## ****HIGH LEVEL DESIGN****

## ****Entity-Relationship Diagram (ERD) Document****

**Project Title:** Project X  
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### ****1. Introduction****

This document outlines the Entity-Relationship Diagram (ERD) for the Attendance Management System. The system supports secure login, role-based access, course scheduling, and QR-based attendance tracking for students and lecturers. This ERD models the data entities and their relationships, which form the foundation of the system's database layer.

#### ****2.2. Student****

Inherits from User and stores student-specific records.

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Type** | **Key** | **Description** |
| id\_student | int | AI PK | Primary key for student table |
| fname | varchar(100) |  | Student's first name |
| lname | varchar(45) |  | Student's last name |
| email | varchar(45) |  | Student's email address |
| username | varchar(45) |  | Student's username |
| password | varchar(45) |  | Student's password (hashed) |
| studentID | varchar(45) |  | Student's ID number |
| ctn | varchar(45) |  | Contact number |

#### ****2.3. Lecturer****

Inherits from User and stores lecturer-specific records.

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Type** | **Key** | **Description** |
| lecturer\_id | Int | Primary Key | Primary key for lecturer table |
| name | Varchar(100) |  | Lecturer’s name |
| email | Varchar(100) |  | Lecturer's email address |
| phone | varchar(20) |  | Lecturer's phone number |
| specialization | Varchar(100) |  | Lecturer's area of expertise |
| department | Varchar(100) |  | Lecturer's department |
| qualification | varchar(100) |  | Lecturer's qualifications |
| created\_at | timestamp |  | When record was created |
| updated\_at | timestamp |  | When record was last updated |
| username | varchar(100) |  | Lecturer's username |
| password | varchar(45) |  | Lecturer's password (hashed) |

#### ****2.4. Class****

Represents a course or class handled by a lecturer. This entity inherits from the User model, specifically for storing lecturer-specific class records.

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Type** | **Key** | **Description** |
| class\_id | int | Primary Key | Primary key for class table |
| class\_name | varchar(100) |  | Name of the class |
| class\_code | varchar(45) |  | Unique code for the class |
| description | text |  | Class description |
| capacity | Int |  | Maximum number of students |
| created\_at | timestamp |  | When class was created |
| updated\_at | timestamp |  | When class was last updated |
| room | varchar(45) |  | Room where class is held |
| schedule | varchar(45) |  | Class schedule |

#### ****2.5. Class\_Assign****

Where the class assign to the lecturer

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Type** | **Key** | **Description** |
| classID\_ass | int | Primary Key | Primary key for class table |
| class\_id | int | Foreign Key | Foreign key to class table |
| class\_name | varchar(100) |  | Name of the class |
| class\_code | varchar(45) |  | Unique code for the class |
| description | text |  | Assignment description |
| instructor\_id | int | Foreign Key | Foreign key to lecturer table |
| created\_at | timestamp |  | When assignment was created |
| updated\_at | timestamp |  | When assignment was last updated |

#### ****2.6. QR\_Codes****

S

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Type** | **Key** | **Description** |
| classID\_ass | int | Primary Key | Primary key for QR code records |
| class\_id | int | Foreign Key | Foreign key to class table |
| lecturer\_id | int | Foreign Key | Foreign key to lecturer table |
| qr\_data | text |  | Data encoded in the QR code |
| generated\_at | timestamp |  | When QR code was generated |
| expires\_at | timestamp | Foreign Key | When QR code expires |
| is\_expired | tinyint(1) |  | Flag indicating if QR code is expired |

#### ****2.7. Administrator****

Inherits from User and stores admin-specific records.

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Type** | **Key** | **Description** |
| id\_admin | Int | Primary Key | Primary key for admin table |
| fname | varchar(45) |  | Admin's first name |
| lname | varchar(45) |  | Admin's last name |
| email | varchar(45) |  | Admin's email address |
| username | varchar(45) |  | Admin's username |
| password | varchar(45) |  | Admin's password (hashed) |
| ctn | varchar(45) |  | Contact number |

#### ****2.8. Course****

Represents a course offered in the system.

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Type** | **Key** | **Description** |
| course\_id | Int | Primary Key (PK) | Unique course ID |
| course\_code | String |  | Alphanumeric course code |
| course\_name | String |  | Course title |
| description | Text |  | Optional description of the course |
| lecturer\_id | Int | Foreign Key | References Lecturer.lecturer\_id |
| schedule\_id | Int | Foreign Key | References Schedule.schedule\_id |
| student\_list | Text/JSON |  | List of student IDs enrolled |

#### ****2.9. Attendance****

Records attendance via QR code for each course.

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Type** | **Key** | **Description** |
| attendance\_id | Int | AI PK | Primary key for attendance records |
| student\_id | int | Foreign Key | Foreign key to student table |
| class\_id | int | Foreign Key | Foreign key to class table |
| status | varchar(20) |  | Attendance status |
| date\_marked | timestamp |  | When attendance was recorded |
| marked\_by | int | Foreign Key | ID of user who marked attendance |

#### ****2.10. Logs****

Tracks user login activity.

|  |  |  |  |
| --- | --- | --- | --- |
| **Field** | **Type** | **Key** | **Description** |
| login\_id | Int | Primary Key (PK) | Primary key for log records |
| user\_id | varchar(45) |  | ID of user who performed action |
| action\_time | timestamp |  | When action occurred |
| action\_type | enum('login','logout','login\_failed') |  | Type of action |
| status | varchar(45) |  | Status of the action |
| details | text |  | Additional details about the action |

### ****3. Relationships Overview****

A User has one **Role\_Type** (Student, Lecturer, or Administrator).

* A Course is taught by one Lecturer and has one Schedule.

A **Course** is taught by one **Lecturer** and has one **Schedule**.

A **Schedule** is linked to a **Course** and a **Lecturer**.

**Attendance** is tied to both **Course** and **Lecturer**, and stores **QR** metadata.

**Login\_Audit logs each login event with reference to a User.**

### ****4. Conclusion****

This ERD document outlines a normalized and role-based data structure for the Attendance Management System. It ensures efficient data retrieval, extensibility for new features (e.g., reporting), and compliance with common software architecture principles.