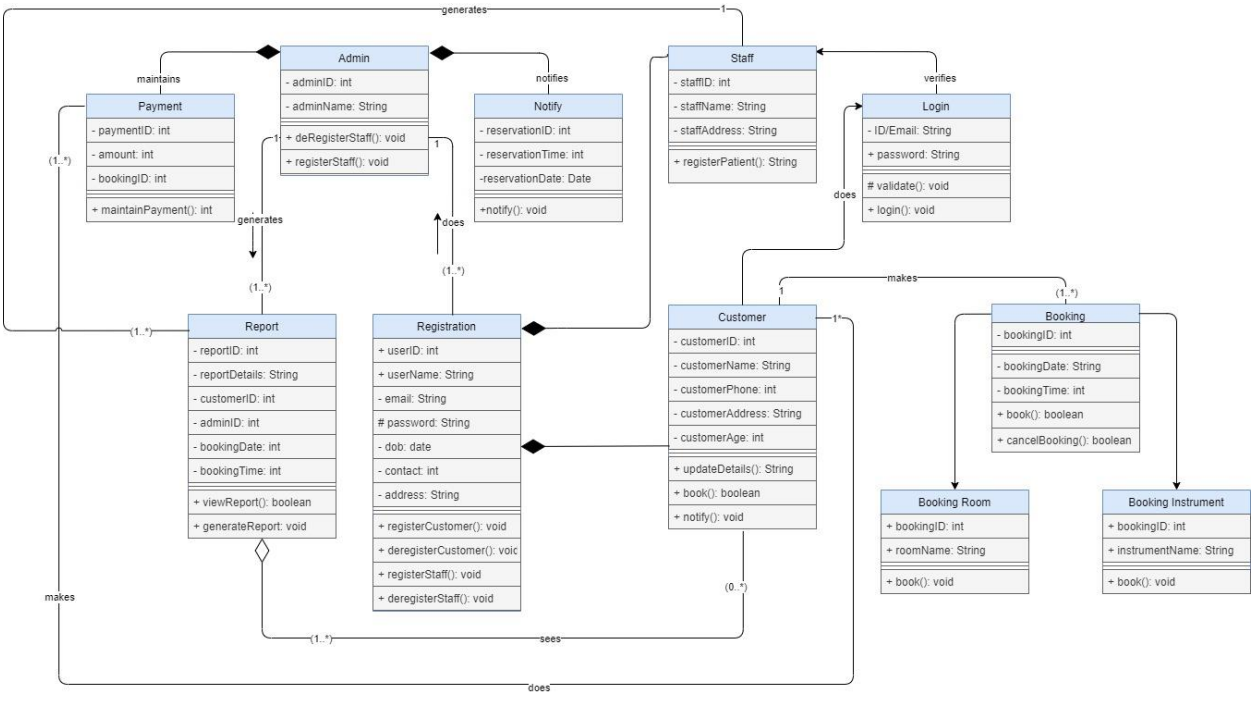

Figure 8: Class Diagram

9. Development Process

To start with the development process, at the very beginning the coursework scenario were studied and the given requirements of the coursework for the system was gathered. The RUP method was used for the system development. According to the RUP method, it consists of four phases for system development which are: Inception phase, Elaboration phase, Construction phase and Transition phase. In the beginning process, the requirements were collected and use case diagram was built. This use case was then used to represent the objects, attributes, and the actors. The relationship between these elements was shown diagrammatically in use case diagram. This diagram also shows the includes, extends and inheritance of use cases. The types of use case diagram i.e. High-level use case and Expanded Use Case was also built which included the functionality of each use case and their elements. The necessity of the system was then identified and analyzed based on this use case diagram the collaboration and sequence diagram were built. The class diagram and Gantt chart was then built. The Gantt chart included all the planning, designing, cost estimation etc. of the activities of the project. Whereas, the class diagram included the detailed information of use case diagram. The class diagram was used to represent the structure of the system including the system details about classes, object, attributes, methods and also shows the interactions between these elements.

After completion of the RUP method, the system was easily visualized to build the system. For this coursework, a proper application was not built but a framework was needed to be designed. And, with the help of all the diagrams the information was collected which helped in creating the system wireframe.

