Basic SQL queries exercise

Topics:

- Basic SQL commands (DDL and DML)
- Constraints

Create tables:

Table 1:

Table Name: Employee

Attribute	Data Type
First Name	VARCHAR2(15)
Mid Name	CHAR(2)
Last Name	VARCHAR2(15)
SSN Number	CHAR(9)
Birthday	DATE
Address	VARCHAR2(50)
Sex	CHAR(1)
Salary	NUMBER (7)
Supervisor SSN	CHAR(9)
Department Number	NUMBER (5)

Create table employee:

```
Connected to:
Oracle Database 11g Express Edition Release 11.2.0.2.0 - 64bit Production

SQL> CREATE TABLE employee
  2  (firstName VARCHAR(15),
  3  midName CHAR(2),
  4  lastName VARCHAR2(15)
  5  );

Table created.

SQL> desc employee
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 FIRSTNAME                                          VARCHAR2(15)
 MIDNAME                                            CHAR(2)
 LASTNAME                                           VARCHAR2(15)
```

```
SQL> alter table employee
  2  add birthday date
  3  add address varchar2(50)
  4  add sex char(2)
  5  add salary number(7)
  6  add supervisorSNN char(9)
  7  add departmentNumber number(5)
  8  ;

Table altered.

SQL> desc table employee
Usage: DESCRIBE [schema.]object[@db_link]
SQL> desc employee
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 FIRSTNAME                                          VARCHAR2(15)
 MIDNAME                                            CHAR(2)
 LASTNAME                                           VARCHAR2(15)
 SSNNUMBER                                          CHAR(9)
 BIRTHDAY                                           DATE
 ADDRESS                                            VARCHAR2(50)
 SEX                                                CHAR(2)
 SALARY                                             NUMBER(7)
 SUPERVISORSNN                                      CHAR(9)
 DEPARTMENTNUMBER                                   NUMBER(5)

SQL>
```

Table 2:

Table Name: Department

Attribute	Data Type
Department Name	Varchar2(15)
Department Number	Number(5)
ManagerSSN	CHAR(9)
ManageStartDate	DATE

Create table department:

```
SQL> create table department
  2  (
  3  departmentName varchar2(15),
  4  departmentNumber number(5),
  5  managerSSN char(9),
  6  manageStartDate date
  7  );

Table created.

SQL> desc department
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 DEPARTMENTNAME                                     VARCHAR2(15)
 DEPARTMENTNUMBER                                   NUMBER(5)
 MANAGERSSN                                         CHAR(9)
 MANAGESTARTDATE                                    DATE

SQL>
```

Table 3:

Table Name: Project

Attribute	Data Type
Project Name	VARCHAR2(15)
Project Number	NUMBER(5)
Project Location	VARCHAR2(15)
Department Number	NUMBER(5)

Create table project:

```
SQL> create table project
  2  (
  3  projectName varchar2(15),
  4  projectNumber number(5),
  5  projectLocation varchar2(15),
  6  departmentNumber number(5)
  7  );

Table created.

SQL> desc project
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 PROJECTNAME                                        VARCHAR2(15)
 PROJECTNUMBER                                      NUMBER(5)
 PROJECTLOCATION                                    VARCHAR2(15)
 DEPARTMENTNUMBER                                   NUMBER(5)
```

Q 1- Insert the data given above in employee, department and project tables.

Data insertion for table employee

```
SQL> insert into employee
  2  values ('Doug','E','Gilbert','554433221','09-JUN-60','11 S 59 E, Salt Lake City, UT','M','80000','NULL','3');
```

```
SQL> insert into employee
  2  values('Joyce','','PAN','543216789','07-FEB-78','35 S 18 E, Salt Lake City, UT','F','70000','NULL','2');
```

```
SQL> insert into employee
  2  values('frankin','t','wong','333445555','08-dec-45','638 voss, houston, tx','m','40000','554433221','5');
```

```
SQL> insert into employee
  2  values('jennifer','s','wallance','987654321','20-jan-31','291 berry bellaire, TX','f',43000,'554433221',4);

1 row created.

SQL> insert into employee
  2   values('Johny','B','Smith','123456789','09-JAN-55','731 Fondren,Houston, TX','M',30000,'333445555',5);

1 row created.

SQL> insert into employee
  2  values('Ramesh','K','Narayan','666884444','15-SEP-52','975 Fire Oak,Humble, TX','M',38000,'333445555',5);

1 row created.

SQL> insert into employee
  2  values('Joyce', 'A', 'English', '453453453', '31-JUL-62','5631 Rice,Houston, TX', 'F', 25000, '333445555', 5);

1 row created.

SQL> insert into employee
  2  values('James', 'E', 'Borg', '888665555', '10-NOV-27', '450 Stone,Houston, TX', 'M', 55000 ,'543216789', 1);

1 row created.

SQL> insert into employee
  2  values('Alicia', 'J', 'Zelaya', '999887777', '19-JUL-58', '3321 Castle,Spring, TX', 'F', 25000 ,'987654321', 4);

1 row created.

SQL> insert into employee
  2  values('Ahmad', 'V', 'Jabbar', '987987987', '29-MAR-59','980 Dallas,Houston, TX', 'M', 25000, '987654321', 4);

1 row created.

SQL>
```

