Education and Research Department

Assignments for RDBMS

June 2004

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Document Revision History

Ver. Revision	Date	Author(s)	Reviewer(s)	Description
V1.0	May 2004	Rakesh Agarwal	Ram Prasad Patnaik, Alok Tiwari	Initial version
Ver 1.1	June 2004	Dharini Venkataraman	Ram Prasad Patnaik, Alok Tiwari	Incorporated new assignment problems and prepared the assignments document in the format suggested by CDM

Contents

Assignment Day 0

RDBMS - PF Link Document

Brief summary of PF project: Assume that telephone directory maintenance project was done for our client's FACILITES department. The brief description and file structures used are given below for your reference.

Files:
Emp Master - E#, Name, Dept#, Location, Telephone#.
Dept Master - Dept#, Dept Name.

These files use fixed length fields.

Description:
There are many departments in the Organization.
One employee belongs to one department only.
One department can have many employees.
When a new employee joins, a new emp# is generated by the system. (one up)
When a new employee joins - his name, dept# are entered thru the employee maintenance screen. The dept# should be validated against the existing departments in the department master file. Other details are populated on the screen.
An employee may have zero or one telephones. (Can not have more than one.)
When a telephone is to be assigned, existing telephones in the department are checked and a new, suitable telephone number is generated by the system.
When a telephone is to be re-assigned to another person (using edit screen), system should check, if that person is already having a telephone. (One employee can not have more than one telephone.)
When an employee resigns, his record is removed from the file - (by populating blanks.)

Some queries:
For a given employee - find out the department name.
Find the first five employees of a given department and list them in the ascending order (of their telephone numbers?).

Client Requests Log

Some of the maintenance requests that came from different departments of our client at different times are listed below. For these requests, you have to provide a report on the changes to be made with the following details-
Action plan (Best approach. How you plan to fulfill the request, with in the given limitations / constraints)
File structure for this application

At the end of each request an action note was added which indicates what was done to the request. The action note may be abandoned or completed.

If the action note specifies the request is completed, it assumes whatever solution you are proposing for the request is accepted and completed. Any later request should assume that the solution provided by you is implemented and is in place and your analysis should start from there. Whenever files belonging to one department are modified, ensure that the other departments application will not get affected.

Request 1:
From: ABC Inc, Facilities Dept.
Date: 10 Jan 2000

Existing Systems: One developed by you earlier. (PF project)

Description: We find that some employee names are truncated (data length in the file is 20 characters only). We analyzed the situation and found that - we need to increase the length of name stored in the file to 50. Do the needful.

Action note: Completed by 20 Jan 2000.

Request 2:
From: ABC Inc, Finance Dept.
Date: 10 Mar 2000

Existing Systems: None

Description: We are going to develop a new application to print salary slips at the end of month. These salary slips will be posted to our employees' residential address. This application needs to print - E#, Name and Designation and salary apart from address. Do the needful.

Note 1: Our FACILITIES department stores employee information in Emp Master file. As you can see, our application also uses that information. They allowed us to use the file. We can use the file as it is, or with modifications. However, they do not want any changes to their existing application.

Note 3: Address contains House No, Street, City, State and PINCODE.

Action note: Completed on 20 Apr 2000.

Request 3:
From: ABC Inc, Facilities Dept.
Date: 6 June 2000

Existing Systems: One completed by you in request 1.

Description: Due to changing business needs, our FACILITES department decided to make the following changes to it's existing application.
There is no limit on the number of telephones a person can have (0 or Many)
Many users may share one telephone. However, all of them should be from the same department.
We also would like to change our application to list out details of all employees of a given department, in the ascending order of their telephone numbers.

Make the necessary changes to the application and file systems.

Action note: Completed on 10 Aug 2000.

Request 4:
From: ABC Inc, Finance Dept.
Date : 29 Aug 2000

Existing Systems: One completed by you in request 2.

Description: Our finance department has decided to implement the following.

All Employees in the organization can view all details of any other employee - except salary.
Any employee can change his address.
Head of a department should be allowed to see all details of employees belonging to his department (only), and modify their designation and salary details. (When he sees details of an employee, who belongs to another department - he must be seen as a normal employee.)
It should never be possible - in any case - for an employee to modify his salary details. (Even if he writes his own application.)

Action note: Completed today?

Assignment Day 1

1. A database used in an order-entry system is to contain information about customers, items, and orders. The following information is to be included:

For each customer:

Customer number (Unique)
Valid "Ship-to" addresses (several per customer)
Balance
Credit limit
Discount

For each order:

Heading information: customer #, "ship-to" address, date of order
Detail lines (several per order), each given item number, quantity ordered

For each item:

Item number (unique)
Manufacturing plants
Quantity on hand at each plant
Stock danger level for each plant
Item description

For internal processing reasons a "quantity outstanding" value is associated with each detail line of each order. This value is initially set equal to the quantity of the item ordered & is (progressively) reduced to zero as partial shipments are made.

Design an ER diagram. (Make semantic assumptions that seem necessary)

2. Draw an ER diagram to capture the requirements as stated below:

A database is needed to capture information pertaining to the running of various clubs by the recreation cell of an institution.

Details such as name, date of birth, gender are needed for each member.

Club details are needed such as the activity type (oratorical, music, dance, instrumental music etc) and contact phone number.

Team details required include team name and the days on which the team practices.

Tutor details such as tutor name, address and telephone number are also needed, along with details of the skill each tutor is qualified in.

Rules governing the involvement of members and tutors in the teams and clubs are as follows: members may head only one team and every team has to have a head. Tutors teach at least one team and every team has at least one tutor.

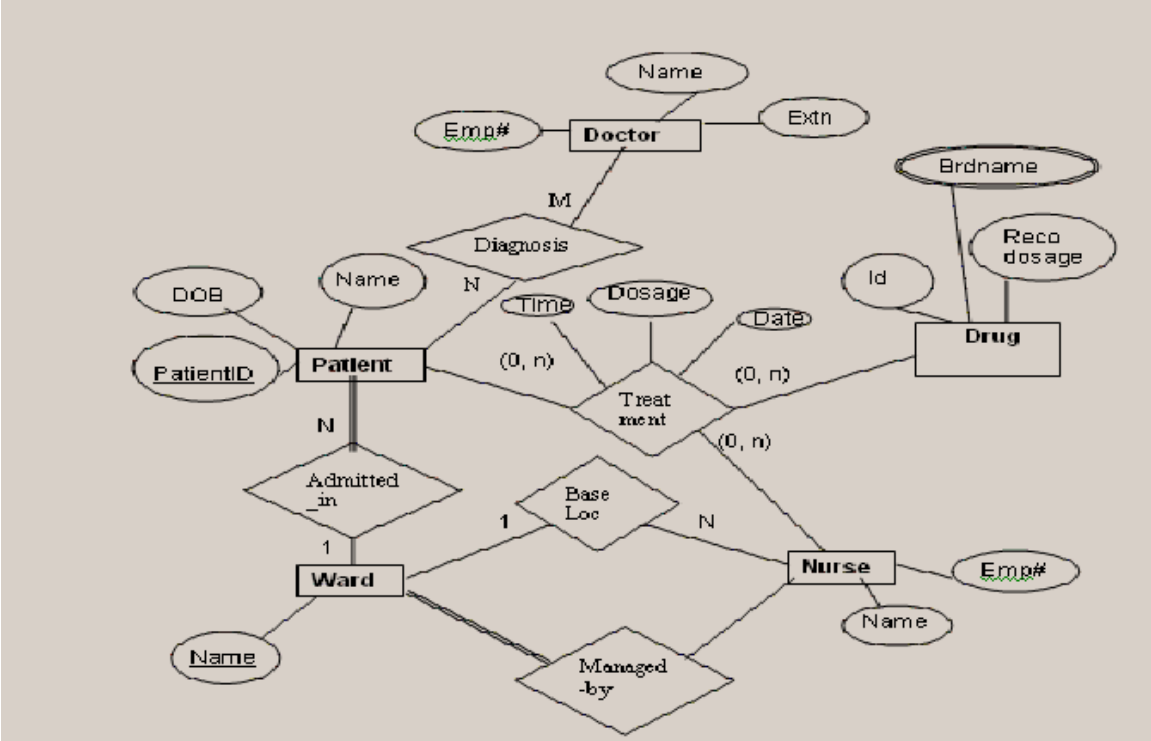
Every member must belong to at least one team and each team has a number of members.

Every team must belong to a club and clubs must have at least one team.

