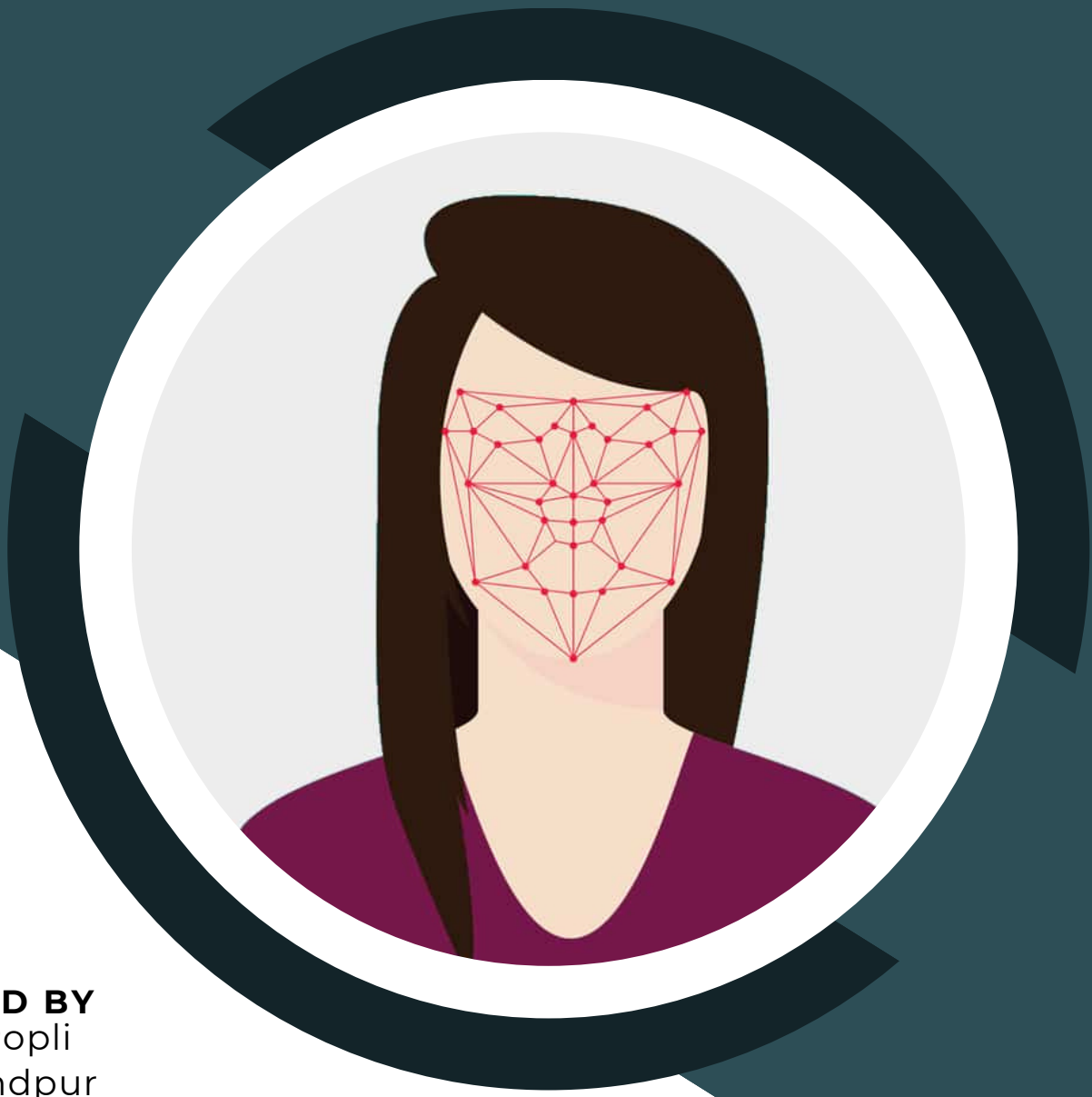


MULTIPLE FACE RECOGNITION

ATTENDANCE
SYSTEM



PREPARED BY
Anshika Popli
Diya Khandpur
Sarvagya Rastogi

CERTIFICATE

This is to certify that Anshika Popli, Diya Khandpur & Sarvagya Rastogi students of B.Sc. (Hons) Computer Science Semester IV have submitted the project entitled **“Multiple Face Recognition: Attendance System”** for the partial fulfilment of the requirements of Software Engineering Project.

It embodies the work done by them during semester IV of their course under the due supervision of Ms. Musarrat Ahmed.

Ms. Musarrat Ahmed

ACKNOWLEDGEMENT

We would like to express our sincere thanks to our Software Engineering teacher “Ms. Musarrat Ahmed” for giving us the opportunity to work under her on this project.

We truly appreciate and value her esteemed guidance and encouragement from the beginning to end of this project. We are extremely grateful to her.

We want to thank all our teachers for providing a solid background for our studies. They have been great source of inspiration to us and we thank them from the bottom of our heart.

Last but not the least, we would like to thank our Computer Science department for providing us with all the facility that was required.

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INTRODUCTION

Uniqueness or individuality of an individual is his face and its features. In this project, face of an individual is used for the purpose of marking attendance automatically. Conventional methodology for taking attendance is by calling the name or roll number of the student and the attendance is manually recorded. The important point of concern with this methodology is Time Consumption. On an average it takes an essential part of the time allotted for the subject. Attendance is prime important for both the teacher and student of an educational organization. So, it is very important to keep record of the attendance. The problem arises when we think about the traditional process of taking attendance in class room. Calling out the name or roll number of the student for attendance is not only a problem of time consumption but also consumes energy. So, an automated attendance system can resolve all the above problems. To stay away from these losses, an automated process has been used in this project which is based on Image Processing. In this project, the two main components that have been used are face detection and face recognition.

Face detection is used to locate the position of the face region and face recognition is used for marking the understudy's attendance. The database of all the students in the class is stored and when the students' faces matches with stored faces in database then the attendance is recorded.

There exists a wide range of automatic attendance management systems which are currently being used by many institutions and organizations. One such system is the biometric based attendance system. Although it is automatic and leaps a step ahead of the traditional method it fails to meet the time constraint because the students have to wait in a queue for marking attendance, which is also a time taking process. This system eliminates classical student identification such as calling names of the students, or checking respective identification cards of the students, which can not only interfere with the ongoing teaching process, but also can be stressful for students during examination.

PROBLEM STATEMENT

Attendances of every student are being maintained by every school, college and university. Empirical evidences have shown that there is a significant correlation between students' attendances and their academic performances. There was also a claim stated that the students who have poor attendance records will generally link to poor retention. Therefore, faculty has to maintain proper record for the attendance. The manual attendance record system is not efficient and requires more time to arrange record and to calculate the average attendance of each student. Hence there is a requirement of a system that will solve the problem of student record arrangement and student average attendance calculation. One alternative to make student attendance system automatic is provided by facial recognition.

With an automated system, you'll save roll-call processing hours and eliminate time theft which means your bottom line will improve. Even though there exist single face recognition systems but they are less efficient as they require each students to face the recognition system individually which ultimately take more time and therefore time costly. Solution to such issue is to automatically recognize multiple faces at a time.

With an automated system, there is no human error. When you manually track your students' time, your students typically report their hours after they've worked them. This will often increase the likelihood of inaccurate reporting. A student may not intend to misrepresent his hours, he may just forget what his actual in and out times were. Or, if a student has illegible handwriting, it could make it difficult for roll list to determine actual hours attended. With manual reporting, the organization is basically relying on the honour system. This system can be abused, which can lead to time theft.

ADVANTAGES AND USP OF THE SYSTEM

a. Accuracy: With an automated system, there is no human error. When you manually track your students' time, your students typically report their hours after they've worked them. This will often increase the likelihood of inaccurate reporting. A student may not intend to 6 misrepresent his hours, he may just forget what his actual in and out times were. Or, if a student has illegible handwriting, it could make it difficult for roll list to determine actual hours attended. With manual reporting, the organization is basically relying on the honour system. This system can be abused, which can lead to time theft.

b. Increased Productivity: Organizations who use a manual roll call process spend several hours each day collecting time cards, re-entering an illegible data by hand, faxing , phoning, and processing roll-call. When you employ an automated time and attendance system, the roll-call process takes just minutes each period.

c. Savings: With an automated system, you'll save roll-call processing hours and eliminate time theft which means your bottom line will improve. Even though there exist single face recognition systems but they are less efficient as they require each students to face the recognition system individually which ultimately take more time and therefore time costly. Solution to such issue is to automatically recognize multiple faces at a time.

d. Three-step Management: The entire system is efficiently split into three components. Firstly, the facial features are stored, and the model is trained. Second, the student is recognized by facial recognition algorithm. Third, the attendance is automatically updated into the database.

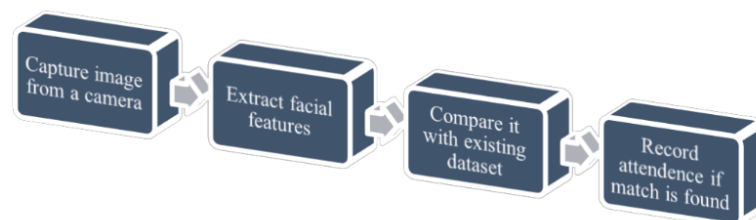


DIAGRAM OF GENERAL FRAMEWORK OF THE SYSTEM

INITIAL REQUIREMENTS

Our system would have two portals: Student Portal and Teacher Portal. Their feature are as follows:

Student Portal:

- Allow new registrations of students.
- Allow already registered students to login using their credentials.
- Student Dashboard which will allow students to edit and manage their information.
- Generate Attendance Report.
- Provide Grievances and Feedback section.

Teacher Portal:

- Allow new teachers to register themselves.
- Allow already registered teachers to login using their credentials.
- Teacher Dashboard which will allow teachers to manage and edit their information as well as that of the students.
- Generate Attendance Report of the entire class.
- Provide Grievances and Feedback section.

SURVEY FORM

Our team floated a Survey Form to get a better understanding of the features needed and issues faced by our targeted audience.

Survey form -

https://docs.google.com/forms/u/4/d/e/1FAIpQLScyoQOjvaIDLjJlfx7yJPHTvbtvq3-7OH8lWh8kbjpmOLZ0pw/viewform?usp=send_form

Section 1 of 4

Software Requirement Survey

We are developing a software that caters to the needs of college administration by making the attendance taking procedure convenient and efficient in comparison to the system presently in use.

Through this Software Engineering Requirements Survey we are gathering various challenges faced by the stakeholders, that is, students, teachers and college administration staff, so that we can provide the best solution to it.

Please answer the below queries responsibly.

 sarvagya.214071@sggsc.ac.in (not shared)
[Switch account](#)



* Required

Name *

Your answer

University/College Name *

Your answer

Type of attendance system currently in use in college *

- ☐ Physical attendance in registers
- ☐ App based attendance
- ☐ Other

Role in the organisation *

- ☐ Student
- ☐ Teacher
- ☐ College Admin

Section 2 of 4

Teacher's View	⌵ ⋮
Description (optional)	

Name *
Short answer text

Department *
Short answer text

Preferred type of attendance system
<input type="radio"/> Physical attendance in registers
<input type="radio"/> App based attendance
<input type="radio"/> Other

Preferred time of attendance
<input type="radio"/> Before class
<input type="radio"/> After class
<input type="radio"/> Other...

Preferred format of attendance graph per subject
<input type="radio"/> Daily basis
<input type="radio"/> Weekly basis
<input type="radio"/> Monthly basis

What all issues do you face while taking/submitting attendance?
Select according to your current type of attendance system
<input type="checkbox"/> Glitches in app
<input type="checkbox"/> Delay in attendance reflection due to poor network
<input type="checkbox"/> Proxy attendance in both physical and app system
<input type="checkbox"/> Missing out name while taking attendance physically
<input type="checkbox"/> Creating extra sessions in registers
<input type="checkbox"/> Disparity in college schedule/time table
<input type="checkbox"/> Other...

