Database Management System – cs422 DE

Assignment 2 – Week 2

This assignment is based on lecture 2 (chapters 4 & 5).

○ Submit your *own work* on time. No credit will be given if the assignment is submitted after the due date.
○ Note that the completed assignment should be submitted in .doc, .docx, .rtf or .pdf format only.
○ If you think that your answer needs explanation to get credit then please write it down.
○ You are encouraged to discuss these questions in the Sakai forum.

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(1) A relational database consists of a collection of

A. Tables
B. Fields
C. Records
D. Keys

ANS:
A

(2) A _____ in a table represents a relationship among a set of values.

A. Column
B. Key
C. Row
D. Entry

ANS:
C

(3) For each attribute of a relation, there is a set of permitted values, called the _____ of that attribute.

A. Domain
B. Relation
C. Set
D. Schema

ANS:
A

(4) Course(course_id, sec_id, semester)
Here the course_id, sec_id and semester are _____ and course is a _____ .

A. Relations, Attribute
B. Attributes, Relation
C. Tuple, Relation
D. Tuple, Attributes

ANS:
B

(5) Department (dept_name, building, budget) and
Employee (emp_id , name, dept_name, salary)

Here the dept_name attribute appears in both the relations.
Using the common attributes in relation schema is one way of relating _____ relations.

A. Attributes of common
B. Tuple of common
C. Tuple of distinct
D. Attributes of distinct

ANS:
C

(6) Student (ID, name, dept_name, tot_pts)
In this query which attribute form the primary key?

A. name
B. dept_name
C. tot_pts
D. ID

ANS:
D

(7) The____ operation allows the combining of two relations by merging pairs of tuples, one from each relation, into a single tuple.

A. Select
B. Join
C. Union
D. Intersection

ANS:
B

(8) Discuss the differences between the five Join operations: Theta join, Equijoin, Natural join, Outer join (left), and Semijoin. Example of each is appreciated.

ANS:

- A Theta Join Defines a relation that contains tuples satisfying the predicate F(<,>,>=…) from the Cartesian product of two relations
- Equijoin is a particular type of Theta join , it returns tuples that have equivalent values for specified attributes.
- Natural join is an Equijoin, it's an operation on two relations matches tuples whose values are the same on all attribute names that are common to both relations. It also eliminates the duplicated attributes from the result.
- Left outer join is join in which tuples from R that do not have matching values in common columns of S are also included in result relation.
- Semijoin Defines a relation that contains the tuples of R that participate in the join of R with S.

(9) A relational database contains details about journeys from Chicago to a variety of destinations and contains the following relations:

Operator (**opCode**, opName)

Journey (**opCode, destCode**, price)
Destination (**destCode**, destName, distance)

Each operator is assigned a unique code (opCode) and the relation *Operator* records the association between this code and the Operator's name (opName).

Each destination has a unique code (destCode) and the relation *Destination* records the association between this code and the destination name (destName), and the distance of the destination from Chicago.

The relation *Journey* records the price of an adult fare from Chicago to the given destination by a specified operator; several operators may operate over the same route.

Formulate the following queries using relational algebra.

1) List the details of journeys less than $100.
2) List the names of all destinations.
3) Find the names of all destinations within 20 miles.
4) List the names of all operators with at least one journey priced at under $5.
5) List the names of all operators and prices of journeys to 'Boston'.

ANS:
1) σ price < 100 (Journey)
2) $\Pi_{\text{destName(Destination)}}$
3) Π_{destName} ($\sigma_{\text{distance <=20}}$ (*Destination*))
4) Π opName (σ price < 5 (Journey) $\bowtie$ opCode Operator)
5) Π opName, price ((σ destName = 'Boston' (Destination)) $\bowtie$ destCode (Journey $\bowtie$ opcode Operator))

(10)Solve Q 5.8 (a-d) on page no. 130 from the course text book (5th edition).

a) Π_{hotelNo} ($\sigma_{\text{price} > 50}$ (Room))
ANS:
This will generate a relation with a single attribute(HotelNo) that will list the hotels with room prices greater than 50

b) $\sigma_{\text{Hotel.hotelNo} = \text{Room.hotelNo}}$(Hotel × Room)
ANS:
This is an Equijoin , it's a join on a cartesian product of the Hotel and Room relations , the join will contain all the attributes of both relations and the hotelNo will be duplicated. It will produce a list containing all rooms in a hotel.

c) $\Pi_{\text{hotelName}}$ (Hotel $\bowtie_{\text{Hotel.hotelNo} = \text{Room.hotelNo}}$ ($\sigma_{\text{price} > 50}$ (Room)))
ANS:

This will produce a list of hotel names of hotels containing rooms with price higher than 50

d) Guest $\ltimes$ ($\sigma_{\text{dateTo} \geq \text{'1-Jan-2007'}}$ (Booking))

ANS:

This is a left outer join of guest and the tuples of booking with dateTo greaterThan or equal to 1-jan-2007. All the guests who don't have booking with such date will still be included in the join. This will produce a relation containing all guests with bookings beyond 1-Jan-2007