

CS166: Database Management Systems

UC Riverside

Midterm 1 Review

Winter 2020

This is meant to be a study guide for Midterm 1. Please note, you should use this to practice concepts but don't limit yourself to only studying these questions and be sure to also be familiar with the content covered in class and in the chapter readings. The midterm will contain multiple-choice, true-false, and free answer questions.

- Know the important characteristics of a database and why we shouldn't store our data in files.
 - What is the relational model?
 - Know how to generate an ER diagram from an application description.
 - Know how to convert an ER diagram to relational model (entities).
 - Know how to use relational algebra to specify queries on relations.
 - Know how to write simple SQL queries.
 - Know the difference between left-outer and right-outer join.
 - Know when to use the HAVING operator in SQL (hint: it is used only with the GROUPBY operator).
1. Define the relational Model:
 2. What are some of the properties offered by the database, i.e. what characteristics does a database offer that is not offered by file(s).
 3. Which built-in SQL function computes the number of rows in a table?
 - (a) AVG
 - (b) MAX
 - (c) COUNT
 - (d) SUM
 - (e) MIN
 4. Which pair of SQL keywords is used to create and delete a table?
 - (a) CREATE, DROP
 - (b) CREATE, DELETE
 - (c) CREATE, ALTER
 - (d) INSERT, DROP
 - (e) INSERT, DELETE
 - (f) INSERT, ALTER
 5. A candidate key is:
 - (a) any set of fields that determines the values of all other fields
 - (b) functionally dependent on non-key attributes
 - (c) an attribute or set of attributes that can be the primary key
 - (d) the primary key of a relation

6. Assume you are given the ER in Figure 1-3. Translate the given ER diagram to relations for each figure.

Figure 1

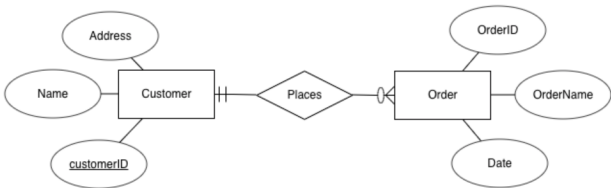


Figure 2

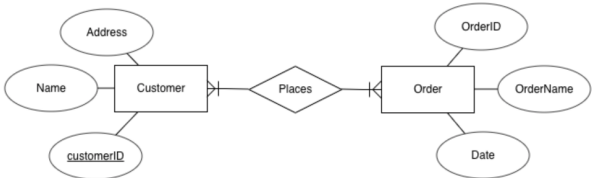
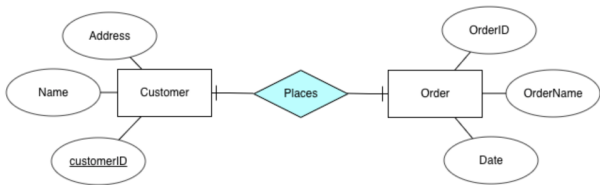


Figure 3



Three relational schema are given below. Express each of the provided information needs as a relational algebra query using only projection (π), selection (σ), renaming (ρ), inner joins (\Join), set union/intersection (\cup), and division (\div).

Patient(ssn:string, name:string, address:string, age:integer)

Doctor(ssn:string, name:string, specialty:string, experience:integer)

PrimaryPhysician(patientSSN:string, doctorSSN:string, firstAppointment:date)

7. Find the ssns of doctors who see patients that are at least 25 years old.
8. Find the ssns of doctors that have not seen any patients.
9. Find the ssns of doctors that have seen a patient under 12.

You have been asked to build a database to handle information about law firms. Each law firm is identified by a name that is unique within a city, and also have a count of how many non-lawyer employees each firm employs. Lawyers are identified by their social security number, and also have a name, address, and salary. A lawyer may be employed by at most one firm. Each lawyer handles a load of cases identified by a case number. Cases may be handled by more than one lawyer, even if the lawyers work for different firms.

The basic entities should be firms, lawyers, cases,

10. Draw an E-R diagram for the requirements above.
11. Translate your E-R diagram into SQL schema.
12. Write SQL query: Find the names of firms employing the lawyers that work on case number 1001.
13. Write SQL query: Find the average salary of lawyers employed by each unique firm.