Any suggestions to improve the current attendance system? *
Long answer text

Section 3 of 4

College Admin's View

Description (optional)

Will it be possible to meet the demand of the hardware devices for facial recognition in each class?

☐ Yes

☐ No

What is the average number of students in each class? *

To check if the installment is feasible or not

Short answer text

What are the issues faced while maintaining the attendance record?

Select according to your current type of attendance system

☐ Difficulty in maintaining/updating records in physical system

☐ Keeping track of college approved leaves

☐ Glitches in app

☐ Disparity in schedules/time table

☐ Difficulty in maintaining the medical leaves in physical system

☐ Other...

Any suggestions to improve the current attendance system? *

Long answer text

Section 4 of 4

Student's View	⌵ ⌶	⋮
Description (optional)		

Name *

Short answer text

Course *

Short answer text

Would you be able to upload photos at multiple angles for facial recognition? *

☐ Yes

☐ No

What all issues do you face in attendance? *

☐ Glitches in app

☐ Teacher missing out on names while calling out attendance

☐ Disparity or last minute changes in schedule/time table

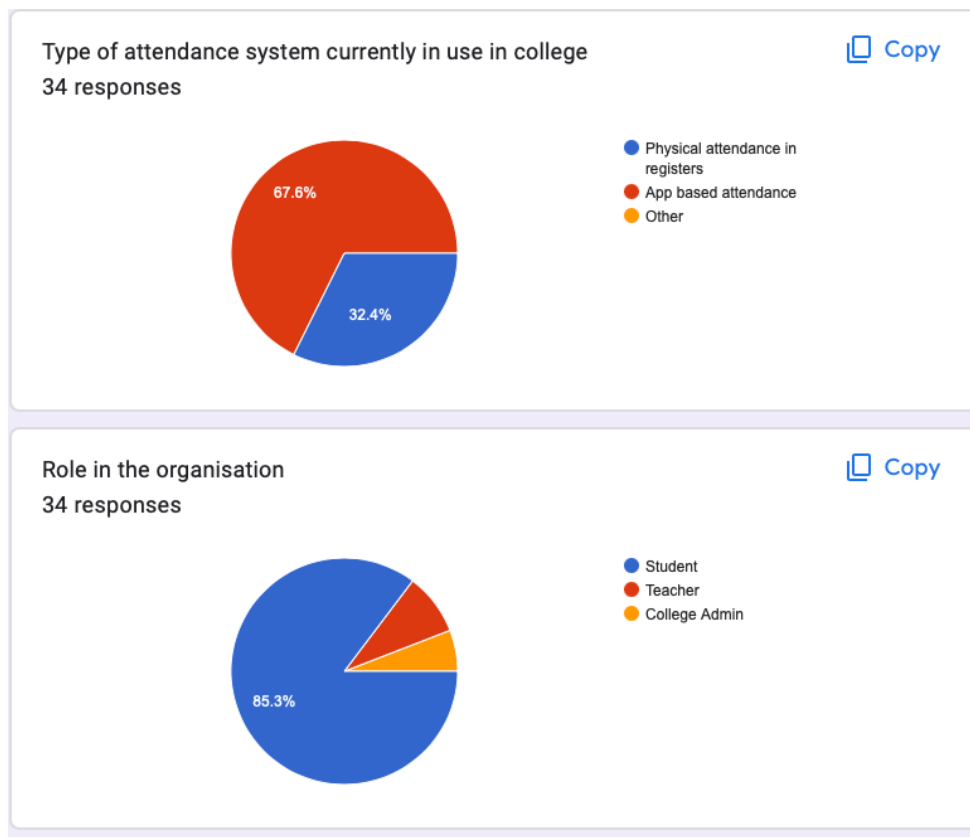
☐ Delay in record reflection

☐ Other...

REQUIREMENT ANALYSIS

We received a total of 34 responses with following being the submissions represented in the form of a pie chart:

Section 1 of 4



REQUIREMENT ANALYSIS

Section 2 of 4

Teacher's View

Name

3 responses

Ahira Jain

Harman

Yadav Singh

Department

3 responses

English

Electrical Engg

CSE

Preferred type of attendance system

3 responses

Copy

100%

Physical attendance in registers

App based attendance

Other

Preferred time of attendance

3 responses

Copy

66.7%

33.3%

Before class

After class

Preferred format of attendance graph per subject

3 responses

Copy

66.7%

33.3%

Daily basis

Weekly basis

Monthly basis

What all issues do you face while taking/submitting attendance?

3 responses

Copy

Glitches in app

Delay in attendance reflection due to po...

Proxy attendance in both physical and a...

Missing out name while taking attenda...

Creating extra sessions in registers

Disparity in college schedule/time table

1 (33.3%)

2 (66.7%)

3 (100%)

0 (0%)

1 (33.3%)

2 (66.7%)

Any suggestions to improve the current attendance system?

3 responses

n/a

na

N/A

REQUIREMENT ANALYSIS

Section 3 of 4

College Admin's View

Will it be possible to meet the demand of the hardware devices for facial recognition in each class?

Copy

2 responses

100%

Yes

No

What is the average number of students in each class?

2 responses

55

80

What are the issues faced while maintaining the attendance record?

Copy

2 responses

Difficulty in maintaining/updatin...

0 (0%)

Keeping track of college approved le...

2 (100%)

Glitches in app

Disparity in schedules/time table
Count: 1

Disparity in schedules/time table

1 (50%)

Difficulty in maintaining the me...

2 (100%)

Any suggestions to improve the current attendance system?

2 responses

N/a

n/a

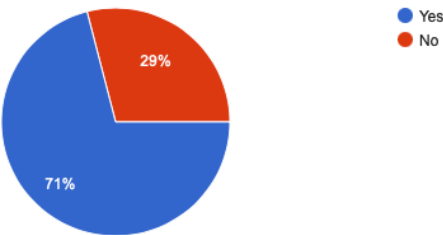
REQUIREMENT ANALYSIS

Section 4 of 4

Would you be able to upload photos at multiple angles for facial recognition?

 Copy

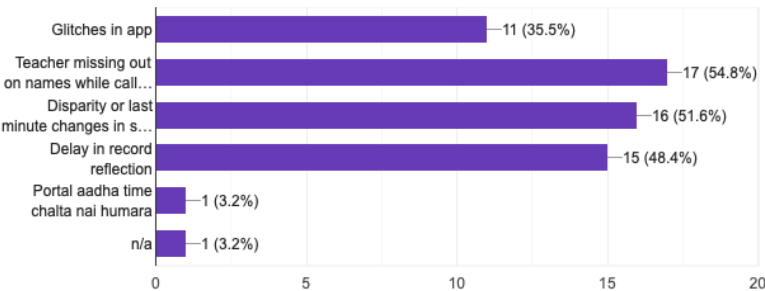
31 responses



What all issues do you face in attendance?

 Copy

31 responses



FINAL REQUIREMENTS

After analysing the submissions and entries of the survey floated by our team, we came across some points which we would like to add to our project:

Under Student's Portal:

- Schedule to showcase the classes scheduled on each day along with the respective professor's name.
- Digital ID card for easy and quick access.

Under Teacher's Portal:

- Schedule to showcase the classes scheduled on each day along with the respective section course, batch year.
- A Dropdown menu option that contains the marks stored by the students in various tests and assignments.

So our Final Requirements are as follows:

Our system would have two portals: Student Portal and Teacher Portal. Their feature are as follows:

Student Portal

1. **Student sign up page** that will allow new student registrations by inputting: Student's first name, last name, roll number, college email address, course, mobile number, gender, password.
2. **Student sign in page** that will allow already registered students to login into the system using their college email address and password.
3. **Student Dashboard** that will show the overview of subject wise attendance graphs and percentages for that particular semester. It will include icons to take the student to the respective page of the following features:
 - i. **Setup** to either upload or take photos of the student at different angles to be used for facial recognition.
 - ii. **Manage/edit Information** allows students to change, update or view personal information.
4. The **Attendance Report** showcases attendance for each day and is updated on a daily basis.
5. **Grievances and feedback** to resolve any conflicts in attendance records.
6. **Schedule** to showcase the classes scheduled on each day along with the respective section course, batch year.
7. **Digital ID card** for easy and quick access

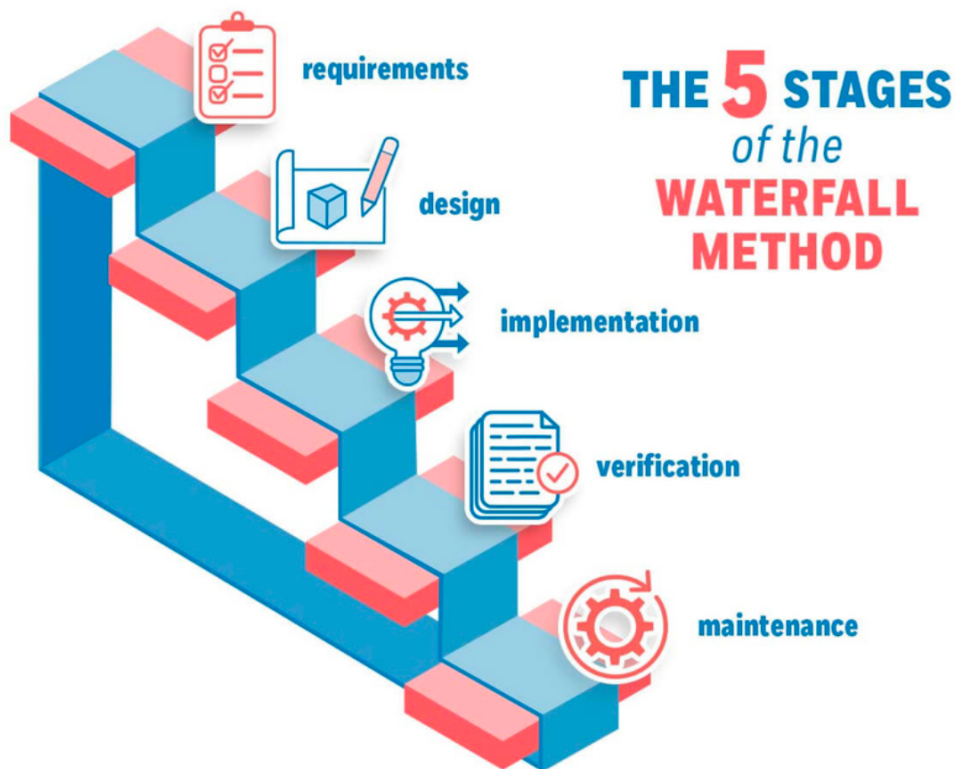
Teacher Portal

1. **Teacher sign up page** that will allow new teacher registrations by inputting: Teacher's first name, last name, teacher code, college email address, department, mobile number, gender, password.
2. **Teacher sign in page** that will allow already registered teachers to login into the system using their college email address and password.
3. **Teacher Dashboard** that will show the overview of subject wise attendance graphs and percentages for all the subjects the teacher is teaching for that particular semester. It will include icons to take the teacher to the respective page of the following features:
 - i. **Setup** to either upload or take photos of the teacher at different angles to be used for facial recognition.
 - ii. **Teacher Attendance** showcases the classes taught by the teacher for each day and is updated on a daily basis.
 - iii. **Manage/edit Information** allows to change, update or view personal information of the teacher.
4. The **Attendance Report** showcases attendance for each student for each class taken and is updated on a daily basis.
5. **Schedule** to showcase the classes scheduled on each day along with the respective section course, batch year.
6. A **Dropdown menu option that contains the marks** stored by the students in various tests and assignments.
7. **Grievances and feedback** to resolve any conflicts in attendance records.

PROCESS MODEL

A software process model is an abstraction of the actual process, which is being described. It can also be defined as a simplified representation of a software process.

In this project of ours, we are using **Linear Sequential model** which is sometimes also called **Waterfall model**.

