EXPERIMENT-1

Aim: Write SQL queries to create for various databases using DDL commands (i.e. CREATE, ALTER, DROP, TRUNCATE).

CREATE TABLE:

Creates a table with specified constraints.

Syntax:

CREATE TABLE tablename (

Column1 data_type[constraint],

Column2 data_type[constraint],

PRIMARY KEY (column1[, colunmn2]),

FOREIGN KEY (column1[, column2]) REFERENCES tablename] [, CONSTRAINT constraint]);

```
SQL> CREATE TABLE student(
  2  s_name VARCHAR2(10),
  3  s_id VARCHAR(5),
  4  s_branch VARCHAR(5),
  5  s_block VARCHAR(5),
  6  PRIMARY KEY(s_id)
  7  )
  8  ;

Table created.

SQL>
SQL>
```

```
SQL> DESC student;
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 S_NAME                                             VARCHAR2(10)
 S_ID                                      NOT NULL VARCHAR2(5)
 S_BRANCH                                           VARCHAR2(5)
 S_BLOCK                                            VARCHAR2(5)

SQL>
```

ALTER TABLE:

Used to add or modify table details like column names and data types, column constraints.

```
SQL> ALTER TABLE student
  2  ADD s_fee NUMBER NOT NULL;

Table altered.

SQL> DESC student;
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 S_NAME                                             VARCHAR2(10)
 S_ID                                      NOT NULL VARCHAR2(5)
 S_BRANCH                                           VARCHAR2(5)
 S_BLOCK                                            VARCHAR2(5)
 S_FEE                                     NOT NULL NUMBER

SQL>
```

DROP TABLE:

Deletes the specified table.

Syntax:

DROP TABLE table_name;

```
SQL> CREATE TABLE instructor2(
  2  i_name VARCHAR2(10),
  3  i_subject VARCHAR(10),
  4  i_salary NUMBER(10),
  5  i_branch VARCHAR(5)
  6  );

Table created.

SQL> DROP TABLE instructor2;

Table dropped.
```

RENAME TABLE:

To rename table_name, column_name.

Syntax:

RENAME new_table_name TO old_table_name;

```
SQL> RENAME student TO students;

Table renamed.

SQL> DESC students;
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 S_NAME                                             VARCHAR2(10)
 S_ID                                      NOT NULL VARCHAR2(5)
 S_BRANCH                                           VARCHAR2(5)
 S_BLOCK                                            VARCHAR2(5)
 S_FEE                                     NOT NULL NUMBER

SQL>
```

TRUNCATE TABLE:

To remove all rows in a specified table.

Syntax:

TRUNCATE TABLE table_name;

```
SQL> TRUNCATE TABLE students;

Table truncated.

SQL>
```

Conclusion:

In this lab, we have practiced CREATE, ALTER, DROP, and TRUNCATE commands for the user created table.

EXPERIMENT-2

AIM: To write SQL queries to MANIPULATE TABLES for c=various databases using DML commands (i.e. INSERT, SELECT, UPDATE, DELETE).

CREATING TABLE:

```
SQL> CREATE TABLE orders(
  2  o_name VARCHAR(10),
  3  o_id VARCHAR(10) NOT NULL,
  4  o_place VARCHAR2(20),
  5  PRIMARY KEY(o_id)
  6  );

Table created.

SQL>
```

INSERT COMMAND:

It is used to add values to a table.

Syntax:

INSERT INTO table_name

VALUES (value1, value2, …., valueN);

INSERT INTO table_name (colunm1, colunm2, …., colunmN)

VALUES (value1, value2, ….., valueN);

```
SQL> INSERT INTO orders(o_name,o_id,o_place)
  2  VALUES('FRIED RICE',2424,'KLD ROAD');

1 row created.

SQL> INSERT INTO orders(o_name,o_id,o_place)
  2  VALUES('GOBI RICE',2038,'GANESH NAGAR');

1 row created.

SQL> INSERT INTO orders(o_name,o_id,o_place)
  2  VALUES('MEALS',5456,'RAM NAGAR');

1 row created.

SQL>
```

SELECT COMMAND:

The SELECT command is used to list the contents of a table.