View table department

```
SQL> select * from employee;

FIRSTNAME       MI LASTNAME        SSNNUMBER BIRTHDAY
--------------- -- --------------- --------- ---------
ADDRESS                                           SE     SALARY SUPERVISO
------------------------------------------------- -- ---------- ---------
DEPARTMENTNUMBER
----------------
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

FIRSTNAME       MI LASTNAME        SSNNUMBER BIRTHDAY
--------------- -- --------------- --------- ---------
ADDRESS                                           SE     SALARY SUPERVISO
------------------------------------------------- -- ---------- ---------
DEPARTMENTNUMBER
----------------

frankin         t  wong            333445555 08-DEC-45
638 voss, houston, tx                             m       40000 554433221
               5

jennifer        s  wallance        987654321 20-JAN-31
291 berry bellaire, TX                            f       43000 554433221

FIRSTNAME       MI LASTNAME        SSNNUMBER BIRTHDAY
--------------- -- --------------- --------- ---------
ADDRESS                                           SE     SALARY SUPERVISO
------------------------------------------------- -- ---------- ---------
DEPARTMENTNUMBER
----------------
               4

Johny           B  Smith           123456789 09-JAN-55
731 Fondren,Houston, TX                           M       30000 333445555
               5
```

```
Johny           B  Smith          123456789 09-JAN-55
731 Fondren,Houston, TX                          M       30000 333445555
              5

Ramesh          K  Narayan         666884444 15-SEP-52

FIRSTNAME       MI LASTNAME       SSNNUMBER BIRTHDAY
--------------- -- --------------- --------- ---------
ADDRESS                                          SE     SALARY SUPERVISO
------------------------------------------------- -- ---------- ---------
DEPARTMENTNUMBER
---------------
975 Fire Oak,Humble, TX                          M       38000 333445555
              5

Joyce           A  English        453453453 31-JUL-62
5631 Rice,Houston, TX                            F       25000 333445555
              5


FIRSTNAME       MI LASTNAME       SSNNUMBER BIRTHDAY
--------------- -- --------------- --------- ---------
ADDRESS                                          SE     SALARY SUPERVISO
------------------------------------------------- -- ---------- ---------
DEPARTMENTNUMBER
---------------
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

FIRSTNAME       MI LASTNAME       SSNNUMBER BIRTHDAY
--------------- -- --------------- --------- ---------
ADDRESS                                          SE     SALARY SUPERVISO
------------------------------------------------- -- ---------- ---------
DEPARTMENTNUMBER
---------------
```

```
FIRSTNAME       MI LASTNAME       SSNNUMBER BIRTHDAY
--------------- -- --------------- --------- ---------
ADDRESS                                          SE     SALARY SUPERVISO
------------------------------------------------- -- ---------- ---------
DEPARTMENTNUMBER
---------------

Ahmad           V  Jabbar         987987987 29-MAR-59
980 Dallas,Houston, TX                           M       25000 987654321
              4


10 rows selected.

SQL> _
```

Data insertion for department table

```
Enter user-name: system
Enter password:

Connected to:
Oracle Database 11g Express Edition Release 11.2.0.2.0 - 64bit Production

SQL> insert into department
  2  values('Manufacture', 1, '888665555', '19-JUN-71');

1 row created.

SQL> insert into department
  2  values('Administration', 2,'543216789', '04-JAN-99');

1 row created.

SQL> insert into department
  2  values('Headquarter', 3, 554433221 22-SEP-55);
values('Headquarter', 3, 554433221 22-SEP-55)
                                   *
ERROR at line 2:
ORA-00917: missing comma


SQL> insert into department
  2  values('Headquarter', 3, '554433221', '22-SEP-55');

1 row created.

SQL> insert into department
  2  values('Finance', 4, '987654321', '01-JAN-85');

1 row created.

SQL> insert into department
  2  values('Research', 5, '333445555', '22-MAY-78');
```