10. Prototype for Sound Strong Application

10.1. Login

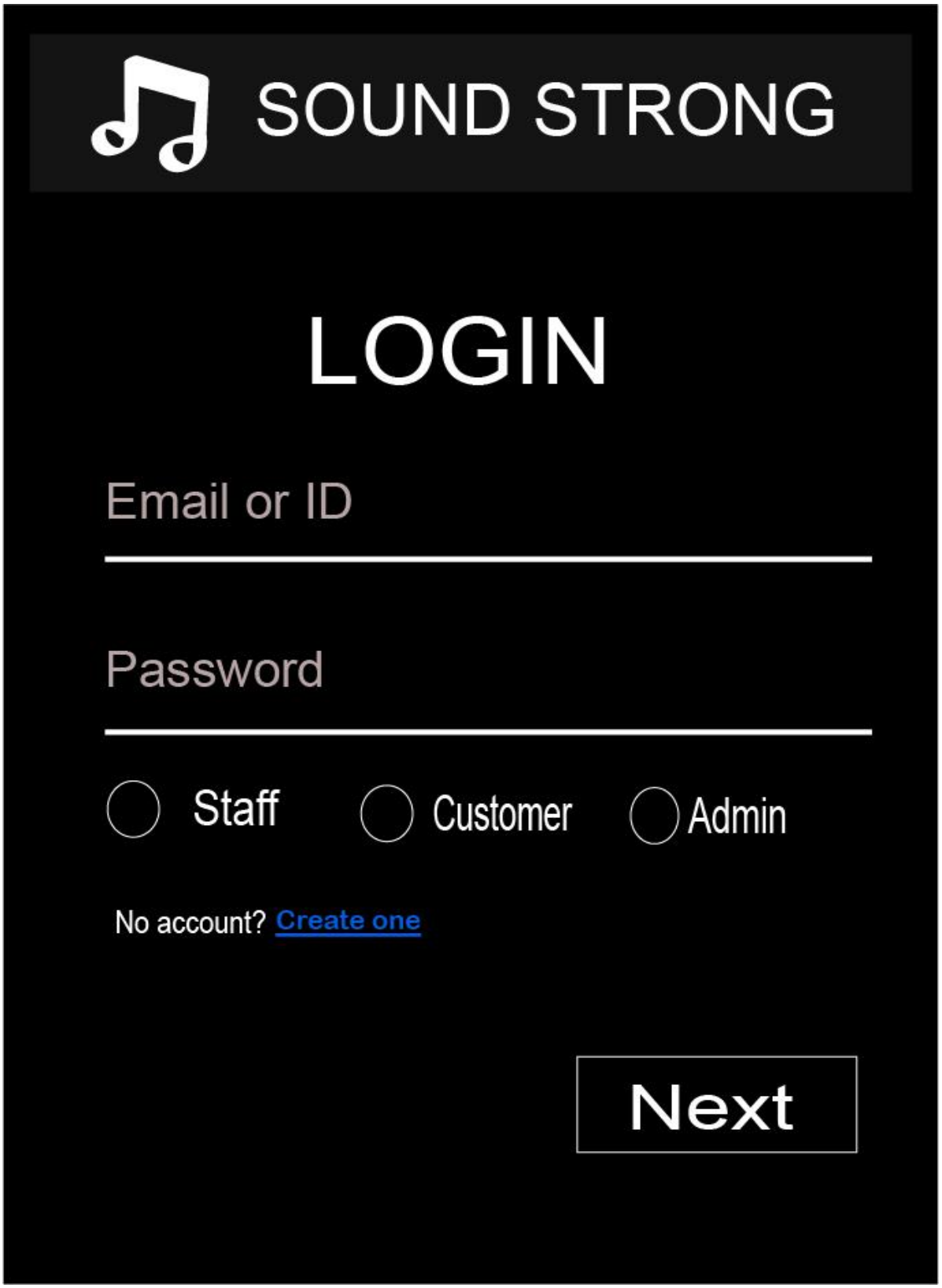
SOUND STRONG
LOGIN
Email or ID
Password
Staff
Customer
Admin
No account? Create one
Next