Syntax:

SELECT * FROM table_name:

SELECT column_name FROM table_name;

```
SQL> SELECT * FROM ORDERS;

O_NAME     O_ID       O_PLACE
---------- ---------- --------------------
FRIED RICE 2424       KLD ROAD
GOBI RICE  2038       GANESH NAGAR
MEALS      5456       RAM NAGAR

SQL>
```

```
SQL> SELECT o_id FROM orders;

O_ID
----------
2424
2038
5456

SQL>
```

UPDATE COMMAND:

The UPDATE command is used to modify the contents of specified table.

Syntax:

UPDATE table_name

SET column_name = value [,

Column_name = value]

[WHERE condition_list];

```
SQL> UPDATE orders SET o_place='AZAD NAGAR' WHERE o_id=2038;

1 row updated.

SQL> SELECT*FROM orders;

O_NAME     O_ID       O_PLACE
---------- ---------- --------------------
FRIED RICE 2424       KLD ROAD
GOBI RICE  2038       AZAD NAGAR
MEALS      5456       RAM NAGAR

SQL>
```

DELETE COMMAND:

To delete all rows or specified rows in a table.

Syntax:

DELETE FROM table_name [WHERE condition_list];

```
SQL> DELETE FROM orders WHERE o_id=2038;

1 row deleted.

SQL> SELECT*FROM orders;

O_NAME     O_ID       O_PLACE
---------- ---------- --------------------
FRIED RICE 2424       KLD ROAD
MEALS      5456       RAM NAGAR

SQL>
```

CONCLUSION:

In this lab, we have practiced INSERT, SELECT, UPDATE, and DELETE commands for user created table.

EXPERIMENT-3

AIM: To implement view high level design for various views to CREATE VIEW, ALTER VIEW and DELETE VIEW using DDL commands.

CREATING TABLE:

```
SQL> CREATE TABLE student1(
  2  s_id VARCHAR2(10),
  3  s_name VARCHAR2(20),
  4  s_branch VARCHAR2(20)
  5  );

Table created.

SQL>
```

INSERTING VALUES INTO TABLE student1:

```
SQL> INSERT INTO student1 VALUES(220,'Alluri','CSE');

1 row created.

SQL> INSERT INTO student1 VALUES(221,'Sita','CSM');

1 row created.

SQL> INSERT INTO student1 VALUES(222,'Siva','CSD');

1 row created.

SQL> SELECT * FROM student1;

S_ID       S_NAME               S_BRANCH
---------- -------------------- --------------------
220        Alluri               CSE
221        Sita                 CSM
222        Siva                 CSD

SQL>
```

CREATE VIEW: Create a view details with attributes s_id and s_name.

```
SQL> CREATE VIEW details AS SELECT s_id,s_name FROM student1;

View created.

SQL>
```

INSERTING VALUES INTO details view:

```
SQL> INSERT INTO details(s_id,s_name) VALUES(223,'RAJU');

1 row created.

SQL> INSERT INTO details(s_id,s_name) VALUES(224,'RAMA');

1 row created.

SQL>
```

```
SQL> SELECT * FROM details;

S_ID       S_NAME
---------- --------------------
220        Alluri
221        Sita
222        Siva
223        RAJU
224        RAMA

SQL>
```

ALTER VIEW: Add an attribute branch to the view.

```
SQL> CREATE VIEW details2 AS SELECT s_id,s_name,s_branch FROM student1 WHERE s_id=222;

View created.

SQL> SELECT * FROM details2 WHERE s_id=222;

S_ID       S_NAME               S_BRANCH
---------- -------------------- --------------------
222        Siva                 CSD

SQL>
```

UPDATE VIEW: Update the existing name with the new name using UPDATE command.

```
SQL> UPDATE details SET s_name='Ram' WHERE s_id=224;

1 row updated.

SQL> SELECT * FROM details;

S_ID       S_NAME
---------- --------------------
220        Alluri
221        Sita
222        Siva
223        RAJU
224        Ram

SQL>
```

DROP VIEW: Drop a view using DROP command.

```
SQL> DROP VIEW details2;

View dropped.

SQL>
```

Conclusion:

In this lab, we have practiced how to CREATE VIEW, ALTER VIEW, UPDATE VIEW, and DELETE VIEW for user created table.

