



University of Central Punjab

Faculty of Information Technology

Database Systems Assignment 3

Total Marks: 100

Due Date: 21 June 2020

Instructions:

1. *Assignment must be in hard copy and submitted in office.*
2. *This is an individual assignment. Project groups will be followed.*
3. *Late submission will cause you to **lose 10% per day**. After three days of deadline no submissions will be entertained.*

Q1. Composite and multivalued attributes can be nested to any number of levels. Suppose we want to design an attribute for a STUDENT entity type to keep track of previous college education. Such an attribute will have one entry for each college previously attended, and each such entry will be composed of college name, start and end dates, degree entries (degrees awarded at that college, if any), and transcript entries (courses completed at that college, if any). Each degree entry contains the degree name and the month and year the degree was awarded, and each transcript entry contains a course name, semester, year, and grade. Design an attribute to hold this information. Use the conventions in Figure 3.5

Q2. Design an ER schema for keeping track of information about votes taken in the U.S. House of Representatives during the current two-year congressional session. The database needs to keep track of each U.S. STATE's Name (e.g., 'Texas', 'New York', 'California') and include the Region of the state (whose domain is {'Northeast', 'Midwest', 'Southeast', 'Southwest', 'West'}). Each CONGRESS_PERSON in the House of Representatives is described by his or her Name, plus the District represented, the Start_date when the congressperson was first elected, and the political Party to which he or she belongs (whose domain is {'Republican', 'Democrat', 'Independent', 'Other'}). The database keeps track of each BILL (i.e., proposed law), including the Bill_name, the Date_of_vote on the bill, whether the bill Passed_or_failed (whose domain is {'Yes', 'No'}), and the Sponsor (the congressperson(s) who sponsored—that is, proposed—the bill). The database also keeps track of how each congressperson voted on each bill (domain of Vote attribute is {'Yes', 'No', 'Abstain', 'Absent'}). Draw an ER schema diagram for this application. State clearly any assumptions you make.

Q3. A database is being constructed to keep track of the teams and games of a world cup 2019. A team has a number of players, not all of whom participate in each game. It is desired to keep track of the players participating in each game for each team, the positions they played in that game, and the result of the game. Design an ER schema diagram for cricket as sport, stating any assumptions you make.

Q4. Consider the ER diagram shown in Figure 3.22 for part of a BANK database. Each bank can have multiple branches, and each branch can have multiple accounts and loans.

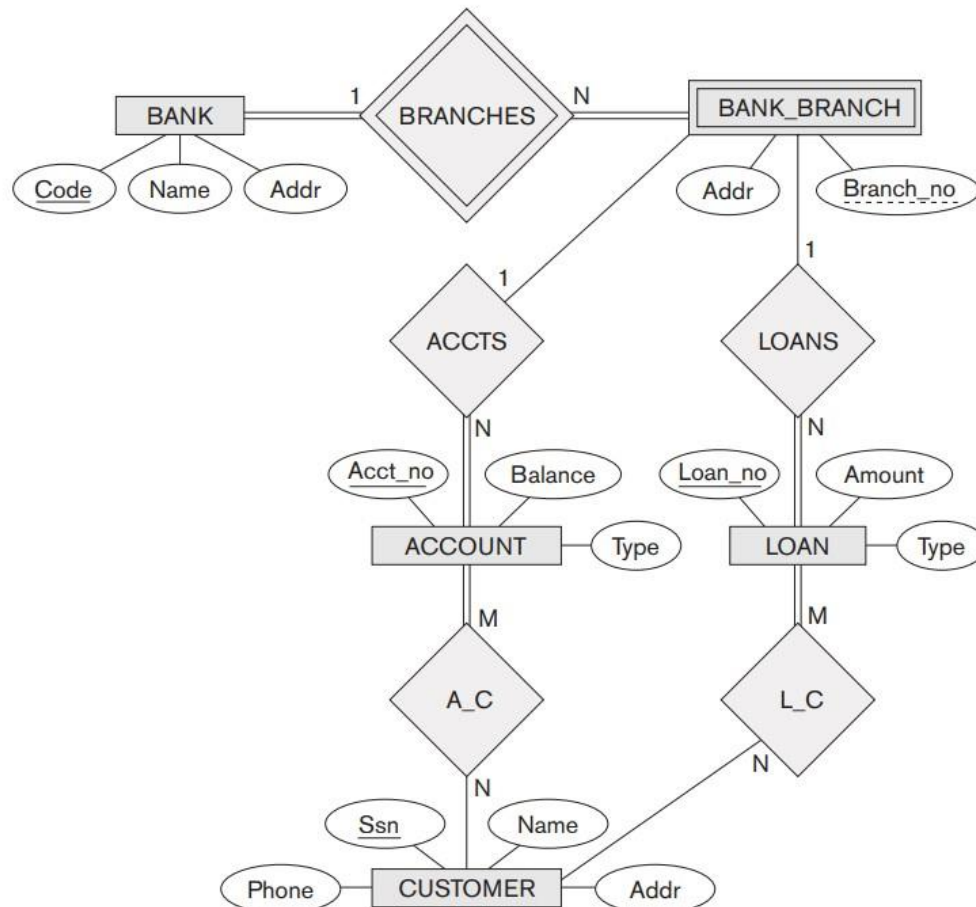
- List the strong (nonweak) entity types in the ER diagram.
- Is there a weak entity type? If so, give its name, partial key, and identifying relationship.

