Symbiosis Institute of Technology

A DBMS Project Report on
Integrated Student Management System

Under the Guidance of

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Title of Project

Integrated Student Management System

About Project

In today's expanding landscape it is crucial to have a streamlined and comprehensive approach to managing administrative and academic functions. Our project introduces a Database Management System (DBMS) specifically designed to meet these requirements. Our system offers a solution for student management incorporating key functionalities such as fee management, hostel accommodation, student records, course administration, library management, timetable scheduling, faculty coordination, attendance tracking and grade management.

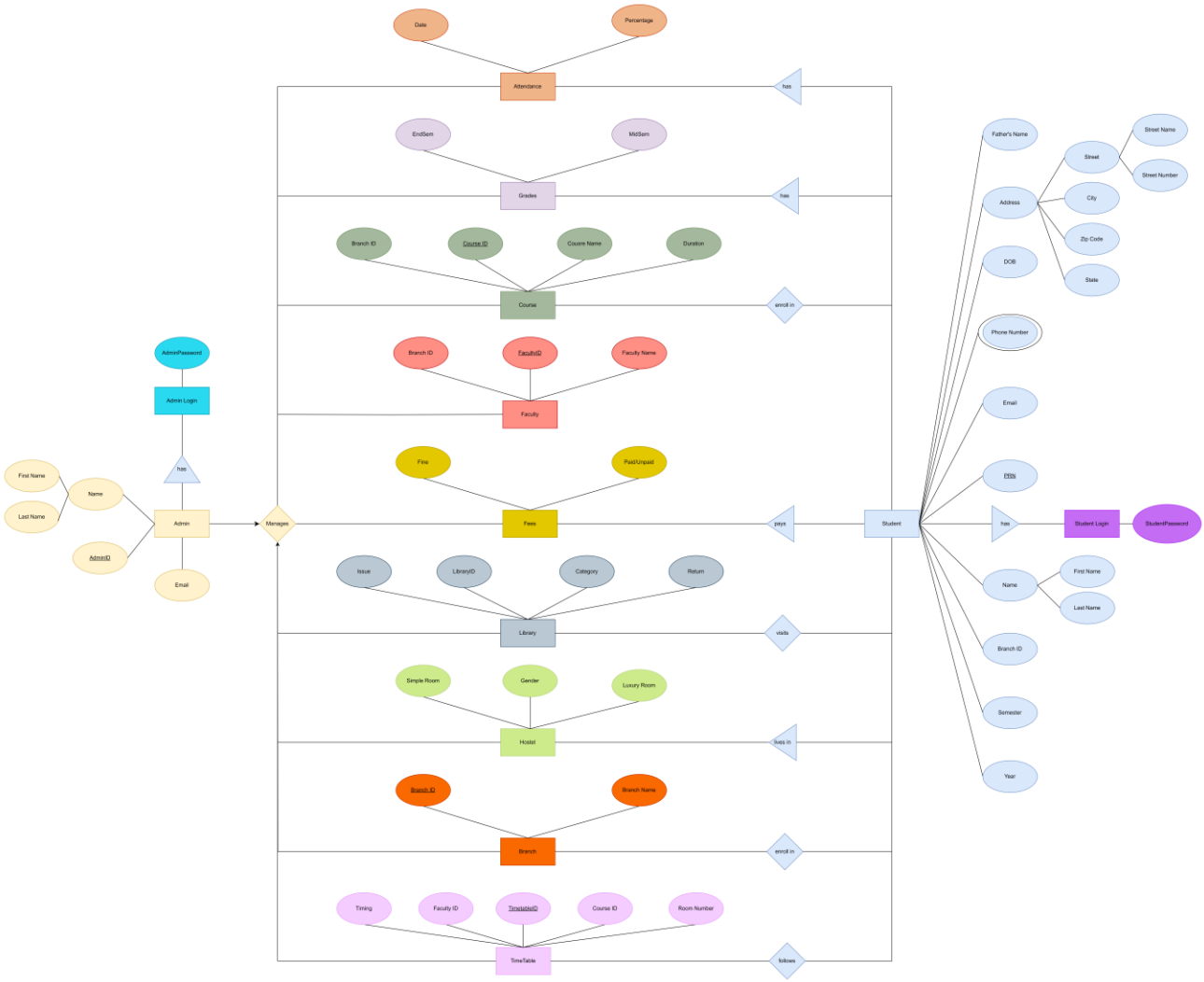
The fee management module of our system simplifies transactions while ensuring transparency and efficiency. Managing hostel accommodations becomes effortless with our process for allocating and maintaining student housing. The student module acts as a repository for all information related to students – an essential component for smooth administration. Course administration is enhanced by features that Facilitate planning and management.

A pivotal feature of our system is the timetable scheduling function that optimizes resource utilization and minimizes scheduling conflicts – resulting in benefits for both students and faculty members. The faculty coordination module provides a platform, for managing faculty information and schedules – an aspect of smooth academic operations.

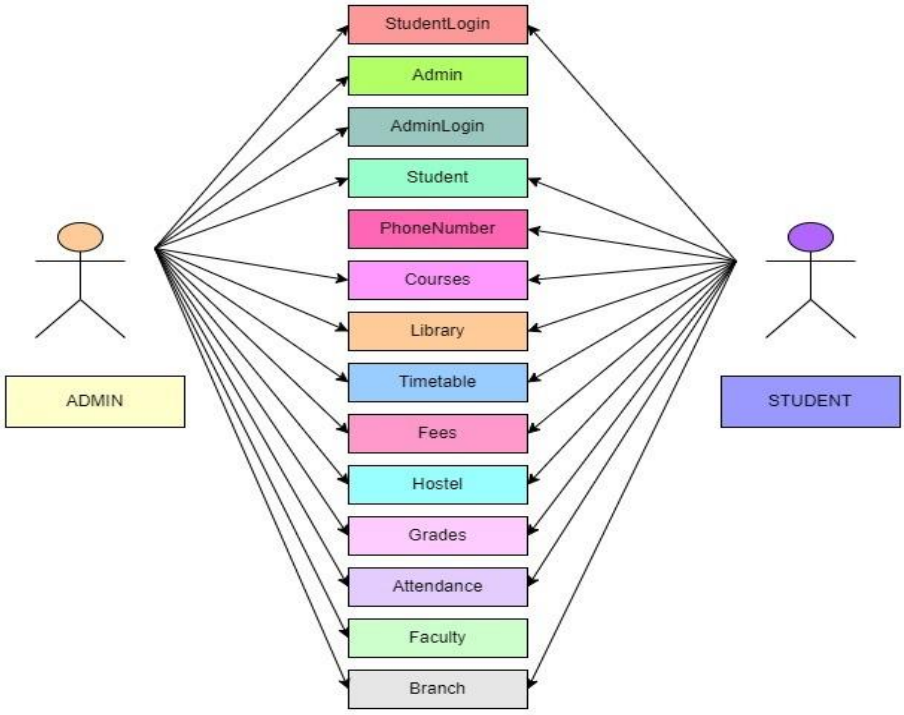
Attendance tracking is automated to ensure accuracy and convenience while the grading system guarantees an efficient process, for evaluating student performance.

This comprehensive student management system, driven by a database management system (DBMS) goes beyond being a technological solution. It is a tool, which simplifies processes while significantly improving the quality of education delivery.

ER Diagram


Date
Percentage
Attendance
has
EndSem
MidSem
Grades
has
Branch ID
Course ID
Course Name
Duration
Course
enroll in
Branch ID
FacultyID
Faculty Name
Faculty
AdminPassword
Admin Login
has
First Name
Name
Last Name
AdminID
Admin
Email
Manages
Fine
Paid/Unpaid
Fees
pays
Issue
LibraryID
Category
Return
Library
visits
Simple Room
Gender
Luxury Room
Hostel
lives in
Branch ID
Branch Name
Branch
enroll in
Timing
Faculty ID
TimetableID
Course ID
Room Number
TimeTable
follows
Student
Father's Name
Address
Street
Street Name
Street Number
City
Zip Code
State
DOB
Phone Number
Email
PRN
has
Student Login
StudentPassword
Name
First Name
Last Name
Branch ID
Semester
Year

Use Case Diagram



Anomalies

In the terms of DBMS, anomalies refers to undesirable or inconsistency in data that occurs due to one or more database operations. These anomalies can occur in various situations, typically when performing data manipulation operations such as insert, update, or delete. There are three main types of anomalies in DBMS:

1. Insertion Anomalies:

Insert anomalies occur when certain attributes cannot be inserted into the database due to missing additional data.

- Redundancy Anomalies: When new records are added, redundant data may be introduced, resulting in duplicated information.
- Constraint Violation: An insertion will be refused and the database may become inconsistent if the data is not consistent with the integrity constraints specified in the schema (such as unique, primary and foreign key constraints).
- Incompleteness: When necessary data is absent, insertion anomalies may also occur, resulting in problems with data accuracy and integrity.

2. Deletion Anomalies:

Delete anomalies occur when deleting a certain row inadvertently leads to the deletion of other important data.