EXPERIMENT-4

AIM: To implement SQL queries for set operations like UNION, UNION ALL, INTERSECT, INTERSECT ALL, MINUS, CROSS JOIN, NATURAL JOIN.

CREATING A TABLE instructor2:

```
SQL> CREATE TABLE instructor2(
  2  i_id VARCHAR2(10),
  3  i_name VARCHAR2(20),
  4  i_branch VARCHAR2(20)
  5  );

Table created.
```

INSERTING VALUES INTO TABLE instructor2:

```
SQL> INSERT INTO instructor2 VALUES(441,'NEHA','CSE');

1 row created.

SQL> INSERT INTO instructor2 VALUES(442,'NANI','CSD');

1 row created.

SQL> INSERT INTO instructor2 VALUES(443,'MEENA','CSM');

1 row created.

SQL> SELECT * FROM instructor2;

I_ID       I_NAME               I_BRANCH
---------- -------------------- --------------------
441        NEHA                 CSE
442        NANI                 CSD
443        MEENA                CSM

SQL>
```

CREATING TABLE department:

```
SQL> CREATE TABLE department(
  2  d_id VARCHAR2(5),
  3  d_name VARCHAR2(20),
  4  d_budget NUMBER(10,2)
  5  );

Table created.
```

INSERTING VALUES INTO department:

```
SQL> INSERT INTO department VALUES(451,'CSE',75000);

1 row created.

SQL> INSERT INTO department VALUES(452,'CIVIL',85000);

1 row created.

SQL> INSERT INTO department VALUES(453,'MECH',80000);

1 row created.

SQL> SELECT * FROM department;

D_ID  D_NAME               D_BUDGET
----- -------------------- ----------
451   CSE                       75000
452   CIVIL                     85000
453   MECH                      80000

SQL>
```

UNION: The attributes i_branch from instructor2 and d_name from department are joined using UNION command.

```
SQL> SELECT i_branch FROM instructor2
  2  UNION
  3  SELECT d_NAME FROM department;

I_BRANCH
--------------------
CSE
CSD
CSM
CIVIL
MECH

SQL>
```

UNION ALL: The attributes i_branch from instructor2 and d_name from department are joined along with duplicates using UNION ALL command.

```
SQL> SELECT i_branch FROM instructor2
  2  UNION ALL
  3  SELECT d_NAME FROM department;

I_BRANCH
--------------------
CSE
CSD
CSM
CSE
CIVIL
MECH

6 rows selected.

SQL>
```

INTERSECT: Displays similar values in two or more attributes from department and instructor4 using INTERSECT command.

```
SQL> SELECT i_branch FROM instructor2
  2  INTERSECT
  3  SELECT d_NAME FROM department;

I_BRANCH
--------------------
CSE

SQL>
```

MINUS: It eliminates the same values of second column from the first column and represents the remaining values using command MINUS.

```
SQL> SELECT i_branch FROM instructor2
  2  MINUS
  3  SELECT d_NAME FROM department;

I_BRANCH
--------------------
CSD
CSM

SQL>
```

CROSS JOIN: Its cross products the all the attributes using CROSS JOIN command.

```
SQL> SELECT i_id,i_name,i_branch
  2  FROM instructor2 i,department d;

I_ID       I_NAME               I_BRANCH
---------- -------------------- --------------------
441        NEHA                 CSE
441        NEHA                 CSE
441        NEHA                 CSE
442        NANI                 CSD
442        NANI                 CSD
442        NANI                 CSD
443        MEENA                CSM
443        MEENA                CSM
443        MEENA                CSM

9 rows selected.

SQL>
```

Conclusion:

In this lab, we have practiced the set operations like UNION, UNION ALL, INTERSECT, MINUS, CROSS JOIN on user created tables.

EXPERIMENT-5

AIM:SQL queries to perform SPECIAL OPERATIONS (IS NULL, BETWEEN, LIKE, IN, EXISTS).