View department table:

```
SQL> select * from department;

DEPARTMENTNAME  DEPARTMENTNUMBER MANAGERSS MANAGESTA
--------------- ---------------- --------- ---------
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

SQL>
```

```
SQL> insert into project
  2  values('ProjectA', 3388, 'Houston', 1);

1 row created.

SQL> insert into project
  2  values('ProjectB',1945, 'Salt Lake City', 3);

1 row created.

SQL> insert into project
  2  values('ProjectC',6688 ,'Houston', 5);

1 row created.

SQL> insert into project
  2  values('ProjectD',2423, 'Bellaire', 4);

1 row created.

SQL> insert into project
  2  values('ProjectE',7745, 'Sugarland', 5);

1 row created.

SQL> insert into project
  2  values('ProjectE',1566, 'Salt Lake City', 3);

1 row created.
```

```
SQL> insert into project
  2  values('ProjectG',1234, 'New York', 2);

1 row created.

SQL> insert into project
  2  values('ProjectH',3467, 'Stafford', 4);

1 row created.

SQL> insert into project
  2  values('ProjectI',4345 ,'Chicago' ,1);

1 row created.

SQL> insert into project
  2  values('ProjectJ',2212,'San Francisco',2);

1 row created.
```

Table project

```
PROJECTNAME     PROJECTNUMBER PROJECTLOCATION DEPARTMENTNUMBER
--------------- ------------- --------------- ----------------
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

10 rows selected.
```

Q 2: Retrieve all the employees' information for a particular department number: I retrieved for department number 5.

```
SQL> select * from employee
  2  where departmentNumber=5;

FIRSTNAME       MI LASTNAME        SSNNUMBER BIRTHDAY
--------------- -- --------------- --------- ---------
ADDRESS                                          SE     SALARY SUPERVISO
------------------------------------------------- -- ---------- ---------
DEPARTMENTNUMBER
---------------
frankin         t  wong            333445555 08-DEC-45
638 voss, houston, tx                            m       40000 554433221
               5

Johny           B  Smith           123456789 09-JAN-55
731 Fondren,Houston, TX                          M       30000 333445555
               5

FIRSTNAME       MI LASTNAME        SSNNUMBER BIRTHDAY
--------------- -- --------------- --------- ---------
ADDRESS                                          SE     SALARY SUPERVISO
------------------------------------------------- -- ---------- ---------
DEPARTMENTNUMBER
---------------

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

FIRSTNAME       MI LASTNAME        SSNNUMBER BIRTHDAY
--------------- -- --------------- --------- ---------
ADDRESS                                          SE     SALARY SUPERVISO
------------------------------------------------- -- ---------- ---------
DEPARTMENTNUMBER
---------------
               5


SQL>
```

Q 3: Get Employee name along with his SSN and Supervisor SSN.

```
SQL> select firstName,midName,lastName,SSNnumber,supervisorSSN from employee;

FIRSTNAME       MI LASTNAME        SSNNUMBER SUPERVISO
--------------- -- --------------- --------- ---------
Doug            E  Gilbert         554433221 NULL
Joyce              PAN             543216789 NULL
frankin         t  wong            333445555 554433221
jennifer        s  wallance        987654321 554433221
Johny           B  Smith           123456789 333445555
Ramesh          K  Narayan         666884444 333445555
Joyce           A  English         453453453 333445555
James           E  Borg            888665555 543216789
Alicia          J  Zelaya          999887777 987654321
Ahmad           V  Jabbar          987987987 987654321

10 rows selected.
```

Q 4: Retrieve the employee names whose birthdate is ’29-MAR-1959’.

```
SQL> select firstname, midname, lastname from employee
  2  where birthday='29-mar-1959';

FIRSTNAME       MI LASTNAME
--------------- -- ---------------
Ahmad           V  Jabbar

SQL> _
```

Q 5: Get salaries of the employees without duplications.