Figure 9: Login Wireframe

10.2. Registration Form

Figure 10: Registration Form Wireframe

10.3. Room Hiring Form

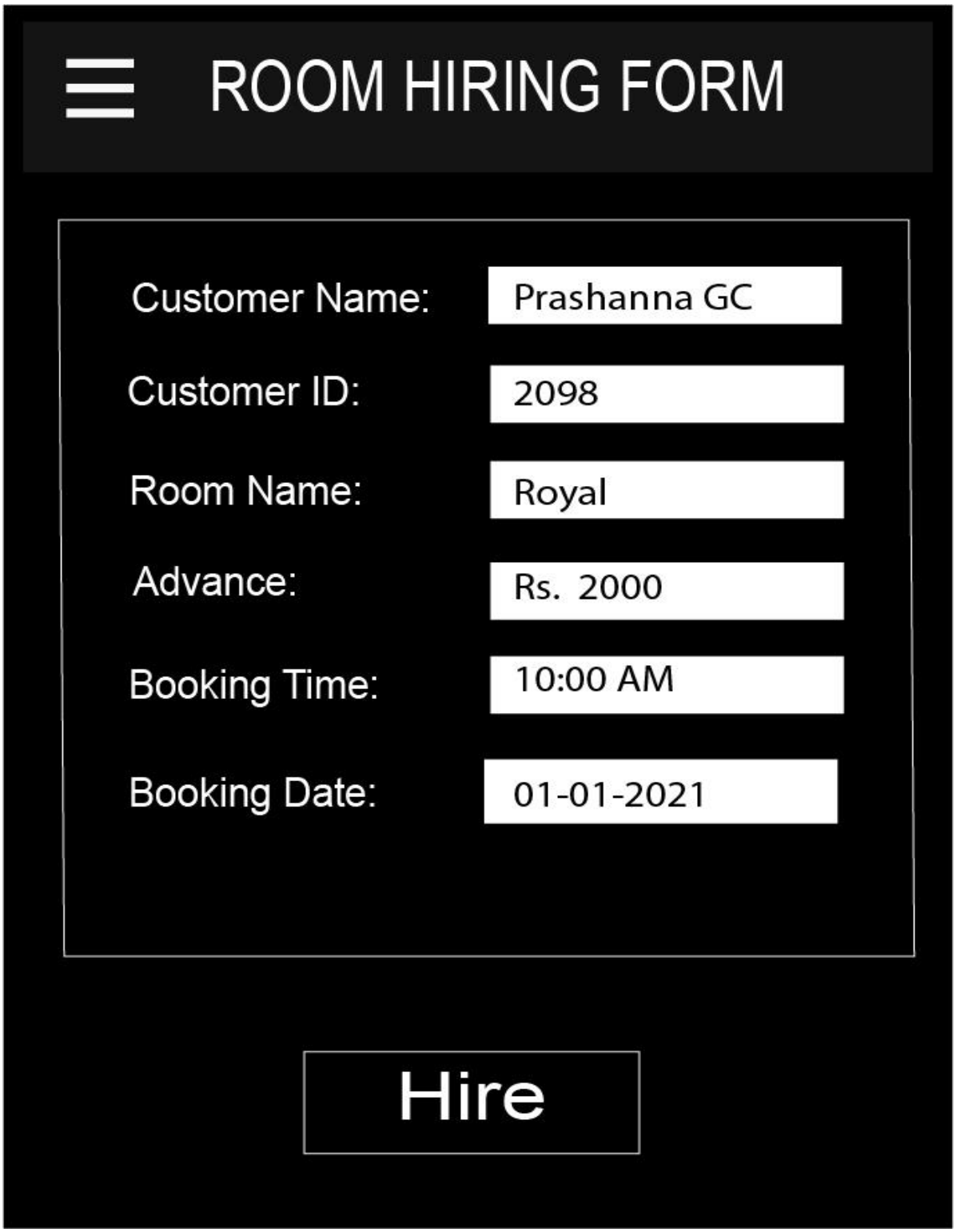

Figure 11: Room Hiring Form Wireframe

10.4. Instrument Rental Form

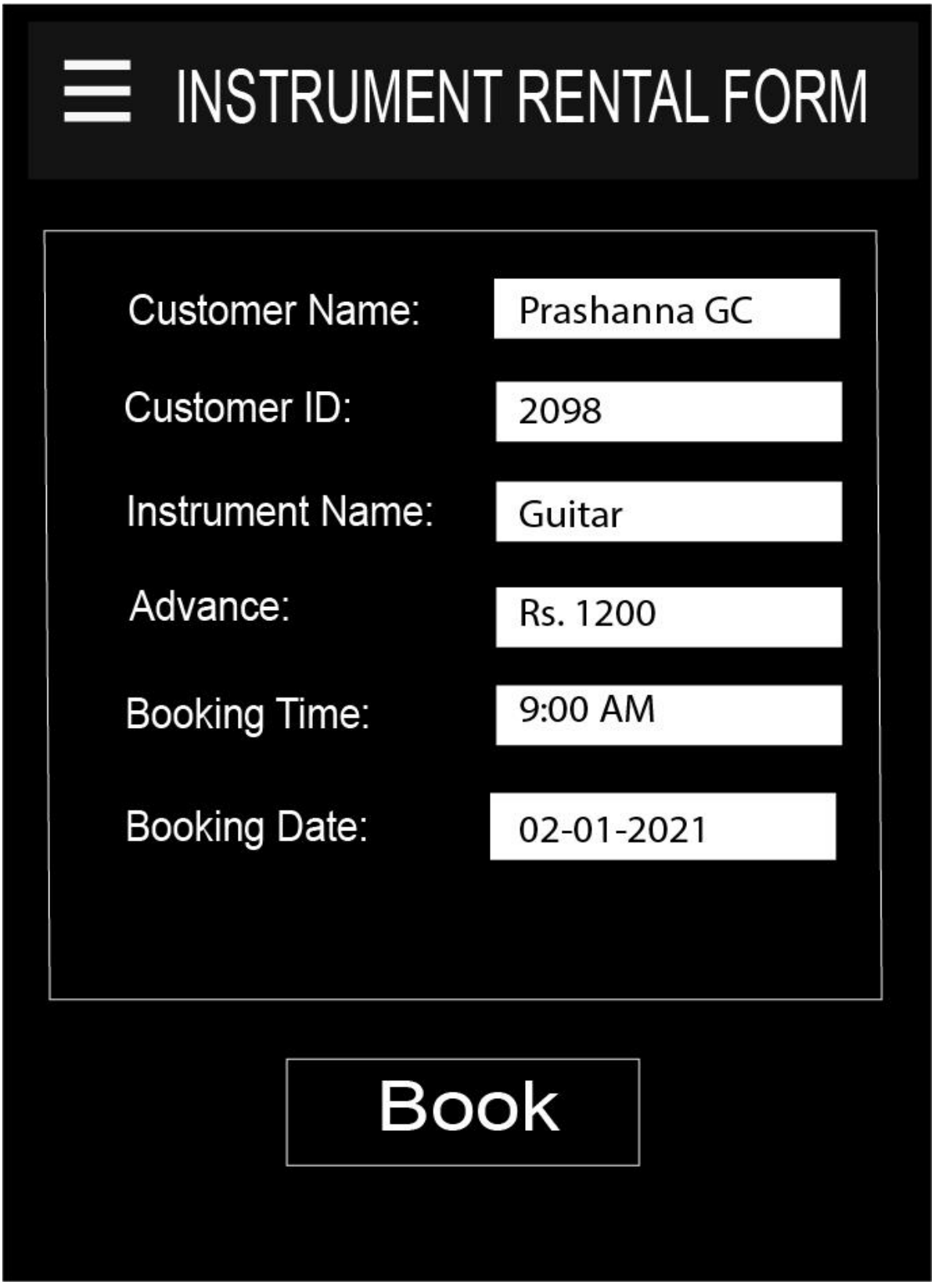

Figure 12: Instrument Rental Form Wireframe

10.5. Payment Method

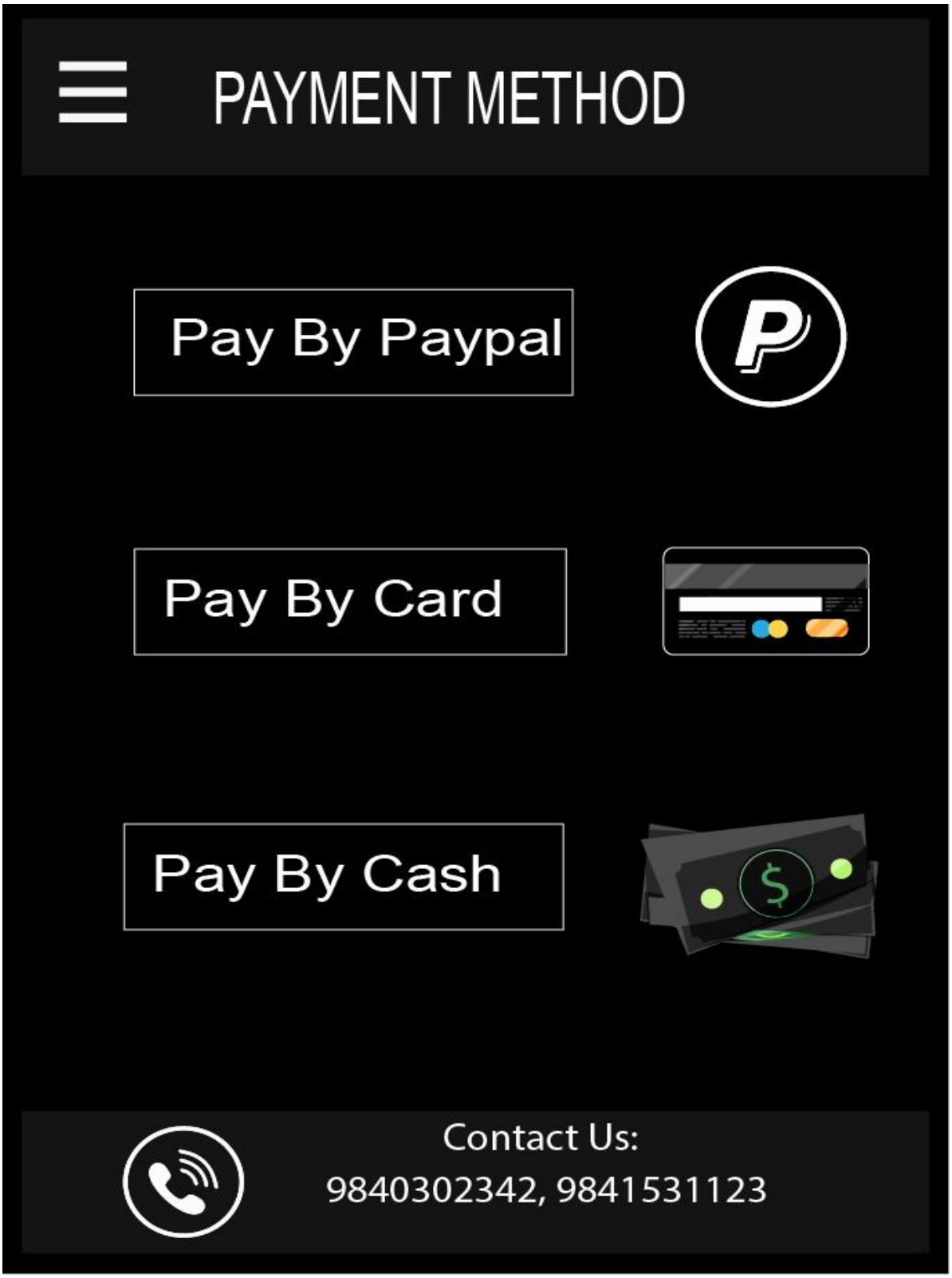

