National University

OfComputer&EmergingSciencesFaisalabad-ChiniotCampus

Assignment # 2

CS 2005 – Database Systems
Spring 2022

Submission Guidelines

1. Use your own words to answer the questions.
2. Plagiarism is not allowed.
3. You have to submit **hand written assignment**.
4. Mention your **name**, **roll Number** and **section** on every page of your assignment.
5. Late submission is strictly not allowed.

1. Design an ER schema for the following Case studies

Case Study: 1
A university consists of a number of departments. Each department offers several courses. A number of modules make up each course. Students enrol in a particular course and take modules towards the completion of that course. Each module is taught by a lecturer from the appropriate department, and each lecturer tutors a group of students.

Case Study: 2
Consider the following set of requirements for a UNIVERSITY database that is used to keep track of students' transcripts.

a. The university keeps track of each student's name, student number, Social Security number, current address and phone number, permanent address and phone number, birth date, sex, class (freshman, sophomore, ..., graduate), major department, minor department (if any), and degree program (B.A., B.S., ..., Ph.D.). Some user applications need to refer to the city, state, and ZIP Code of the student's permanent address and to the student's last name. Both Social Security number and student number have unique values for each student.

b. Each department is described by a name, department code, office number, office phone number, and college. Both name and code have unique values for each department.

c. Each course has a course name, description, course number, number of semester hours, level, and offering department. The value of the course number is unique for each course.

d. Each section has an instructor, semester, year, course, and section number. The section number distinguishes sections of the same course that are taught during the same semester/year; its values are 1, 2, 3... up to the number of sections taught during each semester.

e. A grade report has a student, section, letter grade, and numeric grade (0, 1, 2, 3, or 4).

Design an ER schema for this application, and draw an ER diagram for the schema. Specify key attributes of each entity type, and structural constraints on each relationship type. Note any unspecified requirements, and make appropriate assumptions to make the specification complete.
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.

Case Study: 3

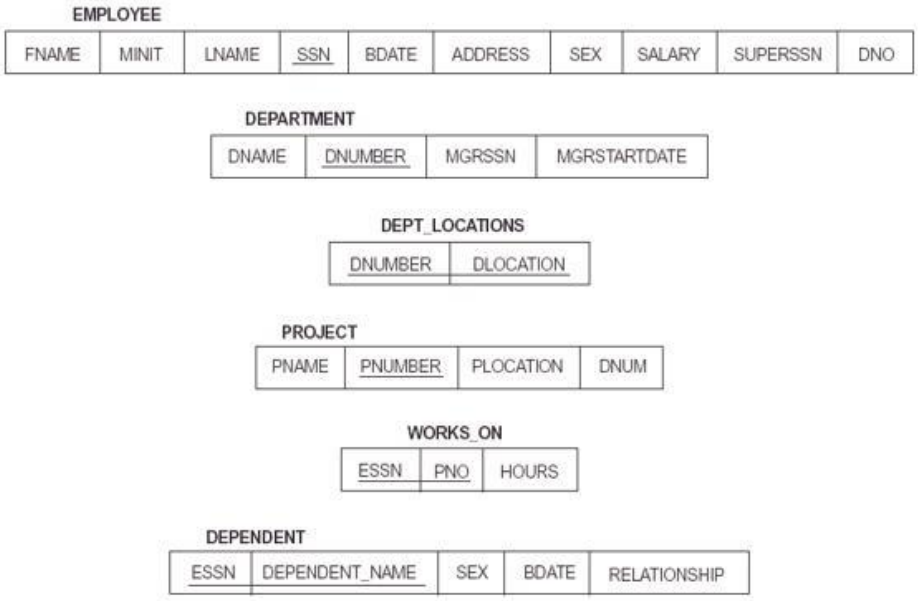
A salesperson may manage many other salespeople. A salesperson is managed by only one sales people. A salesperson can be an agent for many customers. A customer is managed by one sales people. A customer can place many orders. An order can be placed by one customer. An order lists many inventory items. An inventory item may be listed on many orders. An inventory item is assembled from many parts. A part may be assembled into many inventory items. Many employees assemble an inventory item from many parts. A supplier supplies many parts. A part may be supplied by many suppliers

Case Study: 4

A farmer owns and operates a 640-acre farm for several generations. Since the farm business id growing , the farmer is thinking to bult a database that would make easier the management of the activities in the farm. He is considering the following requirement of the activities in the farm. He is considering the following requirements for the database

1. For each livestock classification group (For example cow, horse etc.), the farmer keeps track of the following information : identification number, classification, total number of livestock's per classification group (for example number of cows, number of horses etc.)
2. For each crop the following information is recorded: crop identification number and Classification
3. Farmer has recorded the yield of each crop classification group during the last ten years. The records consist of the year, yield, sales, price of the crop and the amount of money earned.
4. The farmer has recorded the yield of each livestock classification group during the last ten years. The record consists of the following historical data: the year (historical), Selling price per head, number of livestock in the end of the year, number of livestock sold during one-year period, and the total amount of money earned.

2. Mention the Primary, Foreign, and Composite Keys from each table?



3. Design an EERD for the following Case studies

Case Study: 1

Draw an EER diagram for the following description of a law firm: Each case handled by the firm has a unique case number; a date opened, date closed, and judgment description are also kept on each case. A case is brought by one or more plaintiffs, and the same plaintiff may be involved in many cases. A plaintiff has a requested judgment characteristic. A case is against one or more defendants and the same defendant may be involved in many cases. A plaintiff or defendant may be a person or an organization. Over time, the same person or organization may be a defendant or a plaintiff in cases. In either situation, such legal entities are identified by an entity number, and other attributes are name and net worth.

Case Study: 2

Draw an EER diagram for the following problem: A nonprofit organization depends on a number of different types of persons for its successful operation. The organization is interested in the following attributes for all of these persons: SSN, Name, Address, City/State/Zip, and Telephone. Three types of persons are of greatest interest: employees, volunteers, and donors. Employees have only a Date Hired attribute, and volunteers have only a Skill attribute. Donors have only a relationship (named Donates) with an Item entity type. A donor must have donated one or more items, and an item may have no donors, or one or more donors. There are persons other than employees, volunteers, and donors who are of interest to the organization, so that a person need not belong to any of these three groups. On the other hand, at a given time a person may belong to two or more of these groups (e.g., employee and donor).