

UNIVERSITY OF CENTRAL PUNJAB

FACULTY OF INFORMATION TECHNOLOGY

Spring 2025

INTRODUCTION TO DATABASE SYSTEM

LAB 2

(ENTITY RELATIONSHIP DIAGRAM)

**TASK 1:**

**Identify all the entities, attributes and relationships and draw the ER diagram of the following scenario.**

In an educational institute, there are several departments and students belong to one of them. Each department has a unique department number, a name, a location, phone number and is headed by a professor.

Professors have a unique employee Id, name, phone number. We like to keep track of the following details regarding students: name, unique roll number, sex, phone number, date of birth, age and one or more email addresses.

Students have a local address consisting of the hostel name and the room number. They also have home address consisting of house number, street, city and PIN. It is assumed that all students reside in the hostels.

A course taught in a semester of the year is called a *section.* There can be several sections of the same course in a semester; these are identified by the *section number*. Each section is taught by a different professor and has its own timings and a room to meet.

Students enroll for several sections in a semester. Each course has a unique name, number of credits and the department that offers it. A course may have other courses as pre- requisites i.e, courses to be completed before it can be enrolled in.

Professors also undertake research projects. These are sponsored by funding agencies and have a specific start date, end date and amount of money given. More than one professor can be involved in a project. Also a professor may be simultaneously working on several projects. A project has a unique *projectId.*

**TASK 2:**

**Identify all the entities, attributes and relationships and draw the ER diagram of the following scenario.**

A university registrar’s office maintains data about the following entities:

* + (a) Courses, including course number, title , credits, syllabus, and prerequisites;
  + (b) Course offerings, including course number, year, semester, section number, instructor's, timings, and classroom;
  + (c) Students, including student-id, name, and program; and
  + (d) Instructors, including identification number, name, department, and title. Further, the enrollment of students in courses and grades awarded to students in each course they are enrolled for must be appropriately modeled.
* You are required to create a conceptual data model of the data requirements for a
* company that specializes in IT training. The company has 30 instructors and can handle up to
* 100 trainees per training session. The company offers five advanced technology courses, each
* of which is taught by a teaching team of two or more instructors. Each instructor is assigned to
* a maximum of two teaching teams or may be assigned to do research. Each trainee undertakes
* one advanced technology course per training session.
* (a) Identify the main entity types for the company.
* (b) Identify the main relationship types and specify the multiplicity for each relationship. State
* any assumptions you make about the data.
* (c) Using your answers for (a) and (b), draw a single ER diagram to represent the data
* requirements for the company.
* 11.12 Read the following case study, which describes the data requirements for a video rental
* company. The video rental company has several branches throughout the USA. The data held
* on each branch is the branch address made up of street, city, state, and zip code, and the
* telephone number. Each branch is given a branch number, which is unique throughout the
* company. Each branch is allocated staff, which includes a Manager. The Manager is responsible
* for the day-to-day running of a given branch. The data held on a member of staff is his or her
* name, position, and salary. Each member of staff is given a staff number, which is unique
* throughout the company. Each branch has a stock of videos. The data held on a video is the
* catalog number, video number, title, category, daily rental, cost, status, and the names of the
* main actors and the director. Thecatalog number uniquely identifies each video. However, in
* most cases, there are several copies of each video at a branch, and the individual copies are
* identified using the video number. A video is given a category such as Action, Adult, Children,
* Drama, Horror, or Sci-Fi. The status indicates whether a specific copy of a video is available for
* rent. Before hiring a video from the company, a customer must first register as a member of
* a local branch. The data held on a member is the first and last name, address, and the date that
* the member registered at a branch. Each member is given a member number, which is unique
* throughout all branches of the company. Once registered, a member is free to rent videos, up
* to a maximum of ten at any one time. The data held on each video rented is the rental number,
* the full name and number of the member, the video number, title, and daily rental, and the
* dates the video is rented out and returned. The rental number is unique throughout the
* company.
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* dates the video is rented out and returned. The rental number is unique throughout the
* company.

**TASK 3:**

Read the following case study, which describes the data requirements for a video rental company. The video rental company has several branches throughout the USA. The data held on each branch is the branch address made up of street, city, state, and zip code, and the telephone number. Each branch is given a branch number, which is unique throughout the company. Each branch is allocated staff, which includes a Manager. The Manager is responsible for the day-to-day running of a given branch. The data held on a member of staff is his or her name, position, and salary. Each member of staff is given a staff number, which is unique throughout the company. Each branch has a stock of videos. The data held on a video is the catalog number, video number, title, category, daily rental, cost, status, and the names of the main actors and the director. The catalog number uniquely identifies each video. However, in most cases, there are several copies of each video at a branch, and the individual copies are identified using the video number. A video is given a category such as Action, Adult, Children, Drama, Horror, or Sci-Fi. The status indicates whether a specific copy of a video is available for rent. Before hiring a video from the company, a customer must first register as a member of a local branch. The data held on a member is the first and last name, address, and the date that the member registered at a branch. Each member is given a member number, which is unique throughout all branches of the company. Once registered, a member is free to rent videos, up to a maximum of ten at any one time. The data held on each video rented is the rental number, the full name and number of the member, the video number, title, and daily rental, and the dates the video is rented out and returned. The rental number is unique throughout the company.

Identify the main entity types of the video rental company.

(b) Identify the main relationship types between the entity types described in (a) and represent

each relationship as an ER diagram

1. Identify the main entity types and attributes of the video rental company.
2. Identify the main relationship types between the entity types described in and represent each relationship as an ER diagram

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