EXERCISE 3: SQL CONSTRAINTS

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ANSWER ALL QUESTIONS

DBMS LAB ASSIGNMENT 3 MEHER SHRISHTI NIGAM 20BRS1193

SYNTAX OF ORACLE CONSTRIANTS –

1. NOT NULL CONSTRAINT

CREATE TABLE X (A int NOT NULL, B VARCHAR2(10) NOT NULL, C VARCHAR2(10) NOT NULL, D INT);

2. UNIQUE KEY CONSTRAINT

CREATE TABLE X (A INT NOT NULL UNIQUE, B VARCHAR2(10) NOT NULL, C VARCHAR2(10), AGE INT);

3. PRIMARY KEY CONSTRAINT

There are three ways -

CREATE TABLE X (A INT NOT NULL, B VARCHAR2(10) NOT NULL, C VARCHAR2(10), D INT, PRIMARY KEY (A));

CREATE TABLE Y (A INT NOT NULL PRIMARY KEY, B VARCHAR2(10) NOT NULL, C VARCHAR2(10), D INT);

CREATE TABLE Z (A INT NOT NULL, B VARCHAR2(10) NOT NULL, C VARCHAR2(10), D INT, CONSTRAINT PK_A PRIMARY KEY (A));

COMPOSITE PRIMARY KEY: -

CREATE TABLE Z (A INT NOT NULL, B VARCHAR2(10) NOT NULL, C VARCHAR2(10), D INT, CONSTRAINT PK_A PRIMARY KEY (A));

4. FOREIGN KEY CONSTRAINT

CREATE TABLE Y (A INT NOT NULL PRIMARY KEY, B VARCHAR2(10) NOT NULL, C VARCHAR2(10), D INT);

CREATE TABLE Z (E INT NOT NULL PRIMARY KEY, F INT NOT NULL, G INT, CONSTRAINT FK_G FOREIGN KEY (G) REFERENCES Y(A));

5. CHECK CONSTRAINT

CREATE TABLE X (A INT NOT NULL, B VARCHAR2(10) NOT NULL, C VARCHAR2(10), D INT CHECK (C >= 18));

CREATE TABLE Y (A INT NOT NULL, B VARCHAR2(10) NOT NULL, C VARCHAR2(10), D INT, E VARCHAR2(10), CONSTRAINT CHK_Y CHECK (D >= 18 AND E = 'CHENNAI'));

6. DEFAULT CONSTRAINT

CREATE TABLE X (A INT NOT NULL, B VARCHAR2(10) NOT NULL, C VARCHAR2(10), D INT, E VARCHAR2(10) DEFAULT 'CHENNAI');

1. Create the following tables with suitable constraints:
    a. DEPARTMENT (DEPT_ID, DEPT_NAME). Make DEPT_ID as the primary key and DEPT_NAME should not be null.
    b. PROJECT (PROJECT_ID, PROJECT_NAME, DID). Make PROJECT_ID as the primary key and PROJECT_NAME should not be null. DID will be the foreign keys for DEPARTMENT
    c. EMPLOYEE(EMP_ID, NAME, GENDER, DID, PID, DOJ, AGE,LOCATION). Make EMP_ID as the primary key. DID and PID will be the foreign keys for DEPARTMENT and PROJECT tables respectively. Only records with age above 21 years can be included in EMPLOYEE table. If the location is not specified put the location as 'CHENNAI'.

Creating tables with required fields using commands –

CREATE TABLE table_name (col_1 datatype(n), col_2 datatype(n) ……) ;

CREATE TABLE table_name (col_1 datatype(n) NOT NULL, col_2 datatype(n) ……) ;

CREATE TABLE table_name (col_1 datatype(n) NOT NULL PRIMARY KEY, col_2 datatype(n) ……);

CREATE TABLE table_name2 (col_3 datatype(n), CONSTRAINT FK_G FOREIGN KEY (col_3) REFERENCES table_name (col_1));