- Partial Update: Inconsistencies may arise if a record's data is only updated in part.
- Inconsistent Update: Inconsistencies may arise when relevant data is updated in one table without also being updated in other tables.

3. Updation Anomalies:

Update anomalies occur when the same data is repeated in multiple rows, and changes are made in some but not all instances.

- Loss of Data: Errors in record deletion may result in the loss of related data.
- Unintended Deletion: A user may inadvertently remove crucial information from the database.

Anomalies occurring in our database

Insertion Anomaly:

In our schema, insertion anomalies can occur when trying to insert a new student into the Student table before they are assigned a branch or enrolled in any courses. Since BranchID is a foreign key in the Student table, a student must belong to a branch. If a student is inserted before the branch is assigned, it would violate referential integrity constraints.

Deletion Anomaly:

Deletion anomalies may occur when deleting data from the Faculty table. If a faculty member is deleted, it might cause unintended deletion of their related records in TimeTable table if referential integrity constraints are not properly established.

Updation Anomaly:

If faculty member's details change, updating these details could lead to inconsistencies if the updated information is not propagated correctly. For example, if a faculty member's branch ID changes but it's not updated in TimeTable table, the timetable might display outdated information.

Functional Dependencies

In a relational database management system (DBMS), various types of dependencies define the relationships between attributes in tables. Here are the key types of dependencies with examples:

1. **Functional Dependency:**
If one attribute uniquely determines another within the same table, it's called a functional dependency, denoted as P -> Q.

Example:
In the "Branch" table:

BranchID -> BranchName (BranchName is functionally dependent on BranchID).

2. **Fully-Functional Dependency:**
An attribute is fully functionally dependent on another if it depends on it and not on any proper subset of it.

Example:
In the "TimeTable" table:

{TimetableID, CourseID} -> FacultyID, RoomNumber, Timing(FacultyID, RoomNumber, Timing are fully functionally dependent on both TimetableID, CourseID).

3. **Transitive Dependency:**
When an indirect relationship causes functional dependency, it's called a transitive dependency.

Example:
In the "Faculty" table:

{FacultyID -> BranchID} and {BranchID -> BranchName}, then
{FacultyID -> BranchName} is a transitive dependency. (The faculty's ID indirectly determines the branch name through the branch ID.)

If P -> Q and Q -> R, then P -> R is a transitive dependency.

4. **Multivalued Dependency:**
It occurs when the existence of one or more rows in a table implies one or more other rows in the same table.

Example:
If a table has attributes P, Q, and R, and Q and R depend on P, it's represented as P ->-> Q ->-> R.

5. **Partial Dependency:**

Partial Dependency happens when a non-prime attribute is functionally dependent on part of a candidate key.

Example:

In the "Hostel" table:

Gender is partially dependent on PRN (The gender attribute depends only on part of the candidate key, PRN.)
SimpleRoom and LuxuryRoom are partially dependent on PRN (These attributes depend only on part of the candidate key, PRN.)

These dependencies are essential in database design to ensure data integrity and eliminate anomalies.

Functional Dependencies of our Relational Schema

Admin Table:

AdminID -> FirstName, LastName, Email
Email -> AdminID

Branch Table:

BranchID -> BranchName

Student Table:

PRN -> FirstName, LastName, Year, BranchID, Semester, DOB, FathersName, Email, AddressStreetName, AddressStreetNumber, AddressZipCode, AddressState, AddressCity
Email -> PRN
BranchID -> BranchName

PhoneNumber Table:

PRN -> PhoneNumber1, PhoneNumber2

AdminLogin Table:

AdminID -> AdminPassword

StudentLogin Table:

PRN -> StudentPassword

Hostel Table:

PRN -> Gender, SimpleRoom, LuxuryRoom

Library Table:

LibraryID -> Category, Issue, Return1

Faculty Table:

FacultyID -> FacultyName, BranchID

Course Table:

CourseID -> CourseName, Duration, BranchID

TimeTable Table:

TimetableID -> CourseID, FacultyID, RoomNumber, Timing

Grades Table:

PRN -> MidSem, EndSem

Attendance Table:

PRN -> Percentage, Date1

Fees Table:

PRN -> PaidUnpaid, Fine

Normalization

Normalization in Database Management Systems (DBMS) is a process of organizing and structuring the data in a relational database to reduce data redundancy and eliminate certain types of data anomalies. The major objectives of normalisation are to guarantee effective data storage, data integrity and consistency, and ease of handling and maintaining over time. The process of normalization follows a set of rules, typically referred to as normal forms.

Types of normalization

1. First Normal Form (1NF): In 1NF, each column in a table must contain atomic (indivisible) values, and each entry in the table must be unique. It eliminates the possibility of storing multiple values in a single column.

2. Second Normal Form (2NF): A table is in 2NF if it is in 1NF and all non-key attributes are fully functionally dependent on the primary key. This means that each non-key attribute is dependent on the entire primary key, not just a part of it.

3. Third Normal Form (3NF): A table is in 3NF if it is in 2NF, and it has no transitive dependencies. Transitive dependencies occur when a non-key attribute is dependent on another non-key attribute, which is itself dependent on the primary key.

4. Boyce-Codd Normal Form (BCNF): BCNF is a stricter form of 3NF in which for every non-trivial functional dependency, the left-hand side must be a superkey (a set of attributes that can uniquely identify a row in the table). BCNF eliminates partial dependencies, where a non-key attribute is dependent on only part of the primary key.

5. Fourth Normal Form (4NF): 4NF addresses multi-valued dependencies, which occur when an attribute depends on multiple values of another attribute in the same row. 4NF eliminates such dependencies.

6. Fifth Normal Form (5NF): 5NF addresses cases where a table has multiple candidate keys, and a non-key attribute depends on a proper subset of the candidate keys. 5NF eliminates these dependencies.

Normalization occurring in our database

For 1NF:

Atomic Values: Each attribute in all the tables contain atomic values.

For example, In Student Table (FirstName, LastName, Year, BranchID, Semester, DOB, FathersName, Email, AddressStreetName, AddressStreetNumber, AddressZipCode, AddressState, and AddressCity) all represent singular pieces of information without containing multiple values.

PRN	FirstName	LastName	Year	BranchID	Semester	DOB	FathersName	Email	AddressStreetName	AddressStreetNumber	AddressZipCode	AddressState	AddressCity
1001	Abhishek	Rajput	2	5001	4	2000-05-15	Mr. Rajput	abhishek@gmail.com	Main Street	123	400001	Maharashtra	Mumbai
1002	Aditya	Raj	3	5001	6	1999-08-20	Mr. Raj	aditya@gmail.com	Park Avenue	456	110001	Delhi	New Delhi
1003	Archit	Patil	1	5002	2	2001-02-10	Mr. Patil	archit@gmail.com	Broadway	789	560001	Karnataka	Bangalore
1004	Arnav	Jain	4	5002	8	1998-11-25	Mr. Jain	arnav@gmail.com	Green Street	1011	600001	Tamil Nadu	Chennai
1005	Aryan	Sharma	2	5003	4	2000-07-12	Mr. Sharma	aryan@gmail.com	High Street	1314	700001	West Bengal	Kolkata
1006	Avinash	Gupta	3	5003	6	1999-09-18	Mr. Gupta	avinash@gmail.com	River Road	1516	500001	Telangana	Hyderabad
1007	Amita	Singh	1	5004	2	2001-03-22	Mr. Singh	amita@gmail.com	Lake Street	1718	380001	Gujarat	Ahmedabad
1008	Akash	Kumar	4	5004	8	1998-12-30	Mr. Kumar	akash@gmail.com	Gandhi Road	1920	250001	Uttar Pradesh	Agra
1009	Ananya	Yadav	2	5005	4	2000-06-08	Mr. Yadav	ananya@gmail.com	Market Street	2122	560002	Karnataka	Mysore
1010	Ankit	Verma	3	5005	6	1999-10-14	Mr. Verma	ankit@gmail.com	Station Road	2324	110002	Delhi	New Delhi
1011	Aditi	Shah	1	5006	2	2001-04-26	Mr. Shah	aditi@gmail.com	Victoria Street	2526	600002	Tamil Nadu	Coimbatore
1012	Ayesha	Malik	4	5006	8	1998-11-03	Mr. Malik	ayesha@gmail.com	Church Street	2728	700002	West Bengal	Howrah
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

No Repeating Groups: There are no repeating groups or arrays of data within any attribute. Each attribute represents a single piece of information about a student without needing to repeat values within the same field.

For example, In the Student table, before the PhoneNumber table was introduced, phone numbers might have been stored directly as attributes. This could lead to repeating groups if a student has multiple phone numbers. By placing phone numbers in a separate table, we avoid this issue and ensure that each attribute in the Student table represents a single piece of information without repeating groups.