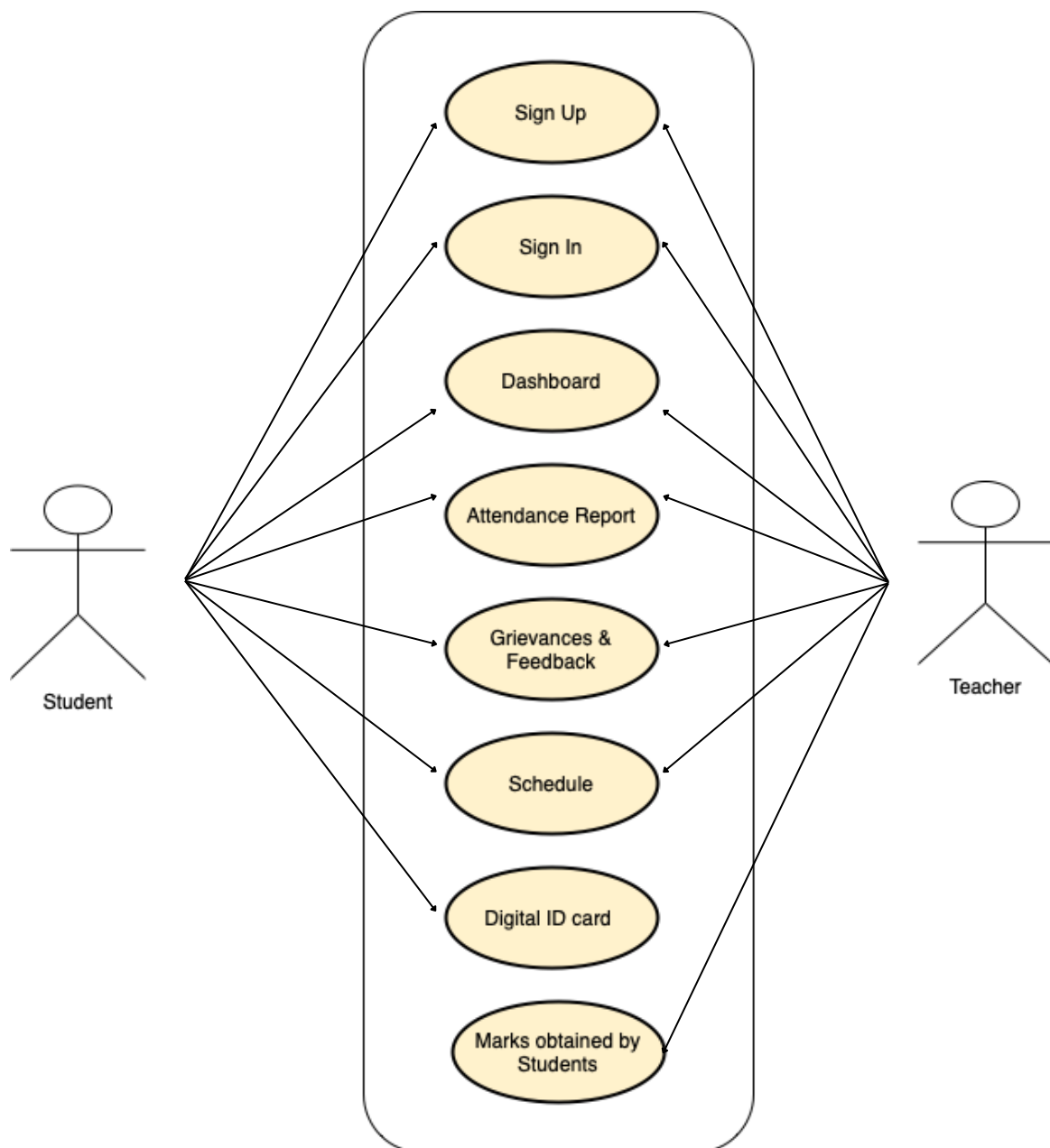


Advantages of Waterfall Model:

- When compared with other methodologies, Waterfall focuses most on a clear, defined set of steps. Its structure is simple.
- Waterfall's approach is highly methodical, it emphasizes a clean transfer of information at each step.
- Easy to manage due to the rigidity of the model. Each phase has specific deliverables and a review process.
- Phases are processed and completed one at a time.
- Process and results are well documented.

USE CASE DIAGRAM

In software and systems engineering, a use case is a list of actions or event steps, typically defining the interactions between a role (known in the Unified Modeling Language as an actor) and a system, to achieve a goal. The actor can be a human, an external system, or time. In systems engineering, use cases are used at a higher level than within software engineering, often representing missions or stakeholder goals. Another way to look at it is a use case describes a way in which a real- world actor interacts with the system. In a system use case you include high-level implementation decision.

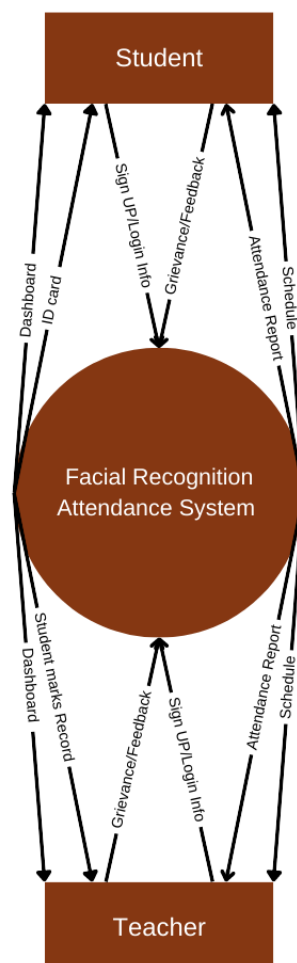


DATA FLOW DIAGRAM

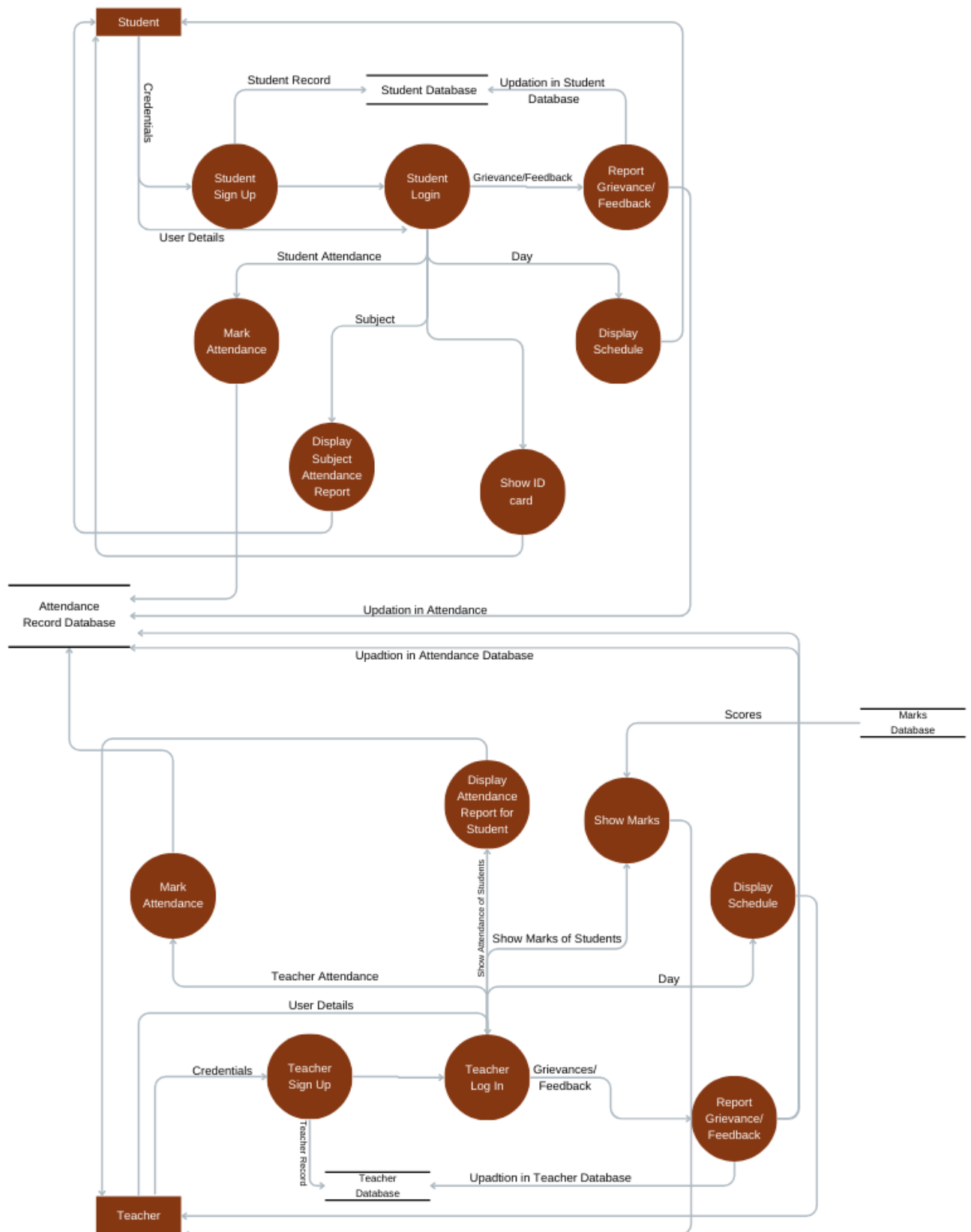
Data flow diagram shows the flow of data from external entities into the system, and from one process to another within the system. It is a graphical representation of flow of data through a system. There are four symbols for drawing a DFD:

- Rectangles representing external entities, which are sources or destination of data.
- Ellipses representing processes, which take data input, validate and process it and output it.
- Arrows representing the data flows, which can either, be electronic data or physical items.
- Open-ended rectangles representing data stores including electronic stores such as databases or XML files and physical stores such as filing cabinets or stacks of paper.

