
Design Document

for

S.M.A.R.T.E.X

Version 2.0

Prepared by

Group #:16

Danish Mehmood	210297
Rikesh Sharma	180606
Lohit P Talavar	210564
Ajeet Meena	210078
Kumar Gourav Songara	170353
Anuj Kumar	200164
Pratiksha Dawane	210760
Avinash Saini	200232

Group Name: BitEngine

danishm21@iitk.ac.in
rikesh@iitk.ac.in
lohitpt21@iitk.ac.in
ajeetm21@iitk.ac.in
songara@iitk.ac.in
kanuj20@iitk.ac.in
ppdawane21@iitk.ac.in
avinashs20@iitk.ac.in

Course: CS253

Mentor TA: Rumit

Date: 22/02/2023

CONTENTS	II
REVISIONS.....	II
1 CONTEXT DESIGN	1
1.1 CONTEXT MODEL	1
1.2 HUMAN INTERFACE DESIGN	1
2 ARCHITECTURE DESIGN.....	2
3 OBJECT-ORIENTED DESIGN.....	3
3.1 USE CASE DIAGRAM	3
3.2 CLASS DIAGRAM	3
3.3 SEQUENCE DIAGRAM	3
3.4 STATE DIAGRAM	3
4 PROJECT PLAN	4
5 OTHER DETAILS	5

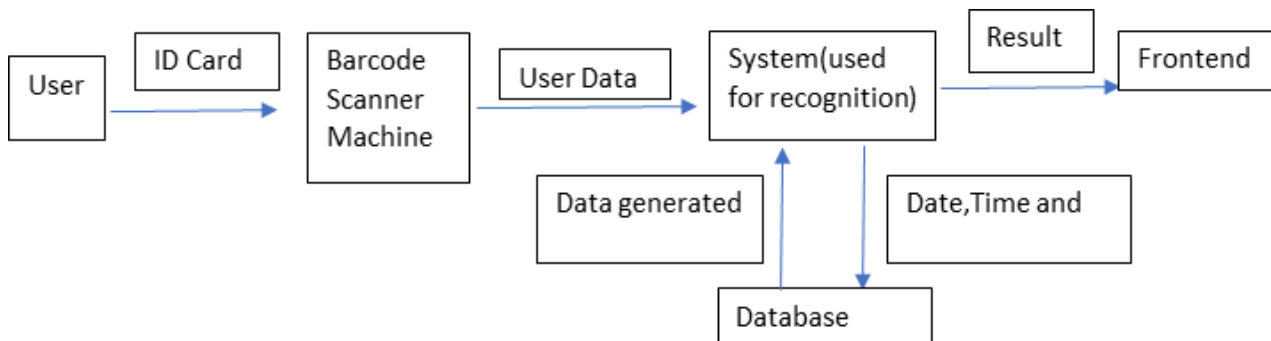
Revisions

Version	Primary Author(s)	Description of Version	Date Completed
Version 2.0	Danish Mehmood	Final Draft.	22/04/2023

1 Context Design

1.1 Context Model

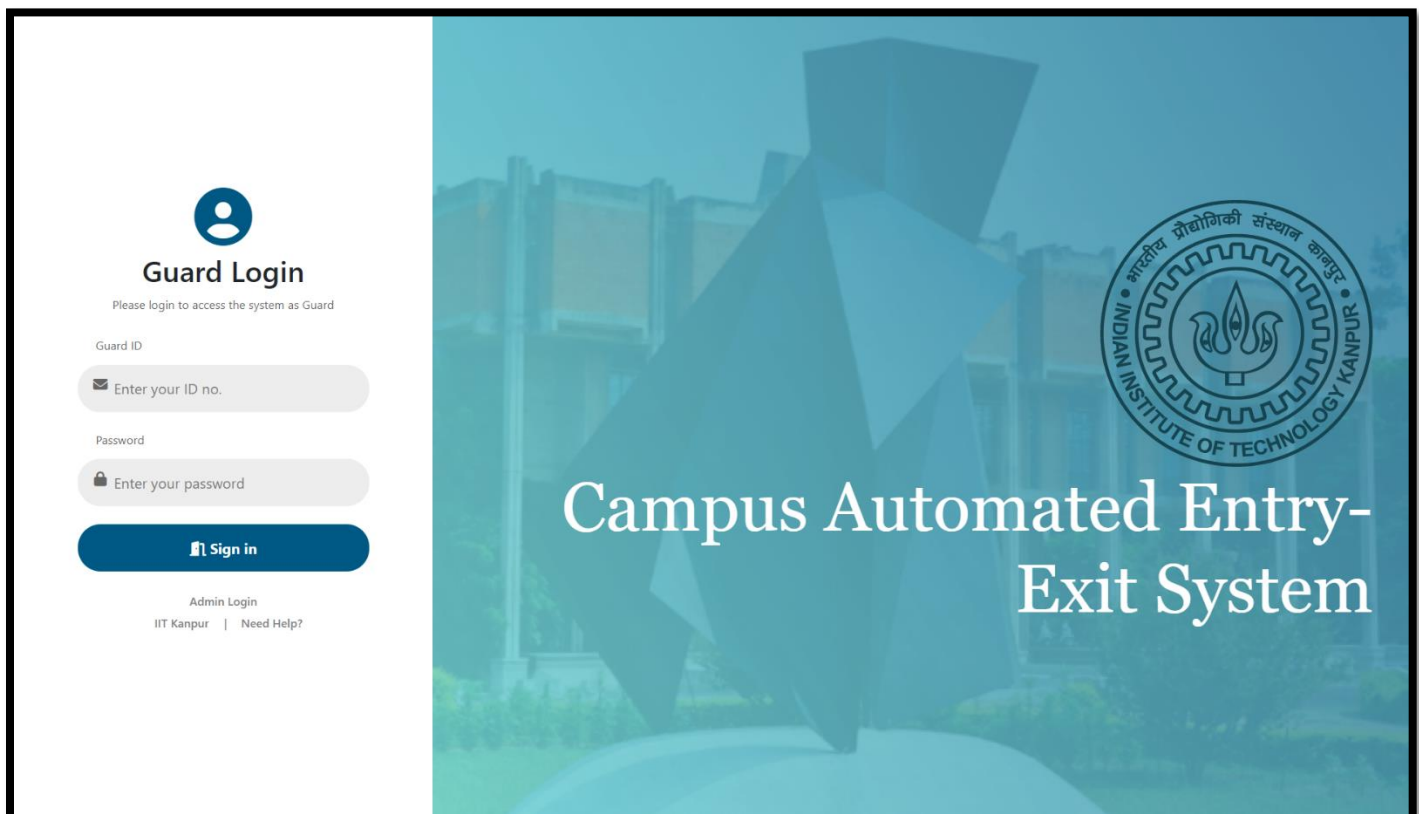
The context diagram as shown in the figure explains what are the basic entities (systems) which our system connects and is connected to. User puts his ID Card on machine i.e., ID Card bar code scanning and then machine takes user data and send it to system for recognition. System again transfers this data to database to check. Then it retakes the data generated from database and returns the result on the frontend.



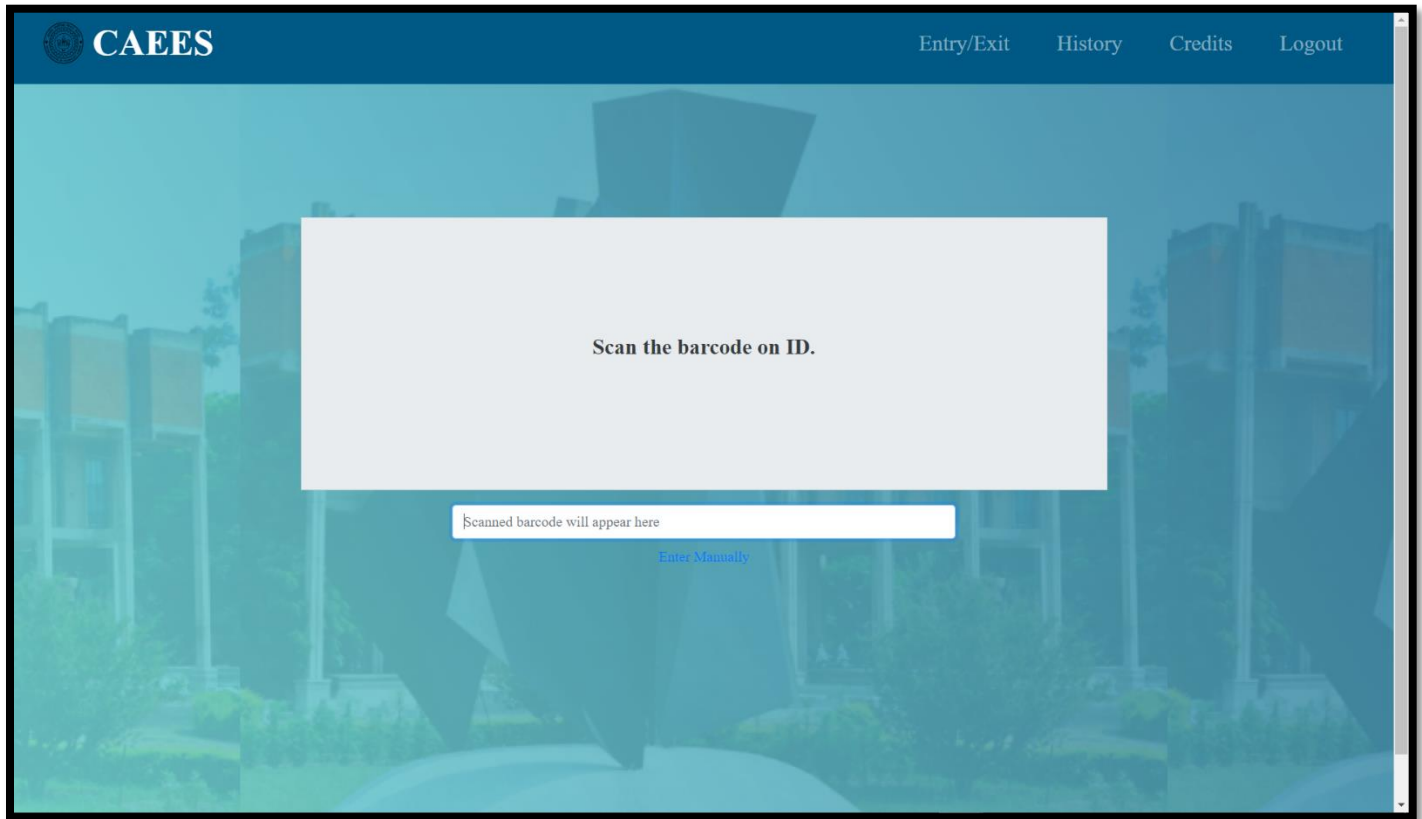
1.2 Human Interface Design

The final version of the human interface looks like this:

- **Guard login-page**

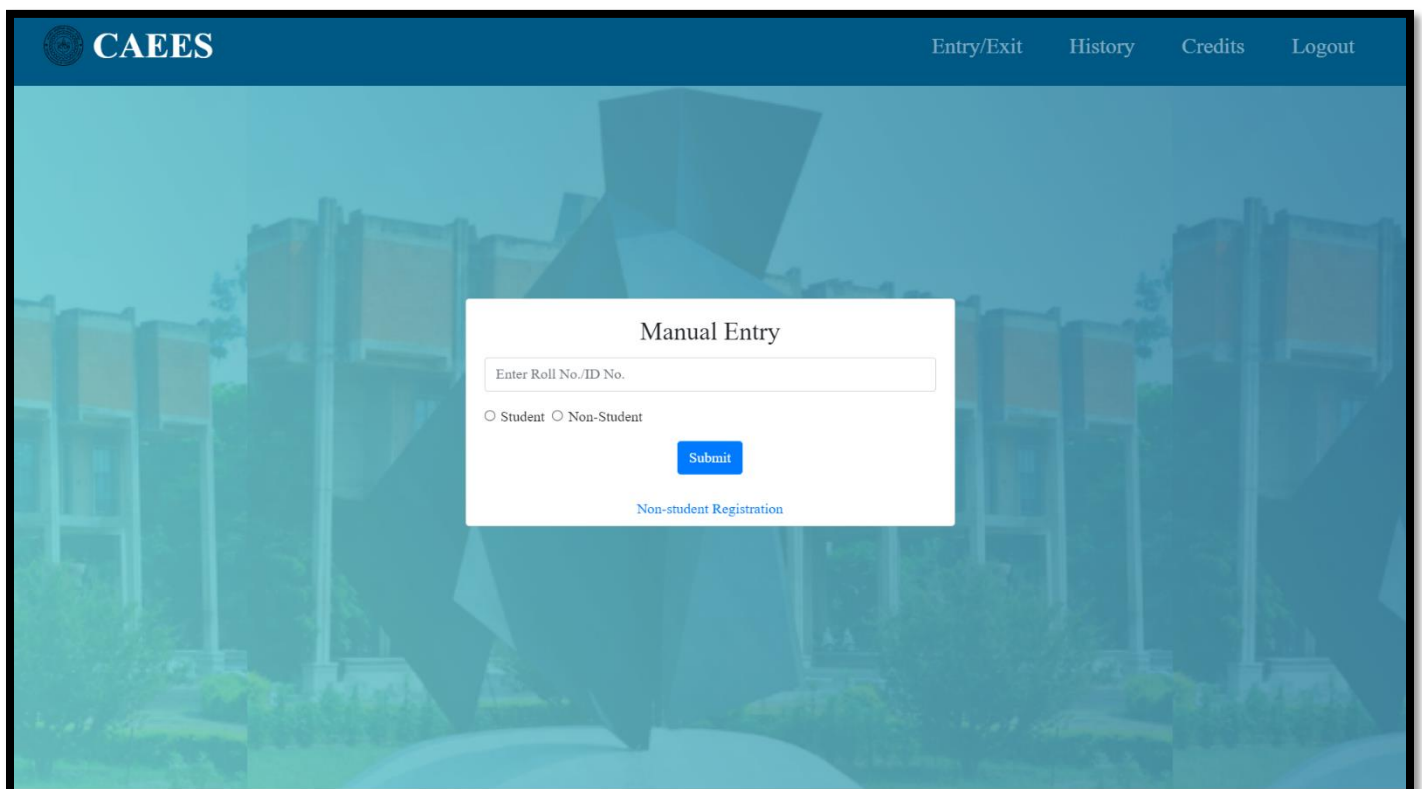


- Main Page to scan the Student ID card



The screenshot shows the CAEES web application interface. The header is dark blue with the CAEES logo on the left and navigation links 'Entry/Exit', 'History', 'Credits', and 'Logout' on the right. The main content area has a light blue background with a large, semi-transparent white box in the center. Inside this box, the text 'Scan the barcode on ID.' is displayed. Below this text is a white rectangular input field containing the placeholder text 'Scanned barcode will appear here'. Underneath the input field is a blue link labeled 'Enter Manually'.

- If Student fails to scan then page for manually entering the details



The screenshot shows the CAEES web application interface for manual entry. The header is dark blue with the CAEES logo on the left and navigation links 'Entry/Exit', 'History', 'Credits', and 'Logout' on the right. The main content area has a light blue background. In the center, there is a white rectangular form titled 'Manual Entry'. Inside the form, there is a text input field with the placeholder 'Enter Roll No./ID No.'. Below the input field are two radio buttons: 'Student' and 'Non-Student'. A blue 'Submit' button is located below the radio buttons. At the bottom of the form, there is a blue link labeled 'Non-student Registration'.