METHOD 1:

```
SQL> select distinct salary from employee;

    SALARY
----------
     38000
     43000
     55000
     30000
     40000
     80000
     25000
     70000

8 rows selected.
```

OR

METHOD 2:

```
SQL> select unique salary from employee;

    SALARY
----------
     38000
     43000
     55000
     30000
     40000
     80000
     25000
     70000

8 rows selected.

SQL>
```

Note: **Unique and Distinct** serve the same purpose i.e. to fetch the non-duplicate aka **unique** aka **distinct** rows and CAN BE used INTERCHANGEABLY. However, **UNIQUE** is not a keyword as per **SQL** standards and is acceptable only in certain databases such as Oracle.

Q 6: Retrieve the MgrSSN, MgrStartDate of the manager of 'Research' department.

```
SQL> select managerssn, managestartdate from department
  2  where departmentname='Research';

MANAGERSS MANAGESTA
--------- ---------
333445555 22-MAY-78
```

Q 7: Change the department number of an employee having fname as ‘Joyce’ to 3.

```
SQL> update employee
  2  set departmentnumber=3
  3  where firstname='Joyce';

2 rows updated.

SQL> select * from employee;

FIRSTNAME       MI LASTNAME        SSNNUMBER BIRTHDAY
--------------- -- --------------- --------- ---------
ADDRESS                                          SE     SALARY SUPERVISO
------------------------------------------------- -- ---------- ---------
DEPARTMENTNUMBER
----------------
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
               3

FIRSTNAME       MI LASTNAME        SSNNUMBER BIRTHDAY
--------------- -- --------------- --------- ---------
ADDRESS                                          SE     SALARY SUPERVISO
------------------------------------------------- -- ---------- ---------
DEPARTMENTNUMBER
----------------

frankin         t  wong            333445555 08-DEC-45
638 voss, houston, tx                            m       40000 554433221
               5

jennifer        s  wallance        987654321 20-JAN-31
291 berry bellaire, TX                           f       43000 554433221

FIRSTNAME       MI LASTNAME        SSNNUMBER BIRTHDAY
--------------- -- --------------- --------- ---------
ADDRESS                                          SE     SALARY SUPERVISO
------------------------------------------------- -- ---------- ---------
DEPARTMENTNUMBER
----------------
```

```
Ramesh          K  Narayan         666884444 15-SEP-52

FIRSTNAME       MI LASTNAME        SSNNUMBER BIRTHDAY
--------------- -- --------------- --------- ---------
ADDRESS                                           SE     SALARY SUPERVISO
------------------------------------------------- -- ---------- ---------
DEPARTMENTNUMBER
---------------
975 Fire Oak,Humble, TX                           M       38000 333445555
              5

Joyce           A  English         453453453 31-JUL-62
5631 Rice,Houston, TX                             F       25000 333445555
              3


FIRSTNAME       MI LASTNAME        SSNNUMBER BIRTHDAY
--------------- -- --------------- --------- ---------
ADDRESS                                           SE     SALARY SUPERVISO
------------------------------------------------- -- ---------- ---------
DEPARTMENTNUMBER
---------------
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

FIRSTNAME       MI LASTNAME        SSNNUMBER BIRTHDAY
--------------- -- --------------- --------- ---------
ADDRESS                                           SE     SALARY SUPERVISO
------------------------------------------------- -- ---------- ---------
DEPARTMENTNUMBER
---------------

Ahmad           V  Jabbar          987987987 29-MAR-59
980 Dallas,Houston, TX                            M       25000 987654321
              4
```

Note: Be careful when updating records in a table! Notice the WHERE clause in the UPDATE statement. The WHERE clause specifies which record(s) that should be updated. If you omit the WHERE clause, all records in the table will be updated!

Q 8: Alter Table department add column ContactNo of NUMBER data type and insert values into this column only.

```
SQL> alter table department
  2  add contactNo number(10);

Table altered.

SQL> desc department
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 DEPARTMENTNAME                                     VARCHAR2(15)
 DEPARTMENTNUMBER                                   NUMBER(5)
 MANAGERSSN                                         CHAR(9)
 MANAGESTARTDATE                                    DATE
 CONTACTNO                                          NUMBER(10)

SQL> update department
  2  set contactno=1122334455
  3  where departmentNumber=1;

1 row updated.

SQL> update department
  2  set contactno=1122334466
  3  where departmentNumber=2;

1 row updated.

SQL> update department
  2  set contactno=1122334459
  3  where departmentNumber=3;

1 row updated.

SQL> update department
  2  set contactno=1122334460
  3  where departmentNumber=4;

1 row updated.
```

```
SQL> update department
  2  set contactno=1122337760
  3  where departmentNumber=5;

1 row updated.

SQL> select * from department;

DEPARTMENTNAME  DEPARTMENTNUMBER MANAGERSS MANAGESTA  CONTACTNO
--------------- ---------------- --------- --------- ----------
Manufacture                   1 888665555 19-JUN-71 1122334455
Administration                2 543216789 04-JAN-99 1122334466
Headquarter                   3 554433221 22-SEP-55 1122334459
Finance                       4 987654321 01-JAN-85 1122334460
Research                      5 333445555 22-MAY-78 1122337760

SQL>
```

Q 9: Change table department by modifying the size of field ContactNo.

```
SQL> alter table department
  2  modify contactNo number(15);

Table altered.

SQL> desc department;
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 DEPARTMENTNAME                                     VARCHAR2(15)
 DEPARTMENTNUMBER                                   NUMBER(5)
 MANAGERSSN                                         CHAR(9)
 MANAGESTARTDATE                                    DATE
 CONTACTNO                                          NUMBER(15)

SQL>
```

Q 10: Modify the field name ContactNo of departments table to MobileNo.

```
SQL> alter table department
  2  rename column contactNo to mobileNo;

Table altered.

SQL> desc department;
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 DEPARTMENTNAME                                     VARCHAR2(15)
 DEPARTMENTNUMBER                                   NUMBER(5)
 MANAGERSSN                                         CHAR(9)
 MANAGESTARTDATE                                    DATE
 MOBILENO                                           NUMBER(15)

SQL>
```

Q 11: Change name of Table Department to DEPT.

```
SQL> rename department to DEPT;

Table renamed.

SQL> desc department;
ERROR:
ORA-04043: object department does not exist


SQL> desc dept;
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 DEPARTMENTNAME                                     VARCHAR2(15)
 DEPARTMENTNUMBER                                   NUMBER(5)
 MANAGERSSN                                         CHAR(9)
 MANAGESTARTDATE                                    DATE
 MOBILENO                                           NUMBER(15)

SQL>
```

Q 12: Alter Table department by removing column MobileNo.

```
SQL> alter table dept
  2  drop column mobileno;

Table altered.

SQL> desc dept;
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 DEPARTMENTNAME                                     VARCHAR2(15)
 DEPARTMENTNUMBER                                   NUMBER(5)
 MANAGERSSN                                         CHAR(9)
 MANAGESTARTDATE                                    DATE

SQL>
```

Q 13: Create a table COPYOFDEPT as a copy of the table DEPT.

```
SQL> create table copyofdept as select * from DEPT;

Table created.

SQL> select * from copyofdept;

DEPARTMENTNAME  DEPARTMENTNUMBER MANAGERSS MANAGESTA
--------------- ---------------- --------- ---------
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

SQL>
```

Q 14: Remove the rows from COPYOF DEPT table with department number as 5.

```
SQL> delete from copyofdept
  2  where departmentnumber=5;

1 row deleted.

SQL> select * from copyofdept;

DEPARTMENTNAME  DEPARTMENTNUMBER MANAGERSS MANAGESTA
-------------- ---------------- --------- ---------
Manufacture                   1 888665555 19-JUN-71
Administration                2 543216789 04-JAN-99
Headquarter                   3 554433221 22-SEP-55
Finance                       4 987654321 01-JAN-85

SQL>
```

Q 15: Remove COPYOF DEPT table.

```
SQL> drop table copyofdept;

Table dropped.

SQL> select * from copyofdept;
select * from copyofdept
              *
ERROR at line 1:
ORA-00942: table or view does not exist


SQL>
```