CREATING TABLE-1:

```
SQL> CREATE TABLE instructors(
  2  id VARCHAR2(10),
  3  name VARCHAR2(20) NOT NULL,
  4  dept_name VARCHAR2(10),
  5  salary NUMERIC(8,2)
  6  );

Table created.

SQL>
```

INSERTING VALUES INTO THE TABLE:

```
SQL> INSERT INTO instructors VALUES(801,'GOPI','CSE',45000);

1 row created.

SQL> INSERT INTO instructors VALUES(802,'SIVA','CSM',64000);

1 row created.

SQL> INSERT INTO instructors VALUES(803,'KESI','CSD',87000);

1 row created.

SQL> INSERT INTO instructors VALUES(804,'TEJU','MECH',77000);

1 row created.

SQL> INSERT INTO instructors VALUES(805,'JOTISH','CIVIL',67000);

1 row created.

SQL> INSERT INTO instructors VALUES(806,'LUCKY','','');

1 row created.

SQL>
SQL> SELECT * FROM instructors;

ID         NAME                 DEPT_NAME      SALARY
---------- -------------------- ---------- ----------
801        GOPI                 CSE             45000
802        SIVA                 CSM             64000
803        KESI                 CSD             87000
804        TEJU                 MECH            77000
805        JOTISH               CIVIL           67000
806        LUCKY

6 rows selected.

SQL>
```

IS NULL: It is used to check null values and display null attributes. It displays attributes that have null values.

```
SQL> SELECT * FROM instructors WHERE salary IS NULL;

ID         NAME                 DEPT_NAME      SALARY
---------- -------------------- ---------- ----------
806        LUCKY

SQL>
```

This command displays the salary that are not equal to 64000.

```
SQL> SELECT * FROM instructors WHERE salary <>64000;

ID         NAME                 DEPT_NAME      SALARY
---------- -------------------- ---------- ----------
801        GOPI                 CSE             45000
803        KESI                 CSD             87000
804        TEJU                 MECH            77000
805        JOTISH               CIVIL           67000

SQL>
```

IS NOT NULL: It displays attributes that don't have null values.

```
SQL> SELECT * FROM instructors WHERE salary IS NOT NULL;

ID         NAME                 DEPT_NAME      SALARY
---------- -------------------- ---------- ----------
801        GOPI                 CSE             45000
802        SIVA                 CSM             64000
803        KESI                 CSD             87000
804        TEJU                 MECH            77000
805        JOTISH               CIVIL           67000

SQL>
```

BETWEEN: This is used to check range of values.

By following command, it displays all the attributes between 45000 and 77000.

```
SQL> SELECT * FROM instructors WHERE salary BETWEEN 45000 AND 77000;

ID         NAME                 DEPT_NAME      SALARY
---------- -------------------- ---------- ----------
801        GOPI                 CSE             45000
802        SIVA                 CSM             64000
804        TEJU                 MECH            77000
805        JOTISH               CIVIL           67000

SQL>
```

The following command displays salary that are not in between 45000 and 77000.

```
SQL> SELECT * FROM instructors WHERE salary NOT BETWEEN 45000 AND 77000;

ID         NAME                 DEPT_NAME      SALARY
---------- -------------------- ---------- ----------
803        KESI                 CSD             87000

SQL>
```

IN: This is used to check a member is in a set or not. It displays if the id's are present in the table.

```
SQL> SELECT * FROM instructors WHERE ID IN ('803','802','804');

ID         NAME                 DEPT_NAME      SALARY
---------- -------------------- ---------- ----------
802        SIVA                 CSM             64000
803        KESI                 CSD             87000
804        TEJU                 MECH            77000

SQL>
```

The following command displays all the attributes with id's except the given id's.

```
SQL> SELECT * FROM instructors WHERE ID NOT IN ('803','802','804');

ID         NAME                 DEPT_NAME      SALARY
---------- -------------------- ---------- ----------
801        GOPI                 CSE             45000
805        JOTISH               CIVIL           67000
806        LUCKY

SQL>
```