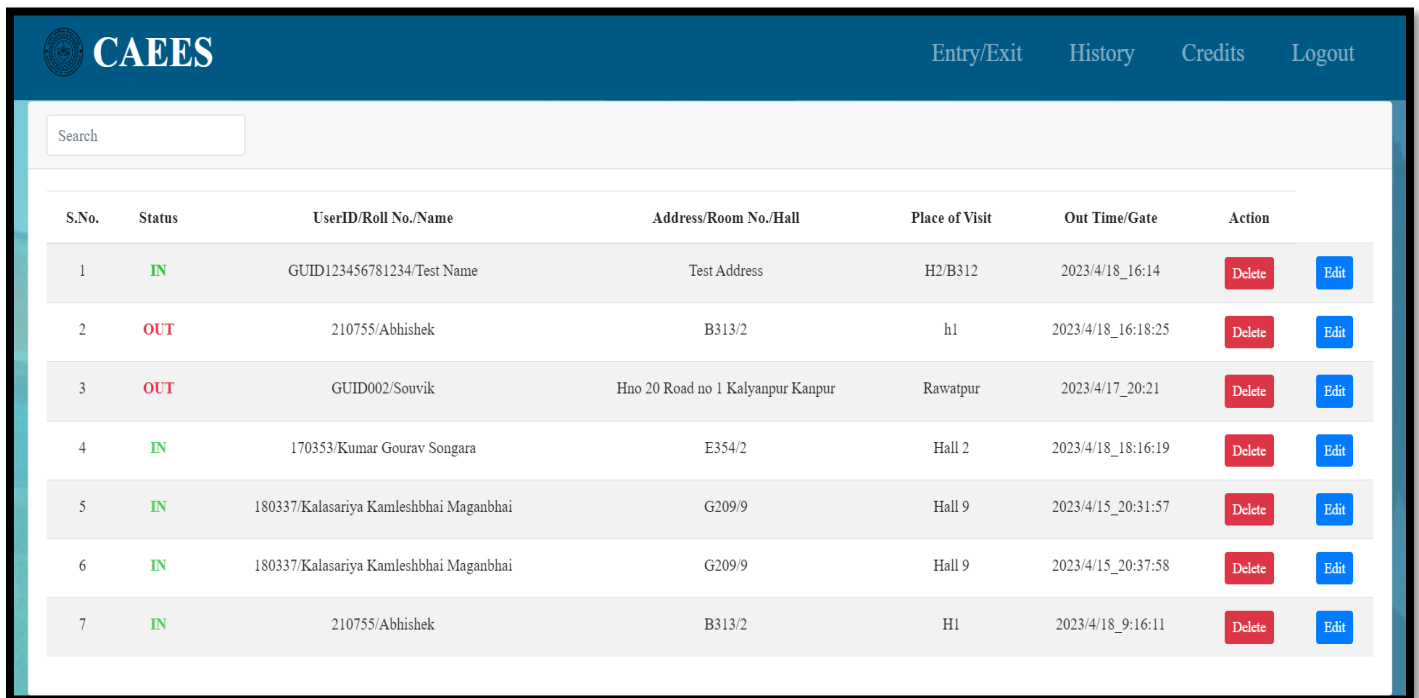
- **Success page (shows details of students after successful entry/exit):**

The screenshot displays the CAEES Success page. The header features the CAEES logo and navigation links: Entry/Exit, History, Credits, and Logout. The main content area is titled "Scan Result" and contains a placeholder for a 150 x 150 image. Below this, there are five form fields for student details: Name (filled with "Danish Mehmood"), Roll No. (filled with "210297"), Hall no. / Room no. (filled with "Hall: 2 / Room-no: B312"), Phone No. (placeholder "Enter phone"), and Place of Visit (placeholder "Enter Place of Visit"). A blue "Submit" button is located at the bottom right of the form.

- **Non-Student first time registration page:**

The screenshot displays the CAEES Non-Student Registration page. The header features the CAEES logo and navigation links: Entry/Exit, History, Credits, and Logout. The main content area is titled "Non-Student Registration" and contains four form fields: Name (placeholder "Enter Name"), Address (placeholder "Enter Address"), Phone No. (placeholder "Enter Phone"), and ID No. (placeholder "Enter Aadhar/Licence No."). A blue "Submit" button is located at the bottom right of the form.

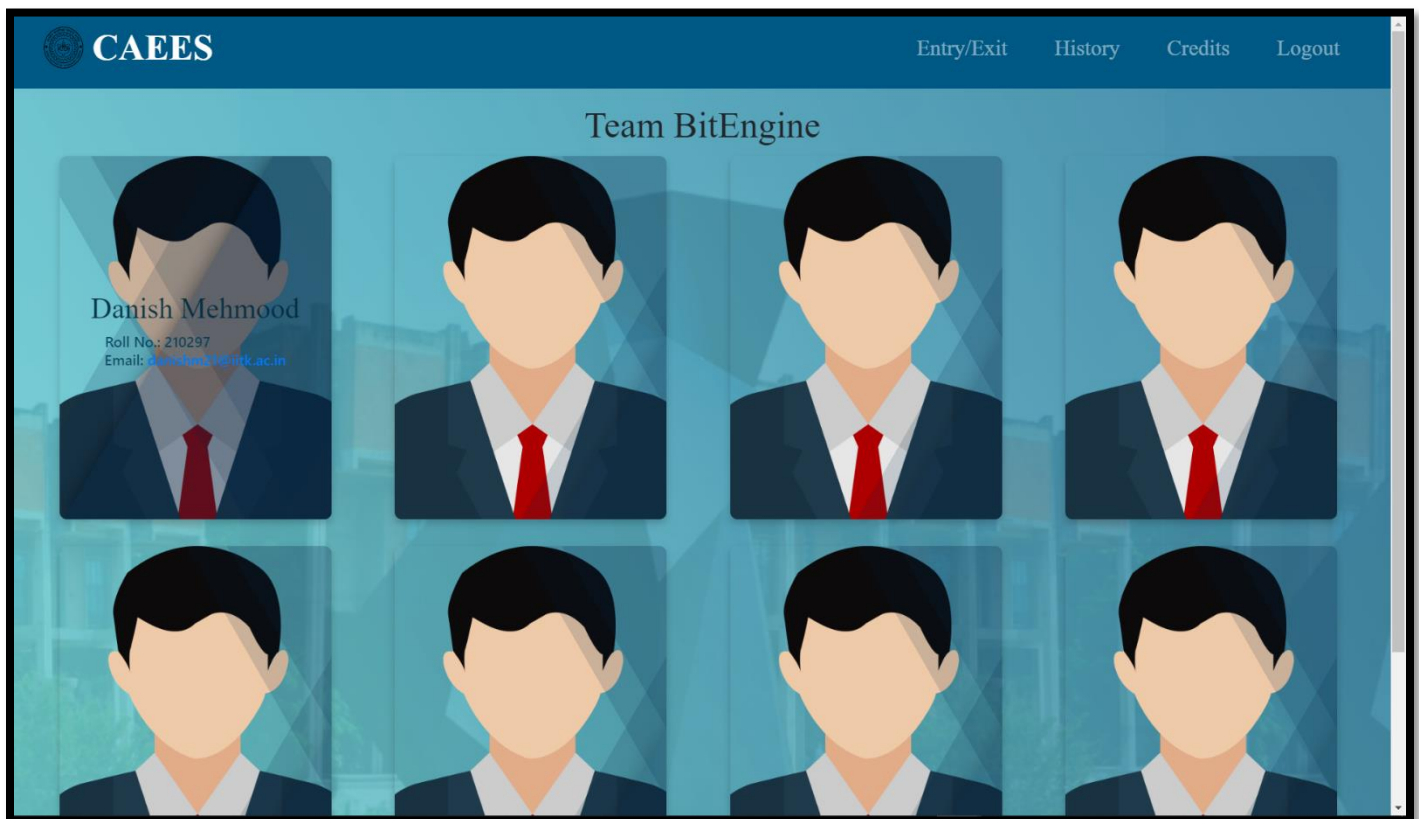
- History Window (used by admin to solve any query regarding entry/exit):



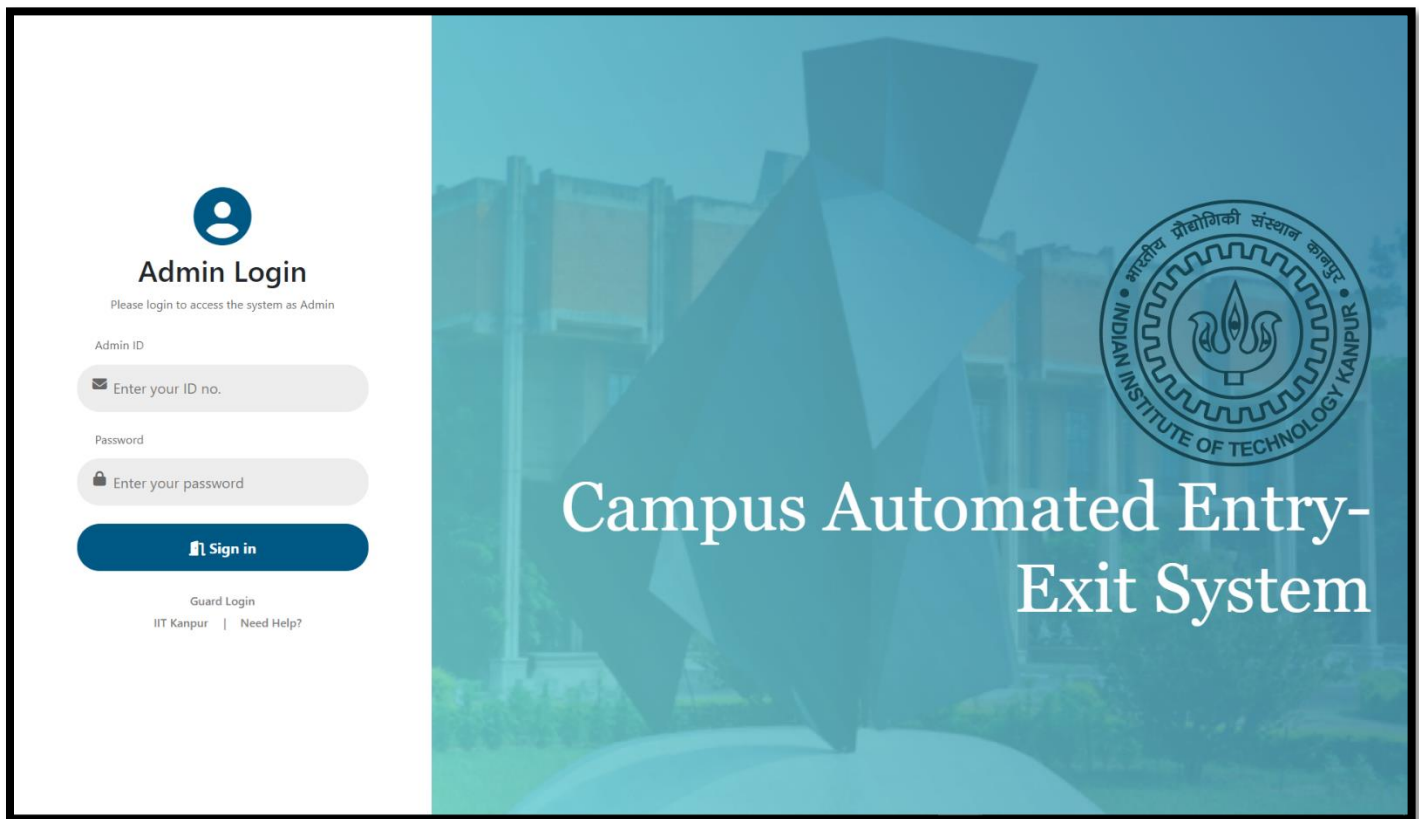
The screenshot shows the 'History' window of the CAEES system. It features a search bar at the top left and navigation links (Entry/Exit, History, Credits, Logout) at the top right. Below the search bar is a table with 7 rows of entry/exit records. Each row contains columns for S.No., Status, UserID/Roll No./Name, Address/Room No./Hall, Place of Visit, Out Time/Gate, and Action. The 'Status' column uses color-coded text: green for 'IN' and red for 'OUT'. The 'Action' column contains 'Delete' and 'Edit' buttons for each record.

S.No.	Status	UserID/Roll No./Name	Address/Room No./Hall	Place of Visit	Out Time/Gate	Action
1	IN	GUID123456781234/Test Name	Test Address	H2/B312	2023/4/18_16:14	Delete Edit
2	OUT	210755/Abhishek	B313/2	h1	2023/4/18_16:18:25	Delete Edit
3	OUT	GUID002/Souvik	Hno 20 Road no 1 Kalyanpur Kanpur	Rawatpur	2023/4/17_20:21	Delete Edit
4	IN	170353/Kumar Gourav Songara	E354/2	Hall 2	2023/4/18_18:16:19	Delete Edit
5	IN	180337/Kalasariya Kamleshbhai Maganbhai	G209/9	Hall 9	2023/4/15_20:31:57	Delete Edit
6	IN	180337/Kalasariya Kamleshbhai Maganbhai	G209/9	Hall 9	2023/4/15_20:37:58	Delete Edit
7	IN	210755/Abhishek	B313/2	H1	2023/4/18_9:16:11	Delete Edit

- Credits page (has info of the Devs/backend admin):



- **Admin Login:**



The Admin Login page features a white sidebar on the left and a large blue-tinted background image of a campus building on the right. The sidebar contains a user icon, the title 'Admin Login', a subtext 'Please login to access the system as Admin', and input fields for 'Admin ID' and 'Password'. A 'Sign in' button is at the bottom of the sidebar. The background image includes the IIT Kanpur logo and the title 'Campus Automated Entry-Exit System'.

Admin Login
Please login to access the system as Admin

Admin ID
Enter your ID no.

