PROJECT REPORT

CS-2005

Database Systems

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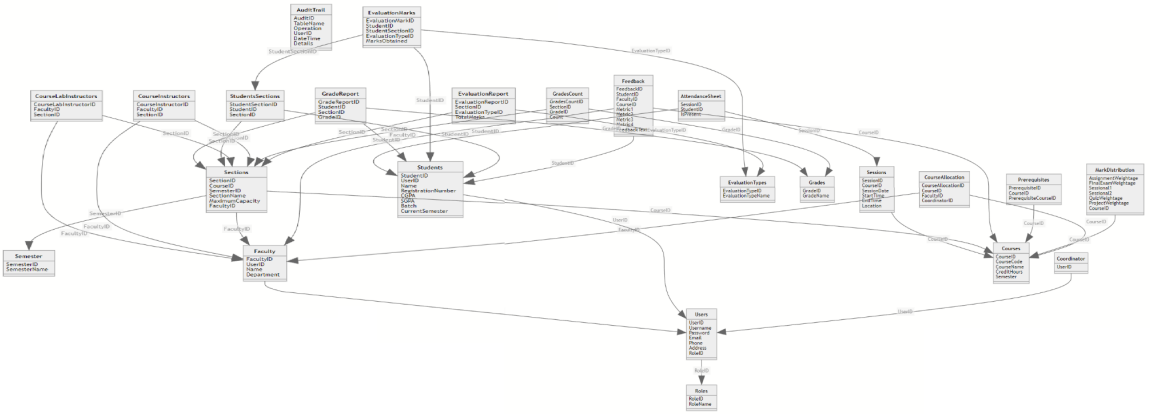
Entity Relationship Diagram

The Full ERD Digram is included in the zip folder (erd.png)



Database Design

I. Introduction

The database structure is designed to support a user management system for an educational institution. It consists of three main tables: Roles, Semester, and Users. The Roles table stores different roles or positions that users can have within the system, such as administrators, teachers, or students. Each role is uniquely identified by a RoleID and has a corresponding RoleName.

The ***Semester*** table holds information about the academic semesters within the institution. It is identified by a SemesterID and includes the SemesterName. This table helps organize user data based on the specific semesters they are associated with.

The ***Users*** table is the core of the system, storing information about individual users. It contains essential details such as UserID, Username, Password, Email, Phone, and Address. Additionally, the RoleID column establishes a relationship with the Roles table, allowing each user to be assigned a specific role. This enables role-based access control and facilitates managing permissions and privileges within the system.

By structuring the database in this way, the system can efficiently manage user information, assign appropriate roles, and organize data based on academic semesters. This structure provides flexibility, scalability, and improved security, enabling effective user management within the educational institution's ecosystem

II. Entity Definition and Relationships

This section focuses on defining the entities within the system and their relationships. It includes the Roles table, which categorizes users into different roles, such as faculty, student, and admin. Additionally, the Semester table maintains information about different semesters.

Roles:

The Role entity represents the different roles or positions that individuals can hold within the educational system. It includes attributes such as Role ID and Role Name. This table serves as a reference for defining and managing the various roles in the system. The Role ID serves as the primary key, ensuring each role has a unique identifier. The Role Name attribute provides a descriptive name for each role, such as "Student," "Faculty," "Administrator," or "Coordinator."

Semester:

The Semester entity represents the academic semesters or terms within the educational system. It includes attributes such as Semester ID, Semester Name, Start Date, and End Date. This table allows for the organization and management of semesters, including their duration. The Semester ID serves as the primary key, ensuring each semester has a unique identifier. The Semester Name attribute provides a descriptive name for each semester, such as "Fall 2023" or "Spring 2024." The Start Date and End Date attributes indicate the beginning and end dates of each semester, helping to establish the academic timeline.

These additional entities, Role and Semester, provide a structured framework for defining the various roles within the system and organizing academic periods. They contribute to the overall functionality and organization of the educational system, allowing for role-based access control and effective scheduling of academic activities.

III. User Management

User management is a vital component of the system. The Users table stores details like username, password, email, and phone, enabling effective user authentication and access control. The Coordinator table represents the role responsible for system coordination.

Users: The User entity represents the individuals who interact with the educational system, such as students, faculty, and administrators. It includes attributes such as User

ID, Username, Password, Email, and Role. This table serves as the foundation for user management and authentication. The User ID serves as the primary key, ensuring each user has a unique identifier within the system. The Role attribute indicates the specific role or access level of the user.

Coordinator: The Coordinator entity represents the individuals responsible for coordinating various administrative tasks within the educational system. It includes attributes such as Coordinator ID, Name, Contact Details, and Department. This table facilitates efficient management of coordinators and their responsibilities. The Coordinator ID serves as the primary key, ensuring the uniqueness of each coordinator within the system. The Department attribute indicates the specific department or area of coordination for the individual.