EXISTS: This is used to check whether given set is empty or not. It displays null attributes that are null according to the given condition.

```
SQL> SELECT * FROM instructors WHERE EXISTS
  2  (SELECT * FROM instructors WHERE dept_name IS NULL);

ID         NAME                 DEPT_NAME      SALARY
---------- -------------------- ---------- ----------
801        GOPI                 CSE             45000
802        SIVA                 CSM             64000
803        KESI                 CSD             87000
804        TEJU                 MECH            77000
805        JOTISH               CIVIL           67000
806        LUCKY

6 rows selected.

SQL>
```

LIKE: This is used to check given string is present or not. It displays all the attributes that start with character 'c'.

```
SQL> SELECT * FROM instructors WHERE dept_name LIKE 'C%';

ID         NAME                 DEPT_NAME      SALARY
---------- -------------------- ---------- ----------
801        GOPI                 CSE             45000
802        SIVA                 CSM             64000
803        KESI                 CSD             87000
805        JOTISH               CIVIL           67000

SQL>
```

Conclusion: In this lab, we have practiced SPECIAL OPERATIONS IS NULL, BETWEEN, LIKE, IN, EXISTS on user created table.

EXPERIMENT-6

AIM: To implement SQL queries to perform JOIN OPERATIONS (CONDITIONAL JOIN, EQUI JOIN, LEFT OUTER JOIN, RIGHT OUTER JOIN, FULL OUTER JOIN).

CREATING TABLE-1:

```
SQL> CREATE TABLE student(
  2  id NUMBER,
  3  name VARCHAR2(20),
  4  branch VARCHAR2(20)
  5  );

Table created.

SQL>
```

INSERTING VALUES INTO THE TABLE:

```
SQL> INSERT INTO student VALUES(81,'RAJU','CSE');

1 row created.

SQL> INSERT INTO student VALUES(82,'RANI','CSM');

1 row created.

SQL> INSERT INTO student VALUES(83,'MANI','CSD');

1 row created.

SQL> INSERT INTO student VALUES(84,'NANI','CIVIL');

1 row created.

SQL>
```

```
SQL> SELECT * FROM student;

        ID NAME                 BRANCH
---------- -------------------- --------------------
        81 RAJU                 CSE
        82 RANI                 CSM
        83 MANI                 CSD
        84 NANI                 CIVIL

SQL>
```

CREATING TABLE-2:

```
SQL> CREATE TABLE library(
  2  id NUMBER,
  3  book_name VARCHAR2(20)
  4  );

Table created.

SQL>
```

INSERTING VALUES INTO TABLE-2:

```
SQL> INSERT INTO library VALUES(81,'JAVA');

1 row created.

SQL> INSERT INTO library VALUES(82,'DBMS');

1 row created.

SQL> INSERT INTO library VALUES(83,'SE');

1 row created.

SQL> SELECT * FROM library;

        ID BOOK_NAME
---------- --------------------
        81 JAVA
        82 DBMS
        83 SE

SQL>
```

CONDITIONAL JOIN: It helps in retrieving the desired data and performing complex queries.

```
SQL> SELECT * FROM student JOIN library USING(id);

        ID NAME                 BRANCH               BOOK_NAME
---------- -------------------- -------------------- --------------------
        81 RAJU                 CSE                  JAVA
        82 RANI                 CSM                  DBMS
        83 MANI                 CSD                  SE

SQL>
```

EQUI JOIN: It helps in retrieving related information from different tables by matching corresponding values.

```
SQL> SELECT * FROM student JOIN library USING(id);

        ID NAME                 BRANCH               BOOK_NAME
---------- -------------------- -------------------- --------------------
        81 RAJU                 CSE                  JAVA
        82 RANI                 CSM                  DBMS
        83 MANI                 CSD                  SE

SQL>
```

LEFT OUTER JOIN: It combines data from two or more tables based on the matching values in specified columns, but it also includes unmatched rows from the left table.

```
SQL> SELECT * FROM student NATURAL LEFT OUTER JOIN library;

        ID NAME                 BRANCH              BOOK_NAME
---------- -------------------- -------------------- --------------------
        81 RAJU                 CSE                 JAVA
        82 RANI                 CSM                 DBMS
        83 MANI                 CSD                 SE
        84 NANI                 CIVIL

SQL>
```