PRN	PhoneNumber1	PhoneNumber2
1001	9650104541	9650104541
1002	7720860456	9650104542
1003	8639914092	9650104543
1004	9377852020	9650104544
1005	9234567890	9876543210
1006	9345678901	9012345678
1007	9456789012	8901234567
1008	9567890123	9890123456
1009	9678901234	8789012345
1010	6789012345	9678901234
1011	8890123456	9567890123
1012	8901234567	8456789012
NULL	NULL	NULL

For 2NF:

No Partial Dependencies: Each attribute in all the tables have no Partial Dependencies.

For example, Each attribute in the Student table directly relates to student-specific information, There are no attributes that depend only on a subset of the primary key. (FirstName, LastName, Year, BranchID, Semester, DOB, FathersName, Email, AddressStreetName, AddressStreetNumber, AddressZipCode, AddressState, and AddressCity) are all attributes that describe individual aspects of a student's profile. Each of these attributes is directly associated with the PRN, indicating that there are no partial dependencies.

For 3NF:

No Transitive Dependencies: Each attribute in all the tables no Transitive Dependencies**.**

For example, In the Student table, we ensured no transitive dependencies exist which means that all non-prime attributes are directly dependent on the primary key and not on other non-prime attributes. BranchID is dependent on the PRN (primary key), not on any other non-prime attribute like Year or Semester. Similarly, AddressState depends on PRN, not on AddressCity or any other attribute.

For BCNF:

Functional Dependencies: To ensure that all the tables satisfies the requirements of Boyce-Codd Normal Form (BCNF), we need to ensure that for every non-trivial functional dependency (X -> Y) in the table, X is a superkey.

For example, In the student table,

PRN -> FirstName, LastName, Year, BranchID, Semester, DOB, FathersName, Email, AddressStreetName, AddressStreetNumber, AddressZipCode, AddressState, AddressCity

All non-prime attributes (FirstName, LastName, Year, BranchID, Semester, DOB, FathersName, Email, AddressStreetName, AddressStreetNumber, AddressZipCode, AddressState, AddressCity) are fully functionally dependent on the primary key (PRN) which means Student table satisfies the condition where all non-trivial functional dependencies are determined by the superkey (PRN), so it is in Boyce-Codd Normal Form (BCNF).

For 4NF:

No Multi-Valued Dependencies (MVDs): Each attribute in all the tables have no multi-valued dependencies**.**

For example, In the Student table, Each attribute is uniquely determined by the primary key (PRN), and there are no sets of attributes that exhibit non-trivial dependencies on each other.

For 5NF:
No Further Decomposition Possible: In all the tables, No Further Decomposition is Possible.

For example, The Student table is already in a state where no further decomposition is possible without losing information or introducing redundancy. Each attribute is functionally dependent on the primary key (PRN), and there are no dependencies between non-key attributes.

What is MySQL?

Popular for its dependability, speed, and user-friendliness, MySQL is an open-source relational database management system (RDBMS). It was created by MySQL AB at first, but Oracle Corporation currently owns it. MySQL is a relational database that arranges data into tables with rows and columns and uses SQL for data management and querying. Because MySQL is open-source and offers a wide range of customization options at a reasonable cost, it is especially appealing to developers and organizations.

Because MySQL is cross-platform compatible, it can be used with a variety of operating systems and platforms, including Windows, Linux, macOS, and more. Furthermore, MySQL is known for its fast performance, which makes it ideal for applications that need to respond quickly by guaranteeing effective data storage and retrieval.

MySQL prioritizes security by providing tools like access control, user authentication, and data encryption. Its sizable and vibrant user base offers excellent documentation, resources, and assistance. Moreover, it complies with ACID, guaranteeing consistency and dependability of transactions.

MySQL provides support for replication, clustering, and other high-availability techniques to guarantee data redundancy and fault tolerance. It is a well-liked option for web apps since it also integrates readily with a wide range of development frameworks and programming languages. For many years, MySQL has been a mainstay of the web development ecosystem, powering dynamic websites and applications. It is frequently used in conjunction with technologies like PHP, Python, and Ruby on Rails.

Implementation of the tables in MySQL

Database Creation

```
CREATE DATABASE studentdb;
USE studentdb;
```

Table Creation

```
-- Admin Table
CREATE TABLE Admin(
   AdminID INT PRIMARY KEY,
   FirstName VARCHAR(50),
   LastName VARCHAR(50),
   Email VARCHAR(50) UNIQUE
);

CREATE TABLE BRANCH(
        BranchID INT PRIMARY KEY,
   BranchName VARCHAR(50)
);

-- Student Table
CREATE TABLE Student (
   PRN INT PRIMARY KEY,
   FirstName VARCHAR(50),
   LastName VARCHAR(50),
   Year INT,
   BranchID INT,
   Semester INT,
   DOB DATE,
   FathersName VARCHAR(50),
   Email VARCHAR(50) UNIQUE,
   AddressStreetName VARCHAR(50),
   AddressStreetNumber VARCHAR(50),
   AddressZipCode VARCHAR(10),
   AddressState VARCHAR(50),
   AddressCity VARCHAR(50),
   FOREIGN KEY (BranchID) REFERENCES Branch(BranchID)
);

-- PhoneNumber Table
CREATE TABLE PhoneNumber (
   PRN INT PRIMARY KEY,
   PhoneNumber1 VARCHAR(15) UNIQUE,
```

```
    PhoneNumber2 VARCHAR(15) UNIQUE,
    FOREIGN KEY (PRN) REFERENCES Student(PRN)
);


-- AdminLogin Table
CREATE TABLE AdminLogin (
    AdminID INT PRIMARY KEY,
    AdminPassword VARCHAR(50),
        FOREIGN KEY (AdminID) REFERENCES Admin(AdminID)
);


-- StudentLogin Table
CREATE TABLE StudentLogin (
    PRN INT PRIMARY KEY,
    StudentPassword VARCHAR(50),
    FOREIGN KEY (PRN) REFERENCES Student(PRN)
);

-- Hostel Table
CREATE TABLE Hostel (
    PRN INT PRIMARY KEY,
    Gender VARCHAR(6),
    SimpleRoom VARCHAR(3),
    LuxuryRoom VARCHAR(3),
    FOREIGN KEY (PRN) REFERENCES Student(PRN)
);

-- Library Table
CREATE TABLE Library (
    LibraryID INT,
    Category VARCHAR(50),
    Issue DATE,
    Return1 DATE
);

-- Faculty Table
CREATE TABLE Faculty (
    FacultyID INT PRIMARY KEY,
    FacultyName VARCHAR(50),
    BranchID INT,
    FOREIGN KEY (BranchID) REFERENCES Branch(BranchID)
);
```

```
-- Course Table
CREATE TABLE Course (
    CourseID INT PRIMARY KEY,
    CourseName VARCHAR(50),
    Duration VARCHAR(50),
        BranchID INT,
    FOREIGN KEY (BranchID) REFERENCES Branch(BranchID)
);

-- TimeTable Table
CREATE TABLE TimeTable (
    TimetableID INT PRIMARY KEY,
    CourseID INT,
    FacultyID INT,
    RoomNumber VARCHAR(50),
    Timing VARCHAR(50),
    FOREIGN KEY (FacultyID) REFERENCES Faculty(FacultyID),
    FOREIGN KEY (CourseID) REFERENCES Course(CourseID)
);

-- Grades Table
CREATE TABLE Grades (
    PRN INT PRIMARY KEY,
    MidSem FLOAT,
    EndSem FLOAT,
    FOREIGN KEY (PRN) REFERENCES Student(PRN)
);

-- Attendance Table
CREATE TABLE Attendance (
    PRN INT PRIMARY KEY,
    Percentage FLOAT,
    Date1 DATE,
    FOREIGN KEY (PRN) REFERENCES Student(PRN)
);


-- Fees Table
CREATE TABLE Fees (
    PRN INT PRIMARY KEY,
    PaidUnpaid VARCHAR(10),
    Fine FLOAT,
    FOREIGN KEY (PRN) REFERENCES Student(PRN)
);
```

Table Insertion

-- Insert values into Admin Table

```
INSERT INTO Admin (AdminID, FirstName, LastName, Email)
VALUES
   (1, 'Raj', 'Patel', 'raj@gmail.com'),
   (2, 'Priya', 'Sharma', 'priya@gmail.com'),
   (3, 'Amit', 'Gupta', 'amit@gmail.com'),
   (4, 'Sneha', 'Desai', 'sneha@gmail.com');
```

-- Insert values into Branch Table

```
INSERT INTO BRANCH (BranchID, BranchName)
VALUES
(5001, 'Computer Science Engineering'),
(5002, 'Electrical Engineering'),
(5003, 'Mechanical Engineering'),
(5004, 'Civil Engineering'),
(5005, 'Aritifical Intelligence Engineering'),
(5006, 'Robotics And Automation Engineering');
```