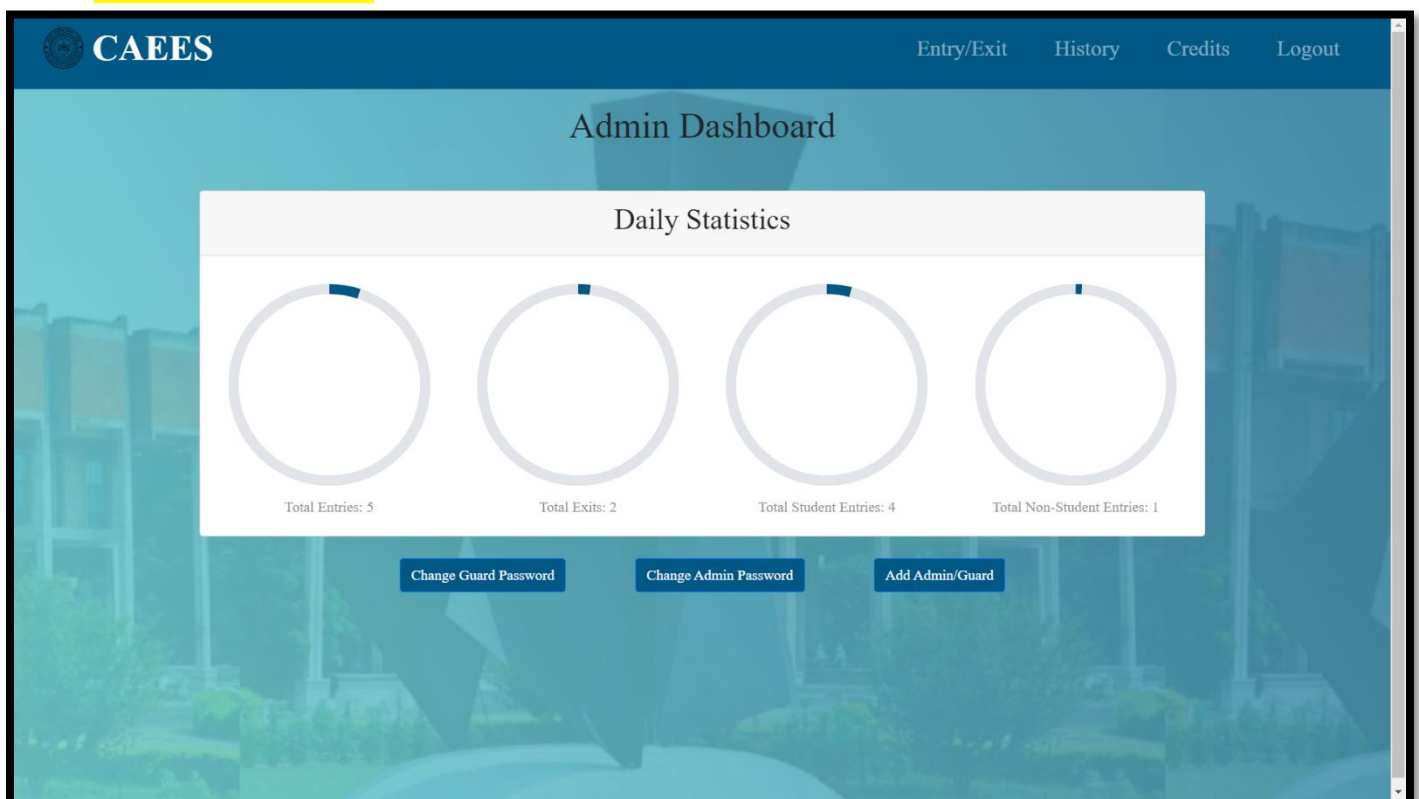
Password
Enter your password

Sign in

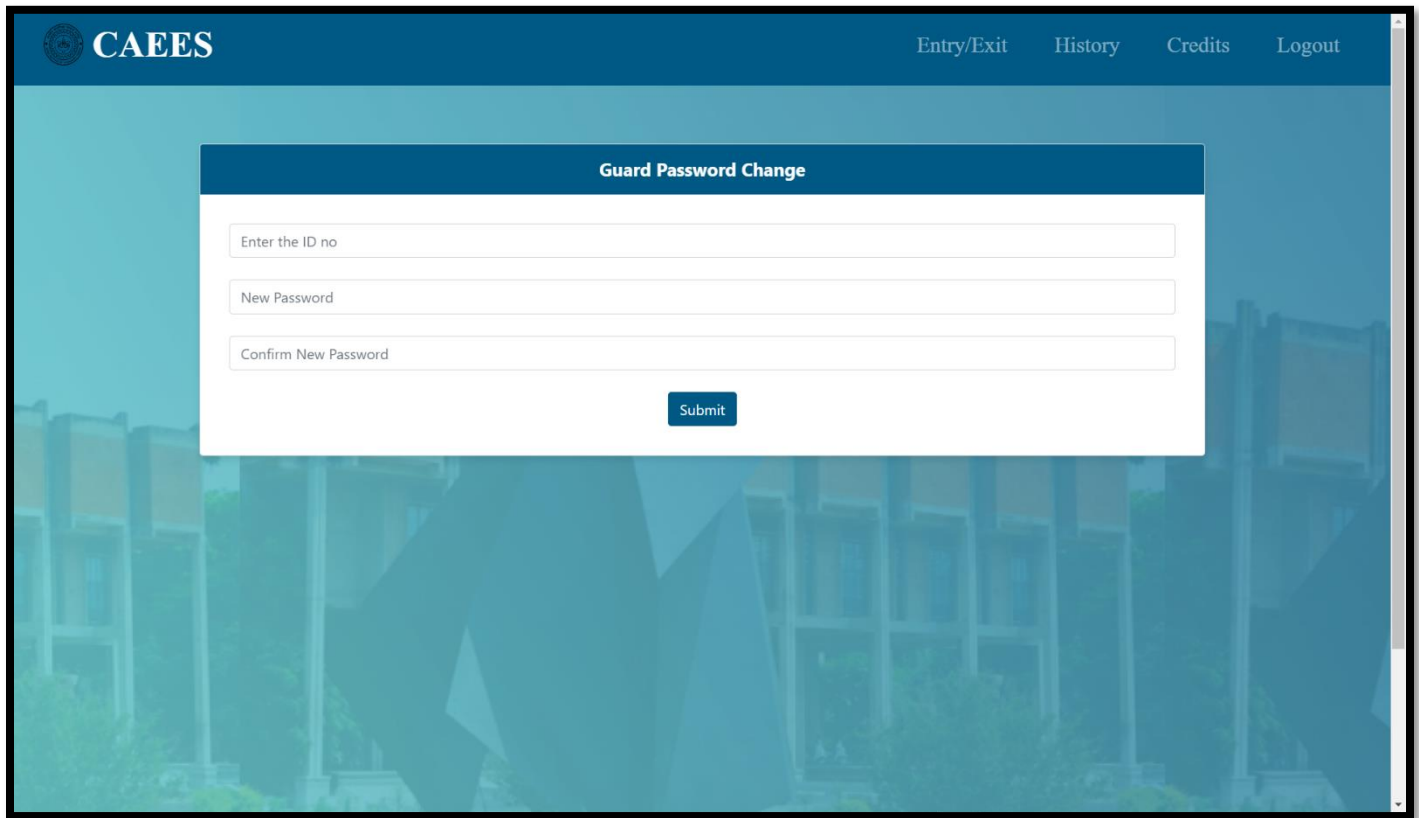
Guard Login
IIT Kanpur | Need Help?

Campus Automated Entry-Exit System

- **Admin Dashboard:**



- **Guard Password Change:**



The screenshot shows a web browser window displaying the CAEES website. The header is dark blue with the CAEES logo on the left and navigation links 'Entry/Exit', 'History', 'Credits', and 'Logout' on the right. The main content area has a light blue background with a faint image of a building. A white form titled 'Guard Password Change' is centered. It contains three input fields: 'Enter the ID no', 'New Password', and 'Confirm New Password'. A blue 'Submit' button is at the bottom of the form.

CAEES

Entry/Exit History Credits Logout

Guard Password Change

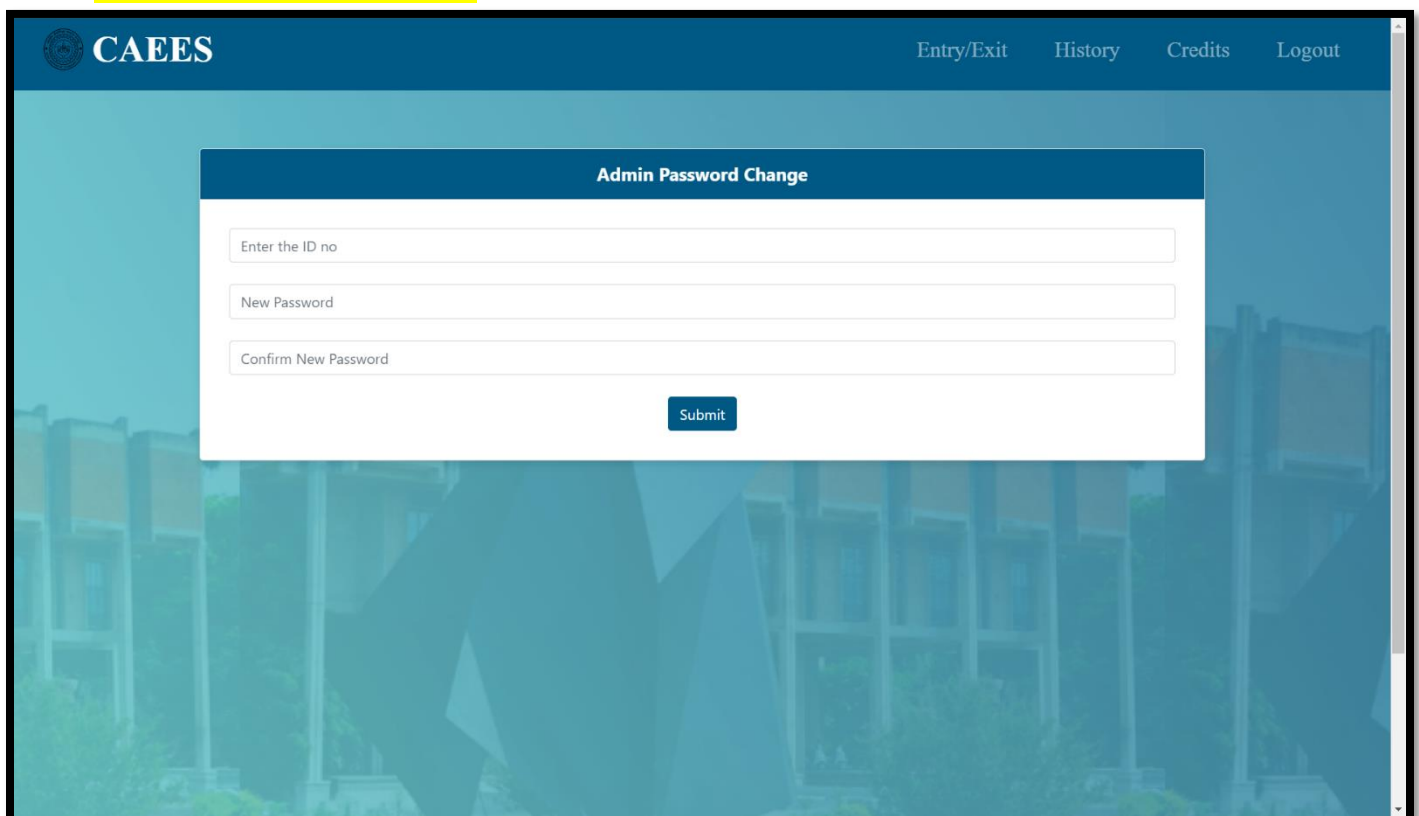
Enter the ID no

New Password

Confirm New Password

Submit

- **Admin Password Change:**



The screenshot shows a web browser window displaying the CAEES website. The header is dark blue with the CAEES logo on the left and navigation links 'Entry/Exit', 'History', 'Credits', and 'Logout' on the right. The main content area has a light blue background with a faint image of a building. A white form titled 'Admin Password Change' is centered. It contains three input fields: 'Enter the ID no', 'New Password', and 'Confirm New Password'. A blue 'Submit' button is at the bottom of the form.

CAEES

Entry/Exit History Credits Logout

Admin Password Change

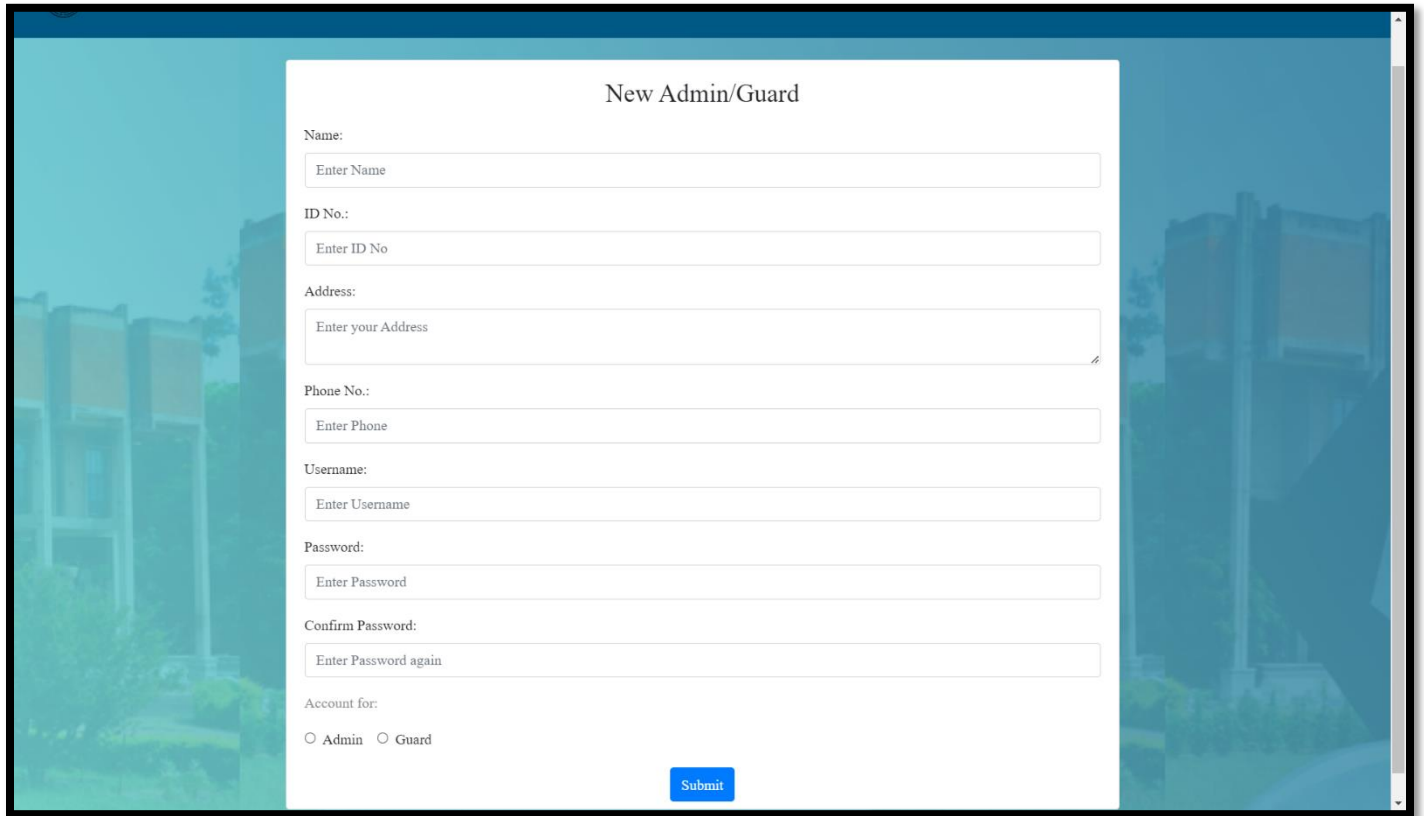
Enter the ID no

New Password

Confirm New Password

Submit

- **New Guard/Admin page:**



The screenshot shows a web browser window with a blue header and a background image of a modern building. The main content area is a white form titled "New Admin/Guard". The form contains several input fields for registration details, followed by radio buttons to select the account type, and a blue "Submit" button at the bottom right.

New Admin/Guard

Name:

ID No.:

Address:

Phone No.:

Username:

Password:

Confirm Password:

Account for:
☐ Admin ☐ Guard

2 Architecture Design

The architectural design can be broken down into several key components:

User Interface: This component provides the user interface that guards/admin use to interact with the system. Normally this is just a barcode reader for student, but it also contains a manual entry system to account for the situation when there is error in scanning system. User Interface also contain an administrator dashboard to carry out administrative action.

Authentication Module: This component performs the authentication of individuals, verifying their identity and authorization to enter or exit the facility. This includes Student ID card and Non-Student ID number authentication method.

Access Control Module: This component manages the flow of students/non-students in and out of the facility. It authorizes or denies access based on result of authentication module.

Data Collection Module: This component collects data on who is entering and exiting the facility and when. This data can then be used for analysis and reporting purposes.

Reporting and Analytics Module: This component provides a range of reporting and analytics features to allow admin/guard to daily statistics of entry/exit.

Data Storage: This component stores the data collected and generated by the system, and can be a database, cloud storage, or other data storage solutions.

Security Module: This component provides increased security and safety by ensuring that only authorized individuals have access to the facility and protects against unauthorized access, data breaches, and other security threats.

MODEL-VIEW-CONTROLLER

MVC is an architectural paradigm that divides an application into three logical components: the model, the view, and the controller. Each of these components is designed to handle distinct application development concerns.

The database is managed by the model. Since recorded data will be organized, a relational database management system is used. It receives from the controller the entrance and exit request for a certain user, profile creation and management information from the administration and updates the controller about queries, reports, and user profiles.

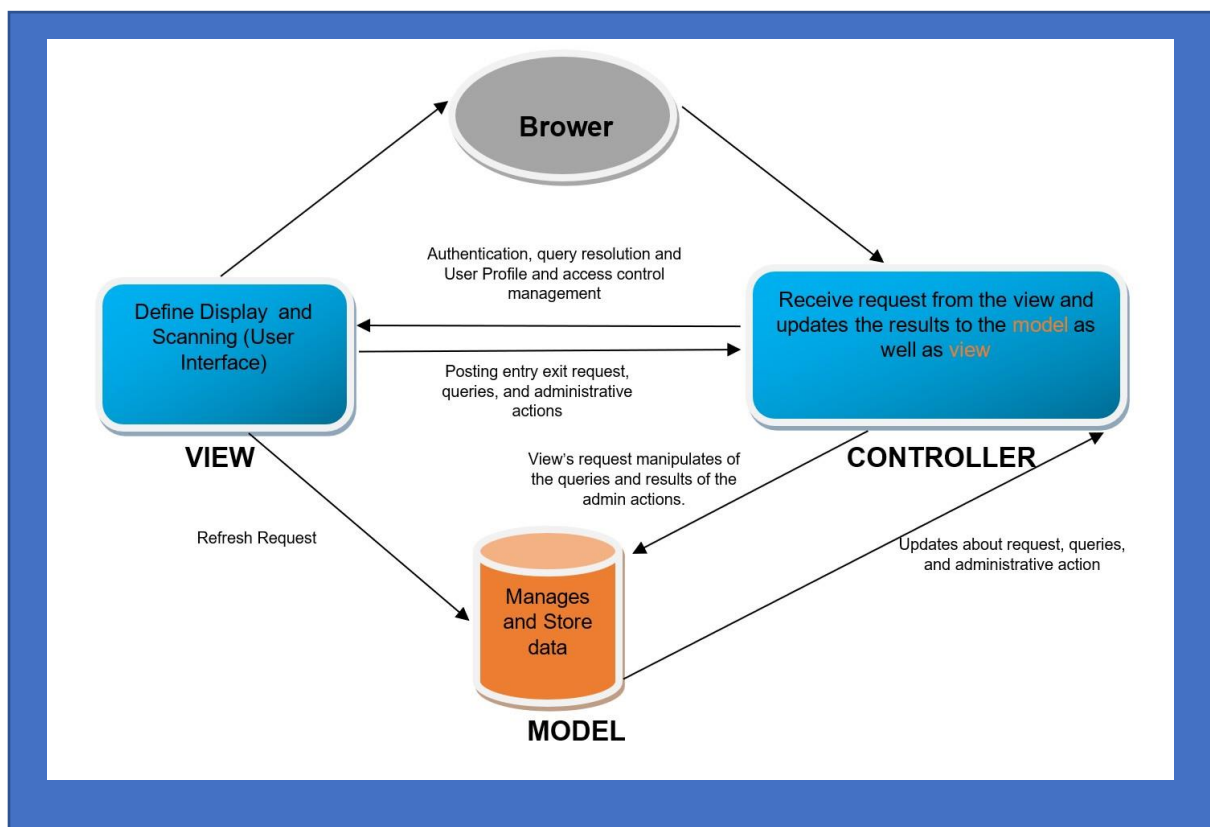
The view provides information on requests that have been added, removed or updated. The view also defines the user interface and presentation. For the view, we are tentatively using HTML, CSS, and JavaScript. It sends query notifications, status updates, and user and profile management to the controller and receives query notifications, status updates, and user and profile management from the controller.

The controller performs the authentication of individuals, verifying their identity and authorization to enter or exit the facility. It also provides a range of reporting and analytics features to the administrator to allow them to generate reports daily stats of entry/exit.

The controller also gets information from the view and transmits it to the model. View and controller are linked directly to the browser.

Therefore, this architecture is the optimal solution for connecting the project's frontend, backend, and database.

It enables data to alter independently of its representation from beginning to finish and vice versa for a variety of capabilities. The sole negative is that it may need extra code or code complexity in instances where data interaction is straightforward, hence increasing debugging time.

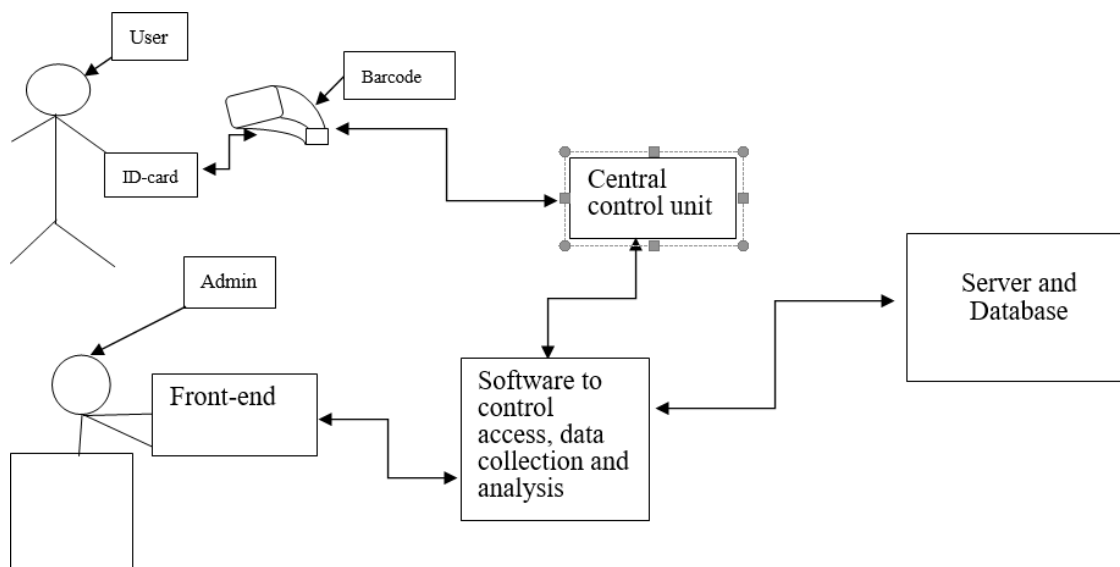


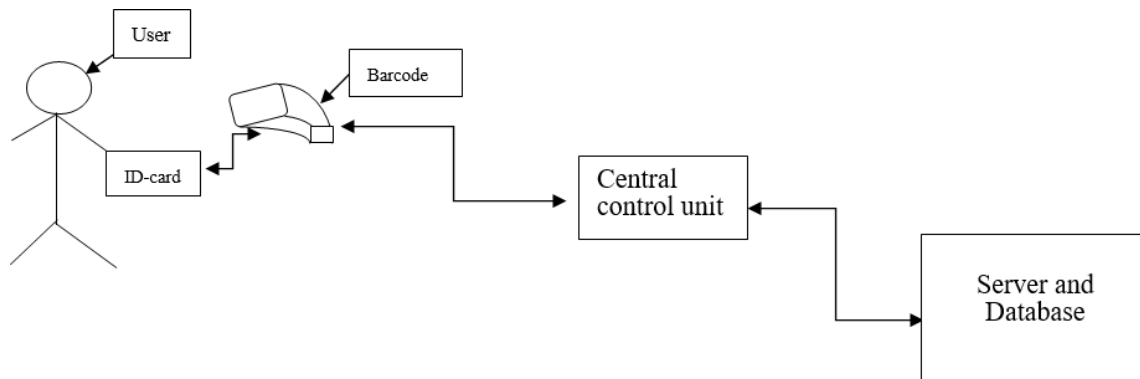
3 Object Oriented Design

3.1 Use Case Diagrams

The system interacts with the environment in several ways. At the point of entry, individuals present their credentials, such as an ID card or biometric data, to the access control device. The device then communicates with the central control unit to verify the individual's identity and authorize or deny access. Once access is granted, the individual can enter the facility. The system also keeps track of the time of entry and exit of individuals.

This system will act as a replacement for the existing manual register entry for movement in and out of the campus. This will help reduce the time and wastage of paper. It will also simplify the process and make the process efficient, secure and less error prone.



Use Case: UN1

Author – Rikesh Sharma

Purpose – Mimicking regular entry and exit from the campus

Requirements Traceability – Scanning with access control device. Retrieving the data from the barcode of the ID card and generating the date time, name, roll no, entry exit information and sending to central control unit to add it to the database.

Priority – Very Important. High.

Preconditions - None

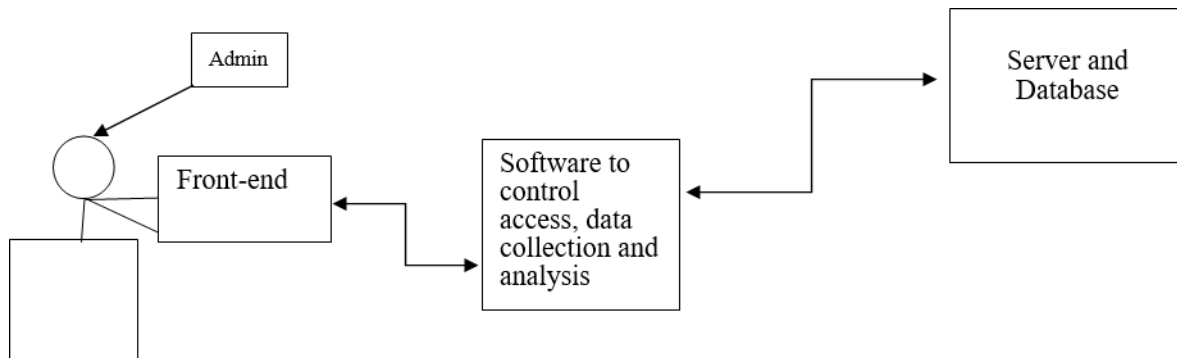
Post conditions – Normal viable product ready

Actors – Human, Scanner, Database

Exceptions – ID card not available, Scanner not working, Scanner unable to read, Bad Internet connection, Database offline.

Includes None

Notes/Issues - None

Use Case: UN2

Author – Rikesh Sharma

Purpose – Normal admin-dashboard access.

Requirements Traceability – Login to the admin dashboard. Accessing the different sections of the system, such as Users, Access Control, Reports, and Settings.

Priority – Very Important. High.

Preconditions - None

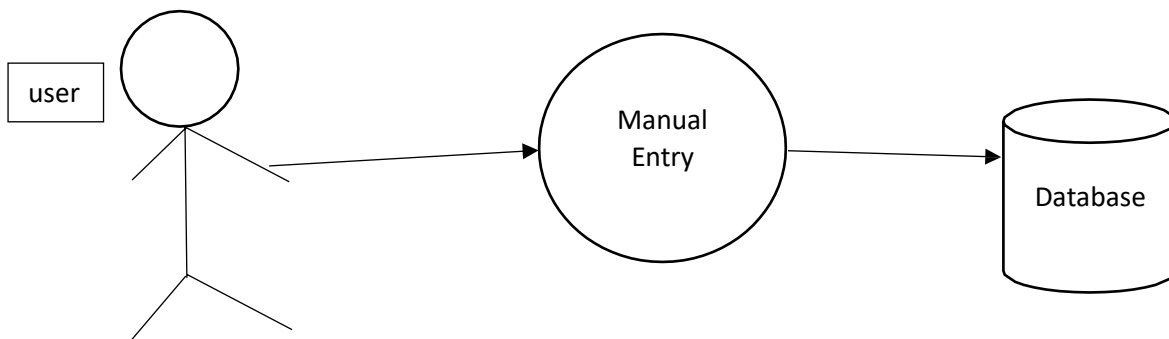
Post conditions – Normal viable product ready

Actors – Human, Desktop, Database

Exceptions – Hardware Desktop error, Bad Internet connection, Database offline.

Includes None

Notes/Issues – None

Use Case: UN2**Use Case: UN3**

Author – Avinash Saini

Purpose – Bar code scanning Failed

Requirements Traceability – Login to the admin dashboard. It will show fail.

Preconditions - None

Post conditions – Normal viable product ready

Actors – Human, Desktop, Database

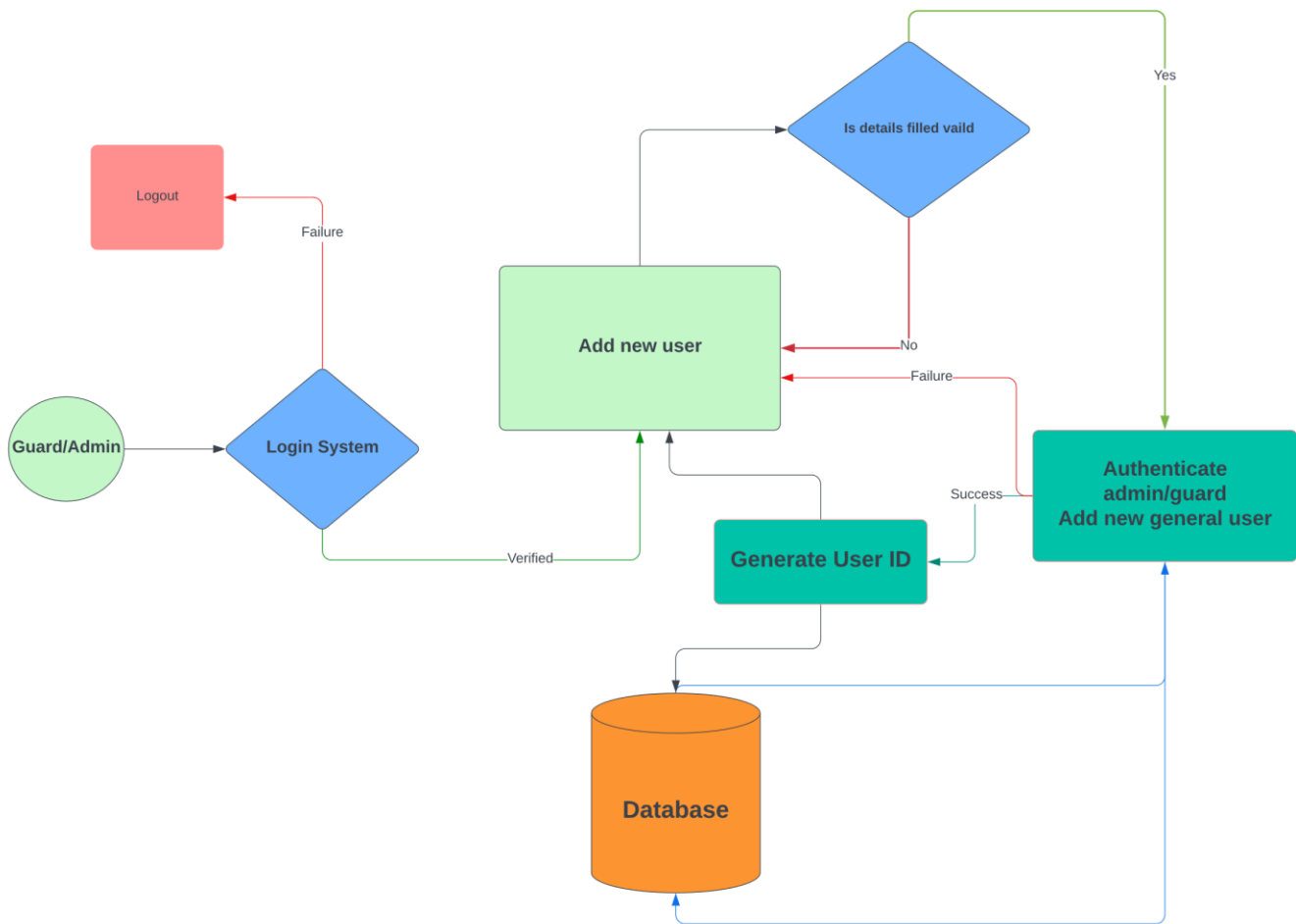
Exceptions – Hardware Desktop error, Bad Internet connection, Database offline.

Includes None

Notes/Issues - None

Use Case: UN4

Add new general user



Author – Rikesh Sharma

Purpose – Add new general user.

Requirements Traceability – Login to the homepage dashboard. Add new general user.

Priority – Very Important. High.