Every club has a member who is the president but a member may only be president of one club.

Assignment Day 2

1. Convert the ER model into a relational Schema



2. Normalize the given table to 2NF and 3 NF

Details:
HappyHome supermarket deals with groceries, household items, stationary products and gift items. They have announced a summer mela where, for every customer who holds a membership with HappyHome, any three items can be taken for free. The total price of the three items should be equal to or below rs.1000. They record details of these free products given to their member customers in a table as below:

Invoice #	Membership#	Cust name	Address	Item 1	Qty	Amt	Item2	Qty	Amt	Item 3	Qty	Amt

Assignments Day 3

1. **Create a database called COMPANY consisting of two tables - EMP & DEPT**

EMP

Column name	Data type	Description
EMPNO	Number	Employee number
ENAME	Varchar	Employee name
JOB	Char	Designation
MGR	Number	Manager's Emp. number
HIREDATE	Date	Date of joining
SAL	Number	Basic Salary
COMM	Number	Commission
DEPTNO	Number	Department Number

DEPT

Column name	Data type	Description
DEPTNO	Number	Department number
DNAME	Varchar	Department name
LOC	Varchar	Location of department

Data for EMP

7369	Smith	Clerk	7902	17/12/80	800		20
7499	Allen	Salesman	7698	20/2/81	1600	300	30
7521	Ward	Salesman	7698	22/2/81	1250	500	30
7566	Jones	Manager	7839	2/4/81	2975		20
7654	Martin	Salesman	7698	28/9/81	1250	1400	30
7698	Blake	Manager	7839	1/5/81	2850		30
7782	Clark	Manager	7839	9/6/81	2450		10
7788	Scott	Analyst	7566	9/12/82	3000		20
7839	King	President		17/11/81	5000		10
7844	Turner	Salesman	7698	8/9/81	1500	0	30
7876	Adams	Clerk	7788	12/1/83	1100		20
7900	James	Clerk	7698	3/12/81	950		30
7902	Ford	Analyst	7566	4/12/81	3000		20
7934	Miller	Clerk	7782	23/1/82	1300		10

Data for DEPT table

10	Accounting	New York
20	Research	Dallas
30	Sales	Chicago
40	Operations	Boston

2. **Perform the following queries on the tables just created :**

1. List the names of analysts and salesmen.
2. List details of employees who have joined before 30 Sep 81.
3. List names of employees who are not managers.
4. List the names of employees whose employee numbers are 7369, 7521, 7839, 7934, 7788.
5. List employees not belonging to department 30, 40, or 10.
6. List employee names for those who have joined between 30 June and 31 Dec. ‘81.
7. List the different designations in the company.
8. List the names of employees who are not eligible for commission.
9. List the name and designation of the employee who does not report to anybody.
10. List the employees not assigned to any department.
11. List the employees who are eligible for commission.
12. List employees hose names either start or end with “S”.
13. List names of employees whose names have “i” as the second character.
14. List the number of employees working with the company.
15. List the number of designations available in the EMP table.
16. List the total salaries paid to the employees.
17. List the maximum, minimum and average salary in the company.
18. List the maximum salary paid to a salesman.

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Assignment Day 4

1) Please refer to the tables created as a part of Assignment 3. Perform the following queries against those tables:

    1) List the number of employees and average salary for employees in department 20.
    2) List name, salary and PF amount of all employees. (PF is calculated as 10% of basic salary)
    3) List names of employees who are more than 2 years old in the company.
    4) List the employee details in the ascending order of their basic salary.
    5) List the employee name and hire date in the descending order of the hire date.
    6) List employee name, salary, PF, HRA, DA and gross; order the results in the ascending order of gross. HRA is 50% of the salary and DA is 30% of the salary.
    7) List the department numbers and number of employees in each department.
    8) List the department number and total salary payable in each department.
    9) List the jobs and number of employees in each job. The result should be in the descending order of the number of employees.
    10) List the total salary, maximum and minimum salary and average salary of the employees jobwise.
    11) List the total salary, maximum and minimum salary and average salary of the employees, for department 20.
    12) List the total salary, maximum and minimum salary and average salary of the employees jobwise, for department 20 and display only those rows having an average salary > 1000

2) The following questions pertain to a database with the following tables.