-- Insert values into Student Table

```
INSERT INTO Student (PRN, FirstName, LastName, Year, BranchID, Semester, DOB,
FathersName, Email, AddressStreetName, AddressStreetNumber, AddressZipCode,
AddressState, AddressCity)
VALUES
(1001, 'Abhishek', 'Rajput', 2, 5001, 4, '2000-05-15', 'Mr. Rajput', 'abhishek@gmail.com',
'Main Street', '123', '400001', 'Maharashtra', 'Mumbai'),
(1002, 'Aditya', 'Raj', 3, 5001, 6, '1999-08-20', 'Mr. Raj', 'aditya@gmail.com', 'Park Avenue',
'456', '110001', 'Delhi', 'New Delhi'),
(1003, 'Archit', 'Patil', 1, 5002, 2, '2001-02-10', 'Mr. Patil', 'archit@gmail.com', 'Broadway',
'789', '560001', 'Karnataka', 'Bangalore'),
(1004, 'Arnav', 'Jain', 4, 5002, 8, '1998-11-25', 'Mr. Jain', 'arnav@gmail.com', 'Green Street',
'1011', '600001', 'Tamil Nadu', 'Chennai'),
(1005, 'Aryan', 'Sharma', 2, 5003, 4, '2000-07-12', 'Mr. Sharma', 'aryan@gmail.com', 'High
Street', '1314', '700001', 'West Bengal', 'Kolkata'),
(1006, 'Avinash', 'Gupta', 3, 5003, 6, '1999-09-18', 'Mr. Gupta', 'avinash@gmail.com', 'River
Road', '1516', '500001', 'Telangana', 'Hyderabad'),
(1007, 'Amita', 'Singh', 1, 5004, 2, '2001-03-22', 'Mr. Singh', 'amita@gmail.com', 'Lake
Street', '1718', '380001', 'Gujarat', 'Ahmedabad'),
(1008, 'Akash', 'Kumar', 4, 5004, 8, '1998-12-30', 'Mr. Kumar', 'akash@gmail.com', 'Gandhi
Road', '1920', '250001', 'Uttar Pradesh', 'Agra'),
(1009, 'Ananya', 'Yadav', 2, 5005, 4, '2000-06-08', 'Mr. Yadav', 'ananya@gmail.com', 'Market
Street', '2122', '560002', 'Karnataka', 'Mysore'),
```

(1010, 'Ankit', 'Verma', 3, 5005, 6, '1999-10-14', 'Mr. Verma', 'ankit@gmail.com', 'Station Road', '2324', '110002', 'Delhi', 'New Delhi'),
(1011, 'Aditi', 'Shah', 1, 5006, 2, '2001-04-26', 'Mr. Shah', 'aditi@gmail.com', 'Victoria Street', '2526', '600002', 'Tamil Nadu', 'Coimbatore'),
(1012, 'Ayesha', 'Malik', 4, 5006, 8, '1998-11-03', 'Mr. Malik', 'ayesha@gmail.com', 'Church Street', '2728', '700002', 'West Bengal', 'Howrah');

-- Insert values into PhoneNumber Table

```
INSERT INTO PhoneNumber (PRN, PhoneNumber1, PhoneNumber2)
VALUES
(1001, '9650104541','9650104541'),
(1002, '7720860456','9650104542'),
(1003, '8639914092','9650104543'),
(1004, '9377852020','9650104544'),
(1005, '9234567890','9876543210'),
(1006, '9345678901','9012345678'),
(1007, '9456789012','8901234567'),
(1008, '9567890123','9890123456'),
(1009, '9678901234','8789012345'),
(1010, '6789012345','9678901234'),
(1011, '8890123456','9567890123'),
(1012, '8901234567','8456789012');
```

-- Insert values into AdminLogin Table

```
INSERT INTO AdminLogin (AdminID, AdminPassword)
VALUES
(1, 'password1'),
(2, 'password2'),
(3, 'password3'),
(4, 'password4');
```

-- Insert values into StudentLogin Table

```
INSERT INTO StudentLogin (PRN, StudentPassword)
VALUES
(1001, 'studentpass1'),
(1002, 'studentpass2'),
(1003, 'studentpass3'),
(1004, 'studentpass4'),
(1005, 'studentpass5'),
(1006, 'studentpass6'),
(1007, 'studentpass7'),
(1008, 'studentpass8'),
(1009, 'studentpass9'),
```

(1010, 'studentpass10'),
(1011, 'studentpass11'),
(1012, 'studentpass12');

-- Insert values into Hostel Table

```
INSERT INTO Hostel (PRN, Gender, SimpleRoom, LuxuryRoom)
VALUES
(1001, 'Male', 'Yes', 'No'),
(1002, 'Male', 'No', 'Yes'),
(1003, 'Male', 'Yes', 'No'),
(1004, 'Male', 'No', 'Yes'),
(1005, 'Male', 'Yes', 'No'),
(1006, 'Male', 'Yes', 'No'),
(1007, 'Female', 'No', 'Yes'),
(1008, 'Male', 'Yes', 'No'),
(1009, 'Female', 'No', 'Yes'),
(1010, 'Male', 'Yes', 'No'),
(1011, 'Female', 'Yes', 'No'),
(1012, 'Female', 'No', 'Yes');
```

-- Insert values into Library Table

```
INSERT INTO Library (LibraryID, Category, Issue, Return1)
VALUES
(1001, 'Science', '2023-01-10', '2023-02-10'),
(1002, 'Literature', '2023-02-15', '2023-03-15'),
(1003, 'Mathematics', '2023-03-20', '2023-04-20'),
(1004, 'History', '2023-04-25', '2023-05-25'),
(1001, 'Civics', '2023-05-26', '2023-06-28'),
(1001, 'Geo', '2023-05-26', Null),
(1005, 'Science', '2023-03-10', '2023-06-10'),
(1007, 'Physics', '2023-01-17', Null),
(1012, 'Mathematics-3', '2023-02-20', '2023-04-20'),
(1009, 'C++', '2023-07-24', '2023-10-25'),
(1010, 'Python', '2023-05-26', Null),
(1004, 'Geo', '2023-05-26', '2023-08-11');
```

-- Insert values into Faculty Table

```
INSERT INTO Faculty (FacultyID, FacultyName, BranchID)
VALUES
(101, 'Dr. Sahil Gupta', 5001),
(102, 'Prof. Aryan Sharma', 5001),
(103, 'Dr. Arnav Singh', 5001),
(104, 'Prof. Archit Patel', 5002),
```

(105, 'Dr. Faraj Khan', 5002),
(106, 'Prof. Dhurmil Verma', 5002),
(107, 'Dr. Dhruv Joshi', 5003),
(108, 'Prof. Pranav Reddy', 5003),
(109, 'Dr. Ankit Malhotra', 5003),
(110, 'Prof. Aman Gupta', 5004),
(111, 'Dr. Ansh Sharma', 5004),
(112, 'Prof. Vijay Singh', 5004),
(113, 'Dr. Harsh Kumar', 5005),
(114, 'Prof. Abhay Desai', 5005),
(115, 'Dr. Ram Patel', 5005),
(116, 'Prof. Amit Shah', 5006),
(117, 'Dr. Tarak Mehta', 5006),
(118, 'Prof. Divyansh Choudhury', 5006);

-- Insert values into Course Table
INSERT INTO Course (CourseID, CourseName, Duration, BranchID)
VALUES
(601, 'Database Management', '3 months', 5001),
(602, 'Power Systems', '4 months', 5001),
(603, 'Thermodynamics', '5 months', 5001),
(604, 'Structural Analysis', '6 months', 5002),
(605, 'Java', '5 months', 5002),
(606, 'Data Structures', '3 months', 5002),
(607, 'Renewable Energy', '4 months', 5003),
(608, 'Fluid Mechanics', '5 months', 5003),
(609, 'Transportation Engineering', '6 months', 5003),
(610, 'Python Programming', '5 months', 5004),
(611, 'Machine Learning', '4 months', 5004),
(612, 'Control Systems', '5 months', 5004),
(613, 'Construction Management', '6 months', 5005),
(614, 'Web Development', '5 months', 5005),
(615, 'Artificial Intelligence', '4 months', 5005),
(616, 'Heat Transfer', '5 months', 5006),
(617, 'Automation ', '6 months', 5006),
(618, 'Mobile App Development', '5 months', 5006);

-- Insert values into TimeTable Table
INSERT INTO TimeTable (TimetableID, CourseID, FacultyID, RoomNumber, Timing)
VALUES
(501, 601, 101, 'Room 101', '9:00 AM - 10:00 AM'),
(502, 602, 102, 'Room 101', '10:00 AM - 11:00 AM'),
(503, 603, 103, 'Room CL1', '11:00 AM - 1:00 PM'),

(504, 604, 104, 'Room 102', '9:00 AM - 10:00 AM'),
(505, 605, 105, 'Room 102', '10:00 AM - 11:00 AM'),
(506, 606, 106, 'Room CL2', '11:00 AM - 1:00 PM'),

(507, 607, 107, 'Room 104', '9:00 AM - 10:00 AM'),
(508, 608, 108, 'Room 105', '10:00 AM - 11:00 AM'),
(509, 609, 109, 'Room CL3', '11:00 AM - 1:00 PM'),

