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Database HW2

CSCE 4523  
Assignment 2 – Due Due-Date on Blackboard  
This assignment may be done in pairs (undergrads only).

Grad students must do the assignment individually.

Objective

The goal is to review material covered in Chapters 1-5.

Do the following questions from the book.

Short answer questions and point form answers are fine. All answers that are just text/words should be done in a word processor. Diagrams may be hand drawn (if needed)

*1.4 Describe the main characteristics of the database approach and contrast it with the file-based approach.*

*The main characteristics of the database approach are that it is secure, the data is logically related, concurrently controlled, all of the data is user accessible, there is recovery control, and there is an integrity system. With a file-based approach, each program defines its own data which means data is isolated, as well as potentially duplicated.*

*1.5 Describe the five components of the DBMS environment and discuss how they relate to each other.*

*A database is secure, has integrity checks, concurrency control, recovery systems, and a user-accessible catalog. All of these are related to eachother. It needs to be secure so that when accessing the data you can trust it. It needs to have concurrency checks so that if data changes it changes for every user and it is always up to date when accessing. There needs to be recovery, otherwise in a bad event you will lose all of your data and there will be none to access. Lastly, the data needs to have integrity checks to make sure that when we are storing and accessing the data there are no duplicates, mistakes, it conforms to the defined rules and constraints, etc...*

*2.2 To address the issue of data independence, the ANSI-SPARC three-level architecture was proposed. Compare and contrast the three levels of this model.*

*There is the external level, the conceptual level, and the internal level. The external level is the individual users’ views of the database. It is how the database is relevant for that particular user. An example is a student vs. a professor on blackboard at the UofA. The conceptual level is the community view of the database and describes what data is stored, and the relationships among the data. Lastly, the internal level is the actual physical representation of the database on the computer. This describes how the data is stored in the database.*

*2.11 Name three record-based data models. Discuss the main differences between these data models.*

*Relational data model, network data model, and the hierarchical data model are three record-based data models. The relational model is structured in tables with rows and columns. The hierarchical data model organizes in a tree-like structure, and the network model organizes by owners, parents, etc...*

*3.16 Describe the main components in a DBMS.*

*The main components in a DBMS are: the database itself, the language used to create, edit, delete, and update the database, a way to query the data, and usually more such as a GUI, security, etc..*

*4.4 Discuss the properties of a relation.*

*The properties of a relation are as follows: the name is distinct from all other related names, each cell of relation contains exactly one atomic value, each attribute has a distinct name, values of an attribute are all from the same domain, each tuple is distinct, order of attributes has no significance, order of tuples has no significance (theoretically).*

*4.5 Discuss the differences between the candidate keys and the primary key of a relation. Explain what is meant by a foreign key. How do foreign keys of relations relate to candidate keys? Give examples to illustrate your answer.*

*A primary key is a candidate key that has been chosen to be the main identifier, and is used to identify tuples uniquely within a relation. For example, in the UofA’s database, there may be a table called students. The primary key here would be “StudentID”. A candidate key is simply an attribute or set of attributes that can uniquely identify a tuple within a relation. So in the UofA’s students table, there may be “StudentID”, “Fname”, “Lname”, “Phone Number”, etc.. Assuming that each of these are completely unique, all of them are candidate keys. Assuming we can have multiple of the same Firstnames or last names, only StudentID and phone number are candidate keys. On the other hand, a foreign key is an attribute or set of attributes that matches the candidate key of some other, or even the same relation. So in our case, “StudentID” would be a foreign key if there was another table called “Honors” and “StudentID” was also a part of that.*

* 1. *a, c, & e using the following schema from the exercises of chapter 4 (Also describe the relations (tuples) that would be created)*

Hotel (hotelNo, hotelName, city)

Room (roomNo, hotelNo, type, price)

Booking (hotelNo, guestNo, dateFrom, dateTo, roomNo)

Guest (guestNo, guestName, guestAddress)

*a)*

hotelNo (price  50 (Room) )

*c)*

hotelName (Hotel  Hotel.hotelNo  Room.hotelNo (price  50 (Room)) )

*e)*

*5.12 b, d, & e using the schema above (Relational Algebra Only)*

*b)* List all single rooms with a price below £20 per night.

*d)* List the price and type of all rooms at the Grosvenor Hotel.

*e)* List the details of all rooms at the Grosvenor Hotel, including the name of the guest staying in the room, if the room is occupied.

*6 (Not from the book) Consider a database with the following schema:*

|  |  |
| --- | --- |
| *Person ( name, age, gender )* | *name is a key* |
| *Frequents ( name, pizzeria )* | *(name, pizzeria) is a key* |
| *Eats ( name, pizza )* | *(name, pizza) is a key* |
| *Serves ( pizzeria, pizza, price )* | *(pizzeria, pizza) is a key* |
| *Write relational algebra expression for the following query:* |  |

List the names of all females who eat both mushroom and pepperoni pizza.