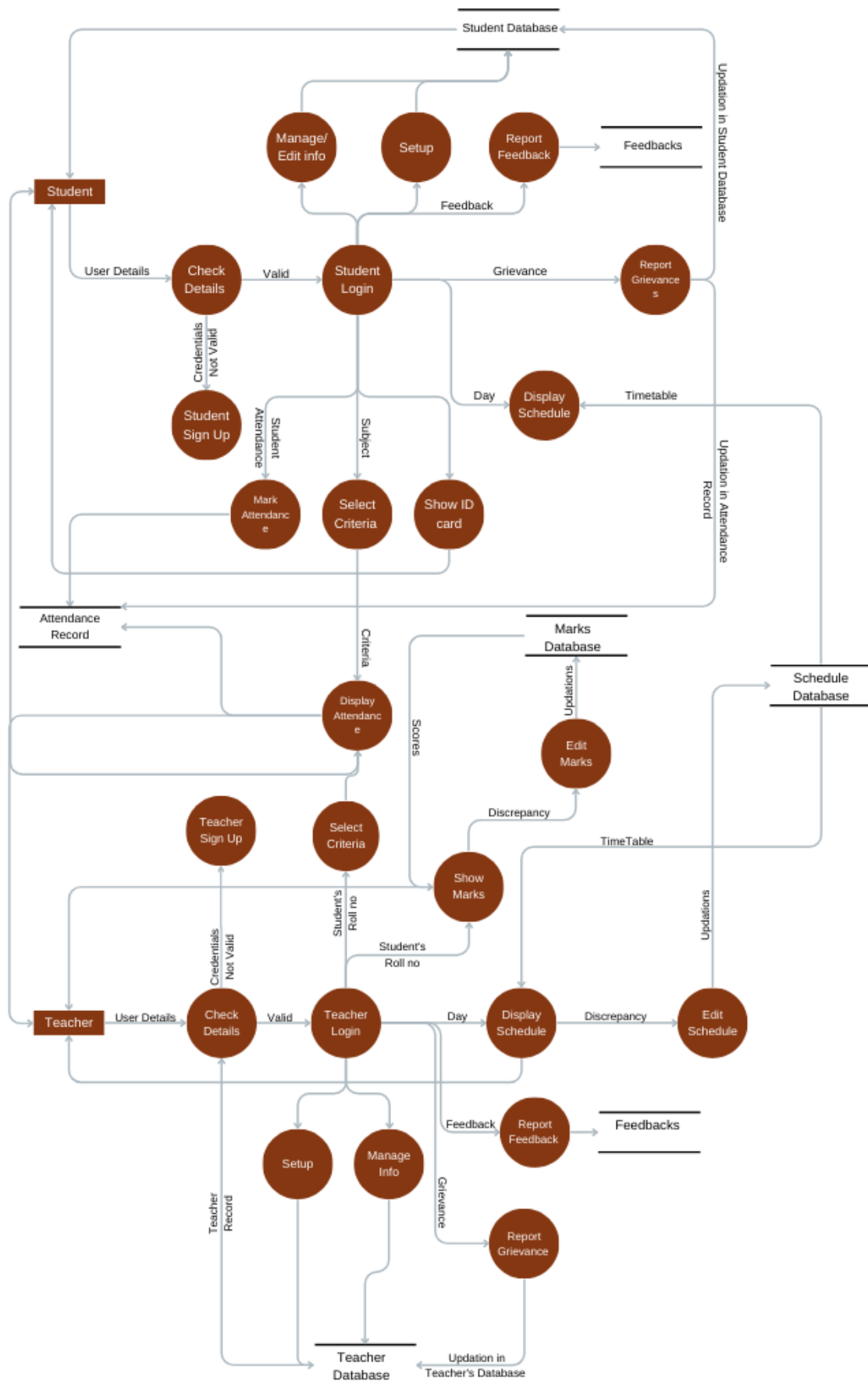
LEVEL 0 DFD



LEVEL 1 DFD



LEVEL 2 DFD



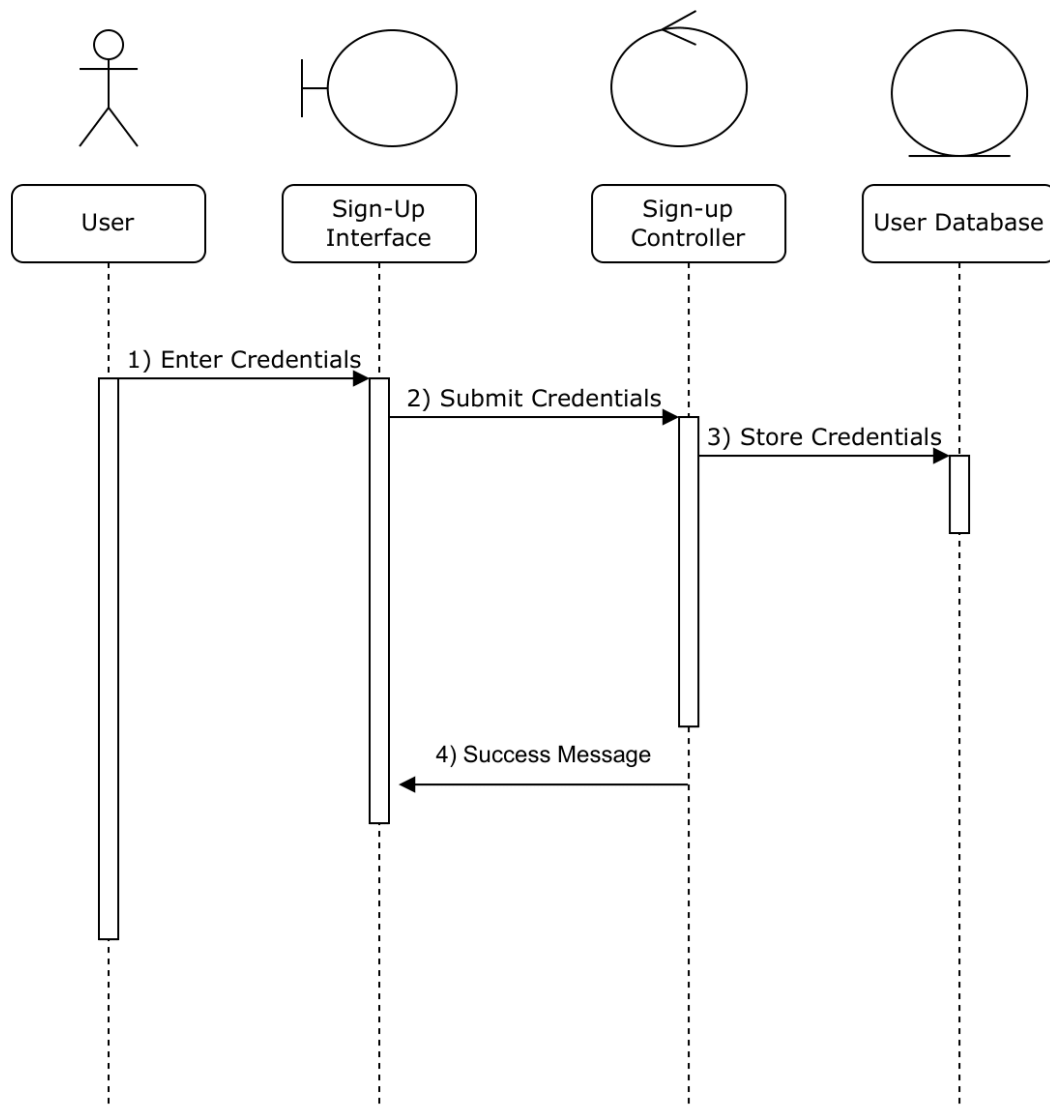
SEQUENCE DIAGRAMS

The sequence diagram represents the flow of messages in the system and is also termed as an event diagram. It helps in envisioning several dynamic scenarios. It portrays the communication between any two lifelines as a time-ordered sequence of events, such that these lifelines took part at the run time.

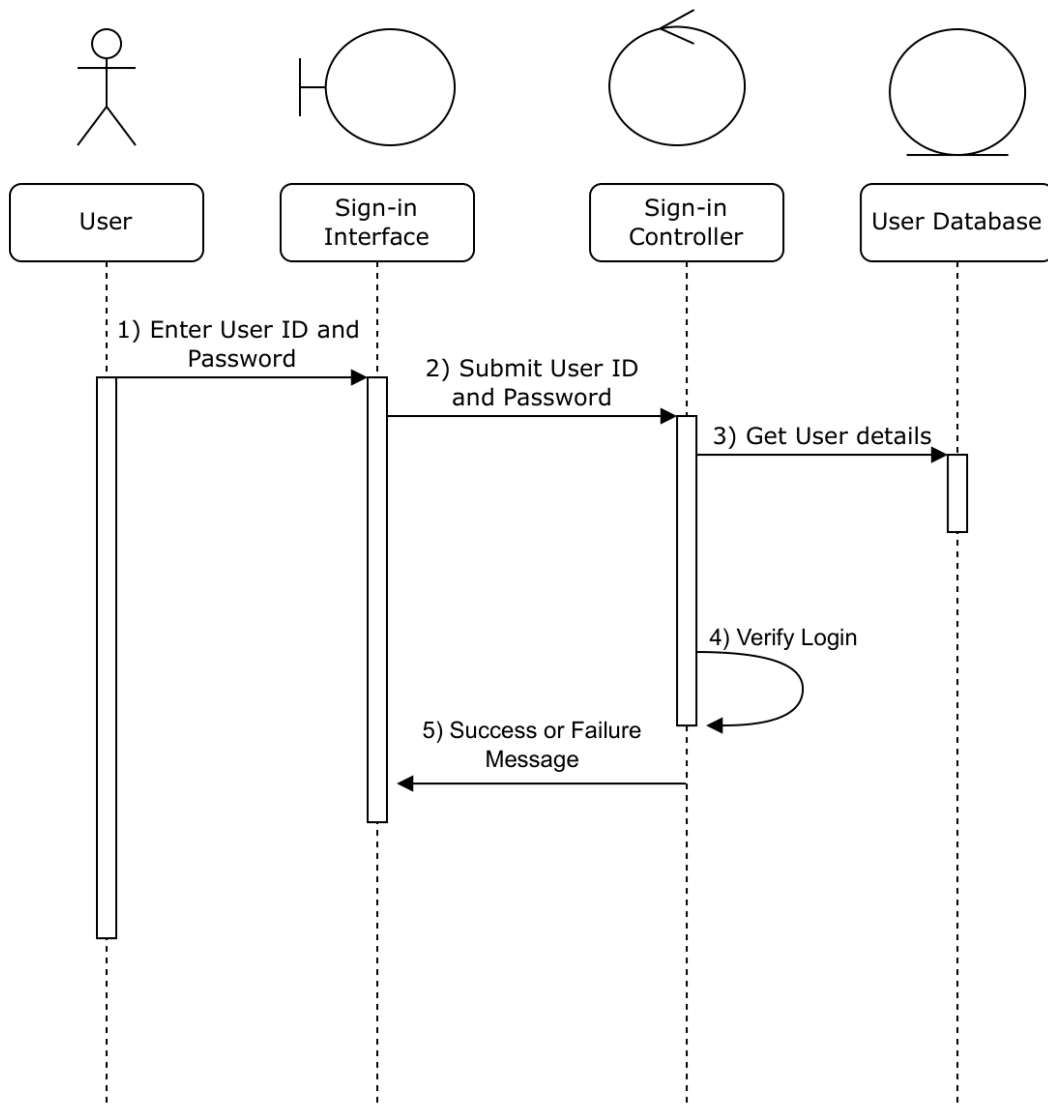
Purpose of a Sequence Diagram:

- To model high-level interaction among active objects within a system.
- To model interaction among objects inside a collaboration realizing a use case.
- It either models generic interactions or some certain instances of interaction