EXERCISE 2

Topic: Constraint

- Alter existing tables to add constraints and make new tables

```
SQL> alter table employee
  2  modify (firstname varchar2(15) constraint nameNotNull NOT NULL);

Table altered.

SQL> alter table employee
  2  modify (lastname varchar2(15) constraint lNameNotNull NOT NULL);

Table altered.

SQL> alter table employee
  2  add constraint checkSex CHECK (sex=='M' or sex=='m' or sex=='F' or sex=='f');
add constraint checkSex CHECK (sex=='M' or sex=='m' or sex=='F' or sex=='f')
                                    *
ERROR at line 2:
ORA-00936: missing expression


SQL> alter table employee
  2  add constraint checkSex CHECK (sex='M' or sex='m' or sex='F' or sex='f');

Table altered.
```

```
SQL> alter table employee modify salary default(800);

Table altered.
```

```
SQL> alter table employee
  2  add constraint con_pk1 primary key(SSNnumber);

Table altered.
```

```
SQL> alter table dept
  2  add constraint con_dept_pk primary key(departmentnumber);

Table altered.
```

```
SQL> alter table dept modify (departmentname varchar2(15) constraint con_dept_null not null);

Table altered.

SQL> alter table employee add constraint con_emp_fk1 foreign key(departmentnumber) references dept(departmentnumber) on delete cascade;

Table altered.
```

```
QL> alter table dept add constraint con_dept_fk foreign key(ManagerSSN) References employee(SSNnumber) on delete set null

able altered.
```

```
SQL> alter table project modify (projectname varchar2(15) constraint con_pr_null not null);

Table altered.

SQL> alter table project add constraint con_pr_pk primary key(projectnumber);

Table altered.
```

```
SQL> alter table project add constraint con_pr_fk foreign key(departmentnumber) References dept(departmentnumber) on delete set null;

Table altered.

SQL> desc project
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 PROJECTNAME                               NOT NULL VARCHAR2(15)
 PROJECTNUMBER                             NOT NULL NUMBER(5)
 PROJECTLOCATION                                    VARCHAR2(15)
 DEPARTMENTNUMBER                                   NUMBER(5)
```

Create new tables

Create Table deptLocations

```
SQL> create table deptLocations
  2  (departmentnnumber number(5),
  3  deptLocation varchar2(15)
  4  );

Table created.
```

```
SQL> alter table deptLocations
  2  rename column departmentnnumber to departmentnumber;

Table altered.
```

```
SQL> alter table deptlocations add constraint fk_depl foreign key(departmentnumber) references dept(departmentnumber) on delete cascade;

Table altered.
```

Insertion of values in table deptLocations:

```
SQL> desc deptlocations;
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 DEPARTMENTNUMBER                                   NUMBER(5)
 DEPTLOCATION                                       VARCHAR2(15)

SQL> insert into deptlocations values(&departmentnumber,'&deptlocation');
Enter value for departmentnumber: 1
Enter value for deptlocation: Houston
old   1: insert into deptlocations values(&departmentnumber,'&deptlocation')
new   1: insert into deptlocations values(1,'Houston')

1 row created.

SQL> insert into deptlocations values(&departmentnumber,'&deptlocation');
Enter value for departmentnumber: 1
Enter value for deptlocation: Chicago
old   1: insert into deptlocations values(&departmentnumber,'&deptlocation')
new   1: insert into deptlocations values(1,'Chicago')

1 row created.

SQL> insert into deptlocations values(&departmentnumber,'&deptlocation');
Enter value for departmentnumber: 2
Enter value for deptlocation: New York
old   1: insert into deptlocations values(&departmentnumber,'&deptlocation')
new   1: insert into deptlocations values(2,'New York')

1 row created.

SQL> 2
SP2-0226: Invalid line number
SQL> insert into deptlocations values(&departmentnumber,'&deptlocation');
Enter value for departmentnumber: 2
Enter value for deptlocation: San Francisco
old   1: insert into deptlocations values(&departmentnumber,'&deptlocation')
new   1: insert into deptlocations values(2,'San Francisco')

1 row created.
```

```
SQL> insert into deptlocations values(&departmentnumber,'&deptlocation');
Enter value for departmentnumber: 3
Enter value for deptlocation: Salt Lake City
old   1: insert into deptlocations values(&departmentnumber,'&deptlocation')
new   1: insert into deptlocations values(3,'Salt Lake City')

1 row created.

SQL> insert into deptlocations values(&departmentnumber,'&deptlocation');
Enter value for departmentnumber: 4
Enter value for deptlocation: Stafford
old   1: insert into deptlocations values(&departmentnumber,'&deptlocation')
new   1: insert into deptlocations values(4,'Stafford')

1 row created.

SQL> insert into deptlocations values(&departmentnumber,'&deptlocation');
Enter value for departmentnumber: 4
Enter value for deptlocation: Bellaire
old   1: insert into deptlocations values(&departmentnumber,'&deptlocation')
new   1: insert into deptlocations values(4,'Bellaire')

1 row created.

SQL> insert into deptlocations values(&departmentnumber,'&deptlocation');
Enter value for departmentnumber: 5
Enter value for deptlocation: Sugarland
old   1: insert into deptlocations values(&departmentnumber,'&deptlocation')
new   1: insert into deptlocations values(5,'Sugarland')

1 row created.

SQL> insert into deptlocations values(&departmentnumber,'&deptlocation');
Enter value for departmentnumber: 5
Enter value for deptlocation: Houston
old   1: insert into deptlocations values(&departmentnumber,'&deptlocation')
new   1: insert into deptlocations values(5,'Houston')

1 row created.
```

