Islamic University of Technology
Organisation of Islamic Cooperation (OIC)
Department of Computer Science and Engineering (CSE)

MID SEMESTER EXAMINATION   SUMMER SEMESTER, 2018-2019
DURATION: 1 Hour 30 Minutes   FULL MARKS: 50

CSE 4409: Database Management System II

Programmable calculators are not allowed. Do not write anything on the question paper. There are **4 (four)** questions. **Question no. 3 is compulsory.** Answer any **2 (two)** from the remaining questions. Figures in the right margin indicate marks.

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1. (a) Prior to the introduction of database management systems data was processed using file pro- [6.66]
   cessing systems. Cite one real-life example where traditional file processing is preferable to
   database management systems. Justify your choice with logical arguments. Now suppose you
   are going to automate a very large banking systems, establish the fact that traditional file pro-
   cessing system is not an ideal solution in this context. Also briefly explain 3 major properties
   that must exist in todays modern database system for large scale system development such as
   banking.

   (b) Suppose you are going to appoint a Database Administrator (DBA) for a large company. Briefly [5]
   explain how you should select a candidate for this position.

   (c) Mention two important purposes of foreign key. Place suitable example with data to explain [5]
   them. Explian the guidelines to select a primary key.

2. (a) Consider the following 2 entities (pk stands for primary key, fk[x] indicates foreign key refer- [6.66]
   encing entity x):

   ```
   DEPT(deptid,name,establishdate,
   EMP(empid (pk),name,hiredate,salary,commission,managerid(fk[EMP]),
   deptid(fk[DEPT],location)
   ```

   Write the SQL statements for the following queries:

   i. Find the list of employees id, name, mananger's name, his salary status. Salary status is
   determined as follows:

   If salary is above 100000 then it gets the status *high*. If it is between 50000 and 100000
   then it is *moderate*, else it is *low*.

   ii. Find the list of department name, establishdate along with its total number of employees.

   iii. Remember the salary in the table indicates basic salary for the employee. Total salary for
   a particular employee is calculated as follows:

   - House rent is 40% of the basic
   - Transport allowance is 10% of the basic
   - Excellence bonus is 150% of the COMMISSION (if any value exists). Remember there
     may be some *null values*.

Total Salary = House rent + Transport allowance + Excellence bonus

   Now write an SQL to list all employees along with their first name and total salary (in
   decreasing order of the salary).

   (b) Consider the EMP table of Question 2.(a). Write a function *getstatus* as directed below: Input: [6]
   ID Output: status Algorithm: If total *yearly salary* is below 500000 then the status is POOR. If
   it is between 500000 and 800000 then it is ORDINARY, otherwise it is GOOD. (Remember the
   salary given in table EMP is the salary per month and total salary is calculated as mentioned
   in Question 2.(a)).

(c) Consider the EMP table as described in Question 2.(a). The programmer designed the ID such that it conveys some useful information. So the format of ID becomes DESIGNA-TION.DOB.NNN, where DOB is the date of birth and NNN is the sequential increment number. [4]

Your task is to criticize this design with appropriate arguments.

3. (Compulsory)

Consider the following scenario:

ABC is a large bank with few hundreds of *branches* located at different parts of the country. *Customers* must provide their *profile information* such as Name, Date of Birth, Address before opening any *account*. Once a customer's profile is available he/she can open multiple accounts reusing the profile information. After opening account regular *transactions* are made. There are two types of transactions such as withdraw and deposit. Apart from personal account, any *organization* can open account. For an *organization only one person* (existing customer) must be attached to the account who will be the operating person on behalf of the organization.

Bank offers loans. Only existing customers who have valid accounts are primarily eligible for getting a loan. There are 3 types of loan schemes such as Platinum, Gold and Silver . Each loan has its own properties as described in table 1.

Table 1: Properties of loan schemes for Question No. 3

Loan Scheme	No. of Instalment	Interest Rate (per year)	Eligibility
Platinum	60	5	Total Transaction (i.e. add both types of transactions) in the last 12 months must be ≥ 2000000
Gold	36	8	Total Transaction in the last 12 months must be between 2000000 and 1500000
Silver	24	12	Total Transaction in the last 12 months must be between 1500000 and 1000000

Your tasks are:

(a) Design the ER diagram and write the required DDLs to reflect your design. [4]

(b) Write a function to assign a customer to a specific category of loans as mentioned. (assume that each customer makes regular transactions such as deposit and withdraw). [4]

Input: Account No.

Output: Rejected or Accepted, if Accepted it should also show which type of loan can be granted based on the *Eligibility* parameter as described in table.

(c) Once a customer is assigned to a specific loan scheme, write a procedure to schedule the loan. Assume each installment must be paid after 1 month interval (i.e Monthly payment). This procedure may have additional procedure or function. [8.66]

Input: Account No, Loan Scheme, Total Amount, Starting Date of Payment.

Note: After approving a loan the Customer receives an amount of Total Amount but in return he/she must pay back a *Total Payback Amount* of (Total Amount + x) where x is the total interest amount to be paid over the entire period.

Output: It will schedule n number of equal installments based on *Total Payback Amount* and No. of Instalment EMP of that particular loan scheme. The schedule information should include: account no, loan scheme, Instalment no.(starts from 1 to n),Instalment amount (i.e. *Total Payback Amount* will be equally distributed), Payment Date (i.e. after every 6 months from

the Starting Date), Payment Status. All fields except Payment Status should be initialised by the procedure. Payment Status should be set to null.

4. (a) Consider the table *citizens(id, name, dob, salary)*. The Government of Bangladesh (GOB) has created one fund of total BDT *total_aid_amount*.   [8.66]

GOB wants to ensure (but can not guarantee) each citizen receives an amount *gob_allownace* such that after receiving it his/her total earning *(i.e. salary + gob_allownace)* is equal to the average income of the country (average is computed before any *gob_allownace* is given). The citizens having more than the average salary of the country are not eligible for this scheme.

For this purpose GOB invites applications from needy and interested people. The applications are stored in *applied(citizen_id, date of application)* table (assume only the valid persons apply). The citizens who have not applied will not be considered even his/her salary is very low.

The citizen (who applied) with the lowest salary will get the highest priority to receive *gob_allownace* and *gob_allownace* amount is determined by the difference of his/her salary and average salary of the citizen. GOB can not ensure sufficient fund for all needy citizens. So the process terminates whenever the fund is exhausted (i.e. *total_aid_amount*=0 or *total_aid_amount is less than the difference of the average salary and the salary of the particular citizen*).

When a citizen receives *gob_allownace* an appropriate update of *citizens* table should be made.

- Your task is to write a procedure *distribute_allowance* satisfying the above requirements. The procedure will take only one IN parameter i.e. *total_aid_amount*.[Hint: use explicit cursor, pay special attention to define the cursor as per the description]

(b) Present the formal definition of data warehouse. Highlight the key features from the definition.   [4]

(c) What are the differences between operational database system and data warehouse? Also explain why people should separate data warehouse from its operational database.   [4]