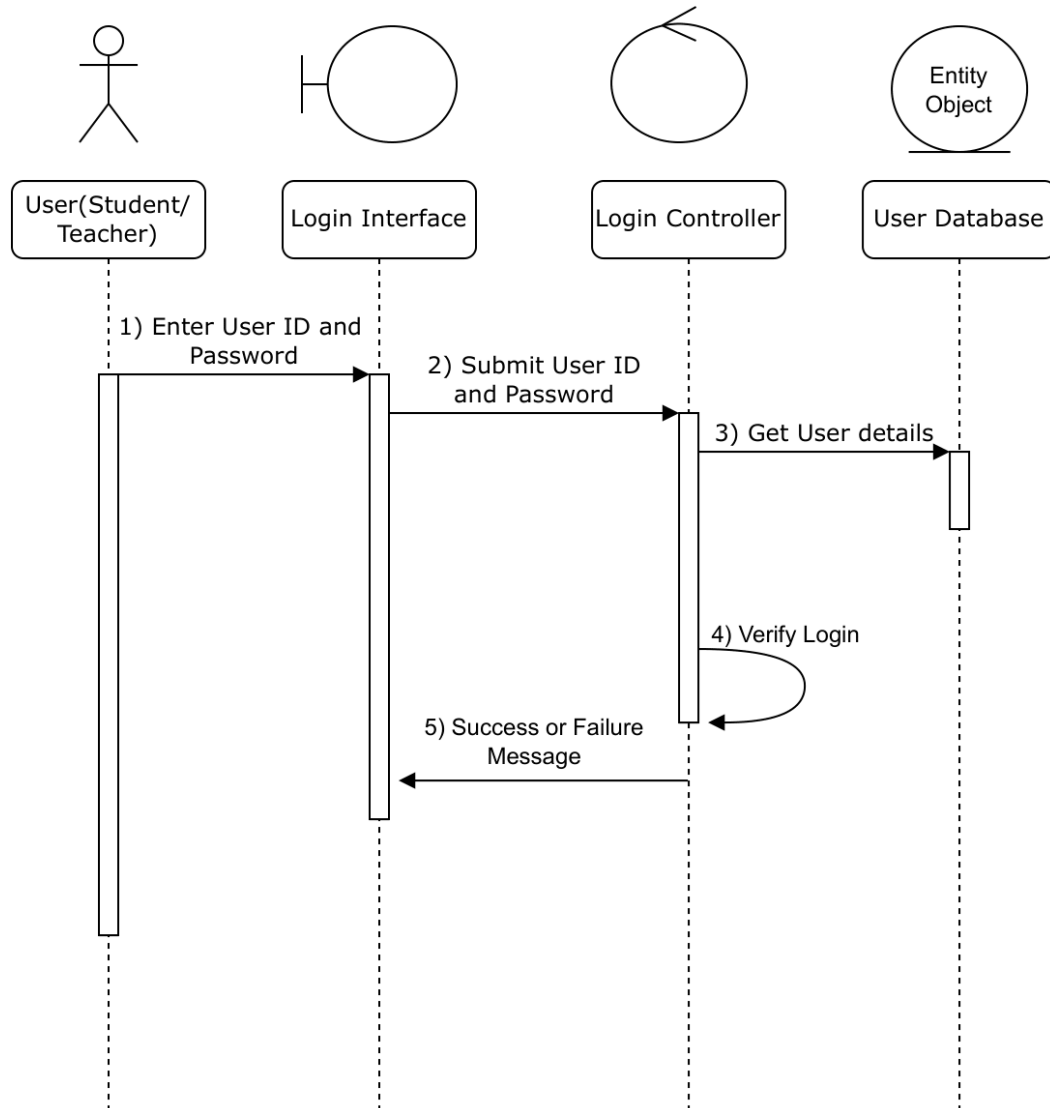
SIGN UP PAGE



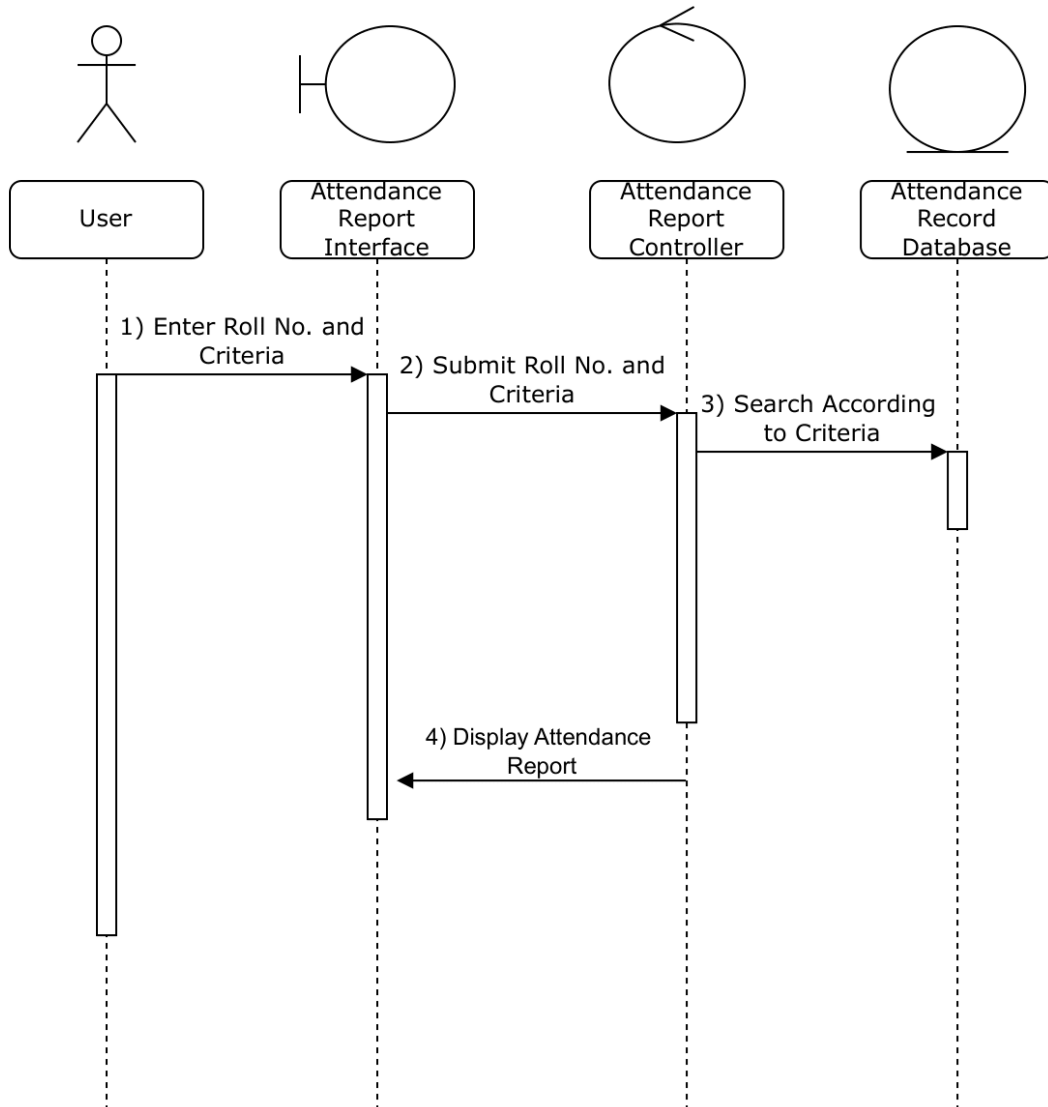
SIGN IN PAGE



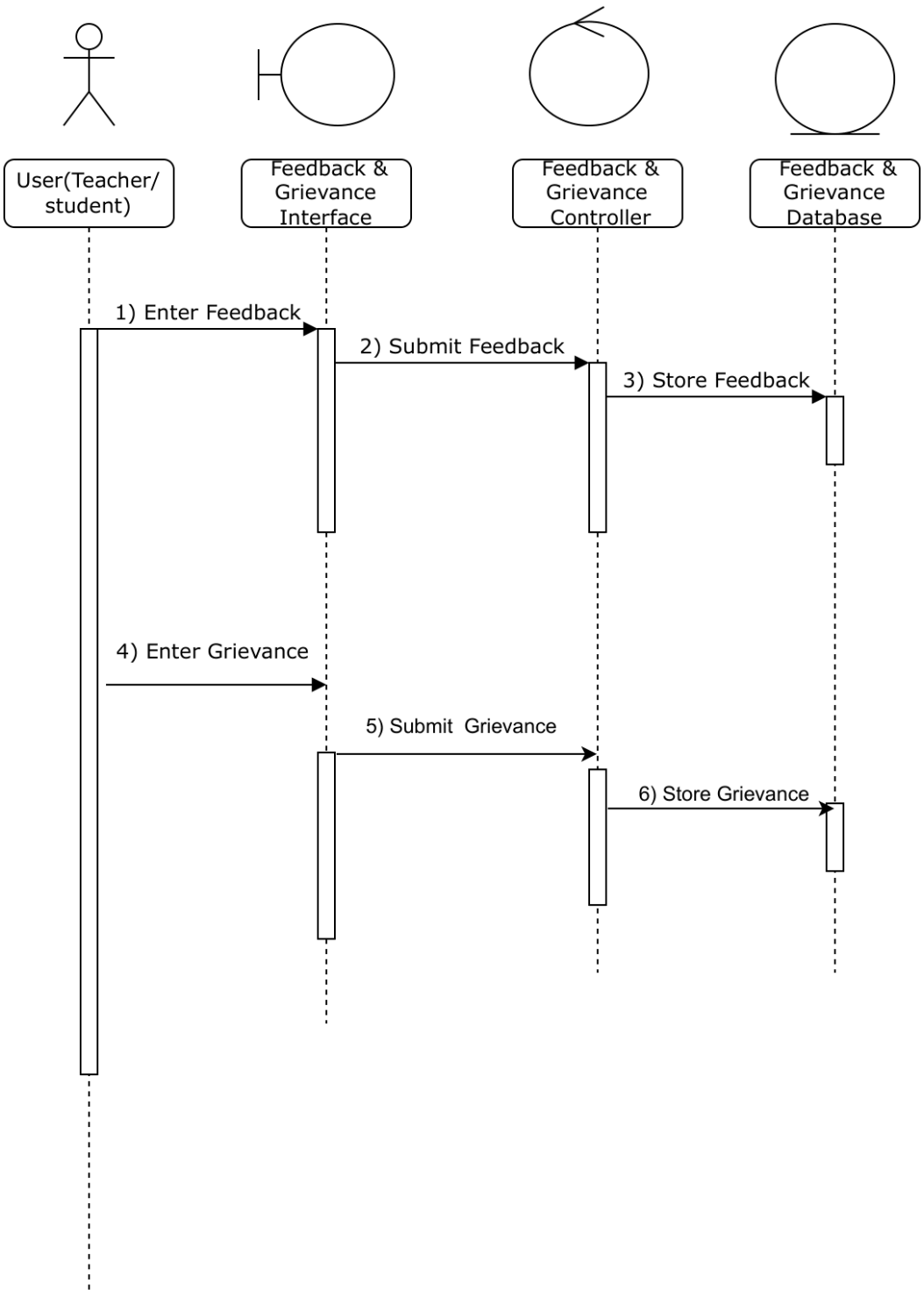
DASHBOARD PAGE



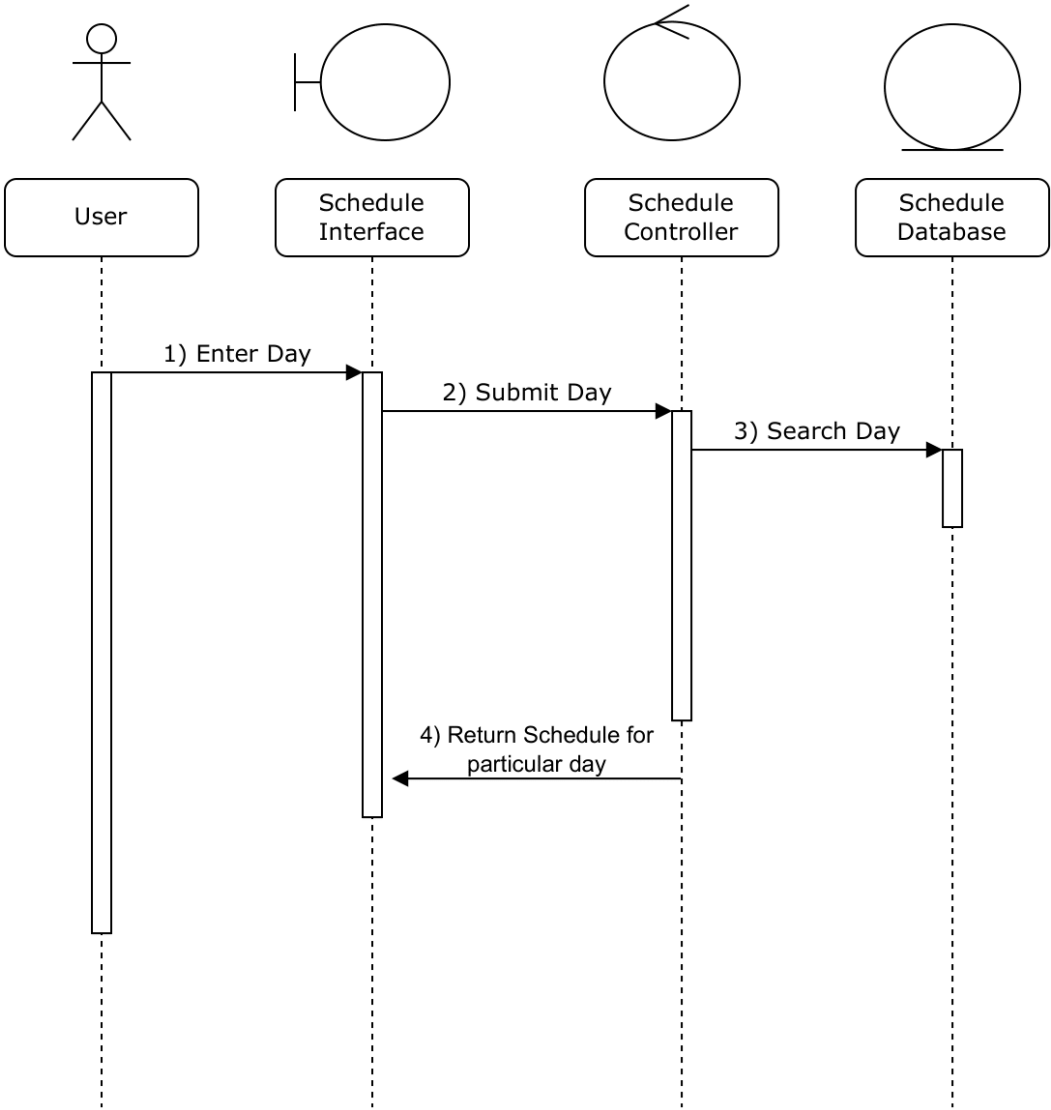
ATTENDANCE REPORT PAGE



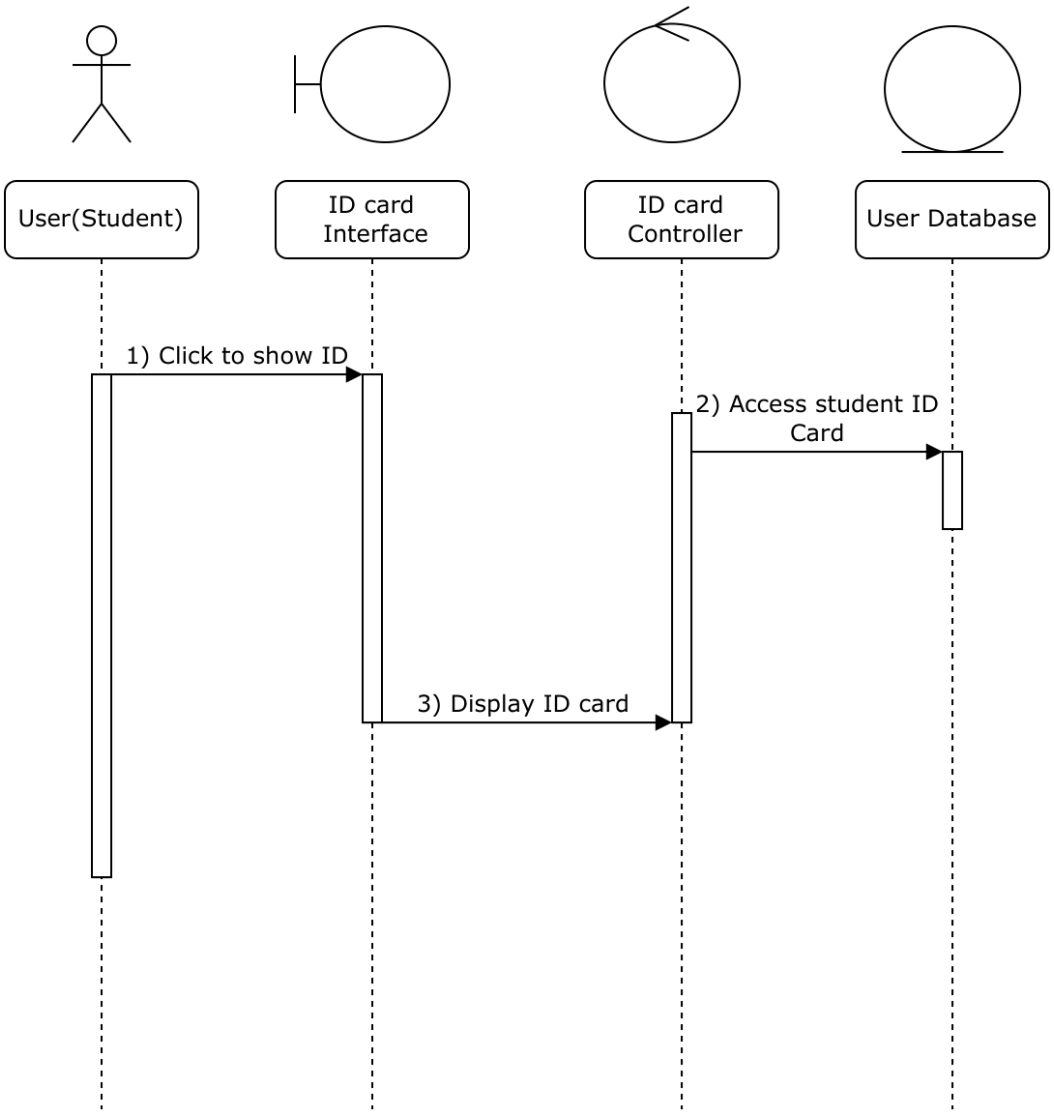
GRIEVANCES & FEEDBACK PAGE



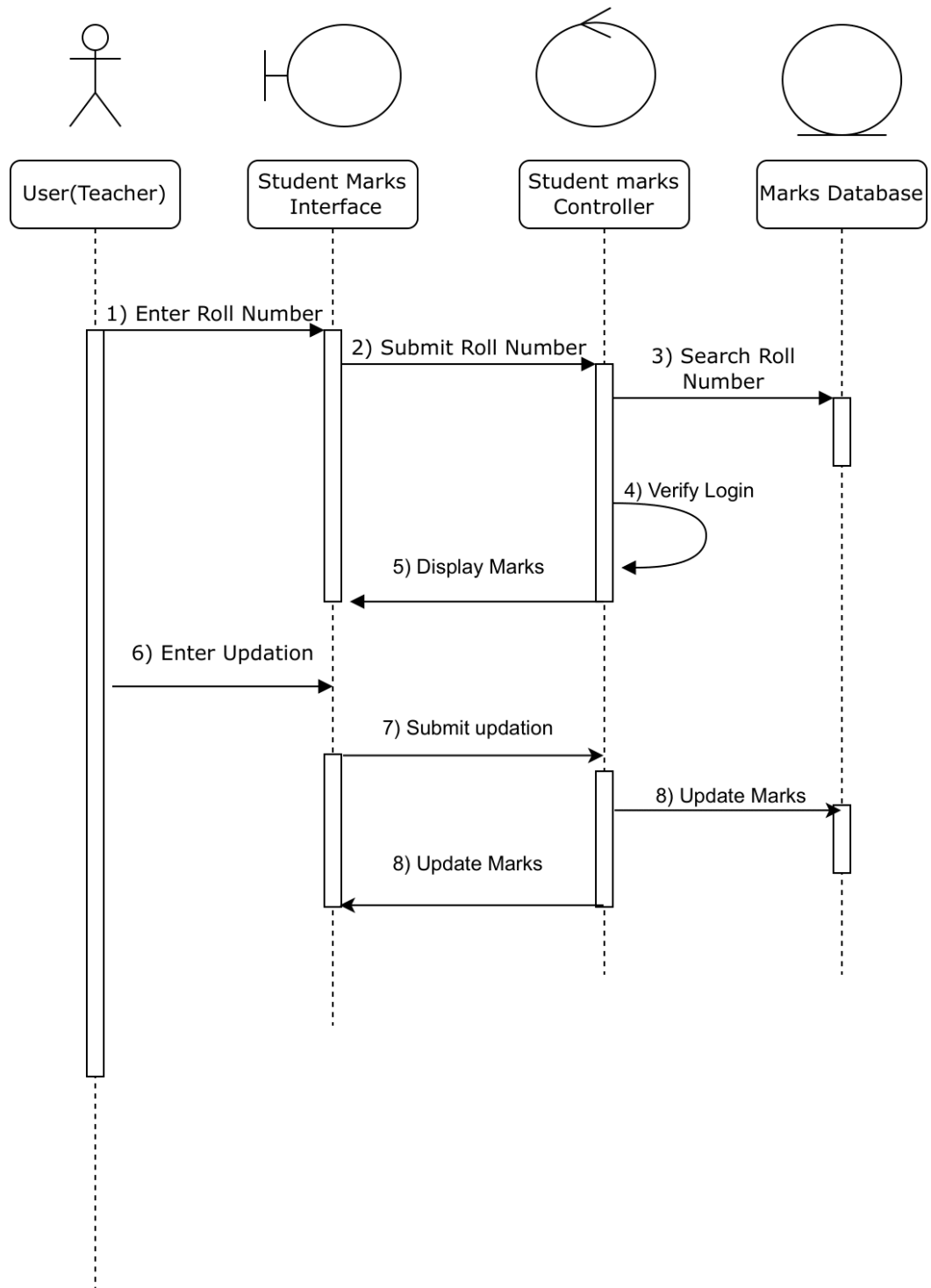
SCHEDULE PAGE



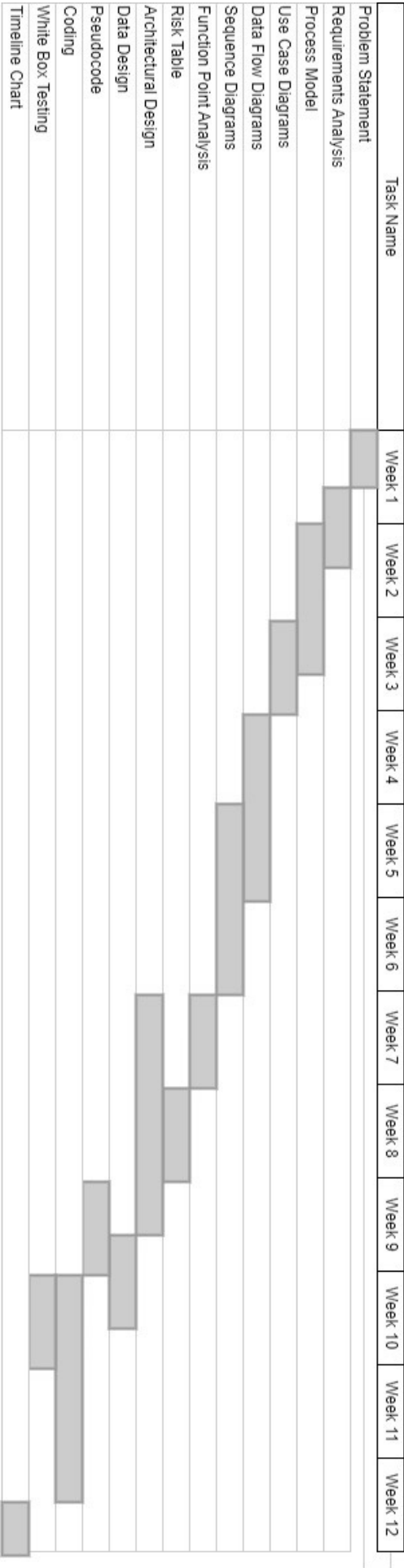
DIGITAL ID CARD PAGE



MARKS OBTAINED BY THE STUDENT PAGE



TIMELINE CHART



FUNCTION POINT ANALYSIS

FPA is a standard metric for the relative size and complexity of a software system, originally developed by Alan Albrecht of IBM in the late 1970s.

Function Points (FPs) can be used to estimate the relative size and complexity of software in the early stages of development- analysis and design.

It assesses the functionality delivered to its users, based on the user's external view of the functional requirements. It measures the logical view of an application not the physically implemented view or the internal technical view.

The FPA technique is used to analyse the functionality delivered by software and Unadjusted Function Point (UFP) is the unit of measurement.

Objectives of FPA:

1. The objective of FPA is to measure functionality that the user requests and receives.
2. The objective of FPA is to measure software development and maintenance independently of technology used for implementation.
3. It should be simple enough to minimize the overhead of the measurement process.
4. It should be a consistent measure among various projects and organizations.