- What constraints do the partial key and the identifying relationship of the weak entity type specify in this diagram?
- List the names of all relationship types, and specify the (min, max) constraint on each participation of an entity type in a relationship type.
- List concisely the user requirements that led to this ER schema design.
- Suppose that every customer must have at least one account but is restricted to at most two loans at a time, and that a bank branch cannot have more than 1,000 loans. How does this show up on the (min, max) constraints?

Justify your Choices

Figure 3.22

An ER diagram for a BANK database schema.



Q5. Design a database to keep track of information for an art museum. Assume that the following requirements were collected:

- The museum has a collection of ART_OBJECTS. Each ART_OBJECT has a unique Id_no, an Artist (if known), a Year (when it was created, if known), a Title, and a Description. The art objects are categorized in several ways, as discussed below.
- ART_OBJECTS are categorized based on their type. There are three main types—PAINTING, SCULPTURE, and STATUE—plus another type called OTHER to accommodate objects that do not fall into one of the three main types.

- A PAINTING has a Paint_type (oil, watercolor, etc.), material on which it is Drawn_on (paper, canvas, wood, etc.), and Style (modern, abstract, etc.).
- A SCULPTURE or a statue has a Material from which it was created (wood, stone, etc.), Height, Weight, and Style.
- An art object in the OTHER category has a Type (print, photo, etc.) and Style.
- ART_OBJECTs are categorized as either PERMANENT_COLLECTION (objects that are owned by the museum) and BORROWED. Information captured about objects in the PERMANENT_COLLECTION includes Date_acquired, Status (on display, on loan, or stored), and Cost. Information captured about BORROWED objects includes the Collection from which it was borrowed, Date_borrowed, and Date_returned.
- Information describing the country or culture of Origin (Italian, Egyptian, American, Indian, and so forth) and Epoch (Renaissance, Modern, Ancient, and so forth) is captured for each ART_OBJECT.
- The museum keeps track of ARTIST information, if known: Name, DateBorn (if known), Date_died (if not living), Country_of_origin, Epoch, Main_style, and Description. The Name is assumed to be unique.
- Different EXHIBITIONS occur, each having a Name, Start_date, and End_date. EXHIBITIONS are related to all the art objects that were on display during the exhibition.
- Information is kept on other COLLECTIONS with which the museum interacts; this information includes Name (unique), Type (museum, personal, etc.), Description, Address, Phone, and current Contact_person.

Draw an ER schema diagram for this application. Discuss any assumptions you make, and then justify your ER design choices.

Q6. For the following ER diagram use the mapping rules to reduce the ER diagram in to a relational schema. Mention Primary and Foreign keys with proper notations.