(510, 610, 110, 'Room 106', '9:00 AM - 10:00 AM'),
(511, 611, 111, 'Room 106', '10:00 AM - 11:00 AM'),
(512, 612, 112, 'Room CL4', '11:00 AM - 1:00 PM'),

(513, 613, 113, 'Room 108', '9:00 AM - 10:00 AM'),
(514, 614, 114, 'Room 108', '10:00 AM - 11:00 AM'),
(515, 615, 115, 'Room CL5', '11:00 AM - 1:00 PM'),

(516, 616, 116, 'Room 110', '9:00 AM - 10:00 AM'),
(517, 617, 117, 'Room 110', '10:00 AM - 11:00 AM'),
(518, 618, 118, 'Room CL6', '11:00 AM - 1:00 PM');

-- Insert values into Grades Table
INSERT INTO Grades (PRN, MidSem, EndSem)
VALUES
(1001, 85, 90),
(1002, 78, 85),
(1003, 80, 88),
(1004, 75, 82),
(1005, 88, 92),
(1006, 82, 89),
(1007, 85, 90),
(1008, 79, 86),
(1009, 83, 88),
(1010, 77, 84),
(1011, 86, 91),
(1012, 81, 88);

-- Insert values into Attendance Table
INSERT INTO Attendance (PRN, Percentage, Date1)
VALUES
(1001, 90, '2023-01-15'),
(1002, 85, '2023-02-20'),
(1003, 88, '2023-03-25'),
(1004, 82, '2023-04-30'),
(1005, 86, '2023-05-05'),
(1006, 83, '2023-06-10'),
(1007, 88, '2023-07-15'),

(1008, 80, '2023-08-20'),
(1009, 85, '2023-09-25'),
(1010, 89, '2023-10-30'),
(1011, 87, '2023-11-05'),
(1012, 84, '2023-12-10');

-- Insert values into Fees Table
INSERT INTO Fees (PRN, PaidUnpaid, Fine)
VALUES
(1001, 'Paid', 0),
(1002, 'Unpaid', 50),
(1003, 'Paid', 0),
(1004, 'Paid', 0),
(1005, 'Unpaid', 50),
(1006, 'Paid', 0),
(1007, 'Unpaid', 500),
(1008, 'Paid', 0),
(1009, 'Paid', 0),
(1010, 'Unpaid', 250),
(1011, 'Paid', 0),
(1012, 'Unpaid', 90);

Table Outputs

SELECT * FROM Admin;

AdminID	FirstName	LastName	Email
1	Raj	Patel	raj@gmail.com
2	Priya	Sharma	priya@gmail.com
3	Amit	Gupta	amit@gmail.com
4	Sneha	Desai	sneha@gmail.com
NULL	NULL	NULL	NULL

SELECT * FROM Student;

PRN	FirstName	LastName	Year	BranchID	Semester	DOB	FathersName	Email	AddressStreetName	AddressStreetNumber	AddressZipCode	AddressState	AddressCity
1001	Abhishek	Rajput	2	5001	4	2000-05-15	Mr. Rajput	abhishek@gmail.com	Main Street	123	400001	Maharashtra	Mumbai
1002	Aditya	Raj	3	5001	6	1999-08-20	Mr. Raj	aditya@gmail.com	Park Avenue	456	110001	Delhi	New Delhi
1003	Archit	Patil	1	5002	2	2001-02-10	Mr. Patil	archit@gmail.com	Broadway	789	560001	Karnataka	Bangalore
1004	Arnav	Jain	4	5002	8	1998-11-25	Mr. Jain	arnav@gmail.com	Green Street	1011	600001	Tamil Nadu	Chennai
1005	Aryan	Sharma	2	5003	4	2000-07-12	Mr. Sharma	aryan@gmail.com	High Street	1314	700001	West Bengal	Kolkata
1006	Avinash	Gupta	3	5003	6	1999-09-18	Mr. Gupta	avinash@gmail.com	River Road	1516	500001	Telangana	Hyderabad
1007	Amita	Singh	1	5004	2	2001-03-22	Mr. Singh	amita@gmail.com	Lake Street	1718	380001	Gujarat	Ahmedabad
1008	Akash	Kumar	4	5004	8	1998-12-30	Mr. Kumar	akash@gmail.com	Gandhi Road	1920	250001	Uttar Pradesh	Agra
1009	Ananya	Yadav	2	5005	4	2000-06-08	Mr. Yadav	ananya@gmail.com	Market Street	2122	560002	Karnataka	Mysore
1010	Ankit	Verma	3	5005	6	1999-10-14	Mr. Verma	ankit@gmail.com	Station Road	2324	110002	Delhi	New Delhi
1011	Aditi	Shah	1	5006	2	2001-04-26	Mr. Shah	aditi@gmail.com	Victoria Street	2526	600002	Tamil Nadu	Coimbatore
1012	Ayesha	Malik	4	5006	8	1998-11-03	Mr. Malik	ayesha@gmail.com	Church Street	2728	700002	West Bengal	Howrah
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

SELECT * FROM PhoneNumber;

PRN	PhoneNumber1	PhoneNumber2
1001	9650104541	9650104541
1002	7720860456	9650104542
1003	8639914092	9650104543
1004	9377852020	9650104544
1005	9234567890	9876543210
1006	9345678901	9012345678
1007	9456789012	8901234567
1008	9567890123	9890123456
1009	9678901234	8789012345
1010	6789012345	9678901234
1011	8890123456	9567890123
1012	8901234567	8456789012
NULL	NULL	NULL

SELECT * FROM AdminLogin;

AdminID	AdminPassword
1	password1
2	password2
3	password3
4	password4
NULL	NULL

SELECT * FROM StudentLogin;

PRN	StudentPassword
1001	studentpass1
1002	studentpass2
1003	studentpass3
1004	studentpass4
1005	studentpass5
1006	studentpass6
1007	studentpass7
1008	studentpass8
1009	studentpass9
1010	studentpass10
1011	studentpass11
1012	studentpass12
NULL	NULL

SELECT * FROM Hostel;

PRN	Gender	SimpleRoom	LuxuryRoom
1001	Male	Yes	No
1002	Male	No	Yes
1003	Male	Yes	No
1004	Male	No	Yes
1005	Male	Yes	No
1006	Male	Yes	No
1007	Female	No	Yes
1008	Male	Yes	No
1009	Female	No	Yes
1010	Male	Yes	No
1011	Female	Yes	No
1012	Female	No	Yes
NULL	NULL	NULL	NULL

SELECT * FROM Library;

LibraryID	Category	Issue	Return1
1001	Science	2023-01-10	2023-02-10
1002	Literature	2023-02-15	2023-03-15
1003	Mathematics	2023-03-20	2023-04-20
1004	History	2023-04-25	2023-05-25
1001	Civics	2023-05-26	2023-06-28
1001	Geo	2023-05-26	NULL
1005	Science	2023-03-10	2023-06-10
1007	Physics	2023-01-17	NULL
1012	Mathematics-3	2023-02-20	2023-04-20
1009	C++	2023-07-24	2023-10-25
1010	Python	2023-05-26	NULL
1004	Geo	2023-05-26	2023-08-11

SELECT * FROM Faculty;

FacultyID	FacultyName	BranchID
101	Dr. Sahil Gupta	5001
102	Prof. Aryan Sharma	5001
103	Dr. Arnav Singh	5001
104	Prof. Archit Patel	5002
105	Dr. Faraj Khan	5002
106	Prof. Dhurmil Verma	5002
107	Dr. Dhruv Joshi	5003
108	Prof. Pranav Reddy	5003
109	Dr. Ankit Malhotra	5003
110	Prof. Aman Gupta	5004
111	Dr. Ansh Sharma	5004
112	Prof. Vijay Singh	5004
113	Dr. Harsh Kumar	5005
114	Prof. Abhay Desai	5005
115	Dr. Ram Patel	5005
116	Prof. Amit Shah	5006
117	Dr. Tarak Mehta	5006
118	Prof. Divyansh Ch...	5006
NULL	NULL	NULL

SELECT * FROM TimeTable;

TimetableID	CourseID	FacultyID	RoomNumber	Timing
501	601	101	Room 101	9:00 AM - 10:00 AM
502	602	102	Room 101	10:00 AM - 11:00 AM
503	603	103	Room CL1	11:00 AM - 1:00 PM
504	604	104	Room 102	9:00 AM - 10:00 AM
505	605	105	Room 102	10:00 AM - 11:00 AM
506	606	106	Room CL2	11:00 AM - 1:00 PM
507	607	107	Room 104	9:00 AM - 10:00 AM
508	608	108	Room 105	10:00 AM - 11:00 AM
509	609	109	Room CL3	11:00 AM - 1:00 PM
510	610	110	Room 106	9:00 AM - 10:00 AM
511	611	111	Room 106	10:00 AM - 11:00 AM
512	612	112	Room CL4	11:00 AM - 1:00 PM
513	613	113	Room 108	9:00 AM - 10:00 AM
514	614	114	Room 108	10:00 AM - 11:00 AM
515	615	115	Room CL5	11:00 AM - 1:00 PM
516	616	116	Room 110	9:00 AM - 10:00 AM
517	617	117	Room 110	10:00 AM - 11:00 AM
518	618	118	Room CL6	11:00 AM - 1:00 PM
NULL	NULL	NULL	NULL	NULL

