Notre Dame University
Faculty of Natural and applied sciences
CSC 226 - Database Systems

Exam 1

For Scoring Use Only:

	Maximum	Received
Problem 1	22	
Problem 2	19	
Problem 3	29	
Problem 4	30	
Total	**100**	

Answers might not be 100% correct.

Problem 1 (22 points - 2 points for each below)

For each of the terms in the left column below, select the right column that *best* matches it. Use the terms in the right column at most once. Indicate your answer in the __ provided.

12 Database	1- The person who is responsible for giving the privileges to the users and for performing backup and Recovery
5 DBMS	2- Changes to the logical schema do not force changes to the external schema
2 Database designer	3- When we have a key of multiple attributes
1 DBA	4- record
6 Column	5- A software that helps you create and manipulate your database
10 Logical data independence	6- Field
9 Physical data independence	7- Build the EER and translate it into tables
11 Candidate keys	8- database schema
3 Composite key	9- Changes to the internal schema do not force changes to the logical schema
4 Metadata	10- A collection of interrelated data
8 Tuple	11- When we have more than one attribute that can be the primary key

Problem 2 (19 points)

Consider that you need to design an application for a physical therapist where you need to store information about the patients (uniquely identified by their patient number), their contact phone, their illnesses, the current illness they are treated for.

Each patient makes several sessions (the first session with no 1, 2, up to the last number of the sessions he performs (say 10 for example), where we need to keep track of the date of the session, the begin time, the finish time, and the actual treatment performed in this session.

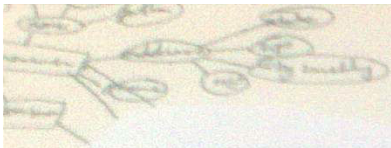
Suppose that the therapist needs to store information about the treating doctors for every patient. Each doctor is uniquely identified by his name, and has multiple phones, an address, and a specialty (orthopedics, internal, chirurgic, ...). For the orthopedists he needs to store their weak points and strong points.

Design an EER for the above application. (10 pts.)

Consider that we want to add additional requirements below. Choose the most appropriate solution. (9 pts.)

1. Suppose we need to store the duration of every session
   a. We put it as multivalued attribute for session
   b. We put it as a derived attribute for session
   c. We put it as multivalued attribute for patient

Answers might not be 100% correct.

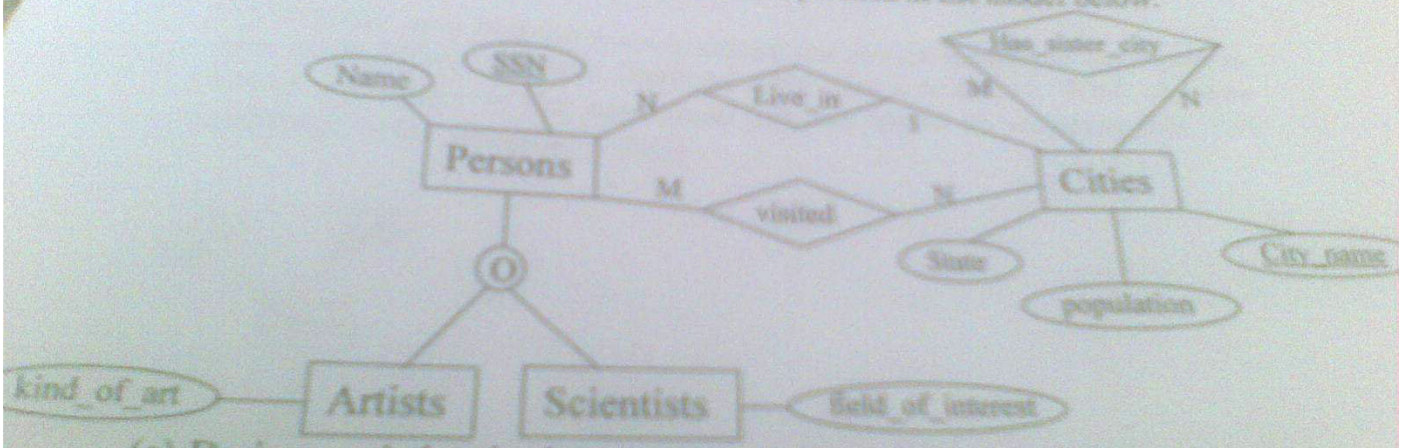


Answers might not be 100% correct.

2. Suppose we need to store the total durations of all sessions performed for a patient:
   a. We put it as multivalued attribute for patient
   b. We put it as a derived attribute for session
   c. We put it as derived attribute for patient

3. Suppose that in some sessions the therapist uses some machine. Each machine has a number, a type, and a price .
   a. We create an entity machine and create a M:N relation between session and machine
   b. We create an entity machine and create a 1:N relation between session and machine
   c. We store machine as a composite multivalued attribute for session.

Problem 3 (29 points)
Consider the conceptual schema fragment specified in ER model below.



(a) Design a relational schema corresponding to the above EER conceptual schema. Specify relations, primary key and referential integrity constraints. State assumptions you make (if any). (10 points)

Answers might not be 100% correct.

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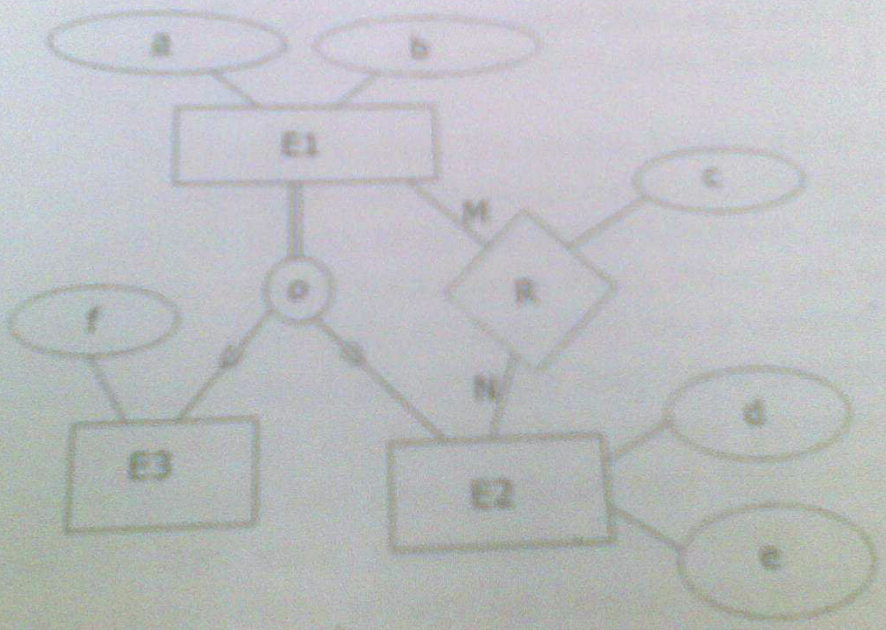
(e) Reduce the following EER diagram into the relational model using **two different** mappings (Specify which option a, b, c, or d). Be sure to identify all primary and foreign keys. *(16points)*



Answers might not be 100% correct.

Problem 4: (30 pts.)

A software company needs to create a database to store information about its employees (programmers) and the projects they are working on.

Each programmer has an ID, name (First, Last, Father's), an address (State, Zip, City building, and no), phone, and an email. We keep track of the skills of each programmer (skill can be VB. Net, C++, Java, Oracle…) and level (beginner, senior..).

Each skill has an ID and a description. We need to keep track of the level of the programmer and whether he got certificate in the specific skill.

We also keep track of all clients of this Software Company, where we keep their unique ID's, name, contact name (Last, First), Phone and email.

Projects belong to clients where each project has a unique ID, a name and as previous project that the current may be a continuation of it. Each project needs many skills and has many programmers who work on it. Each project has one programmer that is the controller and one that is the vice controller. We keep track for each programmer the begin date where he began his work, the end date and the total elapsed time (that may be different from the end minus begin date).

Evaluation for each projects can be performed where each evaluation one has an ID, a date, and evaluator ID, a score comments if any. Only senior programmers can perform evaluation.

Evaluations for each programmer are performed on an annual basis. For each evaluation we have an id that is unique for the evaluatee (the person evaluated), a year, an evaluator id, a score and comments if any. Only senior programmers can perform evaluation.