Database Systems
Assignment #5

Entity Relationship Model

Due Date: Before the start of the class (25 April 2018)

Instructions:

- *Use proper assignment papers for solving your assignment questions. Assignment done on diary pages, register pages, rough pages will not be credited.*
- *Do not copy the work of your peers. In case cheating is detected, then your case will be referred to DC.*

Draw an ER\EER diagram for the problems given below. Make sure that you indicate all cardinality constraints and your diagram should not contain redundant entity sets, relationships, or attributes. If you need to make any assumptions, include them in your answer.

Question 1:

Create an ER model for each of the following scenario:

A sailing club has members. Each member has a unique member number, name, date of birth, and gender. Most members own at least one yacht. However, a yacht can be owned by more than one member. Each yacht has a boat name, sail number, and boat class (such as Topper, Mirror, Contender). (Hint: The sail number uniquely identifies each boat in the same class.) The sailing club offers a range of membership types including adult, child, and a non-sailing social membership. Each membership type has an annual subscription rate, which runs for a year from 1st March. The date that each member pays his or her annual membership is recorded. The sailing club also owns dinghies, which can be borrowed by members for a daily fee.

Use cardinality ratio for specifying constraints and provide any assumptions necessary to support your model.

Question 2:

FASTCABs, a new Taxi service is being launched in Lahore after Uber and Kareem. The operations of the *FastCabs are as follows:* .

Each office has a manager, several taxi owners, drivers and administrative staff. The manager is responsible for the day-to-day running of the office. An owner provides one or more taxis to *FastCabs* and each taxi is allocated for use to a number of drivers. The majority of owners are also drivers. *FastCabs*

taxis are not available for hire by the public hailing a taxi in the street but must be requested by first phoning the company to attend a given address.

There are two kinds of clients, namely private and business. The business provided by private clients is on an *ad hoc* basis. The details of private clients are collected on the first booking of a taxi. However, the business provided by business clients is more formal and involves agreeing a contract of work with the business. A contract stipulates the number of jobs that *FastCabs* will undertake for a fixed fee. When a job comes into *FastCabs* the name, phone number and contract number (when appropriate) of the client is taken and then the pick-up date/time and pick-up/drop-off addresses are noted. Each job is allocated a unique jobID. The nearest driver to the pick-up address is called by radio and is informed of the details of the job. When a job is completed, the driver should note the mileage used and the charge made (for private clients only). If a job is not complete, the reason for the failed job should be noted.

(a) Identify the main entities of *FastCabs*.
(b) Identify the main relationships between the entities.
(c) Determine the multiplicity constraints for each relationship.
(d) Identify attributes and associate them with an entity or relationship. **(Hint: As few attributes are described in the case study, you will need to create your own.)**

Question 3:

The Udemy is an emerging online course website. They wish to conduct some seminars and courses in Lahore. They have hired you to create a database of its course information. The Udemy plans to deliver a number of seminars and training courses. Each course will be delivered by one member of staff at some location (such as internal seminar room, or PC conference room 100). The fees vary for each course and on the number of delegates a company sends to attend the course. For example, if a company sends one person, the charge may be $1000. If the company sends two people, the first may be charged $1000, but the second may be charged $750. The course can be attended by a number of delegates, subject to some upper limit for the course. A delegate can register as an individual or through his/her company. The name of the employee who registers the delegate will be recorded. An invoice will either be sent to the delegate or to his/her company.

The Udemy have hired different employees to conduct seminars and courses. Some employees are renowned professional responsible for conducting the courses and seminars while others are responsible for maintenance and organization. For each employee we record their personal details like CNIC, name, age, address, phone, qualification and also job-related information like job title, responsibilities, salary or contract details in case they are not permanent. The company has defined a number of position types, such as Manager, Lab Incharge, Instructor etc. and each type has a number of grades associated with it, which for most non-senior positions determines the employee's salary. At a senior level, salary is negotiable.

To manage the employees and to ensure that the courses and seminars are conducted in best way, a number of employees are nominated to supervise groups of staff. In addition to this, on a regular basis, each employee is required to undergo a review, which is normally carried out by the Supervisor.

Create an EER model for the above scenario using min-max notation for constraints. *State clearly any additional*

assumptions you make.

Question 4: NUCES BOOKSHOP

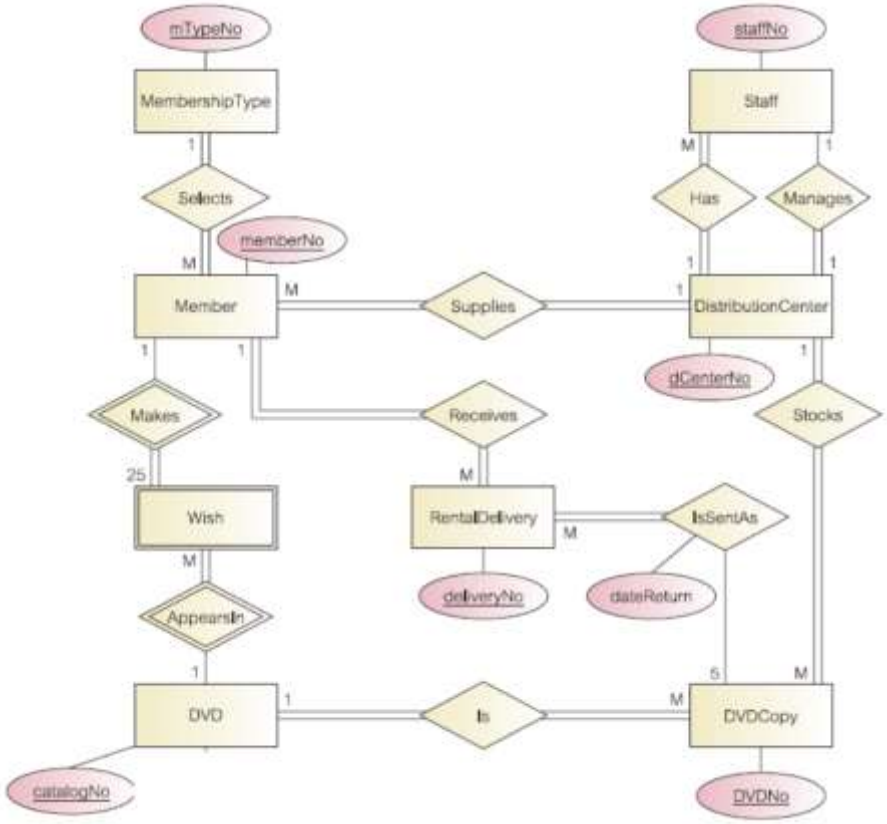
Remember the question 3 in Assignment 1. This time you have to build an ER Model for the NUCES Lahore BOOKSHOP.

The database system for the bookshop will have to keep track of the books required by each course offered in different departments in NUCES, Lahore. You need to maintain the basic details about the books like title, first author, publisher and edition. In addition to this you need to keep details regarding the number of copies of each book purchased and the number of books sold in each semester. You can assume that the bookshop has the information regarding the number of students enrolled in each course, so they can figure out how many books they must purchase. Note bookshop don't need information about the course section since we assume that all sections of a course follow the same books. However, a course may need more than one book.

Identify the attributes and relationships and clearly state the assumptions you make.

Question 5:

The figure given below shows an ER diagram for a DVD Rentals. Transform the diagram into a relational schema that shows referential integrity constraints



PRACTICE QUESTIONS from Book "The Fundamental of Database Systems". You don't have to turn in the practice questions. These are for your practice.

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