View table deptLocations

```
SQL> select * from deptLocations;

DEPARTMENTNUMBER DEPTLOCATION
---------------- ---------------
               1 Houston
               1 Chicago
               2 New York
               2 San Francisco
               3 Salt Lake City
               4 Stafford
               4 Bellaire
               5 Sugarland
               5 Houston

9 rows selected.

SQL>
```

CREATE TABLE WORKSON:

```
SQL> CREATE TABLE workson(
  2  employeessn CHAR(9),
  3  projectnumber NUMBER(5),
  4  hours DECIMAL(3,1) NOT NULL,
  5  CONSTRAINT wko_fky_ssn FOREIGN KEY (employeessn) REFERENCES employee (ssnnumber) ON DELETE CASCADE,
  6  CONSTRAINT wko_fky_jno FOREIGN KEY (projectnumber) REFERENCES project (projectnumber) ON DELETE CASCADE
  7  );

Table created.

SQL> CREATE TABLE dependent(
  2  emp CHAR(9),
  3  dependentname VARCHAR(15),
  4  sex CHAR(1) CHECK (sex IN ('M','F','m','f')),
  5  birthday DATE,
  6  relationship  VARCHAR(8),
  7  CONSTRAINT dep_fky_emp FOREIGN KEY (emp) REFERENCES employee (ssnnumber) ON DELETE CASCADE
  8  );

Table created.

SQL>
```

Data Insertion for new tables:

```
SQL> insert into deptlocations values(1,'Houston');

1 row created.

SQL> insert into deptlocations values(1,'Chicago');

1 row created.

SQL> insert into deptlocations values(2,'New York');

1 row created.

SQL> insert into deptlocations values(2,'San Francisco');

1 row created.

SQL> insert into deptlocations values(3,'Salt Lake City');

1 row created.

SQL> insert into deptlocations values(4,'Stafford');

1 row created.

SQL> insert into deptlocations values(4,'Bellaire');

1 row created.

SQL> insert into deptlocations values(5,'Sugarland');

1 row created.

SQL> insert into deptlocations values(5,'Houston');

1 row created.

SQL>
```

```
SQL> insert into workson values('666884444',3388,40.0);

1 row created.

SQL> insert into workson values('453453453',7745,20.0);

1 row created.

SQL> insert into workson values('453453453',2212,20.0);

1 row created.

SQL> insert into workson values('333445555',7745,10.0);

1 row created.

SQL> insert into workson values('333445555',6688,10.0);

1 row created.

SQL> insert into workson values('333445555',4345,35.0);

1 row created.

SQL> insert into workson values('333445555',2212,28.5);

1 row created.

SQL> insert into workson values('999887777',2212,11.5);

1 row created.

SQL> insert into workson values('543216789',2212,17.0);

1 row created.

SQL> insert into workson values('554433221',1945,21.5);

1 row created.

SQL>
```

```
SQL> insert into dependent values('333445555','Alice','F','05-APR-76','Daughter');

1 row created.

SQL> insert into dependent values('333445555','Theodore','M','25-OCT-73','Son');

1 row created.

SQL> insert into dependent values('333445555','Joy','F','03-MAY-48','Spouse');

1 row created.

SQL> insert into dependent values('987654321','Abner','M','29-FEB-32','Spouse');

1 row created.

SQL> insert into dependent values('123456789','Alice','F','31-DEC-78','Daughter');

1 row created.

SQL>
```

EXERCISE 2 PART(I): Execute the following Queries on the Db to note the violations integrity constraints by any of the following operations:

Q1. Insert ('Robert', 'F', 'Scott', '987987987 ', '21-JUN-42', '2365 Newcastle Rd, Bellaire, TX', M, 58000, '888665555', 1) into EMPLOYEE.