Suppliers - S (S#, Name, Status, City)
Parts - P (P#, Pname, Colour, Weight, City)
Projects - J (J#, Jname, City)
Shipment - SPJ (S#, P#, J#, Qty)

The significance of an SPJ record is that the specified supplier supplies the specified part to the specified project in the specified quantity (and the combination S#-P#-J# uniquely identifies such a record).

1. Get full details of all projects in London.
2. Get S# for suppliers who supply project J1.
3. Get all part-color/part-city combinations.
4. Get all S#/P#/J# triples such that all are co-located.
5. Get al S#, P#, J# triples such that they are not all co-located.
6. Get P# for parts supplied by a supplier in London.

7. Get all pairs of cities such that a supplier in the first city supplies to a Project in the second city.
8. Get J# for projects supplied by at least one supplier not in the same city.
9. Get all pairs of part numbers such that some supplier supplies both the indicated parts.
10. Get the total quantity of part P1 supplied by S1.
11. For each part supplied to a project, get the P#, J# and corresponding total quantity.
12. Get P# of parts supplied to some project in an average quantity > 320.
13. Get project names for projects supplied by supplier S1.
14. Get colors of parts supplied by S1.
15. Get J# for projects using at least one part available from supplier S1.
16. Get supplier numbers for suppliers supplying at least one part supplied by at least one supplier who supplies at least one red part.
17. Get supplier numbers for suppliers with a status lower than that of supplier S1.
18. Get project numbers for projects not supplied with any red part by any London supplier.

Assignment Day 5

1) Write the SQL commands to create a database schema for the following relational schema:

CUSTOMER (CUST_ID, CUST_NAME, ANNUAL_REVENUE, CUST_TYPE)
CUST_ID must be between 100 and 10,000
ANNUAL_REVENUE defaults to $20,000
CUST_TYPE must be manufacturer, wholesaler, or retailer

SHIPMENT (SHIPMENT_#, CUST_ID, WEIGHT, TRUCK_#, DESTINATION, SHIP_DATE)
Foreign Key: CUST_ID REFERENCES CUSTOMER, on deletion cascade
Foreign Key: TRUCK_# REFERENCES TRUCK, on deletion set to null
Foreign Key: DESTINATION REFERENCES CITY, on deletion set to null
WEIGHT must be under 1000 and defaults to 10

TRUCK (TRUCK_#, DRIVER_NAME)

CITY (CITY_NAME, POPULATION)

Perform the following queries:

1. What are the names of customers who have sent packages (shipments) to Sioux City?
2. To what destinations have companies with revenue less than $1 million sent packages?
3. What are the names and populations of cities that have received shipments weighing over 100 pounds?
4. Who are the customers having over $5 million in annual revenue who have sent shipments weighing less than 1 pound?
5. Who are the customers having over $5 million in annual revenue who have sent shipments weighing less than 1 pound or have sent a shipment to San Francisco?
6. Who are the drivers who have delivered shipments for customers with annual revenue over $20 million to cities with populations over 1 million?
7. List the cities that have received shipments from customers having over $15 million in annual revenue.
8. List the names of drivers who have delivered shipments weighing over 100 pounds.
9. List the name and annual revenue of customers who have sent shipments weighing over 100 pounds.
10. List the name and annual revenue of customers whose shipments have been delivered by truck driver Jensen.
11. List customers who had shipments delivered by every truck. (use NOT EXISTS)
12. List cities that have received shipments from every customer. (use NOT EXISTS)

13. List drivers who have delivered shipments to every city. (use NOT EXISTS)
14. Customers who are manufacturers or have sent a package to St. Louis.
15. Cities of population over 1 million which have received a 100-pound package From customer 311.
16. Trucks driven by Jake Stinson which have never delivered a shipment to Denver.
17. Customers with annual revenue over $10 million which have sent packages under 1 pound to cities with population less than 10,000.
18. Create views for each of the following:
    a. Customers with annual revenue under $1 million.
    b. Customers with annual revenue between $1 million and $5 million.
    c. Customers with annual revenue over $5 million.

19. Use these views to answer the following queries:
    a. Which drivers have taken shipments to Los Angeles for customers with revenue over $5 million?
    b. What are the populations of cities which have received shipments from customers with revenue between $1 million and $5 million?
    c. Which drivers have taken shipments to cities for customers with revenue under $1 million, and what are the populations of those cities?