Preconditions - None

Post conditions – Normal viable product ready

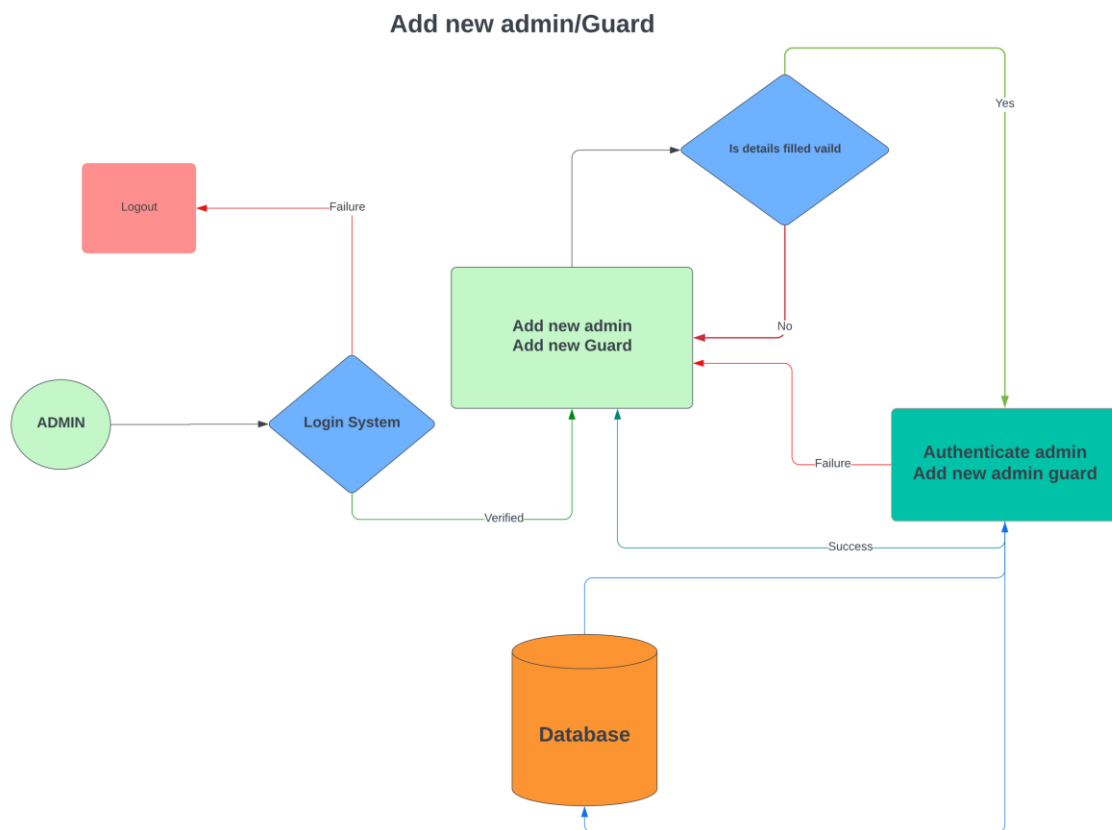
Actors – Human, Desktop, Database

Exceptions – Hardware Desktop error, Bad Internet connection, Database offline.

Includes None

Notes/Issues - None

Use Case: UN5



Author – Rikesh Sharma

Purpose – Add new admin and guard.

Requirements Traceability – Login to the admin dashboard. Add new admin / guard.

Priority – Very Important. High.

Preconditions - None

Post conditions – Normal viable product ready

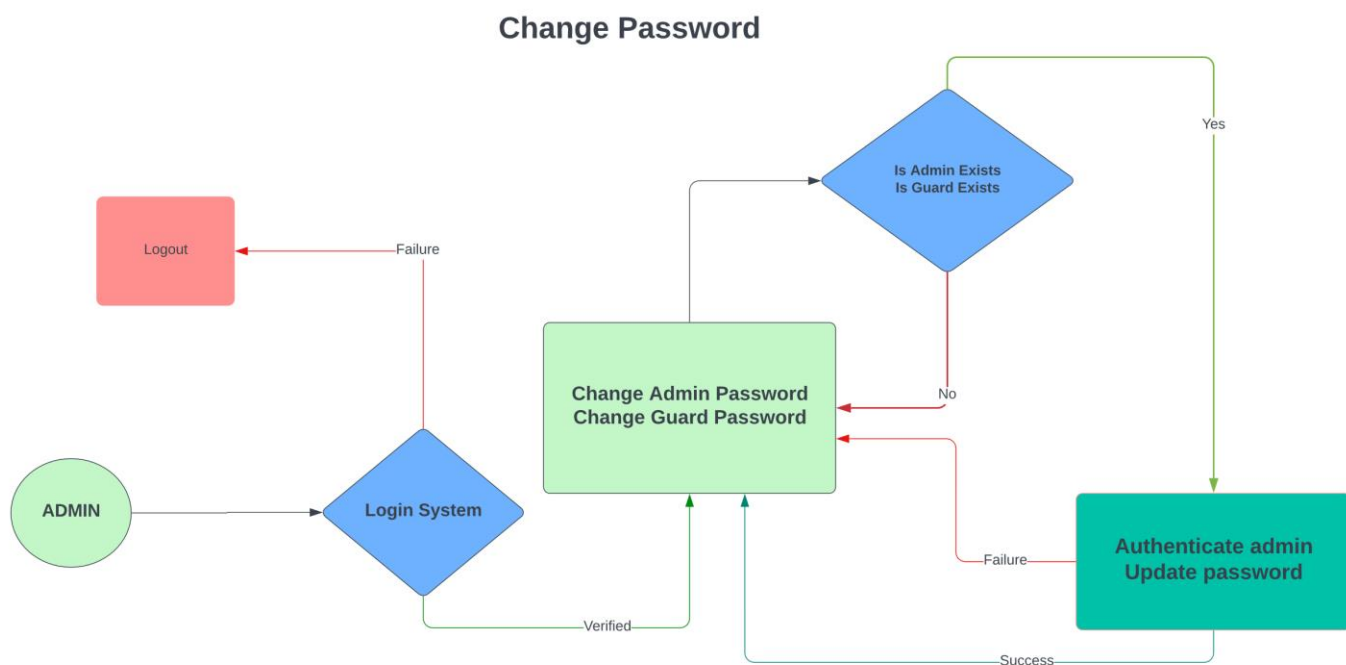
Actors – Human, Desktop, Database

Exceptions – Hardware Desktop error, Bad Internet connection, Database offline.

Includes None

Notes/Issues - None

Use Case: UN6



Author – Rikesh Sharma

Purpose – Change Password.

Requirements Traceability – Login to the admin dashboard. Change admin and guard password.

Priority – Very Important. High.

Preconditions - None

Post conditions – Normal viable product ready

Actors – Human, Desktop, Database

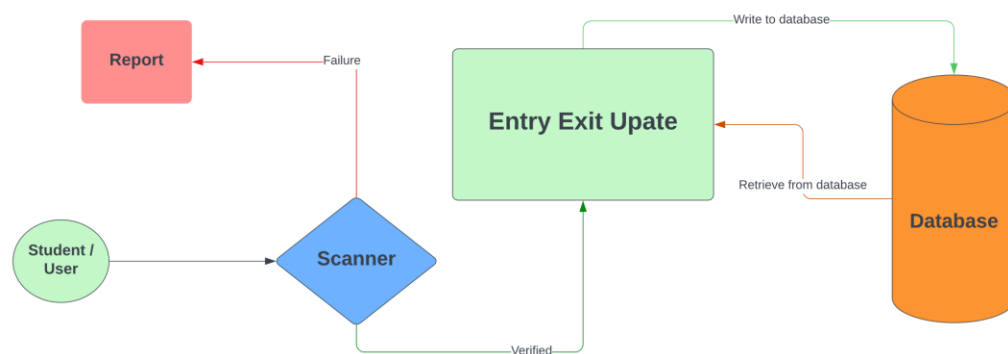
Exceptions – Hardware Desktop error, Bad Internet connection, Database offline.

Includes None

Notes/Issues – None

Use Case: UN7

Illegal Student ID or User ID



Author – Rikesh Sharma

Purpose – Detection of illegal ID card.

Requirements Traceability – Login to the Homepage. Scanner.

Priority – Very Important. High.

Preconditions - None

Post conditions – Normal viable product ready

Actors – Human, Desktop, Database

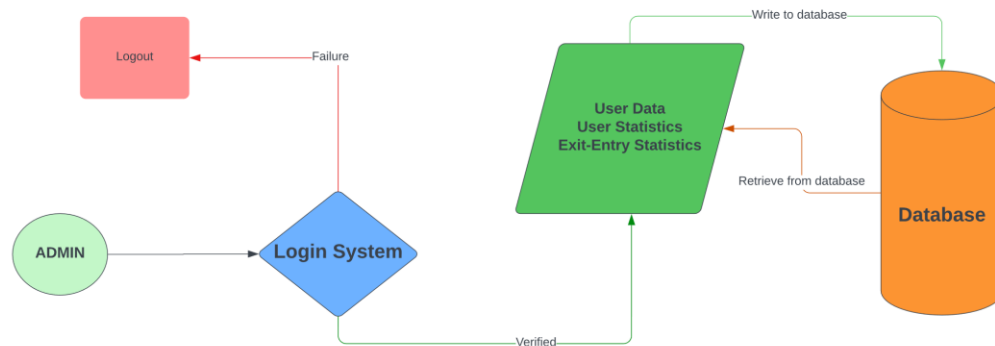
Exceptions – Hardware Desktop error, Bad Internet connection, Database offline.

Includes None

Notes/Issues – None

Use Case: UN8

Admin access for statistics



Author – Rikesh Sharma

Purpose – Access daily statistics.

Requirements Traceability – Login to the admin dashboard. Daily entry exit statistics.

Priority – Very Important. High.

Preconditions - None

Post conditions – Normal viable product ready

Actors – Human, Desktop, Database

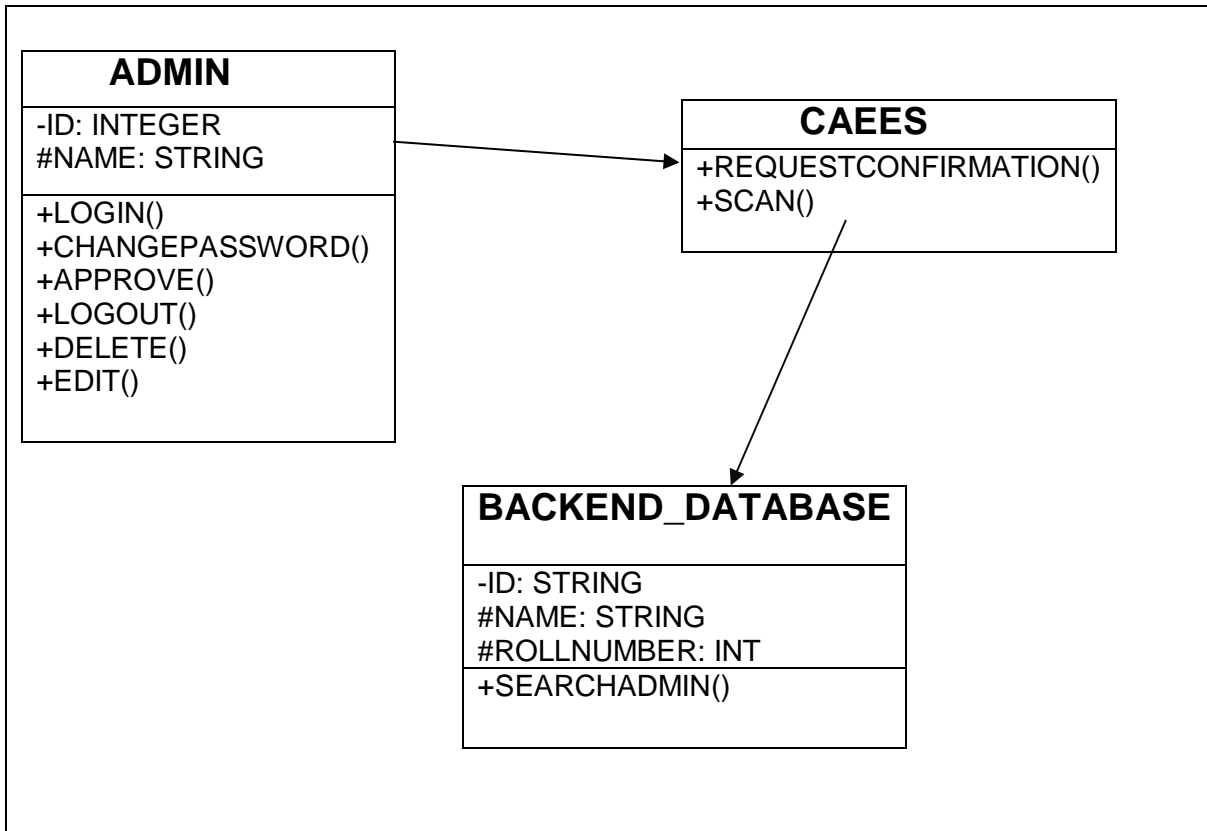
Exceptions – Hardware Desktop error, Bad Internet connection, Database offline.

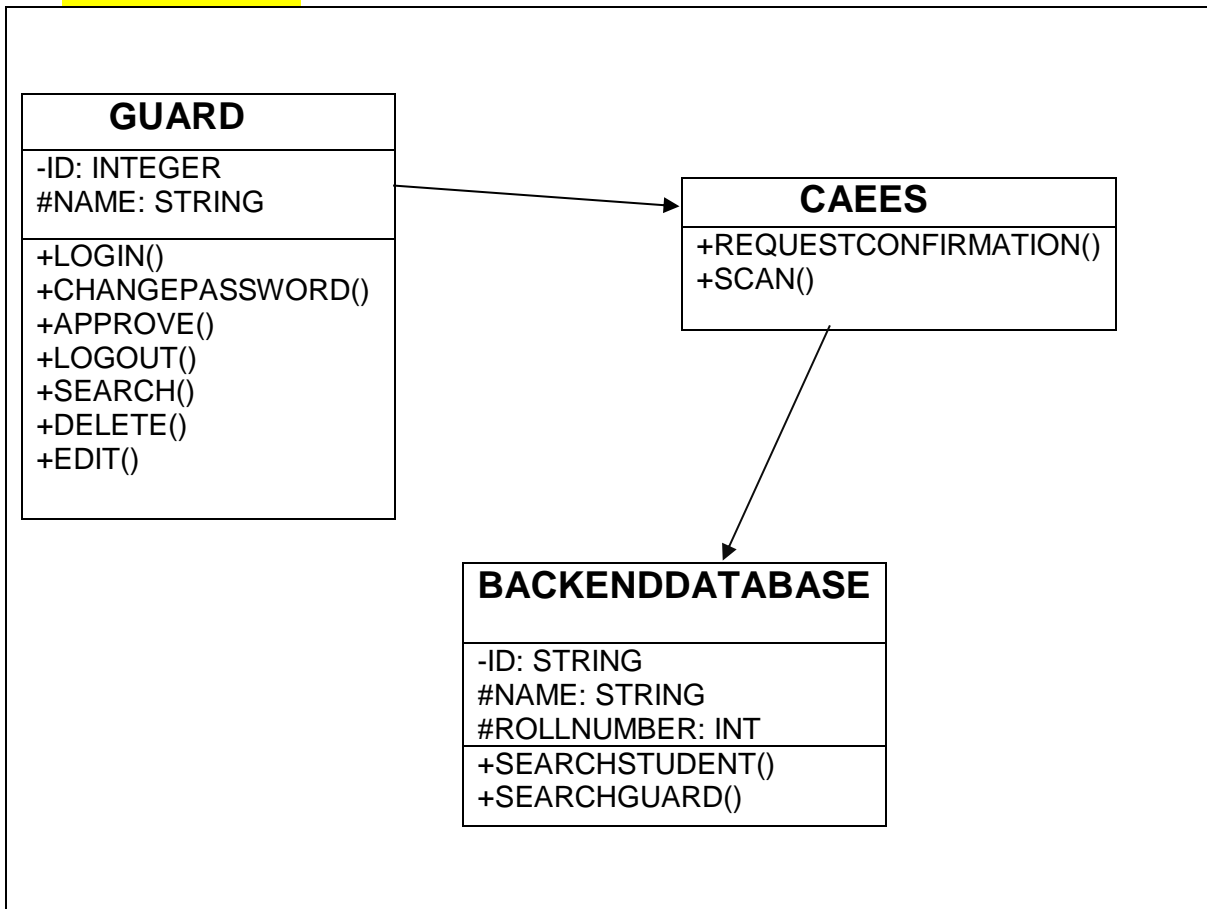
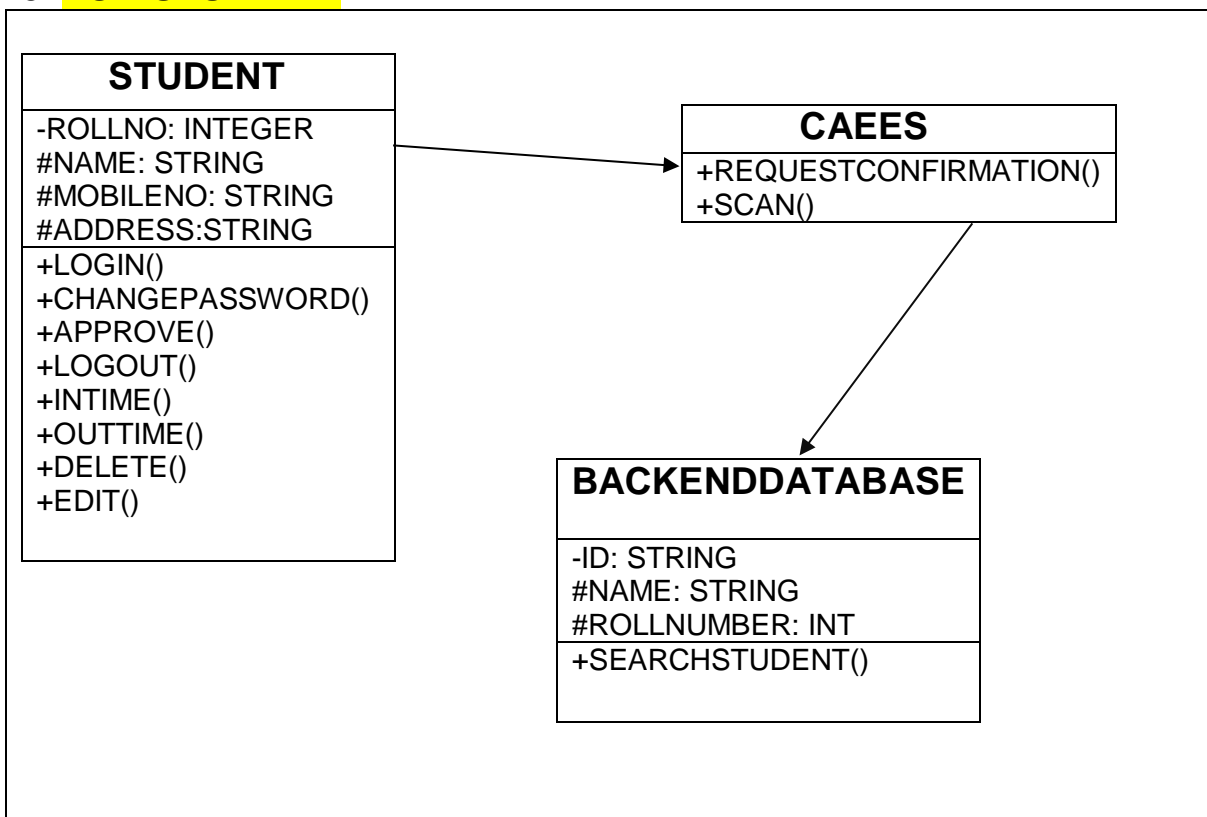
Includes None

