School of Computing Science and Engineering

BTech CSE

Database Management 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-60	11 S 59 E, Salt Lake City, UT	M	80000	NULL	3
Joyce		PAN	543216789	07-FEB-78	35 S 18 E, Salt Lake City, UT	F	70000	NULL	2
Frankin	T	Wong	333445555	08-DEC-45	638 Voss, Houston, TX	M	40000	554433221	5
Jennifer	S	Wallace	987654321	20-JUN-31	291 Berry, Bellaire, TX	F	43000	554433221	4
John	B	Smith	123456789	09-JAN-55	731 Fondren, Houston, TX	M	30000	333445555	5
Ramesh	K	Narayan	666884444	15-SEP-52	975 Fire Oak, Humble, TX	M	38000	333445555	5
Joyce	A	English	453453453	31-JUL-62	5631 Rice, Houston, TX	F	25000	333445555	5
James	E	Borg	888665555	10-NOV-27	450 Stone, Houston, TX	M	55000	543216789	1
Alicia	J	Zelaya	999887777	19-JUL-58	3321 Castle, Spring, TX	F	25000	987654321	4
Ahmad	V	Jabbar	987987987	29-MAR-59	980 Dallas, Houston, TX	M	25000	987654321	4

Data For Department table

DName	DepNo	MgrSSN	MgrStartDate
Manufacture	1	888665555	19-JUN-71
Administration	2	543216789	04-JAN-99
Headquarter	3	554433221	22-SEP-55
Finance	4	987654321	01-JAN-85
Research	5	333445555	22-MAY-78

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 - 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

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

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-42', '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-60', '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. Find the employee names having salary greater than Rs.25000.
2. Find the employee names whose salary lies in the range between 30000 and 70000.
3. Find the employees who have no supervisor.
4. Display the bdate of all employee s in the format 'DDthMonthYYYY'.
5. Display the employee names whose bdate is on or before 1978.
6. Display the employee names having 'salt lake' in their address.
7. Display the department name that starts with 'M'.
8. Display the department names' that ends with 'E'.
9. Display the names of all the employees having supervisor with any of the following SSN 554433221, 333445555.
10. Display all the department names in upper case and lower case.
11. Display the first four characters and last four of the department names using substring function.
12. Display the substring of the Address (starting from 5^{th} position to 11 th position) of all employees.
13. Display the Mgrstartdate on adding three months to it.
14. Display the age of all the employees rounded to two digits.
15. Find the last day and next day of the month in which each manager has joined.
16. Print a substring from the string 'Harini'.
17. Replace the string 'ni' from 'Harini' by 'sh'.
18. Print the length of all the department names.
19. Print the system date in the format 25 th May 2007.
20. Display the date after 10 months from current date.
21. Display the next occurrence of Friday in this month.

22. Convert SSN of employee to Number format and display.
23. Display the project location padded with **** on left side.
24. Remove the word ‘Project’ from the project name and display it.
25. Select the SSN of the employee whose dependent name is either Michaelor Abner.

Exercise: IV (outcome: e)

Group Functions

1. How many different departments are there in the ‘employee’ table
2. For each department display the minimum and maximum employee salaries
3. Print the average annual salary.
4. Count the number of employees over 30 age.
5. Print the Department name and average salary of each department.
6. Display the department name which contains more than 30 employees.
7. Calculate the average salary of employees by department and age
8. Count separately the number of employees in the finance and research department.
9. List out the employees based on their seniority.
10. List out the employees who works in ‘manufacture’ department group by first name

Exercise: V (outcome: l)

Sub Query and View

Aim: to understand the concept of Sub queries and logical tables in oracle

1. Find the employee who is getting highest salary in the department research
2. Find the employees who earn the same salary as the minimum salary for each Department
3. Find the employee whose salary is greater than average salary of department 2
4. List out all the department names with their individual employees strength
5. Find out the department name having highest employee strength
6. List out all the departments and average salary drawn by their employees
7. Find maximum average salary for each department.
8. Create a view to display the employee details who is working in IT department.
9. Create a logical table to store employee details who is getting salary more than 10000.
10. Create a table to store the employees details based on the department no

Exercise: VI (outcome: l)

Joins

Aim: To understand how to relate and access data from multiple tables.

6. Consider the schema given in exercise 2, and execute the following queries

1. Retrieve the names of all employees in department 5 who work more than 10 hours per week on ProductX project.
2. List the names of all employees who have a dependent with the same first name as themselves.
3. Find the names of all the employees who are directly supervised by 'Franklin Wong'.
4. Retrieve the names of all who do not work on any project.
5. Find the names and addresses of all employees who work on atleast one project located in Houston but whose department has no location in Houston.
6. List the names of all managers who have no dependents.
7. List the employee's names and the department names if they happen to manage a department.
8. For each project retrieve the project number, project name and the number of employees who work on that project.
9. For each project, list the project name and the total hours per week (by all employees) spent on that project.
10. Retrieve the names of the employees who have 2 or more dependents.

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: