

Lab Session 02

ER MODELLING & MAPPING-2

Aim:

The aim of this experiment is to understand and apply the concepts of Entity Relationship (ER) Modelling to design a database schema that accurately represents the relationships between entities in a given domain.

Description:

The lab experiment on Entity Relationship (ER) Modelling involves studying and applying the fundamental principles of ER modelling to design a database schema. Students will learn how to identify and define entities, relationships, and attributes within a given domain. They will practice creating an ER diagram that accurately represents the relationships between entities and their attributes. The experiment will also cover the use of cardinality and participation constraints to establish the nature and degree of relationships. By the end of the lab, students will gain hands-on experience in translating realworld scenarios into an ER model, providing a solid foundation for database design and development. Pre-Requisites: PostgreSQL, TerraER Tool, Windows/ Ubuntu/CentOS/Debian, DBMS Concepts.

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Pre-Lab Task:

1. Explain about derived attributes

Derived Attribute: Calculated from other attributes (e.g., Age from Date of Birth).

2. Explain about simple attribute

Simple Attribute: Cannot be divided further (e.g., Name, ID).

3. Explain about composite attribute

Composite Attribute: Can be divided into components (e.g., Address → Street, City).

4. Explain about key attribute

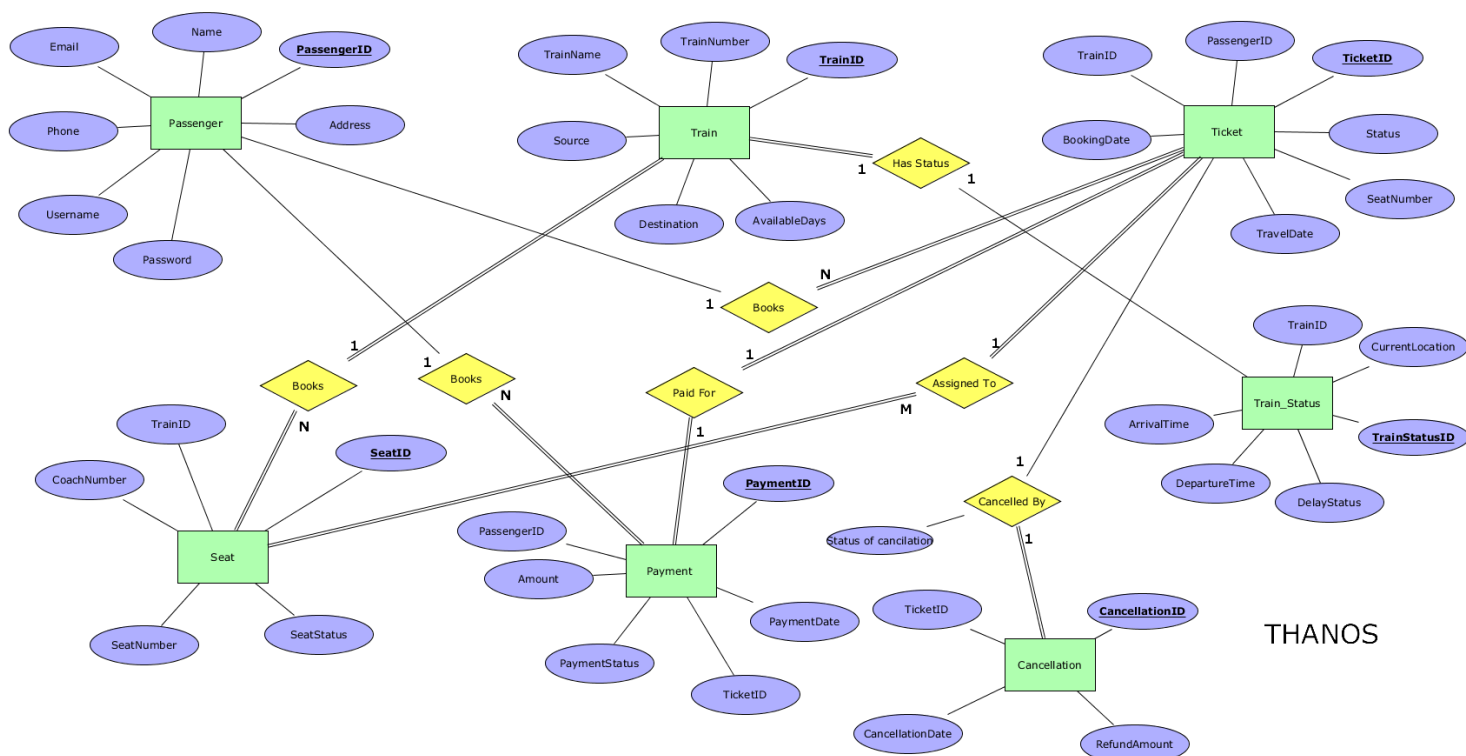
Key Attribute: Uniquely identifies an entity (e.g., Employee ID).

5. Explain about Multi-valued attribute

Multi-Valued Attribute: Can have multiple values (e.g., Phone Numbers).

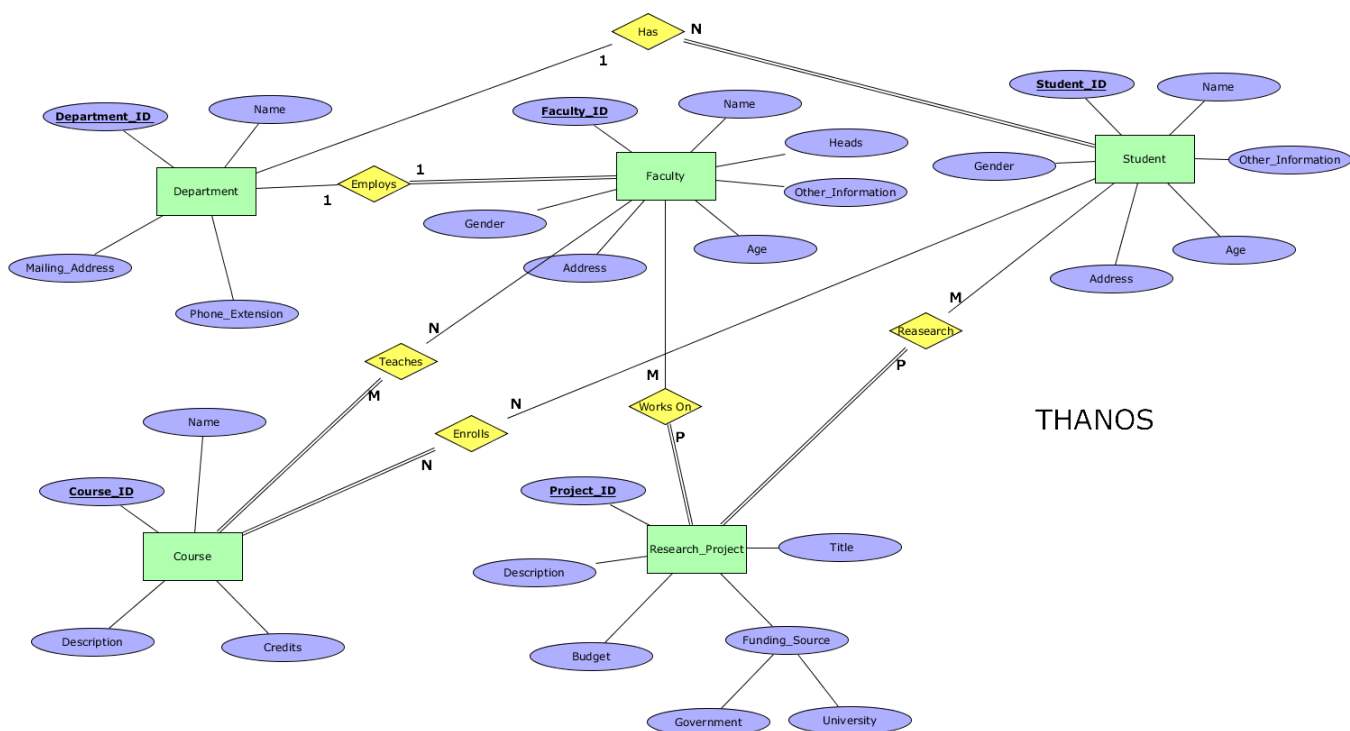
In Lab Task:

Draw an ER Diagram for the case study 3, Railway reservation system. The railway reservation system facilitates the passengers to enquire about the trains available based on source and destination, booking and cancellation of tickets, enquire about the status of the booked ticket. Our aim here is to design and develop a database maintaining records of different trains, train status, and passengers. the record of train includes its number, name, source, destination, and days on when its available. Passengers can book their tickets for the train in which seats are available. Before booking a ticket, the validity of train number and booking date is checked. Once they are validated, seat availability is checked, and ticket is booked. Ticket once booked can be cancelled at any time. For this we need to provide ticket id. Also consider that initially passenger needs authentication as well. Design a database for the above scenario. Include the entities whatever are required according to your requirements.



THANOS

Draw an ER Diagram for the following case study 4. In a university, there are several departments and each department has a head of department who belongs to Faculty. Department have a name, phone extension, specific mailing address and Students that belong to the department. Students can belong to only one Department at a time and Department can have more than one or no Student. Students and faculty have names and unique identification numbers, with address, age, gender and other information. Student studies different Courses offered by university. Faculty teaches these Courses. In each semester one student can take more than one course and Faculty can teach more than one course. Faculty members can teach in multiple Departments. Each course can be taught by many faculty members or no one. Faculty members are also working on multiple research projects. These projects are funded by government and university. One project can have more than one faculty member, and one faculty member can work on more than one project.



THANOS

Viva-Voce Questions (In-Lab):

1. What is an ER Diagram?

ER Diagram: Visual representation of entities, attributes, and relationships in a database.

2. Why are composite keys important when modelling databases with entity-relationship diagrams?

Composite Keys: Combine multiple attributes to uniquely identify an entity when one attribute isn't sufficient (e.g., StudentID + CourseID).

3. What does it mean to generalize/specialize an object in an ER diagram?

Generalize/Specialize:

- **Generalization:** Combine entities into a broader one (e.g., Car + Bike → Vehicle).
- **Specialization:** Split a general entity into specific ones (e.g., Employee → Manager + Technician).

4. What is an identifying relationship?

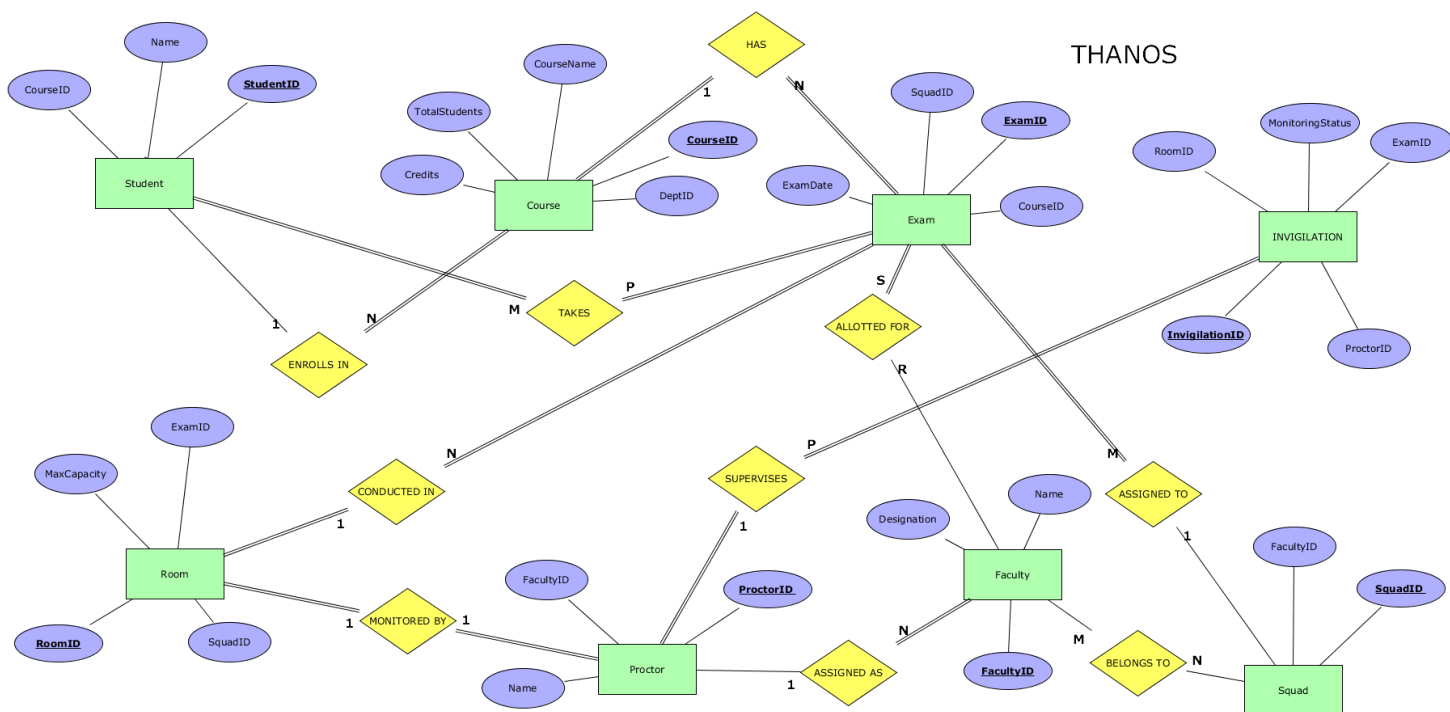
Identifying Relationship: Child entity depends on the parent entity for its key (e.g., OrderItem → Order).

5. What is the primary key? How is it represented in an ER diagram?

Primary Key: Unique identifier for an entity, represented by underlined text or a key symbol in ER diagrams.

Post Lab Task:

Draw an ER Diagram for the case study, University online Exam system. We are all aware of the current pandemic situation, our university is providing the online exams to complete the semester on time. These exam systems come with online invigilation and proctoring features to ensure a fair examination process. This system is very much useful in conducting the exams online maintain the social distance which is very much to be followed in the current scenario. Students also will be benefited by not losing their academic year and can continue their studies without any break. To design this system, the database should contain the information about courses, sections, exam details and staff conducting the exam like squad, proctors involved in the exam duty. Courses database should contain the details of the courses for which exam is being conducted along with the no. of students enrolled for each exam. Online Exam database contains the exam details like exam id, exam date, squad etc. Depending on the number of students enrolled for the exam in a course, rooms should be allotted for the students. This is done in the ROOM database where the no. of students should not be more than 50 and contains the details of proctors allotted for those rooms. There is a faculty database which contains the details of the faculty to whom the exam duties should be allotted. Design a database for the above scenario. Include the entities whatever are required according to your requirements.



Students Signature

(For Evaluator's use only)

<u>Comment of the Evaluator (if Any)</u> 	<u>Evaluator's Observation</u> Marks Secured: _____ out of _____ Full Name of the Evaluator: Signature of the Evaluator Date of Evaluation:
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