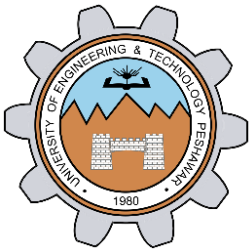
MILESTONE 1:

CONCEPTUAL SCHEMA



CSE-403L Database Management System Lab

Spring 2025

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"On my honor, as student of University of Engineering and Technology, I have neither given nor received unauthorized assistance on this academic work."

Submitted to:

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MILESTONE 1: CONCEPTUAL SCHEMA

Objectives

- To securely store student, exam, instructor, and result information using a centralized database.
- To eliminate manual errors in result processing through automation and validation mechanisms.
- To provide an intuitive, user-friendly interface for teachers, administrators, and examination staff.
- To automate result calculation and generation based on predefined marking schemes and grade thresholds.
- To ensure fast and efficient result publishing with minimal administrative effort.
- To maintain confidentiality and data privacy through role-based access control and secure login.
- To enable real-time result access for students and parents via web portal or mobile interface.
- To generate customizable reports, mark sheets, and transcripts in digital format.
- To offer audit logs for all administrative activities to maintain system transparency and accountability.
- To support scalability for handling large datasets and multiple departments or campuses.
- To back up all data regularly to prevent loss during unexpected failures or system errors.

Entity Description

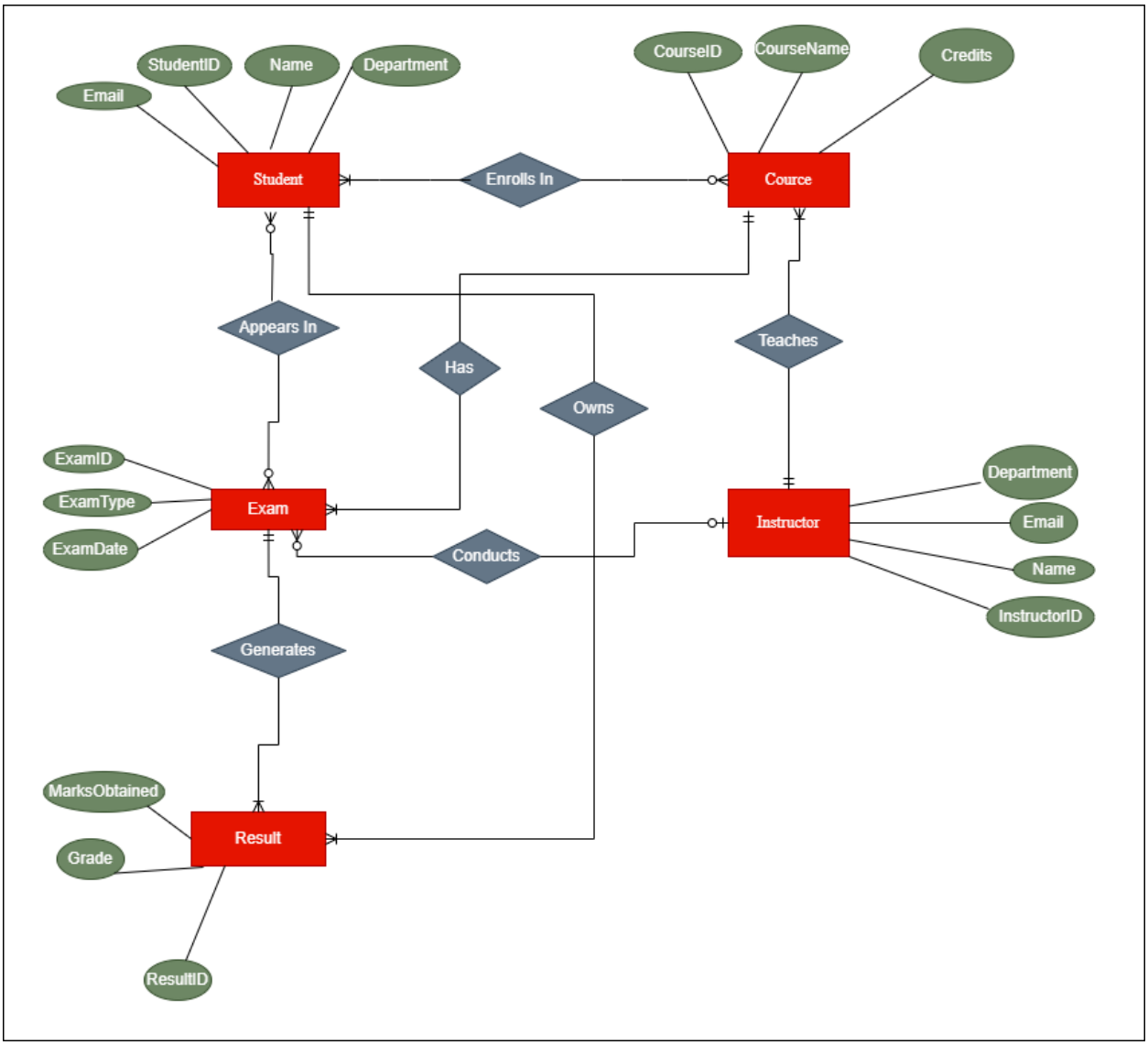
Entity Name	Description
Student	Stores detailed records of each enrolled student including personal info, registration number, contact details, and course enrollment. Each student can be linked to multiple courses and exams, and their academic progress is tracked over time.
Instructor	Contains information about faculty members such as name, ID, department, and contact details. Instructors are assigned to courses, conduct exams, input marks, and play a critical role in student evaluation.
Course	Represents academic subjects with details like course code, title, credit hours, and prerequisites. Courses are taught by instructors and taken by students. Each course has associated exams and contributes to CGPA calculation.
Exam	Keeps records of assessments linked to specific courses. Includes exam type (quiz, midterm, final), date, total marks, and duration. Enables tracking of student attendance and supports result publishing and rechecking.
Result	Documents student performance in exams with data on marks obtained, grade, percentage, and pass/fail status. Links students to exams and is used for generating report cards, transcripts, and performance analytics.

Detailed Business Rules:

- A student can register for multiple courses in a semester, but cannot register for the same course more than once in the same academic term.
- Each course must have at least one assigned instructor, and one of them must be designated as the course coordinator responsible for overall management and grading.
- A course can have multiple exams such as quizzes, midterms, finals, or practicals, but each exam must be linked to only one course.
- A student can appear in multiple exams, but the system allows only one result entry per student for each exam to avoid duplication or conflict.
- Instructors can manage and evaluate multiple exams. They are solely responsible for entering accurate marks and ensuring timely result submission.
- Every result must be linked to a valid student and a valid exam. The system must verify the existence of both before result entry is allowed.
- Students are restricted from viewing their results until the instructor has officially published them in the system.
- All exams must be scheduled at least seven days in advance. Any rescheduling must be immediately communicated to all enrolled students via system notifications.
- Marks for each exam must be entered within ten days from the exam date. Delays beyond this period will require administrative approval or system override.
- Student grades are calculated based on a pre-defined grading policy that is standardized and consistently applied across all courses.

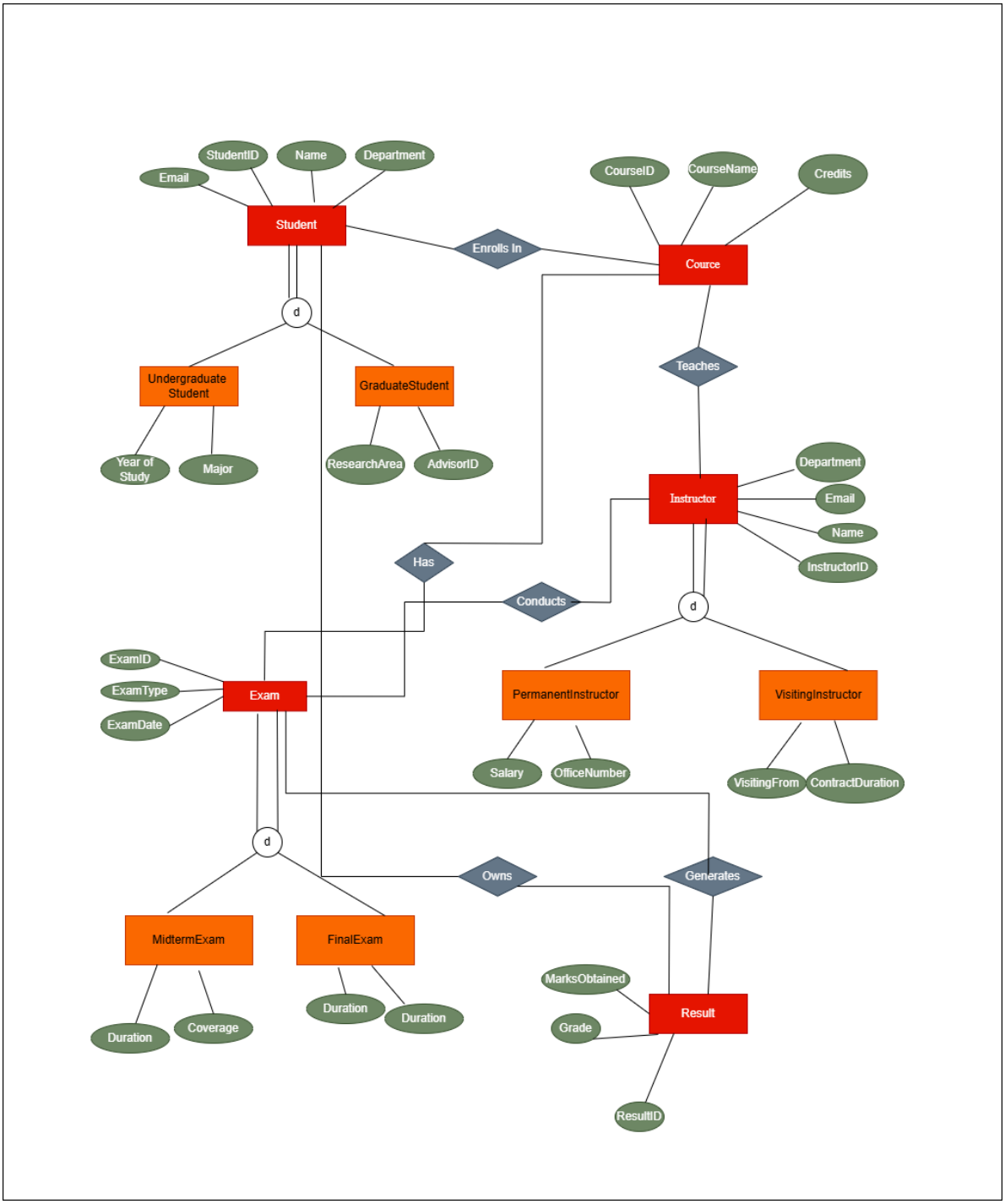
ENTITY RELATIONSHIP DIAGRAM (ERD)

The following Entity Relationship Diagram (ERD) represents the conceptual structure of the *Exam and Result Management System*. It shows the key entities involved, their attributes, and the relationships between them. The diagram includes relationship types such as mandatory one, optional one, mandatory many, and optional many, clearly defined using appropriate cardinality notations. This ERD serves as the foundation for database schema design and system implementation



ENHANCED ENTITY RELATIONSHIP DIAGRAM (EERD)

The EERD includes advanced features like supertypes and subtypes for better data organization. Student is divided into Undergraduate and Graduate using a disjoint relationship. Similarly, Instructor and Exam entities are enhanced with specializations. This helps in clearly representing real-world scenarios.



MILESTONE 1 – PART 5: REFERENCES

1. Lecture notes and slides provided by Sumayyea Salahuddin, Lecturer, DCSE Dept.
2. Class discussions and examples explained during lectures.
3. [Draw.io (https://www.draw.io)] – Used for creating ER and Enhanced ER diagrams.
4. ChatGPT by OpenAI – Used for conceptual guidance, entity design, relationships, and documentation support.
5. Online database modeling resources and tutorials (e.g., GeeksforGeeks, TutorialsPoint) for EERD concepts.