These additional entities, User and Coordinator, allow for comprehensive user management and facilitate the assignment of specific roles and responsibilities within the educational system.

IV. Student Information

The Students table contains comprehensive information about students, including their student ID, name, registration number, CGPA, and current semester. This table ensures efficient management of student data.

Students: The Students entity stores information about individual students, including attributes such as Student ID, Name, Date of Birth, Contact Details, and Address. This table serves as the foundation for managing student records and acts as a reference for other entities, such as Grades and Attendance. The unique Student ID serves as the primary key, ensuring each student has a distinct identifier within the system.

V. Faculty Information

The Faculty table stores details about faculty members, including their faculty ID and department. It facilitates effective faculty management within the system.

Faculty: The Faculty entity comprises information about the teaching staff within the educational system. It includes attributes such as Faculty ID, Name, Specialization, Contact Details, and Address. This table enables efficient tracking and management of faculty details. The Faculty ID serves as the primary key, ensuring the uniqueness of each faculty member within the system.

VI. Course Management

This section focuses on managing courses within the system. The Courses table represents various courses and includes attributes such as course code, name, credit hours, and semester. The Sections table links courses to their respective sections, providing information like section ID, course ID, semester ID, and faculty ID. The CourseInstructors and CourseLabInstructors tables establish associations between instructors and course sections.

Courses: The Courses entity represents the academic courses offered within the educational system. It includes attributes such as Course ID, Course Name, Course Description, and Credits. This table facilitates course management and provides essential information about each course. The Course ID acts as the primary key, enabling efficient retrieval and referencing of course-related data.

Sections: Define attributes like section ID, course ID, semester ID, and faculty ID. Discuss the role of the sections table in linking courses to their respective sections and enabling effective course enrollment and allocation of instructors.

Entity: CourseInstructors

The CourseInstructors entity represents the instructors assigned to teach a specific course. It includes attributes such as Course ID, Instructor ID, and Instructor Type. This table establishes the relationship between courses and instructors, allowing for the assignment of instructors to specific courses. The Course ID attribute serves as a foreign key referencing the Course entity, linking the instructor to the corresponding course. The Instructor ID attribute serves as a foreign key referencing the Instructor entity, identifying the instructor assigned to the course. The Instructor Type attribute specifies the type of instructor, such as "Lecturer," "Adjunct Faculty," or "Teaching Assistant."

Entity: CourseLabInstructors

The CourseLabInstructors entity represents the instructors assigned to teach laboratory sessions for a specific course. It includes attributes such as Course ID, Instructor ID, and Instructor Type. This table establishes the relationship between courses and lab instructors, allowing for the assignment of instructors to specific lab sessions within a course. The Course ID attribute serves as a foreign key referencing the Course entity, linking the lab instructor to the corresponding course. The Instructor ID attribute serves as a foreign key referencing the Instructor entity, identifying the instructor assigned to

the lab session. The Instructor Type attribute specifies the type of lab instructor, such as "Lab Technician," "Teaching Assistant," or "Research Associate."

These additional entities, CourseInstructors and CourseLabInstructors, provide a structured framework for assigning instructors to specific courses and lab sessions within the educational system. They facilitate the management of instructor assignments and help ensure that the right instructors are associated with the appropriate courses and lab sessions, contributing to effective teaching and learning experiences.

VII. Enrollment and Section Allocation

The StudentsSections table manages the enrollment process and section allocation for students. It establishes a many-to-many relationship between students and sections of courses, ensuring accurate tracking of course enrollments.

StudentsSections: Define attributes like student ID and section ID. Explain the purpose of this table in managing the enrollment process and section allocation for students. Highlight the many-to-many relationship between students and course sections.

VIII. Evaluation Management

Evaluation Management involves the EvaluationTypes table, which defines different types of evaluations within the system. The EvaluationMarks table records the marks obtained by students in various evaluations, with references to student IDs, student-section IDs, and evaluation type IDs.

EvaluationTypes: The Evaluation Type entity represents different types of evaluations or assessments conducted for courses. It includes attributes such as Evaluation Type ID and Evaluation Type Name. The Evaluation Type ID attribute serves as the primary key, uniquely identifying each evaluation type. The Evaluation Type Name attribute stores the name or description of the evaluation type, such as "Quiz," "Midterm Exam," or "Final Project."

EvaluationMarks:

The Evaluation Marks entity represents the marks or scores obtained by students in specific evaluations. It includes attributes such as Student ID, Evaluation Type ID, Marks Obtained, and Evaluation Date. This entity establishes the relationship between students and evaluation types, indicating the marks obtained by each student in different evaluations. The Student ID attribute serves as a foreign key referencing the Student entity, identifying the student for whom the marks are recorded. The Evaluation Type ID attribute serves as a foreign key referencing the Evaluation Type entity, identifying the evaluation type for which the marks are recorded. The Marks Obtained attribute stores the numerical or percentage value of the marks obtained by the student in the evaluation. The Evaluation Date attribute stores the date on which the evaluation was conducted.

IX. Feedback System

The Feedback table allows students to provide feedback on faculty and courses. It includes metrics and a feedback text field, facilitating detailed feedback collection and analysis.

Feedback: The Feedback entity represents the feedback or comments provided by instructors to students regarding their performance in evaluations. It includes attributes such as Student ID, Evaluation Type ID, Feedback Text, and Feedback Date. This entity establishes the relationship between students, evaluation types, and feedback, indicating the feedback given by instructors to students for specific evaluations. The Student ID attribute serves as a foreign key referencing the Student entity, identifying the student to whom the feedback is provided. The Evaluation Type ID attribute serves as a foreign key referencing the Evaluation Type entity, identifying the evaluation type for which the feedback is provided. The Feedback Text attribute stores the textual feedback or comments provided by the instructor. The Feedback Date attribute stores the date on which the feedback was given.

These additional entities, Evaluation Type, Evaluation Marks, and Feedback, provide a structured framework for managing different types of evaluations, recording marks obtained by students, and providing feedback on their performance. They facilitate the assessment and evaluation process, enable performance tracking, and support effective communication between instructors and students regarding their academic progress.

X. Additional Entities

This section covers additional entities within the system. It includes tables like Grades, GradeReport, Sessions, AttendanceSheet, CourseAllocation, EvaluationReport, GradesCount, MarkDistribution, and Prerequisites, each serving a specific purpose in the educational system.

Entity: Grades

The Grades entity tracks the grades obtained by students in their respective courses. It includes attributes such as Grade ID, Student ID, Course ID, and Grade Value. This table allows for accurate recording and retrieval of students' grades, facilitating academic evaluation and progress tracking. The Grade ID serves as the primary key, ensuring each grade has a unique identifier.

Entity: GradeReport

The GradeReport entity generates a report summarizing the grades of students for a specific semester and course. It includes attributes such as Student ID, Course ID, Semester ID, and Grade. This table aids in evaluating student performance and generating transcripts. The GradeReport ID can serve as the primary key to uniquely identify each report entry.

Entity: Sessions

The Sessions entity keeps track of the different sessions or classes conducted for each course. It includes attributes such as Session ID, Start Time, End Time, and Course ID. This table facilitates efficient session management, including attendance tracking, scheduling, and conducting effective classes. The Session ID acts as the primary key for each session entry.

Entity: AttendanceSheet

The AttendanceSheet entity records the attendance status of students for each session. It includes attributes such as Session ID, Student ID, and Attendance Status. This table aids in monitoring student participation and compliance with attendance requirements. The combination of Session ID and Student ID can form the primary key for each attendance record.

Entity: CourseAllocation

The CourseAllocation entity assigns faculty members to teach specific courses in a particular semester. It includes attributes such as Faculty ID, Course ID, and Semester ID. This table facilitates effective course scheduling and faculty assignment, ensuring appropriate allocation of resources. The combination of Faculty ID, Course ID, and Semester ID can form the primary key for each allocation entry.

Entity: EvaluationReport

The EvaluationReport entity generates a report summarizing the average marks obtained by students in different evaluations for a specific course and faculty. It includes attributes such as Evaluation Type ID, Course ID, Faculty ID, and Average Marks. This table aids in evaluating faculty performance and assessing course effectiveness. The EvaluationReport ID can serve as the primary key for each report entry.

Entity: GradesCount

The GradesCount entity stores the count of grades obtained by students

XI. Audit Trails

Audit trails play a crucial role in tracking and monitoring changes made to a database system, ensuring transparency and accountability. Triggers, a powerful feature of database systems, can be utilized to automate the creation of audit trails. By defining triggers on specific tables or columns, we can capture and record any modifications or updates made to the data.

For instance, a trigger can be implemented to log information whenever a row is inserted, updated, or deleted in a particular table. The trigger can capture relevant details such as the user responsible for the change, the timestamp of the modification, and the old and new values of the affected data. This information is then stored in a separate audit trail table, dedicated to recording such activities.