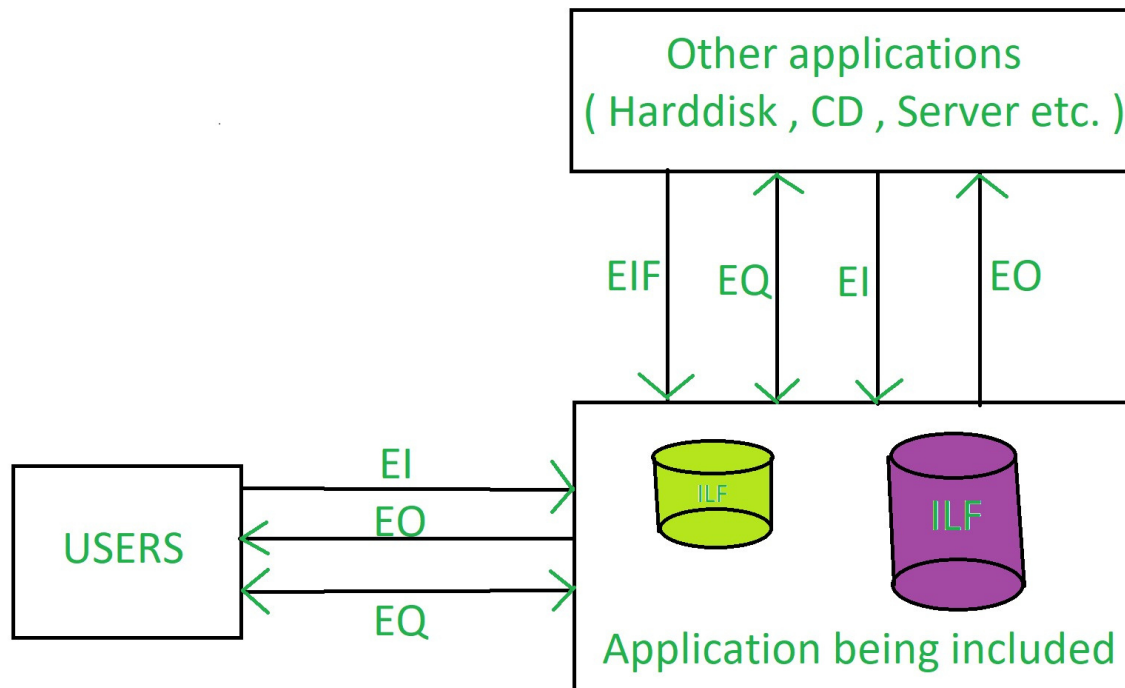
Types of FPA:

Transactional Functional Type –

- 1. External Input (EI):** EI processes data or control information that comes from outside the application's boundary. The EI is an elementary process.
- 2. External Output (EO):** EO is an elementary process that generates data or control information sent outside the application's boundary.
- 3. External Inquiries (EQ):** EQ is an elementary process made up of an input-output combination that results in data retrieval.

Data Functional Type –

- 4. Internal Logical File (ILF):** A user identifiable group of logically related data or control information maintained within the boundary of the application.
- 5. External Interface File (EIF):** A group of user recognizable logically related data allusion to the software but maintained within the boundary of another software.



Benefits of FPA:

- FPA is a tool to determine the size of a purchased application package by counting all the functions included in the package.
- It is a tool to help users discover the benefit of an application package to their organization by counting functions that specifically match their requirements.
- It is a tool to measure the units of a software product to support quality and productivity analysis.

Scale varies from 0 to 5 according to character of Complexity Adjustment Factor (CAF). Below table shows scale:

- 0 = No influence
- 1 = Incidental
- 2 = Moderate
- 3 = Average
- 4 = Significant
- 5 = Essential

STEP1: ADJUSTMENT VALUES TABLE

S. NO.	PARAMETERS	ADJUSMENT FACTOR
1	Does the system require reliable backup and recovery?	f1=4
2	Are specialized data communications required to transfer information to or from application?	f2=3
3	Are there distributed processing functions?	f3=3
4	Is performance critical?	f4=4
5	Will the system run in an existing, heavily utilized operational Environment?	f5=3
6	Does the on-line data entry require the input transaction to be built over multiple screens or operations?	f6=4
7	Does the system require online data entry?	f7=4
8	Is the code designed to be reusable?	f8=3
9	Is the system designed for multiple installations in different organizations?	f9=4
10	Are the inputs, outputs, inquiries complex?	f10=2
11	Are the ILFS updated online?	f11=3
12	Is the internal processing complex?	f12=4
13	Are conversion and installation included in the design?	f13=1
14	Is the application designed to facilitate change and ease of use by the user?	f14=4

Formula for calculating Complexity Adjustment Factor (CAF):

$$\text{CAF} = 0.65 + 0.01 * \sum f_i$$

Calculating $\sum f_i$

$$\begin{aligned}\sum f_i &= f_1 + f_2 + f_3 + f_4 + f_5 + f_6 + f_7 + f_8 + f_9 + f_{10} + f_{11} + f_{12} + f_{13} + f_{14} \\ &= 4 + 3 + 3 + 4 + 3 + 4 + 4 + 3 + 4 + 2 + 3 + 4 + 1 + 4 \\ &= 46\end{aligned}$$

Calculating CAF

$$\begin{aligned}\text{CAF} &= 0.65 + 0.01 * \sum f_i \\ &= 0.65 + 0.01 * 46 \\ &= 0.65 + 0.46 \\ &= 1.11\end{aligned}$$

STEP 2: UNADJUSTED FUNCTION POINT (UFP)

EXTERNAL INPUTS:

INPUT NAME	FIELDS
Sign up	4
Sign in	2
Attendance Criteria	1
Grievance/ Feedback	1
Schedule Day	1

EXTERNAL OUTPUTS:

OUTPUT NAME	FIELDS
Attendance Report	1
Time Table	1
Marks	1

EXTERNAL INQUIRIES:

INQUIRIES	FIELDS
ID Card	1

INTERNAL LOGICAL FILES:

FILE NAME	FIELDS
Student Details	8
Teacher Details	5
Attendance Record per subject	3
Schedule	1
Marks	1
Feedback	2

EXTERNAL INTERFACE FILES: NONE

TABLE FOR UNADJUSTED FUNCTION POINT (UFP):

Calculation:

The weight factor is assumed to be **average**.

FUNCTION TYPE	ESTIMATED FACTOR	WEIGHT FACTOR	FUNCTION TYPE TOTAL
EI	5	3 4 6	20
EO	3	4 5 7	15
EQ	1	3 4 6	4
ILF	6	7 10 15	60
EIF	0	5 7 10	0

Total Unadjusted Function Point Count

$$=20 + 15 + 4 + 60 + 0$$

$$= 99$$

Calculating Function Point Count

$$AFP = UFP * CAF$$

$$AFP = 99 * 1.11$$

$$AFP = 109.89$$

Where,

AFP = Adjusted Function Point

UFP = Unadjusted Function Point

CAF = Complexity Adjustment Factor

RISK MANAGEMENT PLAN

A software project can be concerned with a large variety of risks. In order to be adept to systematically identify the significant risks which might affect a software project, it is essential to classify risks into different classes. The project manager can then check which risks from each class are relevant to the project.

There are three main classifications of risks which can affect a software project:

- **Project risks**
- **Technical risks**
- **Business risks**

1. Project risks: Project risks concern different forms of budgetary, schedule, personnel, resource, and customer-related problems. A vital project risk is schedule slippage. Since the software is intangible, it is very tough to monitor and control a software project.

2. Technical risks: Technical risks concern potential method, implementation, interfacing, testing, and maintenance issue. It also consists of an ambiguous specification, incomplete specification, changing specification, technical uncertainty, and technical obsolescence. Most technical risks appear due to the development team's insufficient knowledge about the project.

3. Business risks: Business risks threaten the viability of the software to be built and often jeopardise the project or the product. Candidates for the top five business risks are:

- Market risk: Building an excellent product or system that no one really wants.
- Strategic risk: Building a product that no longer fits into the overall business strategy for the company.
- Sales risk: building a product that the sales force doesn't understand how to sell.
- Management risk: Losing the support of senior management due to a change in focus or a change in people.
- Budget risk: losing budgetary or personnel commitment.

RISK TABLE

A risk table provides a project manager with a simple technique for risk projection.

It consists of five columns -

- Risk Summary – short description of the risk
- Risk Category – one of seven risk categories (slide 12)
- Probability – estimation of risk occurrence based on group input
- Impact – (1) catastrophic (2) critical (3) marginal (4) negligible
- RMMM – Pointer to a paragraph in the Risk Mitigation, Monitoring, and management file

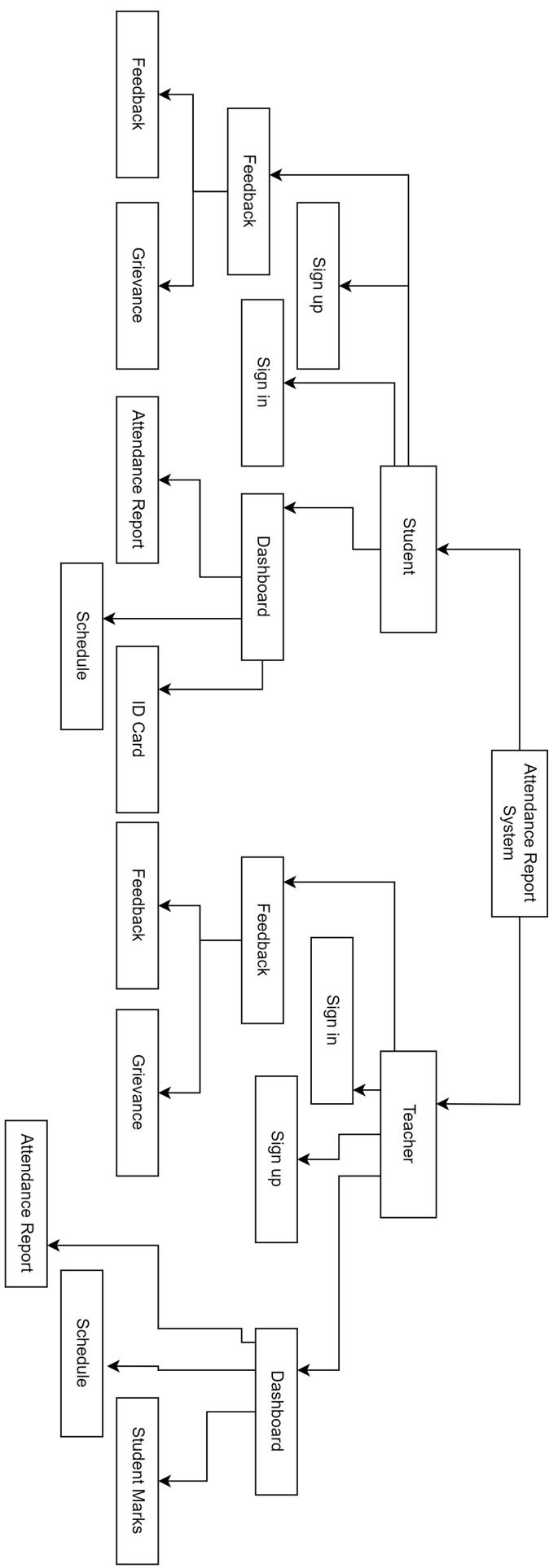
Impact Rates:

1.Catastrophic 2. Critical 3. Marginal 4. Negligible

RMMM TABLE

S.No	Risks	Category	Proba bility	Impact	RMMM
1.	The team may lose all the project artifacts any time during the project and thus will be unable to deliver the application to the customer. Such an unlikely event may be caused by a hard disk failure, etc.	Technical Risk	5%	1	To avoid losing the work already completed, the team will have to carry out a necessary backup of database data, source, code and documentation. Ensure that backups are made in regular intervals of time.
2.	Customer requirements might change. Since our software and system is made in a linear fashion, changing of requirements can be a big problem.	Project Risk	20%	2	SRS should be documented and validated with the customer in advance.
3.	Delivery deadline may be tightened.	Business Risk	20%	3	Schedule made should be realistic and achievable. Monitor that efforts put are according to the schedule.
4.	Lack of training on tools or insufficient skills for operating the system.	Technical Risk	20%	3	Organize sessions/meetings with experienced professionals to gain their insights.
5.	Team dissension/ Lack cohesion	Project Risk	10%	4	Conduct a meeting to find a solution that everyone agrees on. In case of no agreement, either go with the leader's decision or the teacher's.