Figure 13:Payment Method Wireframe

10.6. Notification

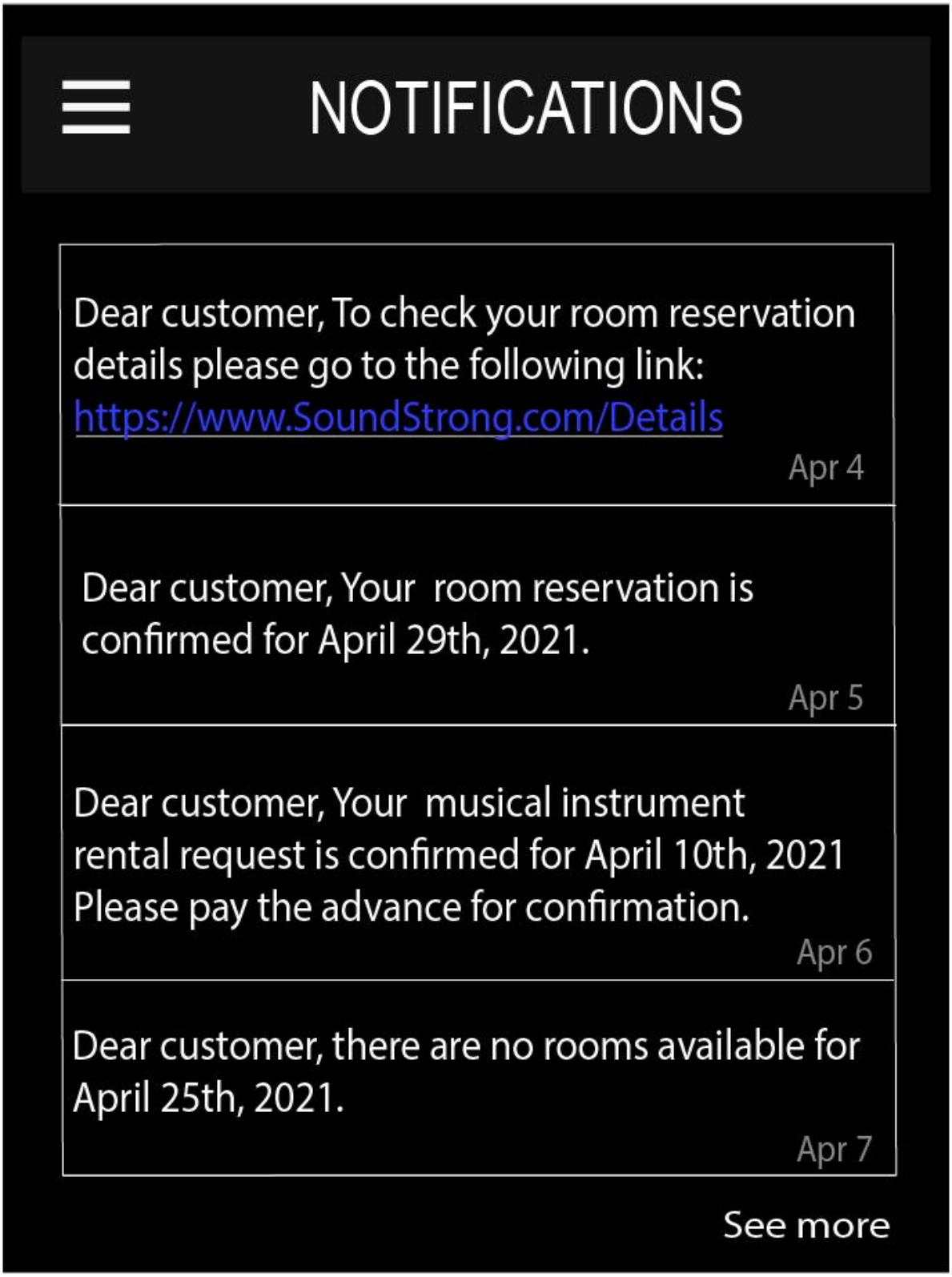

Figure 14: Notification Wireframe

10.7. Report Details

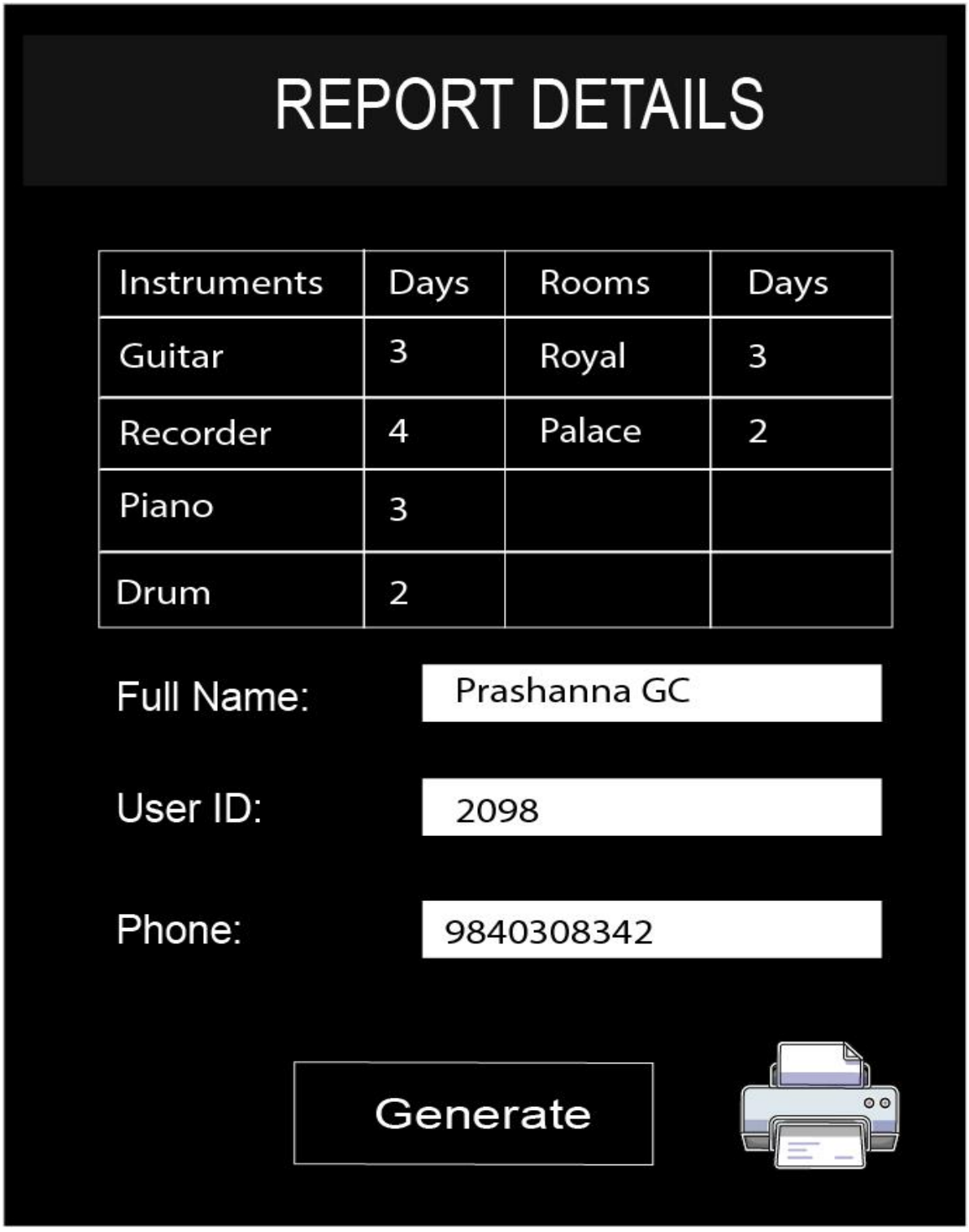

Figure 15: Report Details Wireframe

10.8. Customer De-Registration Form

Figure 16: Customer De-Registration Form Wireframe

10.9. Staff De-Registration Form

Figure 17: Staff De-Registration Form WireFrame

11. Conclusion

The requirement of this coursework was to build an online system for Sound Strong Music Institute. The application developed was able to record the customer's details and could collect requirements of the customer to book a practice room and musical instruments. All the diagrammatical requirements which were needed before developing the application were made. The use case diagram, collaboration diagram, sequence diagram, class diagram and Gantt chart were made. All these diagrams were studied and researched then were drawn in their respective programs.

I found these diagrams very useful and also quite difficult to construct but with the help of recorded videos and discussion with the module leader via hangout, I was able to complete these diagrams. An proper application was not designed in this coursework but all the professional steps that should be taken before building an application were done. This coursework really taught a lot about the working process in a professional field.

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