Question

Entity

Relation

Highlight

CSCE 2501 - Fundamentals of Database Systems
Assignment 1

This is an individual assignment. Rules governing academic integrity are strongly enforced without exception.

Is View a relation? Is there any relation between Applicant and College?

How do we write this relationship? Do we write it between the college and faculty but also mention it as an attribute in the college? Or only as a relation between the college and the faculty? Or write it as an attribute for the relation itself, say I call it: Work?

1. You are building a database system for a new unified college application software system. Each applicant needs to register on the system by providing their basic information, including his/her full name, email address, phone number, date of birth, and address in terms of region, city and country. After registering, the applicant can then view all the available colleges in the system, presented by their names, location in terms of city and country, ranking, and the list of their faculty, including their email addresses, research area, tenure, and number of publications. The applicant can then choose to apply for any number of colleges s/he wishes to. For each application, the candidate must indicate the semester and year s/he is applying for, his/her current GPA, the application date and the email addresses of at least 3 references to provide recommendation letters, which are not necessarily from the same college the candidate is applying to. Finally, each college doesn't accept more than one application for each applicant in a given semester / year.

Is Full name a single or composite attribute?

Is Faculty an Entity or just a Composite Attribute? And if an Entity, does Email work as primary key?

Is References an Entity?

Does this mean a relation between References and College?

Is Application an Entity? If yes is it a weak one? And Who applies exactly--how can we write this relation? Is it from Application to College OR from Applicant to College?And if we have a weak entity, with a relation with more than one Entity, does it take each ones primary key if if it is the many and they are the one?

How do I do this last part/restriction without Foreign Key in the ERD?

Design a database for the college application system described above, illustrating both the ERD and the resulting Relational Model **(10 points)**

2. Consider the following set of data requirements for a Bookstore database which contains data about books and selling transactions.
   a. The Bookstore consists of several branches. Each branch is identified by uniquely assigned ID, Name, and location.
   b. A book is identified by an ISBN (unique), title, publisher, and one or more authors. There may be one or more copies of the same book, distributed over the Bookstore branches. Each book copy is identified by a Copy Number which is unique for all copies of the same book. It is required to keep track of the number of book copies in each Bookstore branch. Each book belongs to one category (Art, Literature, Science, Engineering … etc). Each category has a recruitment budget.
   c. A publisher is identified by Name (unique), Address, Email Address, and Phone numbers.
   d. Each buyer is registered in the system through his/her email address and Name. No two users are allowed to have the same email address. It is required to keep track of the selling transactions of each Bookstore branch. Each selling transaction is identified by a unique reference number and having information about the buyer, the book, the bookstore branch and selling date.

Multi-valued attribute?

Is Book Copy an Entity?

Is Category an Entity?

Is Selling Transaction an Entity?

Design a database for the bookstore described above, illustrating your design through an ERD. After designing your ERD, construct the relational model for your database, illustrating the constraints on each relation.
(15 points)

3. Consider the following set of data requirements for a Hospital database which contains data about the inpatient activities.
   a. The inpatient section consists of several departments and a set of labs. Each department has a unique number, unique name, a set of doctors, and a set of beds. Each department has a chairman.
   b. A doctor is described by his/her syndicate ID (unique), Name, Status (internal or external), and Specialization. Each doctor is allowed to work in only one department.
   c. Each bed in the hospital has an assigned number, and it has a certain category (first class, second class, ... ,etc). The bed number is unique for beds of the same department. Each bed category has a certain cost. It is required to keep track of the number of beds in each department.
   d. Each lab has a uniquely assigned number, a unique name, a manager, and a set of services. Each service has a certain cost.

Set of = multi-variable?

Is the Chairman also a doctor? Do I write it as a relation or just an attribute to Departement?

e. The patient records in the hospital records each patient's National ID, Name , Address, and PhoneNo. A patient is assigned a bed in a department and supervised by one or more doctors (not necessary of the same department). It is required to keep track of the current admissions in each department. The check-in date and the check-out date of each patient have to be recorded. It is also required to keep track of any lab services that may be done to the patient during his/her stay

How to write constraints?

A relation between the Patient and the Lab, or something else?

Design a database for the hospital described above, illustrating your design through an ERD. **(10 points)**

4. Consider the following requirements of a database for an airline flight information system.
   a. Each flight is identified by a flight number, the weekdays it operates on, and consists of one or more flight legs. A flight leg is a nonstop portion of a flight.
   b. Each flight leg of a particular flight is identified by a number 1, 2, 3, etc., its ***scheduled*** arrival and departure times and arrival and departure airports. The flight leg is associated with many instances of that leg – one for each date on which the flight travels. The leg number is unique for flight legs of the same flight. Each instance of the flight leg is recorded, along with the airplane used, and the ***actual*** arrival and departure times.
   c. Fares are kept for each flight. Each fare has a type (business, economy, charter, …), and a price associated with each fare type for each flight leg.
   d. Each airport has code (unique), name, (unique), and city.
   e. Airplanes have different ***types*** that are identified by their name (e.g. Boeing, Airbus, etc.), the manufacturer, and the number of seats on board for each fare type. Different airports only allow certain airplane types to land.
   f. Each airplane has a number that is unique for airplanes of the same type, an airplane type, technical status (in service, out of service, maintenance, etc.)

I don't understand Flight Legs at all.

Design a database for the airline information system described above, illustrating both the ERD and the resulting Relational Model **(15 points)**