ARCHITECTURAL DESIGN



DATA DESIGN

Database involved in this project:

Student_Details: This database contains student details required at Login and Sign Up.

```
create table Student_Details(  
    Name varchar(30) not null,  
    College_Roll_No varchar(30) not null,  
    College_ID varchar(30) not null,  
    Password varchar(30) not null,  
    Grievance varchar(30) not null,  
    Face_X Decimal (7,5) not null,  
    Face_Y Decimal (7,5) not null,  
    Face_Z Decimal (7,5) not null  
)
```

NAME	COLLEGE_ROLL_NO	COLLEGE_ID	PASSWORD	GRIEVANCE	FACE_X	FACE_Y	FACE_Z
Diya Khandpur	214007	Diya-007	qrty123	-	0	0	0
Sarvagya Rastogi	214071	Sarvagya-071	qwerty3	-	0	0	0
Bhoomi Bohara	214002	Bhoomi-002	wsedc345	-	0	0	0
Kartik Arya	214054	Kartik-054	hujnj99	-	0	0	0
Anshika Popli	214008	Anshika-008	qwerty123	-	0	0	0

Download CSV

5 rows selected.

TABLE STUDENT_DETAILS

Column	Null?	Type
NAME	NOT NULL	VARCHAR2(30)
COLLEGE_ROLL_NO	NOT NULL	VARCHAR2(30)
COLLEGE_ID	NOT NULL	VARCHAR2(30)
PASSWORD	NOT NULL	VARCHAR2(30)
GRIEVANCE	NOT NULL	VARCHAR2(30)
FACE_X	NOT NULL	NUMBER(7,5)
FACE_Y	NOT NULL	NUMBER(7,5)
FACE_Z	NOT NULL	NUMBER(7,5)

Teacher_Details: This database contains Teacher details required at Login and Sign Up.

```
Create Table Teacher_Details(  
    Name varchar(20) not null,  
    Email_ID varchar(20) not null,  
    College_ID varchar(20) not null,  
    Password varchar(20) not null,  
    Grievance varchar(20)  
)
```

NAME	EMAIL_ID	COLLEGE_ID	PASSWORD	GRIEVANCE
Mrs. Ushveen Kaur	ushveen@gmail.com	Ushveen-008	Qwerty123	-
Mrs. Musurrat Ahmed	musurrat@gmail.com	Musurrat-003	Qwerty3	-
Mrs. Sugandha Gupta	sugandha@gmail.com	Sugandha-071	Qwey123	-

Download CSV

3 rows selected.

TABLE TEACHER_DETAILS

Column	Null?	Type
NAME	NOT NULL	VARCHAR2(20)
EMAIL_ID	NOT NULL	VARCHAR2(20)
COLLEGE_ID	NOT NULL	VARCHAR2(20)
PASSWORD	NOT NULL	VARCHAR2(20)
GRIEVANCE	-	VARCHAR2(20)

Marks: This database contains Marks scored by the students and can be accessed by the teachers for write and read operations and the students for only read operation.

```
Create Table Marks(  
    College_Roll_No varchar(20) not null,  
    Subject varchar(20) not null,  
    Marks int not null  
);
```

COLLEGE_ROLL_NO	SUBJECT	MARKS
214001	DBMS	88
214008	Data Structures	65
214009	Linear Algebra	90
214071	Programming in C++	78
214042	Algorithms	32

Download CSV

5 rows selected.

TABLE MARKS

Column	Null?	Type
COLLEGE_ROLL_NO	NOT NULL	VARCHAR2(20)
SUBJECT	NOT NULL	VARCHAR2(20)
MARKS	NOT NULL	NUMBER

Feedback_Grievances: This database holds all the feedbacks and grievances received by the users while using this software.

```
Create Table Feedback_Grievances(  
    College_Roll_No varchar(20) not null,  
    Message varchar(100) not null  
);
```

COLLEGE_ROLL_NO	MESSAGE
214008	Attendance not marked.
214009	I want to change my Email ID.
214071	Provide Dark theme for the software.

Download CSV

3 rows selected.

TABLE FEEDBACK_GRIEVANCES

Column	Null?	Type
COLLEGE_ROLL_NO	NOT NULL	VARCHAR2(20)
MESSAGE	NOT NULL	VARCHAR2(100)

Download CSV

Schedule: This database holds the timetable for each day of the academic calendar.

```
Create Table Schedule(  
    Day varchar(20) not null,  
    Timetable varchar(100) not null  
);
```

DAY	TIMETABLE
Monday	SE Theory, SE Practical
Tuesday	DBMS Theory, DBMS Practical
Wednesday	Algorithms Theory, Algorithms Practical
Thursday	R Language Theory, R Language Practical
Friday	DBMS Theory, DBMS Practical
Saturday	DE Theory, DE Practical

Download CSV

6 rows selected.

TABLE SCHEDULE

Column	Null?	Type
DAY	NOT NULL	VARCHAR2(20)
TIMETABLE	NOT NULL	VARCHAR2(100)

Attendance_Record: This database is updated every time attendance is marked. It has 3 attributes.

```
Create Table Attendance_Record(  
    College_Roll_No varchar(20) not null,  
    Date_Record date not null,  
    Status varchar(20) not null  
);
```

COLLEGE_ROLL_NO	DATE_RECORD	STATUS
214008	22-APR-22	–
214009	22-APR-22	–
214071	22-APR-22	–
214042	22-APR-22	–
214001	22-APR-22	–

Download CSV

5 rows selected.

TABLE ATTENDANCE_RECORD

Column	Null?	Type
COLLEGE_ROLL_NO	NOT NULL	VARCHAR2(20)
DATE_RECORD	NOT NULL	DATE
STATUS	NOT NULL	VARCHAR2(20)

PSEUDOCODE

Pseudocode is a high-level description of a computer program or algorithm that uses a mix of natural language and programming language-like constructs to convey the steps involved in the program or algorithm. Pseudocode is used as a tool for designing and planning a program before it is implemented in a programming language. It provides a way to express the logic of the program without the need to worry about the syntax or specific details of a particular programming language.

Below we have provided the pseudocode of our **Attendance Report module**:

```
function generateAttendanceReport():  
    //generates an attendance report based on facial recognition data.  
attendanceReport = {}  
    //The function first initializes an empty dictionary called  
attendanceReport.  
Attendance_Record =  
facialRecognitionDatabase.queryAttendance_Record()  
    //It then queries attendance data from a facial recognition database and  
stores it in a variable called Attendance_Record  
for record in Attendance_Record:  
    //Next, the function loops through each record in the  
Attendance_Record list, extracts the relevant data (student ID and status),  
and checks if the student ID is already in the attendanceReport dictionary.  
if studentId not in Attendance_Record:  
    //If the student ID is not already in the dictionary, a new entry is created  
with an empty list to store the student's attendance records.  
Attendance_Report[studentId]["name"] = studentInfo.name  
    //Finally, the attendance record is added to the student's attendance list,  
and the function returns the completed attendance report dictionary.
```

CODING

Generating Attendance Report Module Code:

Define a function to generate an attendance report based on facial recognition data

```
def generateAttendanceReport():[1]
```

```
    # Initialize empty attendance report
```

```
    attendanceReport = {}[2]
```

```
    # Query attendance data from facial recognition database
```

```
    Attendance_Record =
```

```
    facialRecognitionDatabase.queryAttendance_Record()
```

```
    # Loop through each attendance record
```

```
    for record in Attendance_Record:[3]
```

```
        # Extract relevant data from attendance record
```

```
        studentId = record.studentId[4]
```

```
        status = record.status
```

```
        # Check if student ID is already in the attendance report
```

```
        if studentId not in attendanceReport:[5]
```

```
            # If not, create a new entry for the student in the attendance report
```

```
            attendanceReport[studentId] = {[6]
```

```
                "name": "",
```

```
                "attendance": []
```

```
            }
```

```
            # Query student information from student database
```

```
            studentInfo = studentDatabase.queryStudentInfo(studentId)[7]
```

```
            # Add student name to attendance report
```

```
            attendanceReport[studentId]["name"] = studentInfo.name[8]
```

```
            # Add attendance record to student's attendance list
```

```
            Attendance_Report[studentId]["attendance"].append({[9]
```

```
                "status": status
```

```
            })
```

```
    # Return the completed attendance report
```

```
    return Attendance_Report[10]
```

```
# Test the function
```

```
attendanceReport = generateAttendanceReport()
```

```
print(attendanceReport)
```

CODING

Output for the code module:

The output would be reflected in the Attendance_Record Database as Present or Absent.

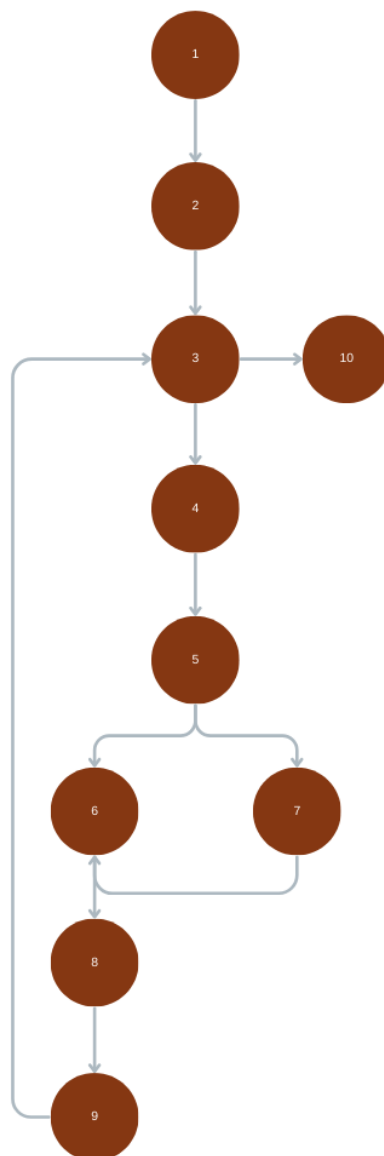
COLLEGE_ROLL_NO	DATE_RECORD	STATUS
214008	22-APR-22	Present
214009	22-APR-22	Present
214071	22-APR-22	Absent
214042	22-APR-22	Present
214001	22-APR-22	Absent

WHITE BOX TESTING

White box testing, also known as clear box testing, is a testing approach that involves examining the internal workings of a software system or application. This type of testing is typically performed by developers or testing professionals who have access to the source code of the software being tested.

The main advantage of white box testing is that it can provide comprehensive coverage of the software code, which can help to identify defects or weaknesses that may be missed by other testing approaches. However, it can also be time-consuming and may require specialized skills and knowledge.

We performed White Box testing of the code and plotted the cyclomatic graph for the same:



CALCULATION OF CYCLOMATIC COMPLEXITY:

To calculate the cyclomatic complexity of the code, we can use the following formula:

$$\mathbf{M = E - N + 2P}$$

where **M** is the cyclomatic complexity,

E is the number of edges in the control flow graph,

N is the number of nodes in the control flow graph, and

P is the number of connected components in the control flow graph.

So,

To calculate P, we need to look for disconnected components in the control flow graph. In this case, there are no disconnected components, so $P = 1$.

Putting it all together:

$$M = E - N + 2P$$

$$M = 11 - 10 + 2(1)$$

$$\mathbf{M = 3}$$

$$\mathbf{\text{Number of Regions} = 3}$$