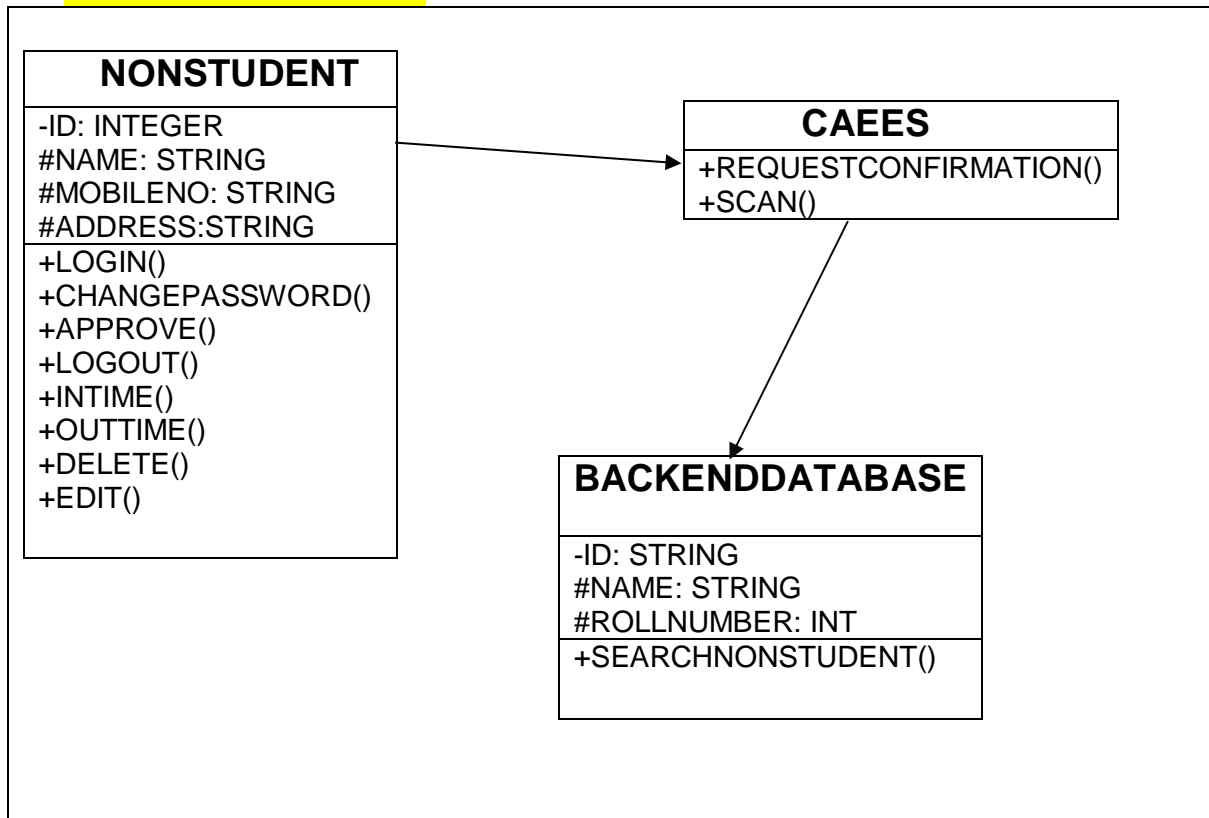
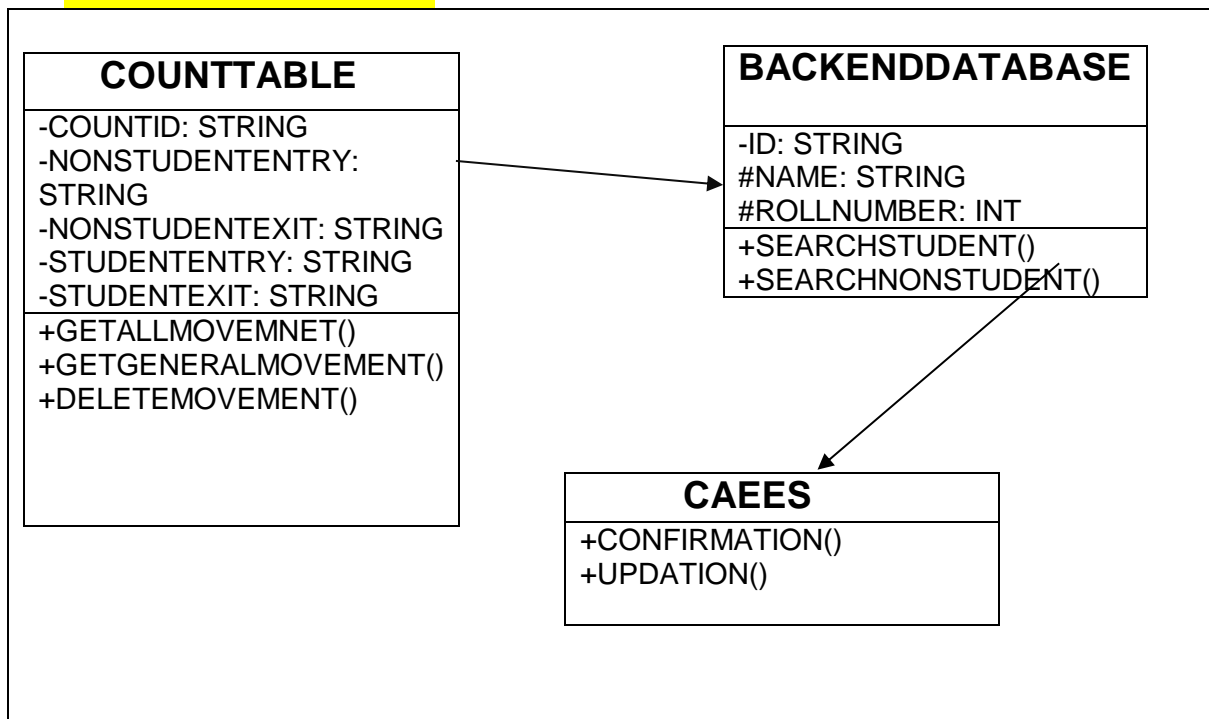
Notes/Issues – None

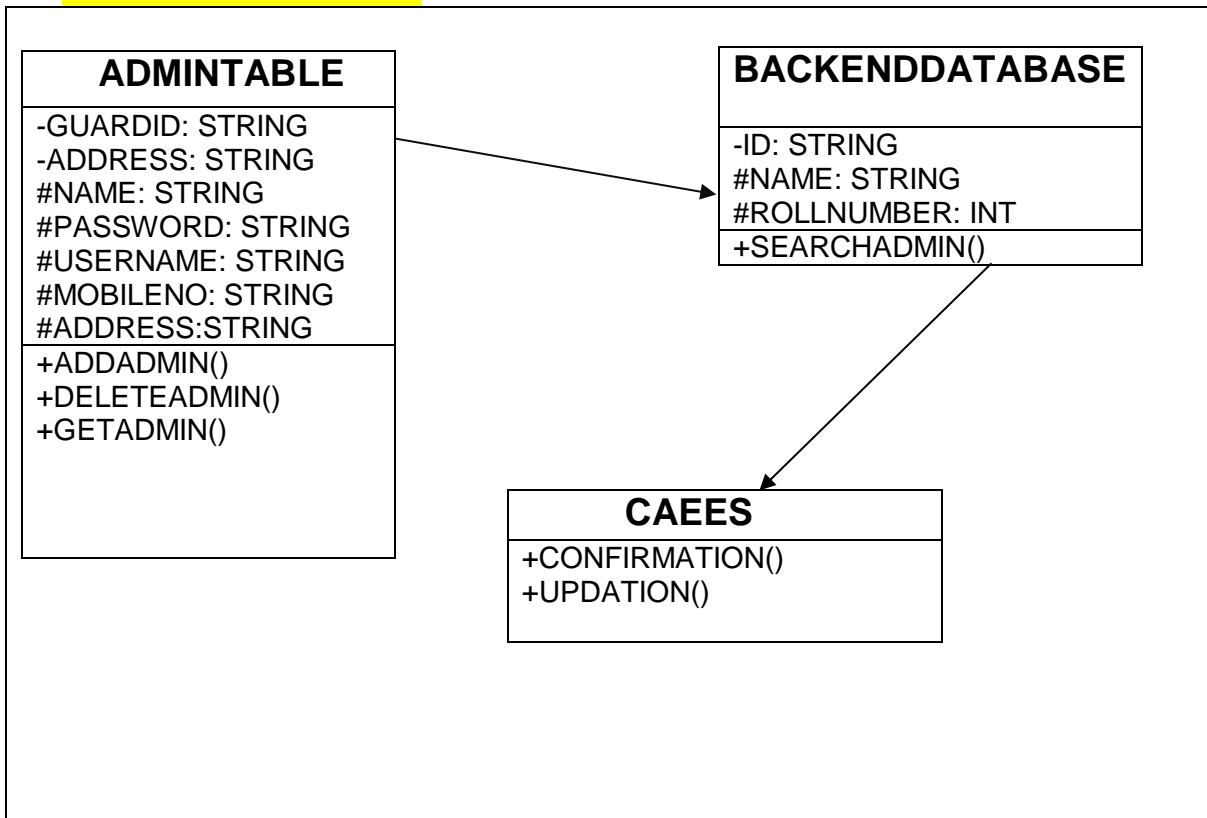
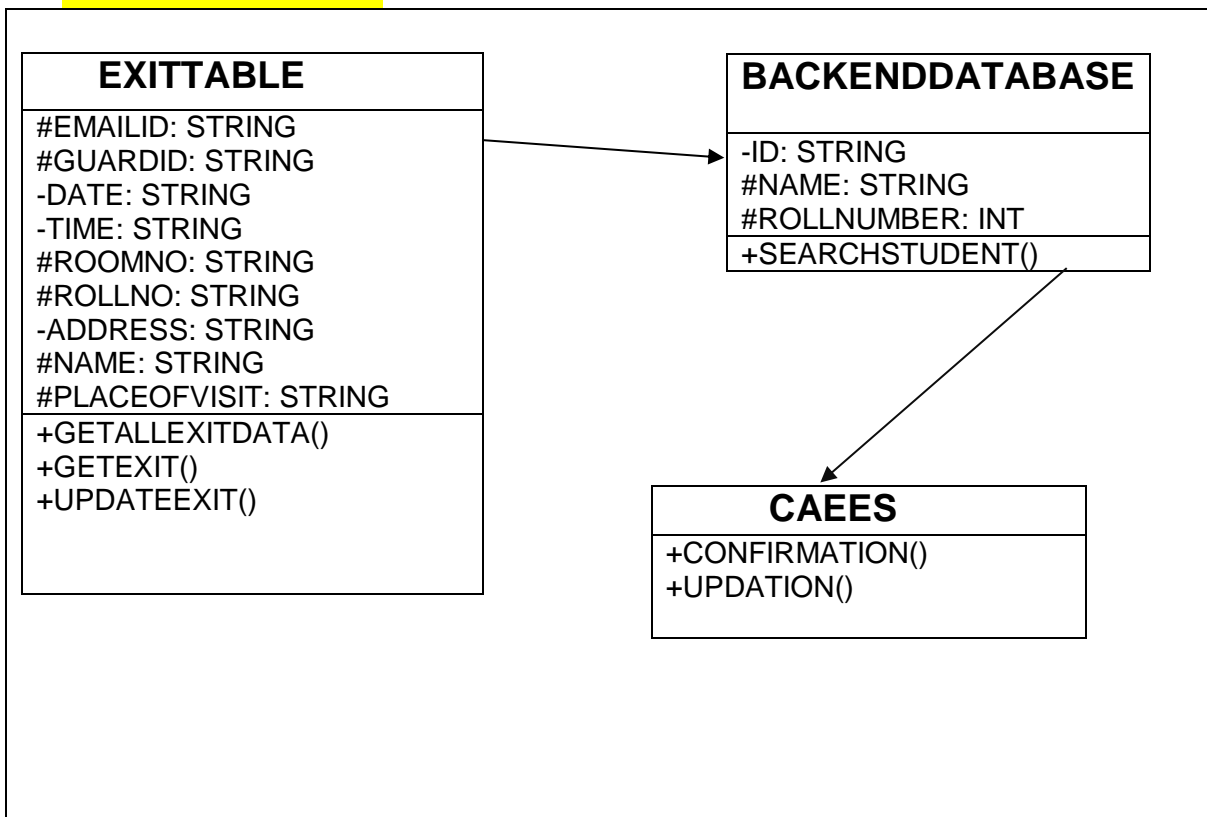
1.1 Class Diagrams:

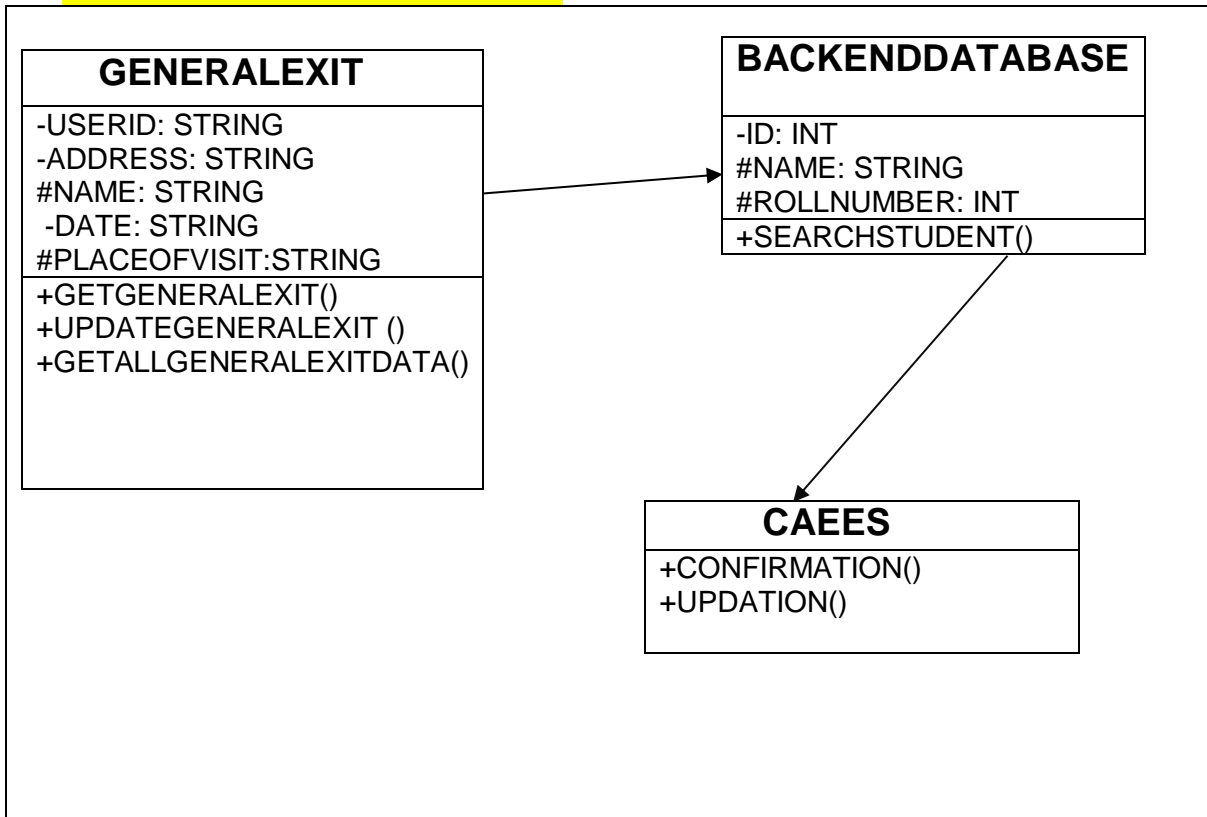
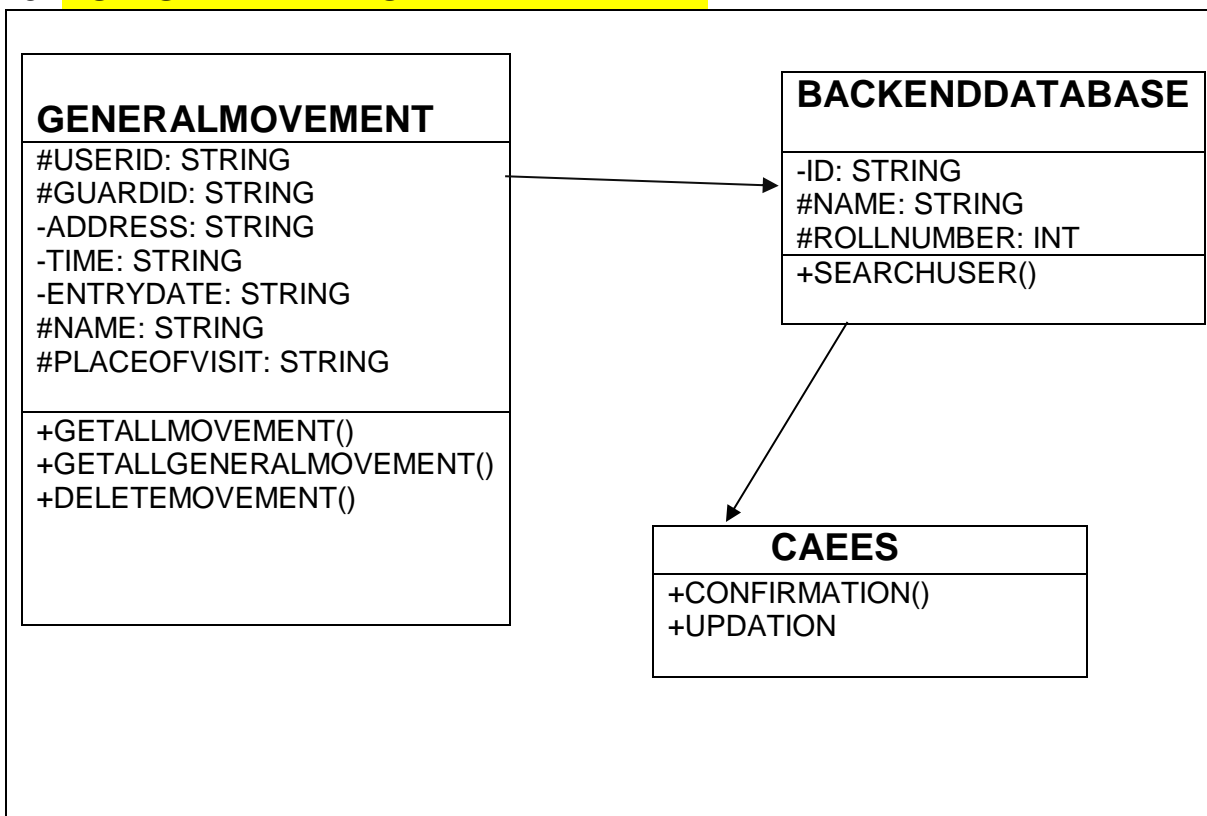
1. FOR ADMIN:

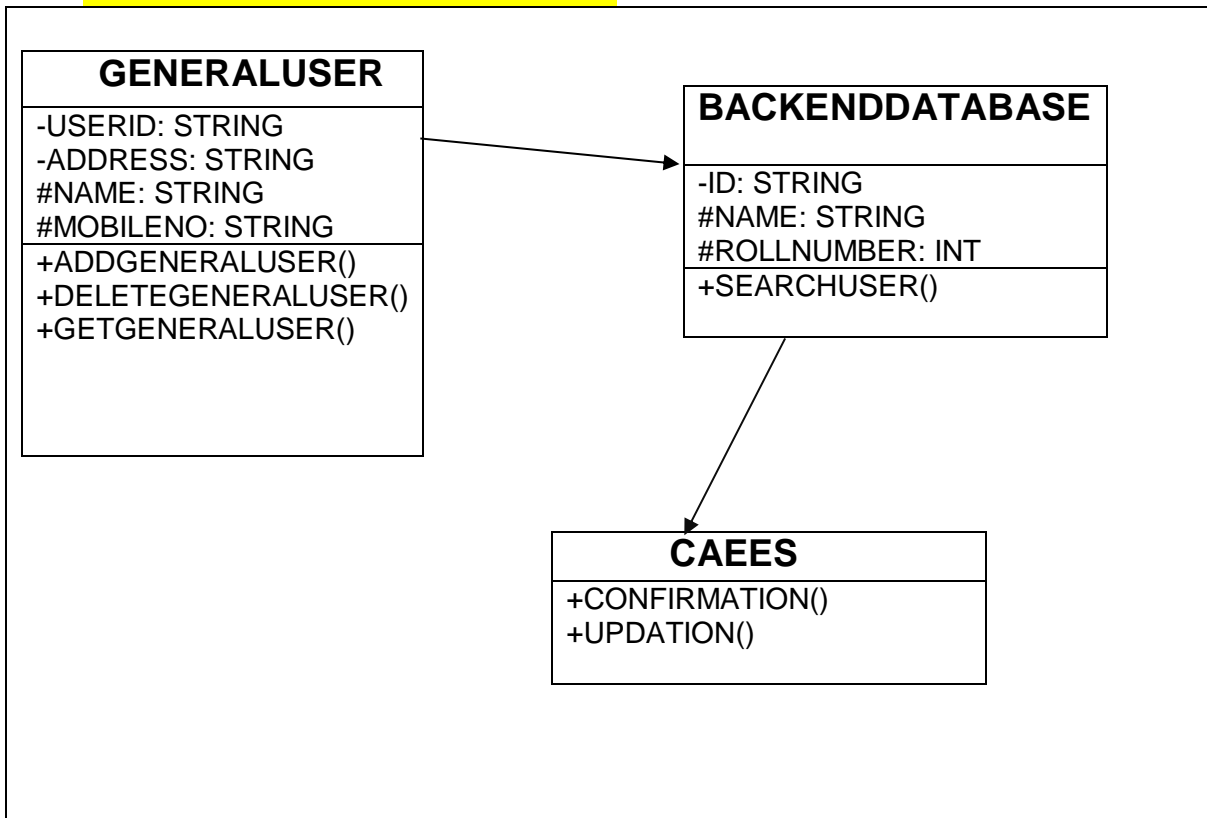
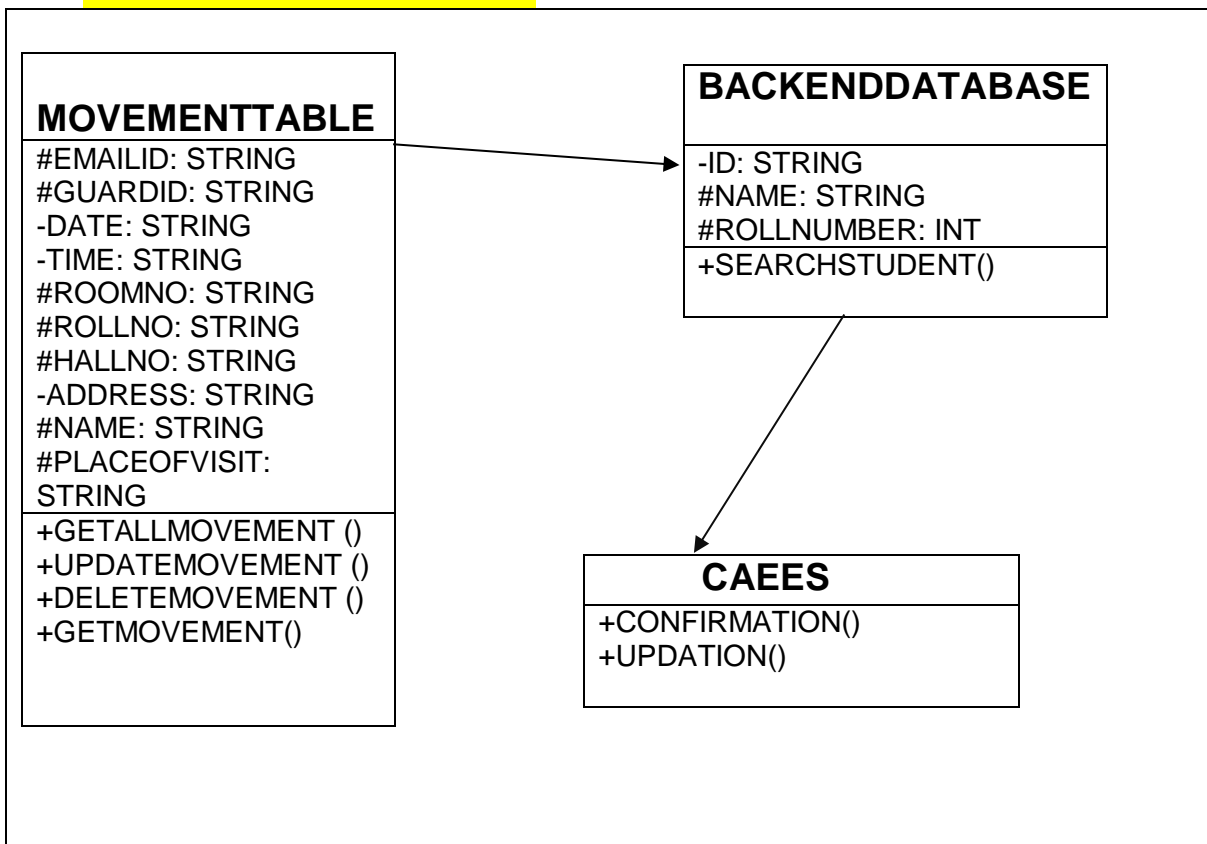