Here we note that the constraint prevents us from inserting invalid input:

```
SQL> insert into employee values('Robert', 'F', 'Scott', '987987987', '21-JUN-42', '2365 Newcastle Rd, Bellaire, TX','M',58000,'888665555', 1);
insert into employee values('Robert', 'F', 'Scott', '987987987', '21-JUN-42', '2365 Newcastle Rd, Bellaire, TX','M',58000,'888665555', 1)
*
ERROR at line 1:
ORA-00001: unique constraint (AAN.EMP_PRI_KEY) violated


SQL>
```

Q2. Insert ('Ramez', 'F', 'Scott', ' ', '21-JUN-42', '2365 Newcastle Rd, Bellaire, TX', M, 58000, '888665555', 1) into EMPLOYEE

```
SQL> INSERT INTO employee values ('Ramez', 'F', 'Scott', '', '21-JUN-42', '2365 Newcastle Rd, Bellaire, TX', 'M', 58000, '888665555', 1 );
INSERT INTO employee values ('Ramez', 'F', 'Scott', '', '21-JUN-42', '2365 Newcastle Rd, Bellaire, TX', 'M', 58000, '888665555', 1 )
                                                    *
ERROR at line 1:
ORA-01400: cannot insert NULL into ("AAN"."EMPLOYEE"."SSNNUMBER")
```

Here we note that the constraint prevents us from inserting invalid input:

Q3. Insert ('677678989', null, '40.0') into WORKS_ON.

```
SQL> INSERT INTO workson values( '677678989', null, '40.0' );
INSERT INTO workson values( '677678989', null, '40.0' )
*
ERROR at line 1:
ORA-02291: integrity constraint (AAN.WKO_FKY_SSN) violated - parent key not
found
```

Here we note that the constraint prevents us from inserting invalid input.

Q4. Insert ('453453453', 'John', M, '12-DEC-60', 'SPOUSE') into DEPENDENT.

```
SQL> INSERT INTO dependent VALUES('453453453','John','M','12-DEC-60','SPOUSE');

1 row created.

SQL>
```

Here we note that the input is valid and it **satisfies the constraints**.

Q5. Insert ('343453453', 'Varun','', '12-DEC-60', 'SON') into DEPENDENT.

```
SQL> INSERT INTO dependent VALUES ( '343453453', 'Varun','', '12-DEC-60', 'SON' );
INSERT INTO dependent VALUES ( '343453453', 'Varun','', '12-DEC-60', 'SON' )
*
ERROR at line 1:
ORA-02291: integrity constraint (AAN.DEP_FKY_EMP) violated - parent key not
found
```

Here we note that the constraint prevents us from inserting invalid inputs.

Q6. Delete WORKS_ON tuples with ESSN= '333445555'.

```
SQL> DELETE FROM workson WHERE employeessn = '333445555';

4 rows deleted.

SQL>
```

Here no constraint is violated so we are allowed to delete the tuples.

Q7. Modify MGRSSN and MGRSTARTDATE of the DEPARTMENT tuple with DNUMBER=5 to '123456789' and '01-OCT-88', respectively.

```
SQL> UPDATE dept SET managerssn = '123456789', managerstartdate = '01-OCT-88' WHERE departmentnumber=5;

1 row updated.

SQL>
```

Here no constraint is violated so we are allowed to update the table dept.

EXERCISE 2 PART (II) - Alter the tables to:

Q1. Enforce Foreign Keys using Alter command [if not done earlier].

This has been done earlier. **Please check the SETUP PART.**

Q2. Remove foreign key defined on SuperSSN and enforce it again using Alter table command.

```
SQL> ALTER TABLE employee DROP CONSTRAINT emp_fky_sun;

Table altered.

SQL> ALTER TABLE employee ADD CONSTRAINT emp_fky_sun FOREIGN KEY (supervisorssn) REFERENCES employee (ssnnumber);

Table altered.

SQL>
```

Q3. Make name of Project as Unique and sex of employee as not null.

```
SQL> ALTER TABLE project ADD CONSTRAINT set_pjn_uni UNIQUE (projectname);

Table altered.

SQL>
SQL> ALTER TABLE employee MODIFY sex NOT NULL;

Table altered.

SQL>
```

Q4. Make salary of employee to accept real values.

```
SQL> ALTER TABLE employee MODIFY salary REAL;

Table altered.

SQL>
```