School of Computing Science and Engineering

BTech CSE – V Sem

Database Systems Lab

Aim: To study Data Definition and Data Manipulation commands.

Consider the following schema:

Table Name: Employee

Attribute	Data Type
First Name	VARCHAR(15)
Mid Name	CHAR(2)
Last Name	VARCHAR(15)
SSN Number	CHAR(9)
Birthday	DATE
Address	VARCHAR(50)
Sex	CHAR(1)
Salary	NUMBER (7)
Supervisor SSN	CHAR(9)
Department Number	NUMBER (5)

Table Name: Department

Attribute	Data Type
Department Name	Varchar(15)
Department Number	Number(5)
ManagerSSN	CHAR(9)
ManageStartDate	DATE

Table Name: Project

Attribute	Data Type
Project Name	VARCHAR(15)
Project Number	NUMBER(5)
Project Location	VARCHAR(15)
Department Number	NUMBER(5)

Data For Employee Table

FName	Minit	LName	SSN	BDate	Address	Sex	Salary	SuperSSN	DepNo
Doug	E	Gilbert	554433221	09-JUN-1975	11 S 59 E, Salt Lake City, UT	M	80000	NULL	3
Joyce		PAN	543216789	07-FEB-1980	35 S 18 E, Salt Lake City, UT	F	70000	NULL	2
Frankin	T	Wong	333445555	08-DEC-1985	638 Voss, Houston, TX	M	40000	554433221	5
Jennifer	S	Wallace	987654321	20-JUN-1977	291 Berry, Bellaire, TX	F	43000	554433221	4
John	B	Smith	123456789	09-JAN-1967	731 Fondren, Houston, TX	M	30000	333445555	5
Ramesh	K	Narayan	666884444	15-SEP-1976	975 Fire Oak, Humble, TX	M	38000	333445555	5
Joyce	A	English	453453453	31-JUL-1973	5631 Rice, Houston, TX	F	25000	333445555	5
James	E	Borg	888665555	10-NOV-1981	450 Stone, Houston, TX	M	55000	543216789	1
Alicia	J	Zelaya	999887777	19-JUL-1972	3321 Castle, Spring, TX	F	25000	987654321	4
Ahmad	V	Jabbar	987987987	29-MAR-1974	980 Dallas, Houston, TX	M	25000	987654321	4

Data For Department table

DName	DepNo	MgrSSN	MgrStartDate
Manufacture	1	888665555	19-JUN-2006
Administration	2	543216789	04-JAN-2010
Headquarter	3	554433221	22-SEP-2011
Finance	4	987654321	01-JAN-2007
Research	5	333445555	22-MAY-2008

Data For Project

PName	PNumber	Plocation	DepNo
ProjectA	3388	Houston	1
ProjectB	1945	Salt Lake City	3
ProjectC	6688	Houston	5
ProjectD	2423	Bellaire	4
ProjectE	7745	Sugarland	5
ProjectF	1566	Salt Lake City	3
ProjectG	1234	New York	2
ProjectH	3467	Stafford	4
ProjectI	4345	Chicago	1
ProjectJ	2212	San Francisco	2

Exercise-I: (outcome: b , c and k)

1. Insert the data given above in both employee, department and project tables. -b
2. Display all the employees' information. - k
3. Display Employee name along with his SSN and Supervisor SSN. - k
4. Display the employee names whose bdate is '29-MAR-1959'. - k
5. Display salary of the employees without duplications. - k
6. Display the MgrSSN, MgrStartDate of the manager of 'Finance' department. - k
7. Modify the department number of an employee having fname as 'Joyce' to 5 - b
8. Alter Table department add column DepartmentPhoneNum of NUMBER data type and insert values into this column only. - b
9. Alter table department to modify the size of DepartmentPhoneNum. - b
10. Modify the field name DepartmentPhoneNum of departments table to PhNo. - b
11. Rename Table Department as DEPT. - c
12. Alter Table department remove column PhNo. - b
13. Create a table COPYOFDEPT as a copy of the table DEPT. - c
14. Delete all the rows from COPYOF DEPT table. - b
15. Remove COPYOF DEPT table. - c

Exercise: II (outcome : b)

Aim: To know how the constraints are used to make table is consistent.

Table Name: Employee

Attribute	Data Type	Constraint
First Name	Varchar (15)	Not Null
Mid Name	Char(2)	
Last Name	Varchar (15)	Not Null
SSN Number	Char (9)	Primary Key
Birthday	Date	
Address	Varchar (50)	
Sex	Char(1)	Sex In (M,F,m,f)
Salary	Number (7)	Default 800
Supervisor SSN	Char (9)	Foreign Key Employee (SSN) on delete set null
Department number	Number(5)	Foreign key to department number of department table on delete cascade

Table Name : Department

Attribute	Data type	Constraint
Department Name	Varchar(15)	Not Null
Department number	INT(5)	Primary key
Manager SSN	Char (9)	Foreign key-Employee (SSN) on delete set null
Manage start date	Date	

Table Name : Dept_locations

Attribute	Data type	Constraint
Department Number	Number(5)	Department (dep no) onDelete Cascade
Department Location	Varchar (15)	

Table Name: Project

Attribute	Data type	Constraint
Project Name	Varchar2(15)	Not Null
Project number	Number(5)	Primary key
Project Location	Varchar2(50)	
Department Number	Number(5)	Foreign Key –Department (dep no) on delete set null

Table Name: Works_On

The combination of Employee SSN and Project Number must be a Primary Key

Attribute	Data type	Constraint
Employee SSN	Char (9)	Foreign Key Employee (SSN) on delete cascade
Project number	INT(5)	Foreign Key project (Pnumber) on delete cascade
Hours	Decimal (3,1)	Not null

Name: Dependent

The combination of Employee SSN and Dependent Name must be a Primary Key.

Attribute	Datatype	Constraint
Employee	Char (9)	Foreign Key- Employee (SSN) on Delete Cascade
Dependent Name	Varchar(15)	
Sex	Char(1)	Check Sex in (M,F,m,f)
Birthday	Date	
Relationship	Varchar(8)	

Data for table - Dept_Locations

Dep No	D Location
1	Houston
1	Chicago
2	New York
2	San Francisco
3	Salt Lake City
4	Stafford
4	Bellaire
5	Sugarland
5	Houston

Data for Table - Dependent

ESSN	Dependent_name	Sex	Bdate	Relationship
333445555	Alice	F	05-Apr-76	Daughter
333445555	Theodore	M	25-Oct-73	Son
333445555	Joy	F	03-May-48	Spouse
987654321	Abner	M	29-Feb-32	Spouse
123456789	Alice	F	31-Dec-78	Daughter
123456789	Elizabeth	F	05-may-57	Spouse

Data for Table - Works_On

ESSN	Pno	Hours
123456789	3388	32.5
123456789	1945	7.5
666884444	3388	40.0
453453453	7745	20.0
453453453	2212	20.0
333445555	7745	10.0
333445555	6688	10.0
333445555	4345	35.0
333445555	2212	28.5
999887777	2212	11.5
543216789	2212	17.0
554433221	1945	21.5

Execute the following Query on the Db to display and discuss the integrity constraints violated by any of the following operations

1. Insert ('Robert', 'F', 'Scott', '943775543', '21-JUN-1975', '2365 Newcastle Rd, Bellaire, TX', M, 58000, '888665555', 1) into EMPLOYEE.
2. Insert ('677678989', null, '40.0') into WORKS_ON.
3. Insert ('453453453', 'John', M, '12-DEC-1983', 'SPOUSE') into DEPENDENT
4. Delete the WORKS_ON tuples with ESSN= '333445555'.
5. Modify the MGRSSN and MGRSTARTDATE of the DEPARTMENT tuple with DNUMBER=5 to '123456789' and '01-OCT-88', respectively.

Alter the tables to

1. Add Foreign Keys using Alter Table [if not done earlier].
2. Drop Foreign key defined on SuperSSN and add it using Alter table command.
3. Make name of Project as Unique and sex of employee as not null.
4. In the copy table add the columns door no, street, city, State, Continent.
5. Make salary of employee to accept real values.