SELECT * FROM Course;

CourseID	CourseName	Duration	BranchID
601	Database Management	3 months	5001
602	Power Systems	4 months	5001
603	Thermodynamics	5 months	5001
604	Structural Analysis	6 months	5002
605	Java	5 months	5002
606	Data Structures	3 months	5002
607	Renewable Energy	4 months	5003
608	Fluid Mechanics	5 months	5003
609	Transportation Engineering	6 months	5003
610	Python Programming	5 months	5004
611	Machine Learning	4 months	5004
612	Control Systems	5 months	5004
613	Construction Management	6 months	5005
614	Web Development	5 months	5005
615	Artificial Intelligence	4 months	5005
616	Heat Transfer	5 months	5006
617	Automation	6 months	5006
618	Mobile App Development	5 months	5006
NULL	NULL	NULL	NULL

SELECT * FROM Grades;

	PRN	MidSem	EndSem
▶	1001	85	90
	1002	78	85
	1003	80	88
	1004	75	82
	1005	88	92
	1006	82	89
	1007	85	90
	1008	79	86
	1009	83	88
	1010	77	84
	1011	86	91
	1012	81	88
*	NULL	NULL	NULL

SELECT * FROM Attendance;

	PRN	Percentage	Date1
▶	1001	90	2023-01-15
	1002	85	2023-02-20
	1003	88	2023-03-25
	1004	82	2023-04-30
	1005	86	2023-05-05
	1006	83	2023-06-10
	1007	88	2023-07-15
	1008	80	2023-08-20
	1009	85	2023-09-25
	1010	89	2023-10-30
	1011	87	2023-11-05
	1012	84	2023-12-10
*	NULL	NULL	NULL

SELECT * FROM Fees;

	PRN	PaidUnpaid	Fine
▶	1001	Paid	0
	1002	Unpaid	50
	1003	Paid	0
	1004	Paid	0
	1005	Unpaid	50
	1006	Paid	0
	1007	Unpaid	500
	1008	Paid	0
	1009	Paid	0
	1010	Unpaid	250
	1011	Paid	0
	1012	Unpaid	90
*	NULL	NULL	NULL

Queries Implemented

1. Retrieve the names of students who have a mid-semester grade above 80.

SELECT s.prn,s.FirstName, s.LastName,g.midsem FROM Student s
JOIN Grades g ON s.PRN = g.PRN WHERE g.MidSem > 80;

prn	FirstName	LastName	midsem
1001	Abhishek	Rajput	85
1005	Aryan	Sharma	88
1006	Avinash	Gupta	82
1007	Amita	Singh	85
1009	Ananya	Yadav	83
1011	Aditi	Shah	86
1012	Ayesha	Malik	81

2. Find out the course which has the maximum duration.

SELECT * FROM Course WHERE Duration = (SELECT MAX(Duration) FROM Course);

CourseID	CourseName	Duration	BranchID
604	Structural Analysis	6 months	5002
609	Transportation Engineering	6 months	5003
613	Construction Management	6 months	5005
617	Automation	6 months	5006
NULL	NULL	NULL	NULL

3. Retrieve the total number of students enrolled in each branch.

SELECT b.BranchName, COUNT(s.PRN) AS TotalStudents FROM Branch b
JOIN Student s ON b.BranchID = s.BranchID
GROUP BY b.BranchName;

BranchName	TotalStudents
Computer Science Engineering	2
Electrical Engineering	2
Mechanical Engineering	2
Civil Engineering	2
Aritifical Intelligence Engineering	2
Robotics And Automation Engineering	2

4. Retrieve all students who have unpaid fees along with their details.

SELECT * FROM Student
WHERE PRN IN (SELECT PRN FROM Fees WHERE PaidUnpaid = 'Unpaid');

PRN	FirstName	LastName	Year	BranchID	Semester	DOB	FathersName	Email	AddressStreetName	AddressStreetNumber	AddressZipCode	AddressState	AddressCity
1002	Aditya	Raj	3	5001	6	1999-08-20	Mr. Raj	aditya@gmail.com	Park Avenue	456	110001	Delhi	New Delhi
1005	Aryan	Sharma	2	5003	4	2000-07-12	Mr. Sharma	aryan@gmail.com	High Street	1314	700001	West Bengal	Kolkata
1007	Amita	Singh	1	5004	2	2001-03-22	Mr. Singh	amita@gmail.com	Lake Street	1718	380001	Gujarat	Ahmedabad
1010	Ankit	Verma	3	5005	6	1999-10-14	Mr. Verma	ankit@gmail.com	Station Road	2324	110002	Delhi	New Delhi
1012	Ayesha	Malik	4	5006	8	1998-11-03	Mr. Malik	ayesha@gmail.com	Church Street	2728	700002	West Bengal	Howrah
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

5. Retrieve the students who have a mid-semester grade between 80 and 90, and are enrolled in either the 'Computer Science Engineering' or 'Mechanical Engineering' branch.

```
SELECT * FROM Student
WHERE PRN IN (
   SELECT PRN
   FROM Grades
   WHERE MidSem BETWEEN 80 AND 90
)
AND BranchID IN (
   SELECT BranchID
   FROM Branch
   WHERE BranchName IN ('Computer Science Engineering', 'Mechanical Engineering')
);
```

PRN	FirstName	LastName	Year	BranchID	Semester	DOB	FathersName	Email	AddressStreetName	AddressStreetNumber	AddressZipCode	AddressState	AddressCity
1001	Abhishek	Rajput	2	5001	4	2000-05-15	Mr. Rajput	abhishek@gmail.com	Main Street	123	400001	Maharashtra	Mumbai
1005	Aryan	Sharma	2	5003	4	2000-07-12	Mr. Sharma	aryan@gmail.com	High Street	1314	700001	West Bengal	Kolkata
1006	Avinash	Gupta	3	5003	6	1999-09-18	Mr. Gupta	avinash@gmail.com	River Road	1516	500001	Telangana	Hyderabad
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

6. Retrieve the library books that are currently not returned.

```
SELECT *
FROM Library
WHERE Return1 IS NULL;
```

LibraryID	Category	Issue	Return1
1001	Geo	2023-05-26	NULL
1007	Physics	2023-01-17	NULL
1010	Python	2023-05-26	NULL

7. Query: Retrieve all students whose last name has exactly six characters:

```
SELECT *
FROM Student
```

WHERE LastName LIKE '_____';

PRN	FirstName	LastName	Year	BranchID	Semester	DOB	FathersName	Email	AddressStreetName	AddressStreetNumber	AddressZipCode	AddressState	AddressCity
1001	Abhishek	Rajput	2	5001	4	2000-05-15	Mr. Rajput	abhishek@gmail.com	Main Street	123	400001	Maharashtra	Mumbai
1005	Aryan	Sharma	2	5003	4	2000-07-12	Mr. Sharma	aryan@gmail.com	High Street	1314	700001	West Bengal	Kolkata
NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

8. Find the number of books issued in each category from the library.

SELECT Category, COUNT(*) AS BooksIssued
FROM Library
GROUP BY Category;

Category	BooksIssued
Science	2
Literature	1
Mathematics	1
History	1
Civics	1
Geo	2
Physics	1
Mathematics-3	1
C++	1
Python	1

9.Retrieve the student details along with their branch names and sorted by branch names in descending order.

SELECT s.prn,s.Firstname,s.lastname,b.branchid,b.BranchName
FROM Student s
INNER JOIN Branch b ON s.BranchID = b.BranchID
ORDER BY b.BranchName DESC;

prn	Firstname	lastname	branchid	BranchName
1011	Aditi	Shah	5006	Robotics And Automation Engineering
1012	Ayesha	Malik	5006	Robotics And Automation Engineering
1005	Aryan	Sharma	5003	Mechanical Engineering
1006	Avinash	Gupta	5003	Mechanical Engineering
1003	Archit	Patil	5002	Electrical Engineering
1004	Arnav	Jain	5002	Electrical Engineering
1001	Abhishek	Rajput	5001	Computer Science Engineering
1002	Aditya	Raj	5001	Computer Science Engineering
1007	Amita	Singh	5004	Civil Engineering
1008	Akash	Kumar	5004	Civil Engineering
1009	Ananya	Yadav	5005	Aritifical Intelligence Engineering
1010	Ankit	Verma	5005	Aritifical Intelligence Engineering

10. Create a view to display student details along with their branch names.

```
CREATE VIEW StudentDetailsWithBranch AS
SELECT s.prn,s.Firstname,s.lastname, b.BranchName
FROM Student s
INNER JOIN Branch b ON s.BranchID = b.BranchID;
```

```
SELECT * from studentdetailswithbranch;
```

prn	Firstname	lastname	BranchName
1001	Abhishek	Rajput	Computer Science Engineering
1002	Aditya	Raj	Computer Science Engineering
1003	Archit	Patil	Electrical Engineering
1004	Arnav	Jain	Electrical Engineering
1005	Aryan	Sharma	Mechanical Engineering
1006	Avinash	Gupta	Mechanical Engineering
1007	Amita	Singh	Civil Engineering
1008	Akash	Kumar	Civil Engineering
1009	Ananya	Yadav	Aritifical Intelligence Engineering
1010	Ankit	Verma	Aritifical Intelligence Engineering
1011	Aditi	Shah	Robotics And Automation Engin...
1012	Ayesha	Malik	Robotics And Automation Engin...

Function

A function in SQL is a named collection of SQL statements that have the ability to process data, receive parameters, and return either a series of results or a single value. Functions are usually used for data processing, calculations, and retrieval; they also improve the organisation and reusability of code in SQL queries.

1. Function to calculate the student's grades based on their mid-semester and end-semester grades.

```
DELIMITER $$
CREATE FUNCTION calculate_average_grade(p_prn INT)
RETURNS FLOAT
DETERMINISTIC
BEGIN
   DECLARE v_avg_grade FLOAT;
   SELECT (MidSem + EndSem) / 2 INTO v_avg_grade FROM Grades WHERE PRN = p_prn;
   RETURN v_avg_grade;
END$$
DELIMITER ;

SELECT  calculate_average_grade(1001) AS AVERAGE;
```

	average
▶	87.5

2. Function to determine the grade status (Pass/Fail) of a student based on their average grade.

```
DELIMITER $$
CREATE FUNCTION get_student_grade_status(p_prn INT)
RETURNS VARCHAR(50)
DETERMINISTIC
BEGIN
   DECLARE v_grade_status VARCHAR(10);
   DECLARE v_avg_grade FLOAT;
   SELECT calculate_average_grade(p_prn) INTO v_avg_grade FROM DUAL;

   IF v_avg_grade >= 60 THEN
      SET v_grade_status = 'Pass';
   ELSE
      SET v_grade_status = 'Fail';
   END IF;
```

```
    RETURN v_grade_status;
END $$
DELIMITER ;

SELECT get_student_grade_status(1005) AS Grade;
```

	Grade
▶	Pass

Procedure

A precompiled collection of SQL statements and procedural logic kept in a database is called a stored procedure. It is used to access or edit data in the database and is shared and reused by multiple programmes. Stored procedures centralise complicated processes and business logic within the database system, improving data security, reducing redundancy, and increasing the efficiency of database operations.

1. Procedure to Add New Faculty.

```
DELIMITER //
CREATE PROCEDURE add_new_faculty(
   IN p_faculty_id INT,
   IN p_faculty_name VARCHAR(50),
   IN p_branch_id INT)
BEGIN
   INSERT INTO Faculty (FacultyID, FacultyName, BranchID)
   VALUES (p_faculty_id, p_faculty_name, p_branch_id);
END //
DELIMITER ;

CALL add_new_faculty(119,'Dr.lakshya',5006);
SELECT  *  FROM faculty;
```

FacultyID	FacultyName	BranchID
101	Dr. Sahil Gupta	5001
102	Prof. Aryan Sharma	5001
103	Dr. Arnav Singh	5001
104	Prof. Archit Patel	5002
105	Dr. Faraj Khan	5002
106	Prof. Dhurmil Verma	5002
107	Dr. Dhruv Joshi	5003
108	Prof. Pranav Reddy	5003
109	Dr. Ankit Malhotra	5003
110	Prof. Aman Gupta	5004
111	Dr. Ansh Sharma	5004
112	Prof. Vijay Singh	5004
113	Dr. Harsh Kumar	5005
114	Prof. Abhay Desai	5005
115	Dr. Ram Patel	5005
116	Prof. Amit Shah	5006
117	Dr. Tarak Mehta	5006
118	Prof. Divyansh Ch...	5006
119	Dr.lakshya	5006
NULL	NULL	NULL

2. Procedure which takes student's PRN as input and returns their first name and last name as output parameters.

```
DELIMITER //
CREATE PROCEDURE get_student_name(
   IN p_prn INT,
   OUT p_first_name VARCHAR(50),
   OUT p_last_name VARCHAR(50))
BEGIN
   SELECT FirstName, LastName
   INTO p_first_name, p_last_name
   FROM Student
   WHERE PRN = p_prn;
END //
DELIMITER ;

CALL get_student_name(1002, @first_name, @last_name);
SELECT @first_name, @last_name;
```

	@first_name	@last_name
▶	Aditya	Raj

Trigger

A trigger in a database is a set of predefined SQL statements that are automatically executed in response to specific events or actions within the database, such as insertions, deletions, updates, or other defined operations. Triggers are used to enforce data integrity, ensure business rules are followed, and automate certain database actions based on predefined conditions, thereby enhancing the database's functionality and maintaining data consistency.

1. Trigger to Update Last Modified Timestamp for Student Table.

```
CREATE TABLE StudentAudit (
   AuditID INT AUTO_INCREMENT PRIMARY KEY,
   PRN INT,
   LastModified TIMESTAMP DEFAULT CURRENT_TIMESTAMP ON UPDATE
   CURRENT_TIMESTAMP,
   FOREIGN KEY (PRN) REFERENCES Student(PRN)
);


DELIMITER //
CREATE TRIGGER student_update_trigger
BEFORE UPDATE ON Student
FOR EACH ROW
BEGIN
   INSERT INTO StudentAudit (PRN) VALUES (NEW.PRN);
END //
DELIMITER ;

UPDATE student SET firstname="Abhishek" WHERE prn=1001;
SELECT * FROM StudentAudit;
```

	AuditID	PRN	LastModified
▶	1	1001	2024-04-08 18:03:17
*	NULL	NULL	NULL

2. Trigger to ensure that the email address entered for a student follows a valid format before insertion into the Student table

```
DELIMITER //
CREATE TRIGGER validate_email_format_trigger
BEFORE INSERT ON Admin
FOR EACH ROW
BEGIN
   IF NEW.Email NOT REGEXP '^[a-zA-Z0-9._%+-]+@[a-zA-Z0-9.-]+\.[a-zA-Z]{2,}$'
THEN
```

```
        SIGNAL SQLSTATE '45000' SET MESSAGE_TEXT = 'Invalid email format.';
    END IF;
END //
DELIMITER ;

INSERT INTO Admin VALUES( 5, 'Raj', 'More', 'raj@gmail|[]/.com');
```

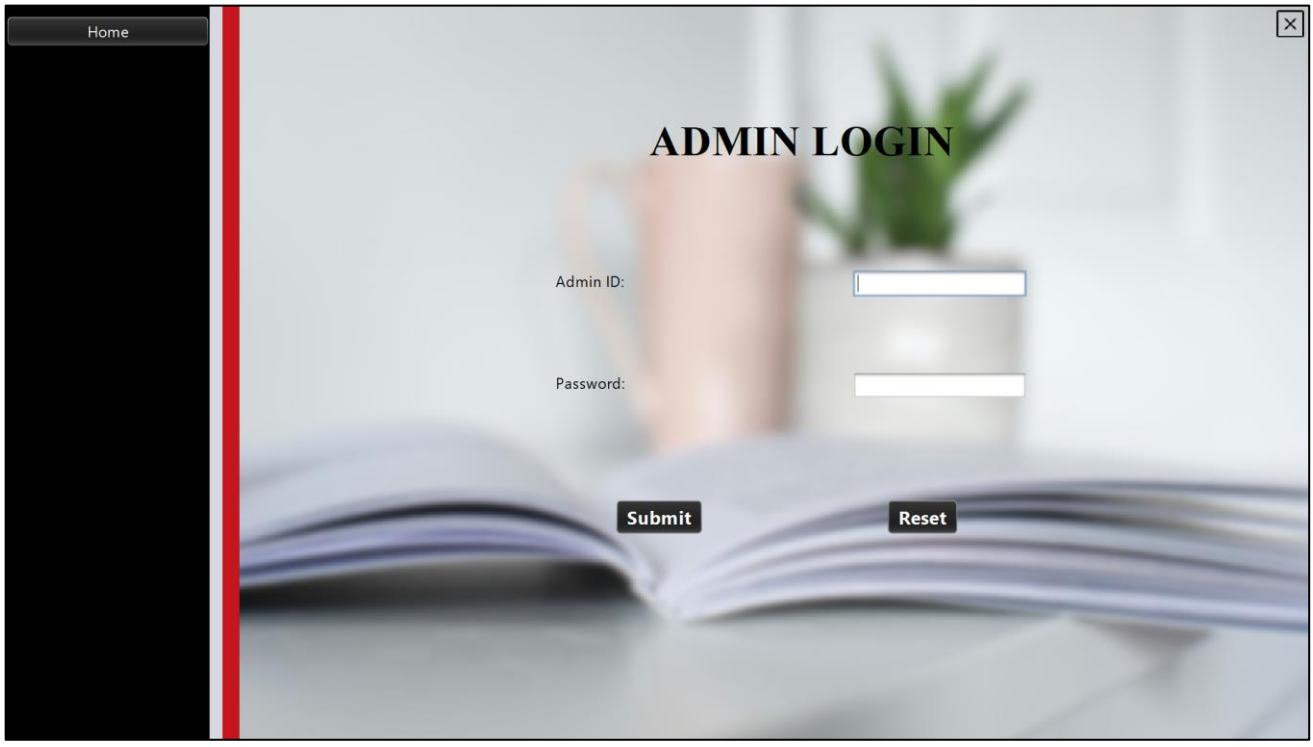
✓	79	00:29:52	CREATE TRIGGER validate_email_format_trigger BEFORE INSERT ON Admin FOR EACH ROW BEGIN IF ...	0 row(s) affected
✗	80	00:29:56	INSERT INTO Admin VALUES(5, 'Raj', 'More', 'raj@gmail[]/.com')	Error Code: 1644. Invalid email format.

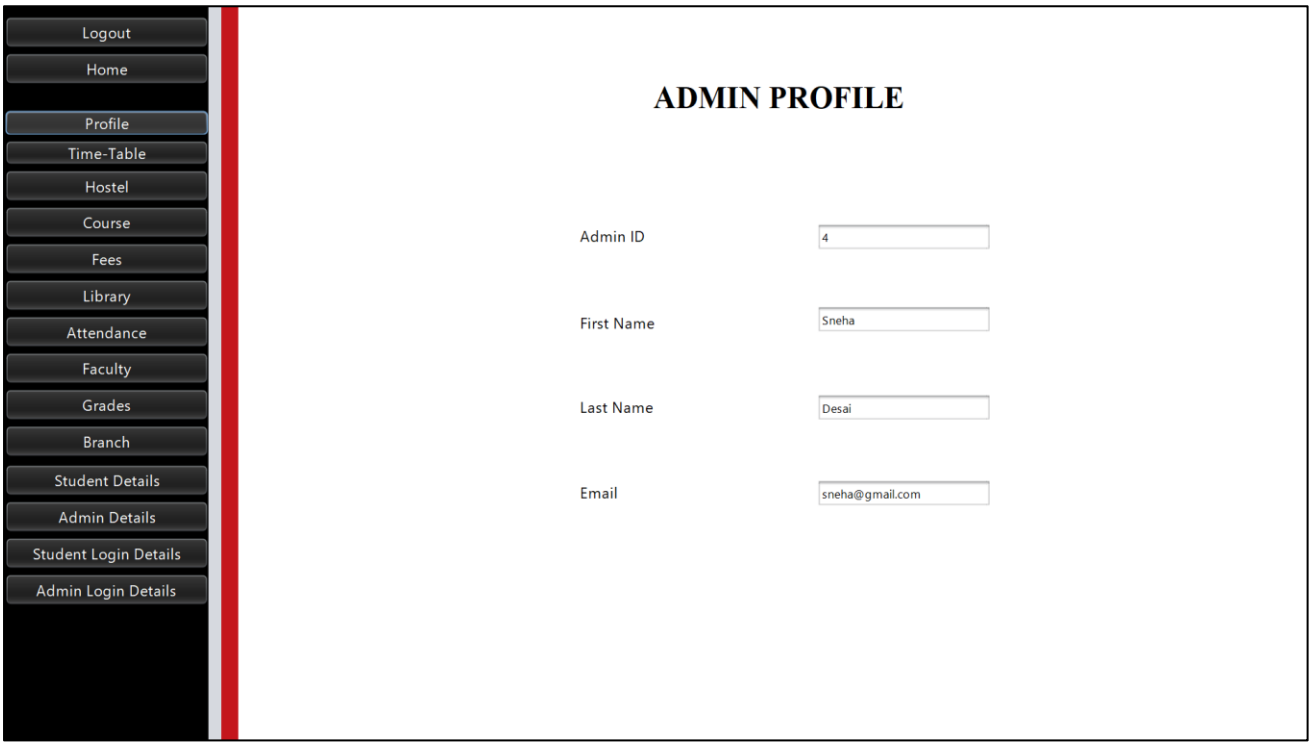
AWS

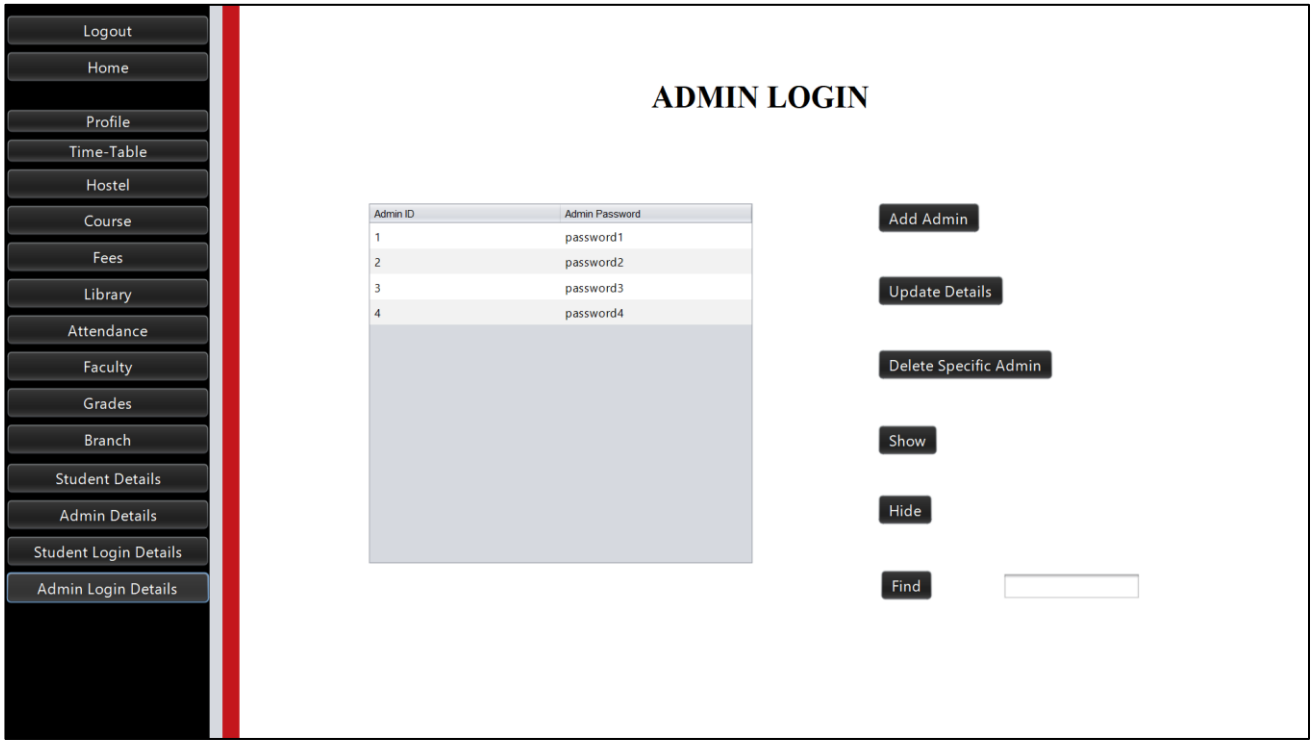
Amazon Web Services (AWS) is a comprehensive and leading cloud computing platform that offers an extensive array of services, including storage, compute, networking, machine learning, and database management. Known for its flexibility, scalability, and reliability, AWS provides businesses and developers with the tools and resources they need to efficiently manage applications and data in the cloud. Among its offerings is the Relational Database Management System (RDS) Service, which simplifies the deployment and management of relational databases. This service automates tasks such as backups, scaling, and software patching, allowing users to focus on their applications and data without the burden of database administration.

In our Integrated Student Management project, we have harnessed the power of AWS RDS to store data online, enabling a seamless and robust solution for managing student and faculty information. By integrating AWS RDS, the project benefits from high availability, data security, and automatic backups, ensuring reliable and uninterrupted access to critical information. This cloud-based approach enhances the overall efficiency and performance of the system, supporting the streamlined operation of administrative and academic processes within educational institutions.

Front End Sample Design




Logout
Home
Profile
Time-Table
Hostel
Course
Fees
Library
Attendance
Faculty
Grades
Branch
Student Details
Admin Details
Student Login Details
Admin Login Details
ADMIN PROFILE
Admin ID
4
First Name
Sneha
Last Name
Desai
Email
sneha@gmail.com


Logout
Home
Profile
Time-Table
Hostel
Course
Fees
Library
Attendance
Faculty
Grades
Branch
Student Details
Admin Details
Student Login Details
Admin Login Details
ADMIN LOGIN
Admin ID
Admin Password
1
password1
2
password2
3
password3
4
password4
Add Admin
Update Details
Delete Specific Admin
Show
Hide
Find

Github Link

https://github.com/Abhishek-2502/Campus_Nexus.git

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