RIGHT OUTER JOIN: It combines data from two or more tables based on the matching values in specified columns, but also includes unmatched rows from he right table.

```
SQL> SELECT * FROM student NATURAL RIGHT OUTER JOIN library;

        ID NAME                 BRANCH              BOOK_NAME
---------- -------------------- -------------------- --------------------
        81 RAJU                 CSE                 JAVA
        82 RANI                 CSM                 DBMS
        83 MANI                 CSD                 SE

SQL>
```

FULL OUTER JOIN: It includes all the rows from both the left and right tables, even if there is no match.

```
SQL> SELECT * FROM student NATURAL FULL OUTER JOIN library;

        ID NAME                 BRANCH              BOOK_NAME
---------- -------------------- -------------------- --------------------
        81 RAJU                 CSE                 JAVA
        82 RANI                 CSM                 DBMS
        83 MANI                 CSD                 SE
        84 NANI                 CIVIL

SQL>
```

Conclusion: In this lab, we have practiced JOIN OPERATIONS CONDITIONAL JOIN, EQUI JOIN, LEFT OUTER JOIN, RIGHT OUTER JOIN, FULL OUTER JOIN on user created tables.

EXPERIMENT-7

AIM: To implement SQL queries to perform AGGREGATE OPERATIONS (SUM, COUNT, AVG, MIN, MAX).

CREATING A TABLE:

```
SQL> CREATE TABLE employee(
  2  ID VARCHAR2(5),
  3  NAME VARCHAR2(20),
  4  FIELD VARCHAR2(20),
  5  SALARY NUMERIC(8,2)
  6  );

Table created.

SQL>
```

INSERTING VALUES INTO TABLE:

```
SQL> INSERT INTO employee VALUES(661,'NEHA','DEVELOPER',60000);

1 row created.

SQL> INSERT INTO employee VALUES(662,'NANI','TESTER',62000);

1 row created.

SQL> INSERT INTO employee VALUES(663,'DEVI','MANAGER',70000);

1 row created.

SQL> INSERT INTO employee VALUES(664,'TEJU','REVERSE ENGINEER',75000);

1 row created.

SQL> INSERT INTO employee VALUES(665,'JOTISH','TESTER',66000);

1 row created.

SQL>
```

```
SQL> SELECT * FROM employee;

ID    NAME                 FIELD                  SALARY
----- -------------------- -------------------- ----------
661   NEHA                 DEVELOPER                 60000
662   NANI                 TESTER                    62000
663   DEVI                 MANAGER                   70000
664   TEJU                 REVERSE ENGINEER          75000
665   JOTISH               TESTER                    66000

SQL>
```

COUNT: It displays the count on members present in employee.

```
SQL> SELECT COUNT(*) FROM employee;

  COUNT(*)
----------
         5

SQL>
```

AVERAGE(AVG): It displays average salary of each employee.

```
SQL> SELECT FIELD,AVG(SALARY) AS AVG_SALARY
  2  FROM employee
  3  GROUP BY FIELD;

FIELD                AVG_SALARY
-------------------- ----------
DEVELOPER                 60000
TESTER                    64000
MANAGER                   70000
REVERSE ENGINEER          75000

SQL>
```

SUM: It displays sum of all the salaries from the table.

```
SQL> SELECT SUM(SALARY) FROM employee;

SUM(SALARY)
-----------
     333000

SQL>
```

MIN: It displays the minimum salary from the table.

```
SQL> SELECT MIN(SALARY) FROM employee;

MIN(SALARY)
-----------
      60000

SQL>
```

MAX: It displays the maximum salary from the table.

```
SQL> SELECT MAX(SALARY) FROM employee;

MAX(SALARY)
-----------
      75000

SQL>
```

Conclusion: In this lab, we have practiced AGGREGATE OPERATIONS like SUM, COUNT, AVERAGE, MIN, MAX on user created table.