Exercise: III (outcome: e)

Operators and Functions

Aim: To understand different operators and types of function in SQL

Execute the following queries based on the schema specified in exercise 1

1. Retrieve the SSN and Last name of employees who were born in May Month.
2. Retrieve the employee details whose salary is less than 25000 and greater than 10000
3. List the employees with Supervisors
4. List the employees whose department number is not null
5. List employees whose last name is Abraham and first name is “joyce” or “paul”
6. Select the employees with a last name equal to "Smith" or "Narayan" or “Borg”
7. Retrieve the details of employee SSN Supervisor no and years of experience equals five
8. Display the bdate of employees in the format ‘DD-Month-YYYY’
9. List the employees who were born on or before 1980.
10. Display the manager ssn having ‘facture’ in their department name.
11. Retrieve the project locations starting with ‘H’.
12. Retrieve the department names ending with ‘e’.
13. Display the names of all the employees having supervisor with any of the following SSN 554433221, 333445555.
14. Display the employee first name in Upper case and last name in lower case.
15. Retrieve the employee first name and the first character of last name using substring function.
16. Display the substring of the Address (starting from 5th position to 11 th position) of all employees
17. Display the Mgr start date on adding three months to it.
18. Derive the age of all the employees rounded to two digits
19. Increment the salary of employees by Rs.50000 whose Department number is 3210.
20. Display Managers whose join date is between January 2011 to December 2011.
21. Display the length of address field from employee table
22. Display the employee name and the salary rounded to the nearest integer

23. Concatenate name, designation, salary from employee table in the format “x ||is a|| supervisor|| with salary ||35000”.
24. List employees whose surname is narayan and lives in city Chennai
25. List the employees list by joining date in descending order

Exercise IV (outcome: e)

Group Functions

1. How many male employees have supervisor with number 333445555?
2. Print each department name along with its average , maximum and minimum salary
3. Find out the number of employees over 40 years of age
4. Display the number of employees along with department number in which employee middle name is ‘E’
5. Determine the minimum salary drawn by employees in each department.
6. Calculate average salary of employees over 40 years of age
7. Display total number of employees and total salary drawn in each department
8. List out junior most employee in research and finance departments
9. How many employees are there in each department with middle name as ‘E’?
10. Get the number of employees and their department who are from ‘Houston’

Exercise V (outcome l)

Subquery and View

1. List the First name of the employees who has dependents.
2. Find the Manager who gets highest salary among managers.
3. List the SSN of employees in department number 5 who gets more salary than all of the employees of department number 4.
4. Display the department name whose projects are not functioning in Houston.
5. List the managers to whom at least one employee is reporting to them.
6. List the departments that do not have any employees .
7. Find the employee who is getting the minimum salary among all of his colleagues.

8. List the First Name of employees in department number 5 who gets more salary when compared to that of employees in department 4.
9. Create a virtual table containing the details of employees working in department number 3.
10. Create a view to store the first name, SSN of employees and corresponding project names.

Exercise VI (outcome l)

Joins

1. Find the names of employees whose department location is ‘Houston’
2. Find the subordinates of ‘Doug E Gilbert’ to two immediate levels.
3. Find the name of employee who work and control the maximum number of projects.
4. Find the names of employees who work on maximum number of projects.
5. List the manager names whose department does not control any project.
6. Display the first names of employees along with the project names for employees who work in departments 3,4 and 5.
7. Display the first name and SSN of employees along with the project names for employees whose project location is 'salt lake city'.
8. List the total working hours of employees according to their departments.
9. List the details of managers dependents.
10. Display the details of employees who are getting minimum salary in their project.

Mini Project (Start after CAT-I) (outcome: m)

Choose a Mini Project and apply the data base concepts as given below.

1. **Draw ER Diagram**
2. **ER-to -Relational Mapping**
3. **Table Creation**
4. **Establish the relationship between relevant tables**
5. **Apply Normalization (if necessary)**
6. **Create GUI**

7. **Establish Connection between front end and back end as Oracle (Choose any front end tool like VB,VC++, .NET ,Java etc.,)**
8. **Prepare Project Report**
9. **Demonstration & Presentation(PPT)**

Sample Projects:

1. **Library Management System**
2. **Airline Reservation System**
3. **Hospital Management System**
4. **Proctor Management System**
5. **Hostel Management System**

Sample ER –to-Relational Mapping for reference: