

Date: 14th September, 2017

Ahsanullah University of Science and Technology

Department of Computer Science and Engineering

Third Year, First Semester

Final Examination, Spring 2017

Course No: CSE 3103

Course Title: Database

Time: 3 Hours

Full Marks: 70

[Answer any 5(Five) sets from 7(Seven) sets.]

[Marks allotted are indicated in the right margin within '[]']

- 1.a) What are the differences between Data Definition Language and Data Manipulation Language? [3]
- b) Describe the classifications of database users and their classified activities. [5]
- c) While executing a transaction, it passes through several states, until it finally commits or aborts. Draw the state diagram of a transaction. [6]
- active partial commit failed abort
- 2.a) Explain the difference between a strong and a weak entity set using appropriate illustrations. [3]
- b) Why "N-ary" relationships of database are avoided in design phase? [3]
- c) Pickaboo.com is recently creating the market buzz in Bangladesh at online market. Pickaboo.com started their operations as online shop, basically they sale all sorts of electronics and day to day life products. Moreover, they have also give some options to the customer to return back of the product in 3 days if that is not suitable with the customers' choice and performance. They have some clean and visible transparent policy of payments which is making them bigger day by days. [8]

To view a product you need not follow any registration process. But when you want to place an order in this online shop, Customer need to be register in the website first. To register every customer, system requires his/her some basic information. Customer's address is basically segmented in multiple parts like house, street, city, country etc. Customer can also search product by price range, groups. Basically this products are specialized in some groups or segments. Products' groups can be electronics, lifestyle, computer accessories, mobile and tables. Each of the product groups have some common features and some of them are specific. Common features can be item id, item name, origin, item group etc. Specific features can be warranty time, service time and mount fees for electronics as an example.

A Customer can places orders for various products. In the same time customer can create different orders which may have different product items. For Each time he/she places an order, an order number is being generated which is a unique number. Entitled with some features are also needed like Order Date, Shipment time calculation, Address of the Customer and Order status. When customer places an order a Cart is also created. This cart section is connected through a payment section which also have a unique payment number, date, type of the payment, order number and cart number. In the payment some specific things are in common like discount, VAT and EMI. For each cart a specific payment is happening. Sometimes card payment, cash payment, Bkash these are also possible which is basically payment type but creating generalization for the payment options.

Draw an Entity Relation Diagram (ERD) maintaining the original notation and symbols. Also mention the cardinality constraints and limit in the relations. You have the flexibility to choose/guess the attributes for the relations and the entity set if needed.

Abnote

Abnat

Abnoat

3. Maker(maker_id, maker_name, maker_city)
pc(model_id, maker_id, speed, ram, hd, price)
laptop(model_id, maker_id, speed, ram, hd, screen, price)
 Computer_Info Database

[14]

Consider the Computer_Info Database above, where the primary keys are underlined. Write the following queries in relational algebra.

- Find manufacturer related Information (id, name, city) who only make laptop but no PCs.
- Find the model id and maker id of the lowest priced laptop.
- For all manufacturers, find the total number of PCs they produce. Display the result along with the manufacturer Information (id and name).
- Delete PCs that have manufactured by 'Dell'.
- Find the id, name and city of manufacturer(s) with the fastest processor among all those PCs that have the smallest amount of RAM.
- Find all PCs and laptops information (only id) with price more than the average price of all machines including both laptops and PCs.
- Decrease the price of laptops by 10% if the current price is more than 100000. Otherwise, decrease the price by 5%.

4. Movie (mID, title, year, director)
Reviewer (rID, name)
Rating (rID, mID, stars, ratingDate)
 Movie Database

year → movie in 5...

[14]

Give an expression in SQL for each of the following queries, using the Movie Database.

- Find the titles of all movies directed by Steven Spielberg.
- Find all years that have a movie that received a rating of 4 or 5, and sort them in increasing order.
- Some reviewers didn't provide a date with their rating. Find the names of all reviewers who have ratings with a NULL value for the date.
- For each movie that has at least one rating, find the highest number of stars that movie received. Return the movie title and number of stars. Sort by movie title. Do not include any movies that received less than 4 stars.
- Find title, release year and director of the movie that received the lowest average stars. Do not use any set comparison operators.
- For any rating where the reviewer is the same as the director of the movie, return the reviewer name, movie title, and number of stars. You must use nested subquery within where clause.
- Find the names of all reviewers who have contributed three or more ratings. You must use nested subquery within FROM clause.

- 5.a) Explain the difference between a clustering index and non-clustering index with appropriate examples. [4]
- b) Briefly describe the query processing steps with the exact diagram. [6]
- c) Database-system implementers have paid much more attention to the ACID properties than have file-system implementers. Why might this be the case? [4]

Atomicity
 Consistency
 Isolation
 Durability

query
 query
 output

parser
 translation
 Page 2 of 3
 evaluation engine
 data

relational
 optima
 evaluation plan
 execute

- 6.a) What is the difference between RAID 1 and RAID 5? Describe the pricing factors for the physical storage devices. [3]
- b) Describe all the types of the parallel database architectures. [4]
- c) A database schema named "PROJECT" contains the following relations which are already in 1NF. [7]
Project (Project_Code, Project_Title, Project_Manager, Project_Budget)
Project_Employee_Department (Project_Code, Employee_No, Employee_Name, Dept_No, Dept_Name, Hourly_Rate).
 You have to decompose the following relations in such a way so that the resulting relations are in 3NF. Explain your answer at each step and identify the primary keys as necessary. A sample dataset is given below for these two relations.

Project

Project_Code	Project_Title	Project_Manager	Project_Budget
PC010	Pension System	M Phillips	24500
PC045	Salary System	H Martin	17400
PC064	HR System	K Lewis	12250

Project_Employee_Department

Project_Code	Employee_No	Employee_Name	Dept_No	Dept_Name	Hourly_Rate
PC010	S10001	A Smith	L004	IT	22.00
PC010	S10030	L Jones	L023	Pension	18.50
PC010	S21010	P Lewis	L004	IT	21.00
PC045	S10010	B Jones	L004	IT	21.75
PC045	S10001	A Smith	L004	IT	18.00
PC045	S31002	T Gilbert	L028	Database	25.00
PC045	S13210	W Richard	L008	Salary	17.00
PC064	S31002	T Gilbert	L028	Database	23.25
PC064	S21010	P Lewis	L004	IT	17.50
PC064	S10034	B James	L009	HR	16.50

- 7.a) Consider the following set of key values to create B+ tree: [10]

(42, 3, 51, 87, 11, 9, 65, 17, 94, 19, 23, 75, 29, 31)

Assume that the tree is initially empty and values are added in ascending order. Construct two B+ trees with the following threshold values of n .

- Four
- Six

Using the final B+ tree of 7(a)(i), show the form of the tree after each of the following series of operations:

- Delete 19

- b) Explain the distinction between serial schedule and serializable schedule using appropriate example. [4]

29 31
 3 9 11 17 19 23 42 51 65 75 87 94

3 9 11 17 19 23 29 31 42 51
 65 75 87 94