CREATE TABLE table_name (col_1 datatype(n) NOT NULL, col_2 datatype(n) DEFAULT 123);

```
SQL> CREATE TABLE DEPARTMENT_20BRS1193(DEPT_ID INT PRIMARY KEY, DEPT_NAME VARCHAR2(50) NOT NULL);

Table created.
```

```
SQL> CREATE TABLE PROJECT_20BRS1193(PROJECT_ID INT PRIMARY KEY, PROJECT_NAME VARCHAR2(100) NOT
NULL, DID INT, CONSTRAINT FK_DID FOREIGN KEY (DID) REFERENCES DEPARTMENT_20BRS1193(DEPT_ID));

Table created.
```

```
SQL> CREATE TABLE EMPLOYEE_20BRS1193(EMP_ID INT PRIMARY KEY, GENDER VARCHAR2(10), DID INT, PID INT, DOJ
 VARCHAR2(15), AGE INT, LOCATION VARCHAR2(20) DEFAULT 'CHENNAI', CONSTRAINT CHK_EMP CHECK (AGE >= 21),
CONSTRAINT FK_DID2 FOREIGN KEY (DID) REFERENCES DEPARTMENT_20BRS1193(DEPT_ID), CONSTRAINT FK_PID FOREIG
N KEY (PID) REFERENCES PROJECT_20BRS1193(PROJECT_ID));

Table created.
```

2. Insert 5 departments into DEPARTMENT table.
3. Insert 5 projects into PROJECT table.
4. Insert 5 Employees into EMPLOYEE table. Ensure that all the constraint criteria are met.

Inserting multiple entries –

INSERT ALL

INTO TABLE_1 VALUES ('abc', 12.3, 'dfe')

INTO TABLE_1 VALUES ('abc', 12.3, 'dfe')

INTO TABLE_1 VALUES ('abc', 12.3, 'dfe')

SELECT * FROM DUAL;

While adding entries where we use the default constraint, we need to add the column names as well.

```
SQL> INSERT ALL
  2  INTO DEPARTMENT_20BRS1193 (DEPT_ID, DEPT_NAME) VALUES (1, 'Computer Science Engineering')
  3  INTO DEPARTMENT_20BRS1193 (DEPT_ID, DEPT_NAME) VALUES (2, 'Electrical Engineering')
  4  INTO DEPARTMENT_20BRS1193 (DEPT_ID, DEPT_NAME) VALUES (3, 'Electronics Engineering')
  5  INTO DEPARTMENT_20BRS1193 (DEPT_ID, DEPT_NAME) VALUES (4, 'Mechanical Engineering')
  6  INTO DEPARTMENT_20BRS1193 (DEPT_ID, DEPT_NAME) VALUES (5, 'Law')
  7  SELECT * FROM DUAL;

5 rows created.

SQL> SELECT * from DEPARTMENT_20BRS1193;

   DEPT_ID DEPT_NAME
---------- --------------------------------------------------
         1 Computer Science Engineering
         2 Electrical Engineering
         3 Electronics Engineering
         4 Mechanical Engineering
         5 Law
```

```
SQL> INSERT ALL
  2  INTO PROJECT_20BRS1193 VALUES (1, 'ML Program', 1)
  3  INTO PROJECT_20BRS1193 VALUES (2, 'Power Efficient Mini Inverter', 2)
  4  INTO PROJECT_20BRS1193 VALUES (3, 'IoT and Arduino based Noise Detector', 3)
  5   INTO PROJECT_20BRS1193 VALUES (4, 'High Performance Hovercraft With Power Turning', 4)
  6   INTO PROJECT_20BRS1193 VALUES (5, 'Legal Analysis of Child Labour', 5)
  7  SELECT * FROM DUAL;

5 rows created.

SQL> SELECT * from PROJECT_20BRS1193;

PROJECT_ID
----------
PROJECT_NAME
--------------------------------------------------------------------------------
       DID
----------
         1
ML Program
         1

         2
Power Efficient Mini Inverter
         2

PROJECT_ID
----------
PROJECT_NAME
--------------------------------------------------------------------------------
       DID
----------

         3
IoT and Arduino based Noise Detector
         3

         4
High Performance Hovercraft With Power Turning

PROJECT_ID
----------
PROJECT_NAME
--------------------------------------------------------------------------------
       DID
----------
         4

         5
Legal Analysis of Child Labour
         5
```

```
SQL> INSERT ALL
  2  INTO EMPLOYEE_20BRS1193 VALUES (1001, 'Male', 1, 1, '10-7-2007', 30, 'MUMBAI')
  3  INTO EMPLOYEE_20BRS1193 VALUES (1002, 'Female', 1, 1, '10-2-2005', 27, 'KOLKATA')
  4  INTO EMPLOYEE_20BRS1193 VALUES (1003, 'Male', 4, 4, '23-7-2014', 42, 'DELHI')
  5  INTO EMPLOYEE_20BRS1193 VALUES (3001, 'Female', 2, 2, '28-7-2012', 47, 'BANGLORE')
  6  INTO EMPLOYEE_20BRS1193 (EMP_ID, GENDER, DID, PID, DOJ, AGE) VALUES (3002, 'Male', 2, 2, '9-7-2003', 51)
  7  INTO EMPLOYEE_20BRS1193 (EMP_ID, GENDER, DID, PID, DOJ, AGE) VALUES (2002, 'Female', 1, 1, '1-7-2006', 35)
  8  INTO EMPLOYEE_20BRS1193 VALUES (3003, 'Male', 3, 3, '17-7-2007', 28, 'CHENNAI')
  9  INTO EMPLOYEE_20BRS1193 VALUES (2003, 'Female', 3, 3, '3-7-2008', 36, 'LUCKNOW')
 10  INTO EMPLOYEE_20BRS1193 VALUES (3004, 'Male', 4, 4, '7-7-2011', 48, 'HYDERABAD')
 11  INTO EMPLOYEE_20BRS1193 (EMP_ID, GENDER, DID, PID, DOJ, AGE) VALUES (4001, 'Female', 5, 5, '31-1-2009', 25)
 12  SELECT * FROM DUAL;

10 rows created.
```

```
SQL> SELECT * from EMPLOYEE_20BRS1193;

    EMP_ID GENDER            DID        PID DOJ                   AGE
---------- ---------- ---------- ---------- -------------- ----------
LOCATION
--------------------
      1001 Male                1          1 10-7-2007              30
MUMBAI

      1002 Female              1          1 10-2-2005              27
KOLKATA

      1003 Male                4          4 23-7-2014              42
DELHI


    EMP_ID GENDER            DID        PID DOJ                   AGE
---------- ---------- ---------- ---------- -------------- ----------
LOCATION
--------------------
      3001 Female              2          2 28-7-2012              47
BANGLORE

      3002 Male                2          2 9-7-2003               51
CHENNAI

      2002 Female              1          1 1-7-2006               35
CHENNAI


    EMP_ID GENDER            DID        PID DOJ                   AGE
---------- ---------- ---------- ---------- -------------- ----------
LOCATION
--------------------
      3003 Male                3          3 17-7-2007              28
CHENNAI

      2003 Female              3          3 3-7-2008               36
LUCKNOW

      3004 Male                4          4 7-7-2011               48
HYDERABAD


    EMP_ID GENDER            DID        PID DOJ                   AGE
---------- ---------- ---------- ---------- -------------- ----------
LOCATION
--------------------
      4001 Female              5          5 31-1-2009              25
CHENNAI


10 rows selected.
```

5. Demonstrate with some queries the various constraint violations pertaining to the tables created above.

1. PRIMARY KEY HAS TO BE UNIQUE

```
SQL> INSERT INTO DEPARTMENT_20BRS1193 VALUES (1, 'MBA');
INSERT INTO DEPARTMENT_20BRS1193 VALUES (1, 'MBA')
*
ERROR at line 1:
ORA-00001: unique constraint (C##MEHER1193.SYS_C007511) violated
```

2. DEPT_NAME CANNOT BE NULL

```
SQL> INSERT INTO DEPARTMENT_20BRS1193 VALUES (6, NULL);
INSERT INTO DEPARTMENT_20BRS1193 VALUES (6, NULL)
                                         *
ERROR at line 1:
ORA-01400: cannot insert NULL into
("C##MEHER1193"."DEPARTMENT_20BRS1193"."DEPT_NAME")
```

3. PRIMARY KEY HAS TO BE UNIQUE

```
SQL> INSERT INTO PROJECT_20BRS1193 VALUES (1, 'AI Program', 1);
INSERT INTO PROJECT_20BRS1193 VALUES (1, 'AI Program', 1)
*
ERROR at line 1:
ORA-00001: unique constraint (C##MEHER1193.SYS_C007513) violated
```

4. PROJECT_NAME CANNOT BE NULL

```
SQL> INSERT INTO PROJECT_20BRS1193 VALUES (6, NULL, 1);
INSERT INTO PROJECT_20BRS1193 VALUES (6, NULL, 1)
                                         *
ERROR at line 1:
ORA-01400: cannot insert NULL into
("C##MEHER1193"."PROJECT_20BRS1193"."PROJECT_NAME")
```

5. FOREIGN KEY DOESN'T EXIST

```
SQL> INSERT INTO PROJECT_20BRS1193 VALUES (6, 'AI Program', 7);
INSERT INTO PROJECT_20BRS1193 VALUES (6, 'AI Program', 7)
*
ERROR at line 1:
ORA-02291: integrity constraint (C##MEHER1193.FK_DID) violated - parent key not
found
```

6. PRIMARY KEY HAS TO BE UNIQUE

```
SQL> INSERT INTO EMPLOYEE_20BRS1193 VALUES (1001, 'Male', 1, 1, '10-7-2007', 30, 'MUMBAI');
INSERT INTO EMPLOYEE_20BRS1193 VALUES (1001, 'Male', 1, 1, '10-7-2007', 30, 'MUMBAI')
*
ERROR at line 1:
ORA-00001: unique constraint (C##MEHER1193.SYS_C007520) violated
```

7. **WHILE ADDING ENTRIES WHERE WE USE THE DEFAULT CONSTRAINT, WE NEED TO ADD THE COLUMN NAMES AS WELL.**

```
SQL> INSERT INTO EMPLOYEE_20BRS1193 VALUES (5003, 'Male', 1, 1, '10-7-2007', 30);
INSERT INTO EMPLOYEE_20BRS1193 VALUES (5003, 'Male', 1, 1, '10-7-2007', 30)
            *
ERROR at line 1:
ORA-00947: not enough values
```

8. **CHECK CONSTRAINT VIOLATED - AGE IS LESS THAN 21**

```
SQL> INSERT INTO EMPLOYEE_20BRS1193 VALUES (5003, 'Male', 1, 1, '10-7-2007', 18, 'MUMBAI');
INSERT INTO EMPLOYEE_20BRS1193 VALUES (5003, 'Male', 1, 1, '10-7-2007', 18, 'MUMBAI')
*
ERROR at line 1:
ORA-02290: check constraint (C##MEHER1193.CHK_EMP) violated
```

9. **FOREIGN KEY DOESN'T EXIST**

```
SQL> INSERT INTO EMPLOYEE_20BRS1193 VALUES (5003, 'Male', 7, 1, '10-7-2007', 30, 'MUMBAI');
INSERT INTO EMPLOYEE_20BRS1193 VALUES (5003, 'Male', 7, 1, '10-7-2007', 30, 'MUMBAI')
*
ERROR at line 1:
ORA-02291: integrity constraint (C##MEHER1193.FK_DID2) violated - parent key
not found
```

10. **FOREIGN KEY DOESN'T EXIST**

```
SQL> INSERT INTO EMPLOYEE_20BRS1193 VALUES (5003, 'Male', 1, 7, '10-7-2007', 30, 'MUMBAI');
INSERT INTO EMPLOYEE_20BRS1193 VALUES (5003, 'Male', 1, 7, '10-7-2007', 30, 'MUMBAI')
*
ERROR at line 1:
ORA-02291: integrity constraint (C##MEHER1193.FK_PID) violated - parent key not
found
```

All the code used in this exercise –

EXERCISE 3

CREATE TABLE DEPARTMENT_20BRS1193(DEPT_ID INT PRIMARY KEY, DEPT_NAME VARCHAR2(50) NOT NULL);
CREATE TABLE PROJECT_20BRS1193(PROJECT_ID INT PRIMARY KEY, PROJECT_NAME VARCHAR2(100) NOT NULL, DID INT, CONSTRAINT FK_DID FOREIGN KEY (DID) REFERENCES DEPARTMENT_20BRS1193(DEPT_ID));
CREATE TABLE EMPLOYEE_20BRS1193(EMP_ID INT PRIMARY KEY, GENDER VARCHAR2(10), DID INT, PID INT, DOJ VARCHAR2(15), AGE INT, LOCATION VARCHAR2(20) DEFAULT 'CHENNAI', CONSTRAINT CHK_EMP CHECK (AGE >= 21), CONSTRAINT FK_DID2 FOREIGN KEY (DID) REFERENCES DEPARTMENT_20BRS1193(DEPT_ID), CONSTRAINT FK_PID FOREIGN KEY (PID) REFERENCES PROJECT_20BRS1193(PROJECT_ID));

INSERT ALL
INTO DEPARTMENT_20BRS1193 (DEPT_ID, DEPT_NAME) VALUES (1, 'Computer Science Engineering')
INTO DEPARTMENT_20BRS1193 (DEPT_ID, DEPT_NAME) VALUES (2, 'Electrical Engineering')

```
        INTO DEPARTMENT_20BRS1193 (DEPT_ID, DEPT_NAME) VALUES (3, 'Electronics Engineering')
        INTO DEPARTMENT_20BRS1193 (DEPT_ID, DEPT_NAME) VALUES (4, 'Mechanical Engineering')
        INTO DEPARTMENT_20BRS1193 (DEPT_ID, DEPT_NAME) VALUES (5, 'Law')
SELECT * FROM DUAL;
SELECT * from DEPARTMENT_20BRS1193;
INSERT ALL
        INTO PROJECT_20BRS1193 VALUES (1, 'ML Program', 1)
        INTO PROJECT_20BRS1193 VALUES (2, 'Power Efficient Mini Inverter', 2)
        INTO PROJECT_20BRS1193 VALUES (3, 'IoT and Arduino based Noise Detector', 3)
        INTO PROJECT_20BRS1193 VALUES (4, 'High Performance Hovercraft With Power Turning', 4)
        INTO PROJECT_20BRS1193 VALUES (5, 'Legal Analysis of Child Labour', 5)
SELECT * FROM DUAL;
SELECT * from PROJECT_20BRS1193;
INSERT ALL
        INTO EMPLOYEE_20BRS1193 VALUES (1001, 'Male', 1, 1, '10-7-2007', 30, 'MUMBAI')
        INTO EMPLOYEE_20BRS1193 VALUES (1002, 'Female', 1, 1, '10-2-2005', 27, 'KOLKATA')
        INTO EMPLOYEE_20BRS1193 VALUES (1003, 'Male', 4, 4, '23-7-2014', 42, 'DELHI')
        INTO EMPLOYEE_20BRS1193 VALUES (3001, 'Female', 2, 2, '28-7-2012', 47, 'BANGLORE')
        INTO EMPLOYEE_20BRS1193 (EMP_ID, GENDER, DID, PID, DOJ, AGE) VALUES (3002, 'Male', 2, 2, '9-7-2003',
51)
        INTO EMPLOYEE_20BRS1193 (EMP_ID, GENDER, DID, PID, DOJ, AGE) VALUES (2002, 'Female', 1, 1, '1-7-
2006', 35)
        INTO EMPLOYEE_20BRS1193 VALUES (3003, 'Male', 3, 3, '17-7-2007', 28, 'CHENNAI')
        INTO EMPLOYEE_20BRS1193 VALUES (2003, 'Female', 3, 3, '3-7-2008', 36, 'LUCKNOW')
        INTO EMPLOYEE_20BRS1193 VALUES (3004, 'Male', 4, 4, '7-7-2011', 48, 'HYDERABAD')
        INTO EMPLOYEE_20BRS1193 (EMP_ID, GENDER, DID, PID, DOJ, AGE) VALUES (4001, 'Female', 5, 5, '31-1-
2009', 25)
SELECT * FROM DUAL;
SELECT * from EMPLOYEE_20BRS1193;


// WRONG

INSERT INTO DEPARTMENT_20BRS1193 VALUES (1, 'MBA'); // PRIMARY KEY HAS TO BE UNIQUE
INSERT INTO DEPARTMENT_20BRS1193 VALUES (6, NULL); // DEPT_NAME CANNOT BE NULL
INSERT INTO PROJECT_20BRS1193 VALUES (1, 'AI Program', 1); // PRIMARY KEY HAS TO BE UNIQUE
INSERT INTO PROJECT_20BRS1193 VALUES (6, NULL, 1); // PROJECT_NAME CANNOT BE NULL
INSERT INTO PROJECT_20BRS1193 VALUES (6, 'AI Program', 7); // FOREIGN KEY DOESN'T EXIST
INSERT INTO EMPLOYEE_20BRS1193 VALUES (1001, 'Male', 1, 1, '10-7-2007', 30, 'MUMBAI'); // PRIMARY KEY HAS
TO BE UNIQUE
INSERT INTO EMPLOYEE_20BRS1193 VALUES (5003, 'Male', 1, 1, '10-7-2007', 30); // 7.  WHILE ADDING ENTRIES
WHERE WE USE THE DEFAULT CONSTRAINT, WE NEED TO ADD THE COLUMN NAMES AS WELL.
INSERT INTO EMPLOYEE_20BRS1193 VALUES (5003, 'Male', 1, 1, '10-7-2007', 18, 'MUMBAI'); // AGE IS LESS THAN
21
INSERT INTO EMPLOYEE_20BRS1193 VALUES (5003, 'Male', 7, 1, '10-7-2007', 30, 'MUMBAI'); // FOREIGN KEY
DOESN'T EXIST
INSERT INTO EMPLOYEE_20BRS1193 VALUES (5003, 'Male', 1, 7, '10-7-2007', 30, 'MUMBAI'); // FOREIGN KEY
DOESN'T EXIST
```