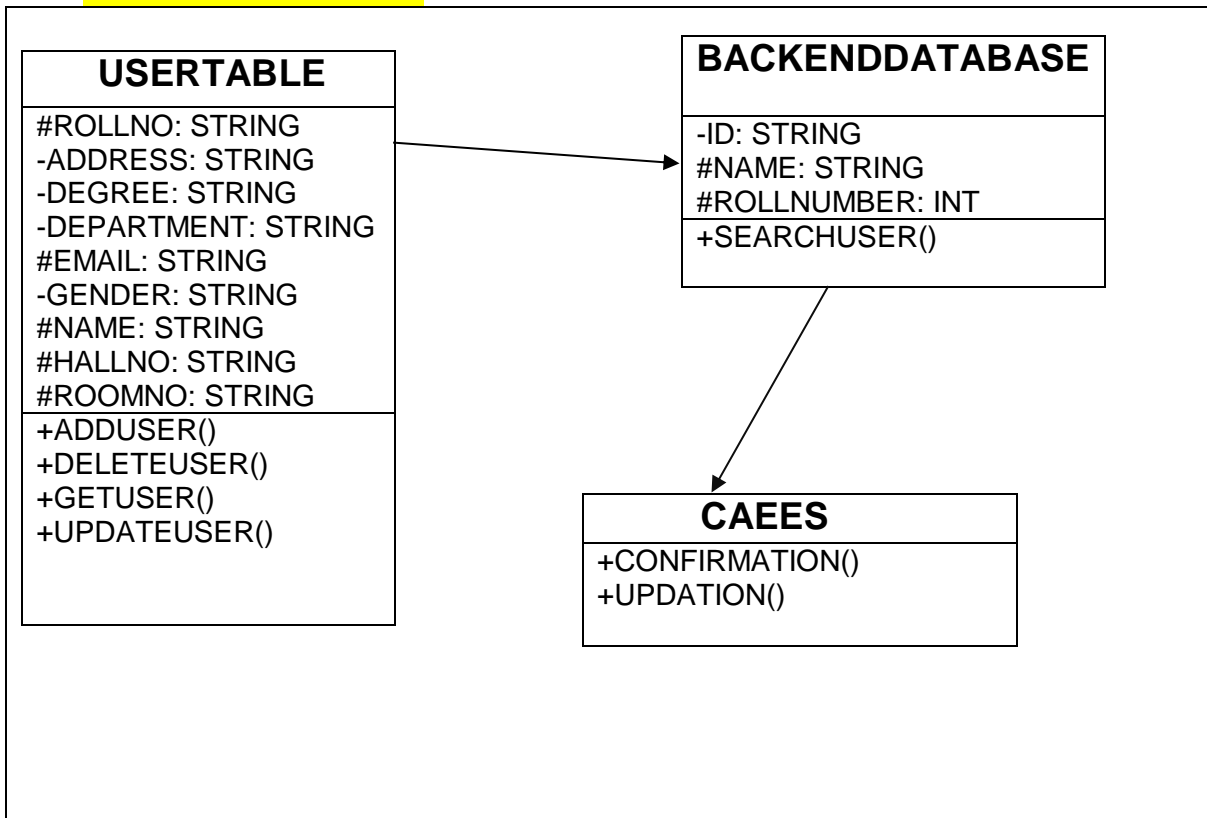
2. FOR GUARD:**3. FOR STUDENT:**

4. FOR NONSTUDENT:**5. FOR COUNT TABLE:**

6. FOR ADMIN TABLE:**7. FOR EXIT TABLE:**

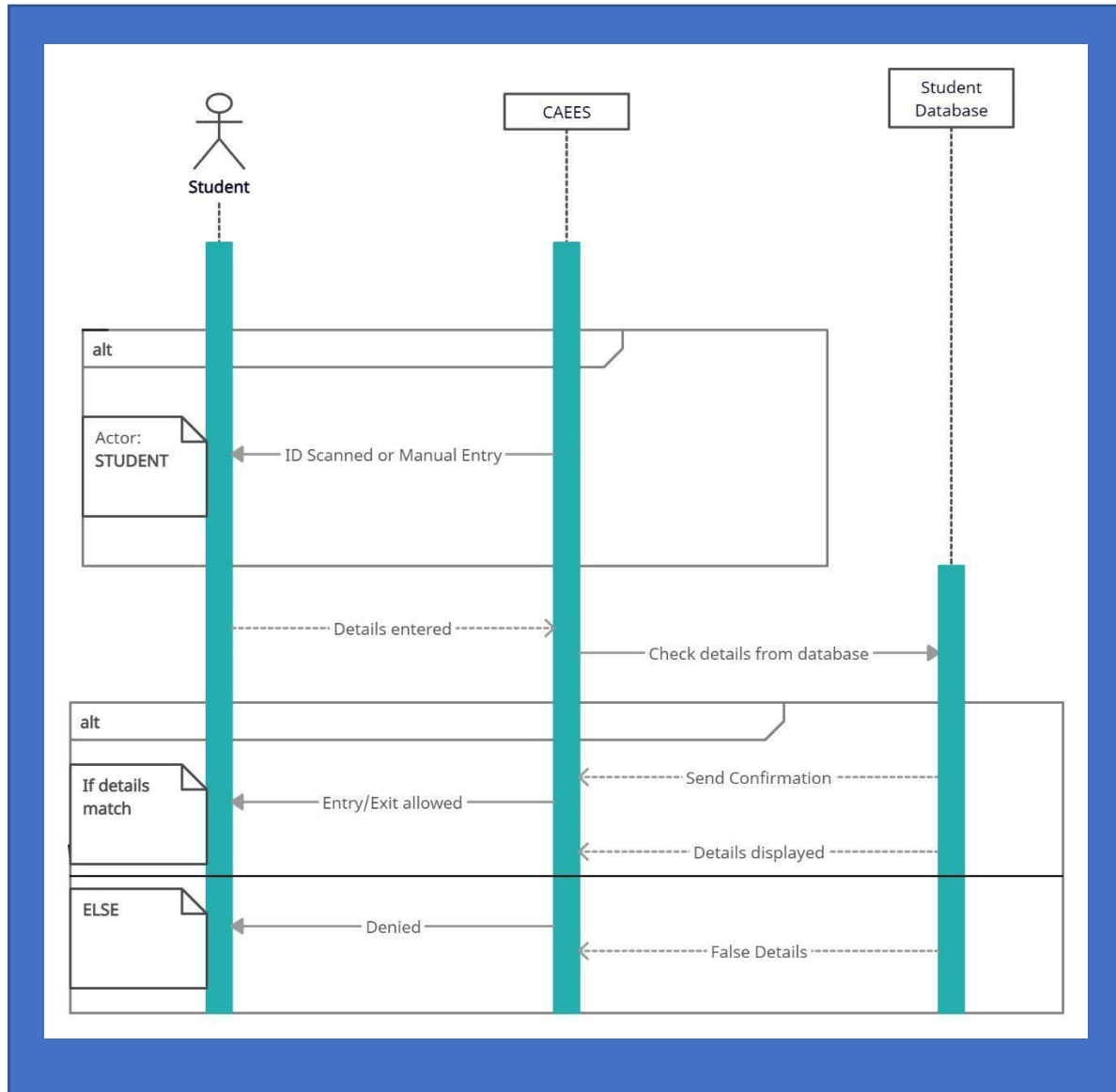
8. FOR GENERAL EXIT TABLE:**9. FOR GENERAL MOVEMENT TABLE:**

10. FOR GENERAL USER TABLE:**11. FOR MOVEMENT TABLE:**

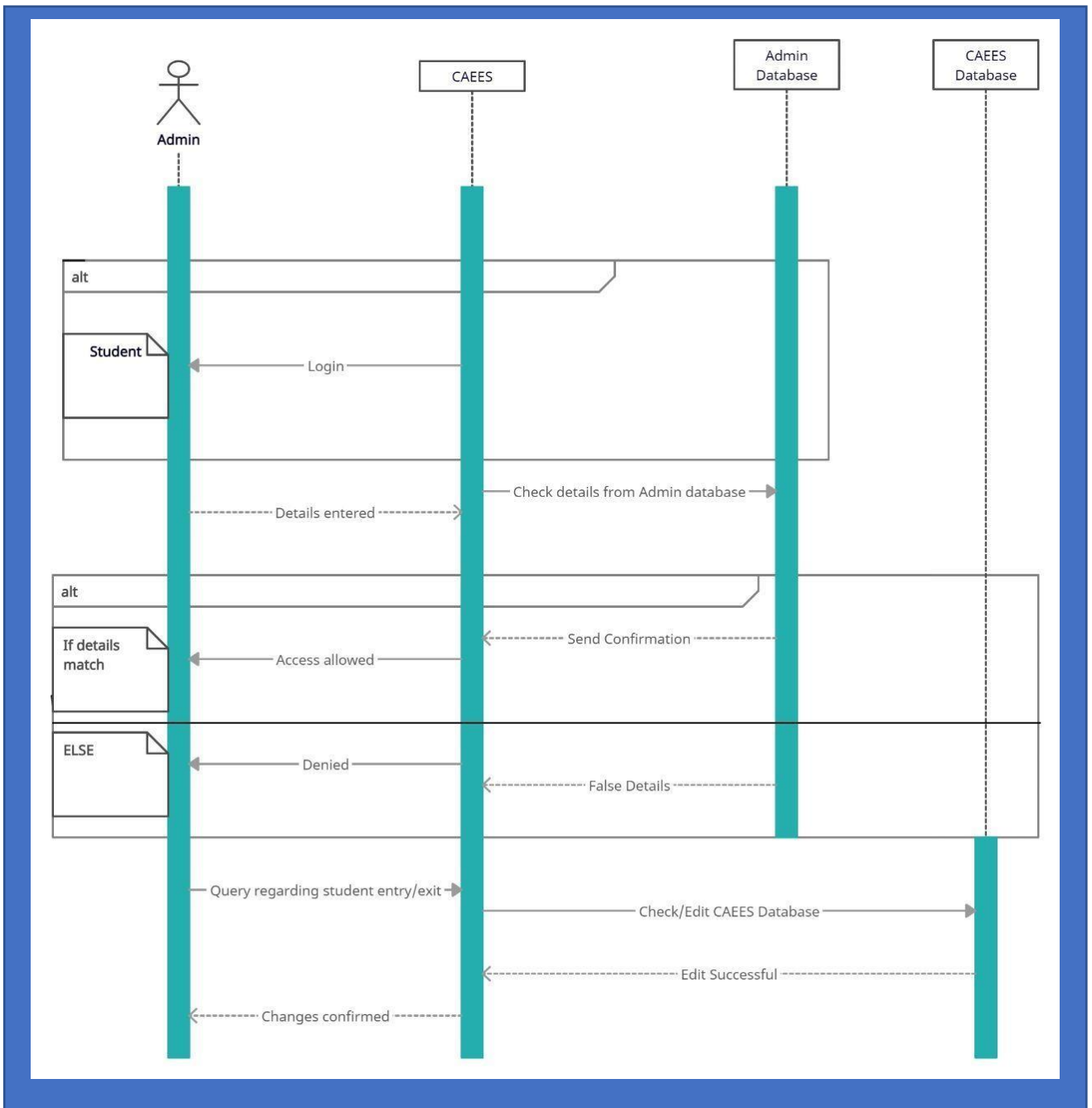
12. FOR USER TABLE:

3.2 Sequence Diagrams

- For STUDENT/USER:

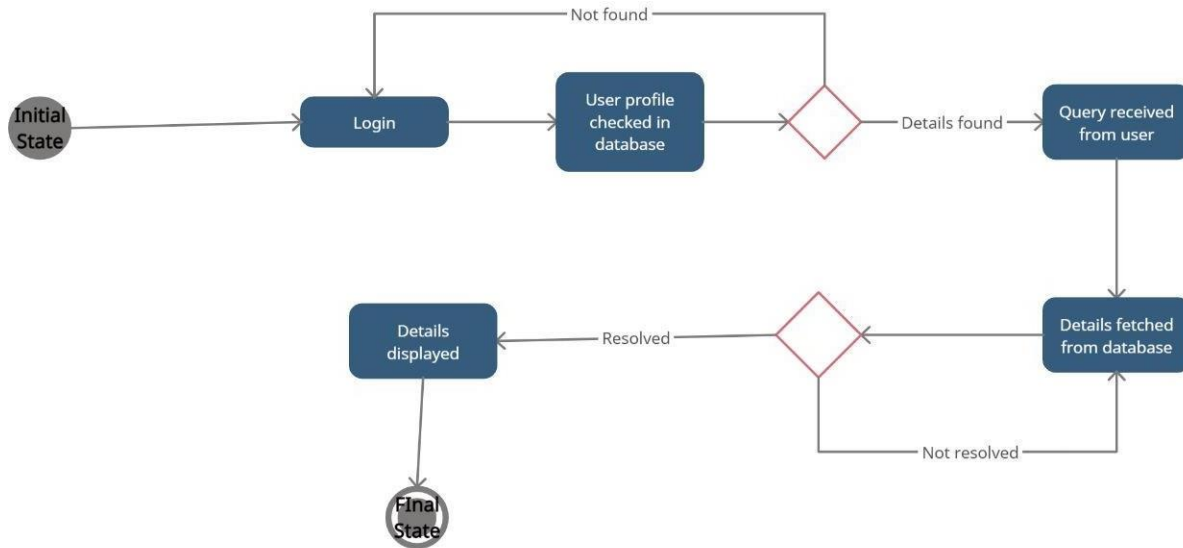


- For ADMIN/GUARD:

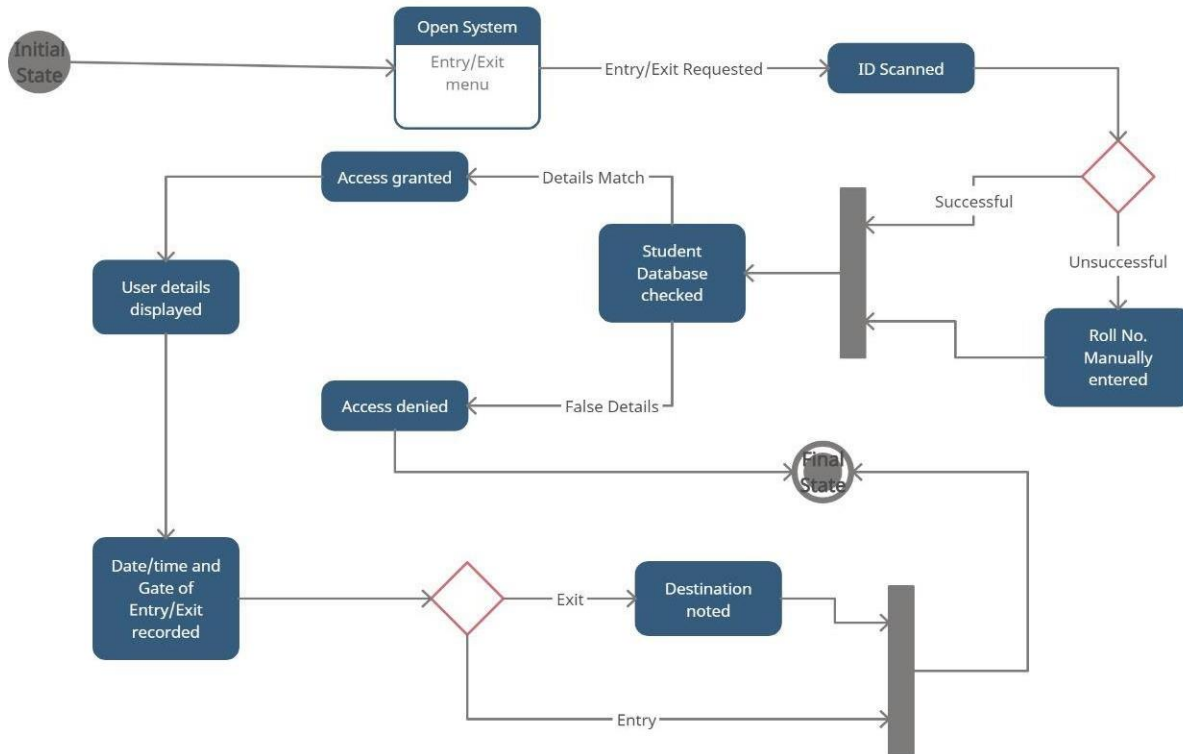


3.3 State Diagrams

- State diagram for administrative access.



- State diagram during the authentication process.

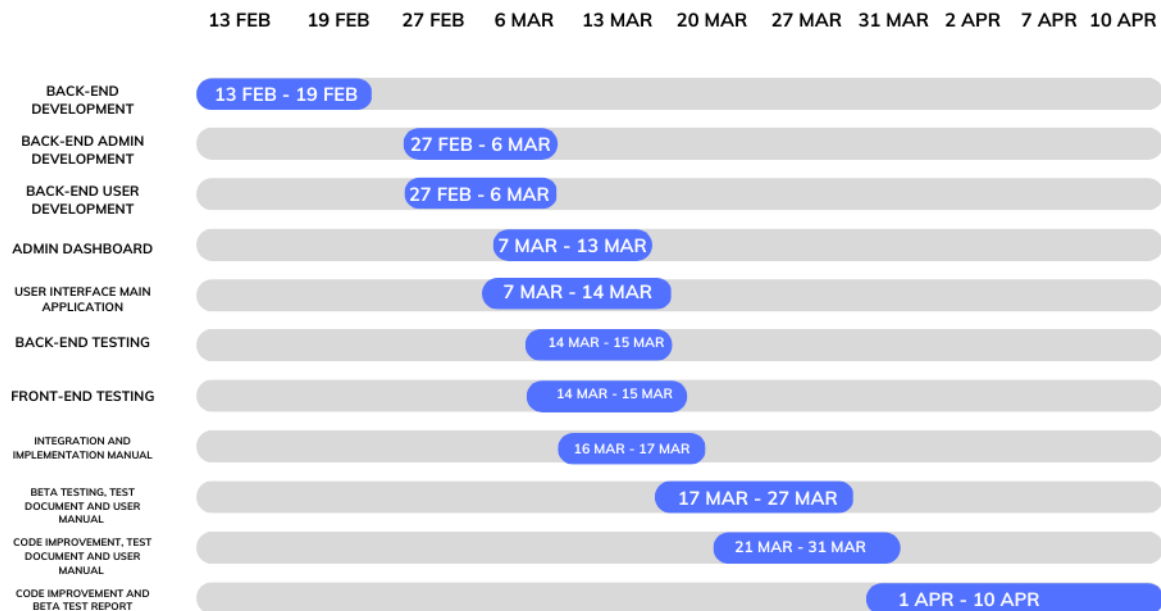


4 Project Plan

- Project work distribution and timeline

GANTT CHART

BIT-ENGINE | GROUP NO:16



Back-End Admin: Kumar Gaurav, Rikesh Sharma, Pratiksha Dawane, Avinash Saini.

Back-End User: Kumar Gaurav, Danish Mehmood, Lohit P Talavar, Rikesh Sharma, Ajeet Meena, Anuj Kumar.

Admin Front-end: Avinash Saini, Ajeet Meena, Lohit P Talavar, Pratiksha Dawane.

User Front-End: Danish Mehmood, Rikesh Sharma, Kumar Gaurav, Anuj Kumar.

Back-end Testing: Kumar Gaurav, Rikesh Sharma, Lohit P Talavar.

Front-end Testing: Danish Mehmood, Avinash Saini, Ajeet Meena.

Integration: Everyone.

5 Other Details

We will be using the student databases for implementing the system. The database can be imported from the Pingala servers or student search. For now we have manually added the team info for test purposes.