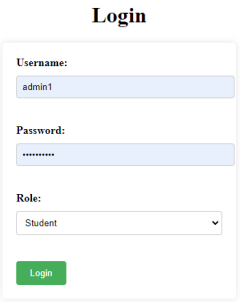
Triggers provide a proactive and unobtrusive approach to maintaining audit trails, as they are automatically invoked whenever a defined action occurs on the monitored tables or columns. This ensures that a comprehensive record of all data modifications is maintained, facilitating forensic analysis, compliance auditing, and troubleshooting.

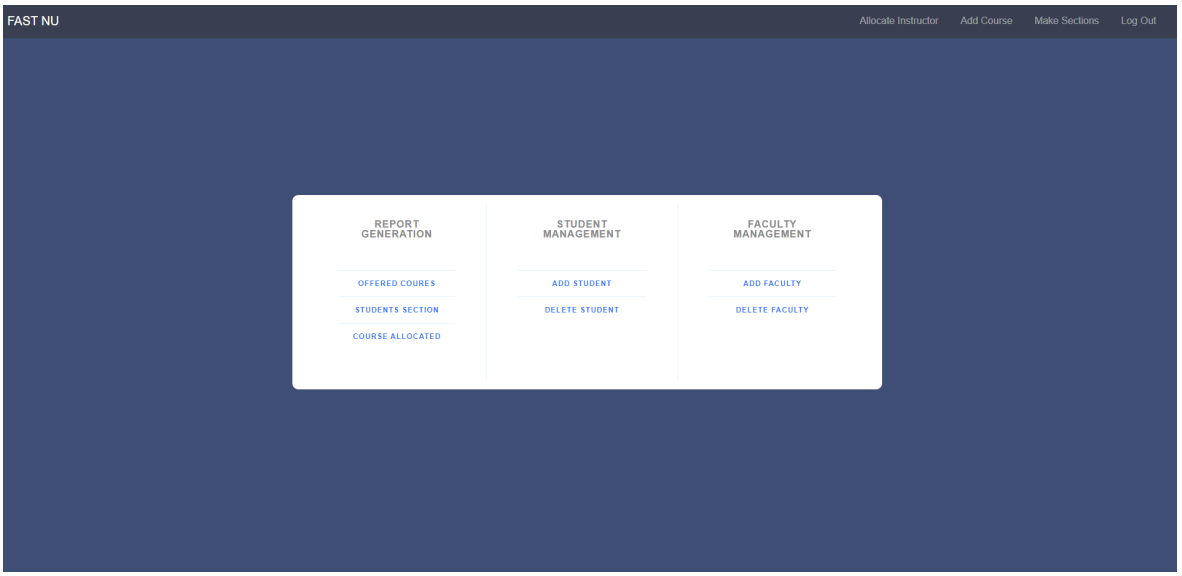
By incorporating triggers to generate audit trails, organizations can enhance data governance and mitigate risks associated with unauthorized changes, data corruption, or data loss. The audit trails serve as a valuable resource for tracking the history of data modifications, identifying potential security breaches, and ensuring data integrity and regulatory compliance.

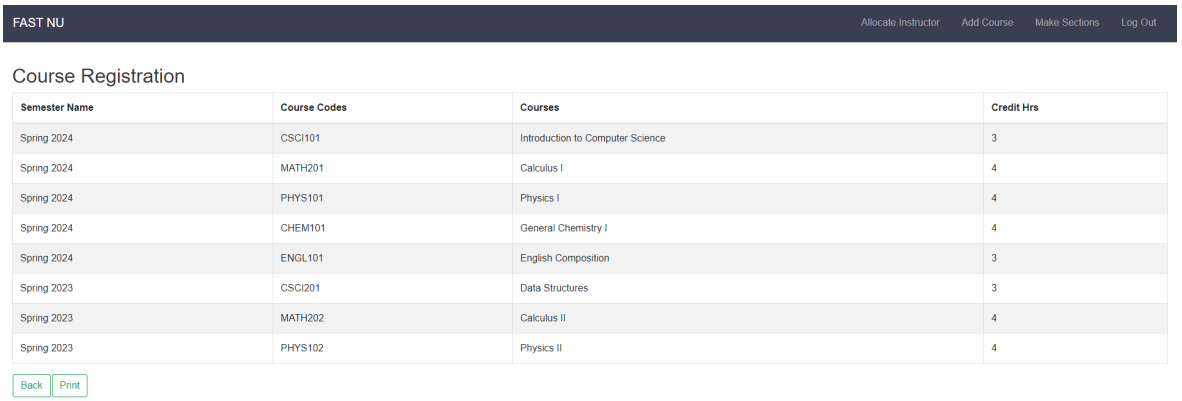
XII. Conclusion

We tried.

Appendix:Screenshots







ETC . IT'S NOT POSSIBLE TO INCLUDE ALL SCREENSHOTS