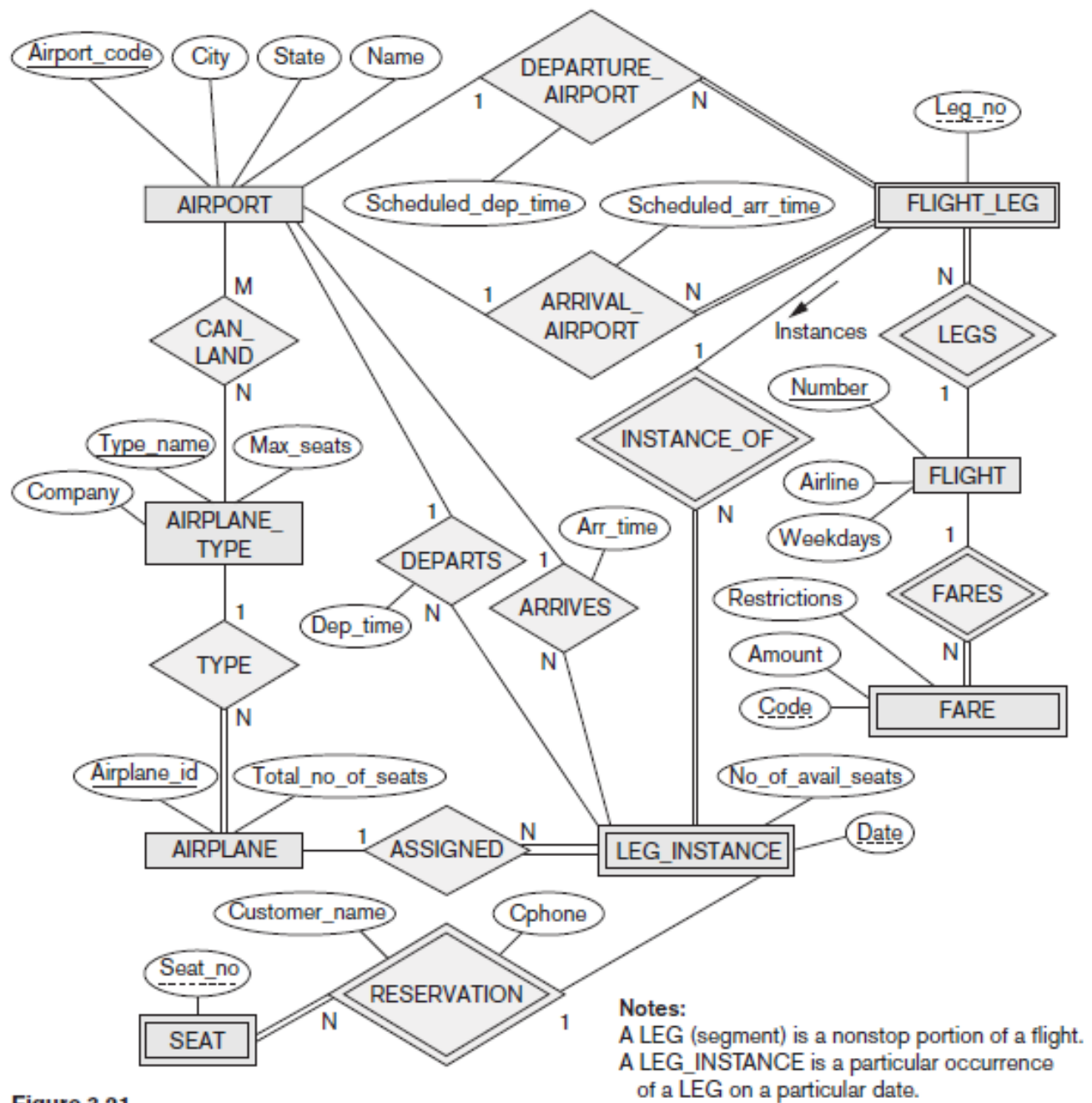


Figure 3.21