EXPERIMENT-8

AIM: To implement SQL queries to perform BUILT-IN FUNCTIONS (DATE, TIME).

CASE CONVERSION:

LOWER (): It converts a string into lowercase.

```
SQL> SELECT LOWER('HELLO WORLD') FROM DUAL;

LOWER('HELL
-----------
hello world

SQL>
```

UPPER (): It converts a string into uppercase.

```
SQL> SELECT UPPER('Hello world') FROM DUAL;

UPPER('HELL
-----------
HELLO WORLD

SQL>
```

INITCAP (): It converts a string into camel case.

```
SQL> SELECT INITCAP('hello world') FROM DUAL;

INITCAP('HE
-----------
Hello World

SQL>
```

CONCAT (): It adds two or more expressions together.

```
SQL> SELECT CONCAT('Hello','World') FROM DUAL;

CONCAT('HE
----------
HelloWorld

SQL>
```

SUBSTR (): It extracts a substring from a string.

```
SQL> SELECT SUBSTR('Hello World',1,5) FROM DUAL;

SUBST
-----
Hello

SQL>
```

LENGTH (): It returns the length of the given string.

```
SQL> SELECT LENGTH('Hello World') FROM DUAL;

LENGTH('HELLOWORLD')
--------------------
                  11

SQL>
```

INSTR (): It returns the position or the first occurrence of a string in another string.

```
SQL> SELECT INSTR('Hello World','Hello') FROM DUAL;

INSTR('HELLOWORLD','HELLO')
---------------------------
                          1

SQL>
```

TRIM (): It removes the selected one from string.

```
SQL> SELECT TRIM('H' FROM 'Hello World') FROM DUAL;

TRIM('H'FR
----------
ello World

SQL>
```

NUMBER FUNCTIONS:

ROUND (): It returns the specified values.

```
SQL> SELECT ROUND(87.9865) FROM DUAL;

ROUND(87.9865)
--------------
            88

SQL> SELECT ROUND(87.9865,2) FROM DUAL;

ROUND(87.9865,2)
----------------
           87.99

SQL>
```

TRUNCATE (): It removes the decimal values which are specified.

```
SQL> SELECT TRUNC(87.9865,0) FROM DUAL;

TRUNC(87.9865,0)
----------------
              87

SQL>
```

MOD (): It returns the remainder.

```
SQL> SELECT MOD(1600,33) FROM DUAL;

MOD(1600,33)
------------
          16

SQL>
```

DATE FUNCTIONS:

SYSDATE ():

```
SQL> SELECT SYSDATE FROM DUAL;

SYSDATE
---------
12-JAN-24

SQL>
```

MONTHS_BETWEEN ():

```
SQL> SELECT MONTHS_BETWEEN(SYSDATE,'1-JAN-24') FROM DUAL;

MONTHS_BETWEEN(SYSDATE,'1-JAN-24')
----------------------------------
                        .372958109

SQL>
```

ADD_MONTHS ():

```
SQL> SELECT ADD_MONTHS(SYSDATE,5) FROM DUAL;

ADD_MONTH
---------
12-JUN-24

SQL>
```

NEXT_DAY ():

```
SQL> SELECT NEXT_DAY(SYSDATE,'FRIDAY') FROM DUAL;

NEXT_DAY(
---------
19-JAN-24

SQL>
```

LAST_DAY ():

```
SQL> SELECT LAST_DAY(SYSDATE) FROM DUAL;

LAST_DAY(
---------
31-JAN-24

SQL>
```

TRUNC ():

```
SQL> SELECT TRUNC(SYSDATE,'DAY') FROM DUAL;

TRUNC(SYS
---------
07-JAN-24

SQL>
```

Conclusion: In this lab, we have practiced BUILT-IN FUNCTIONS like DATE AND TIME .

EXPERIMENT-9

AIM: To implement SQL queries to perform KEY CONSTRAINTS (PRIMARY KEY, FOREIGN KEY, UNIQUE, NOT NULL, CHECK, DEFAULT).

PRIMARY KEY: A primary key is a field which can uniquely identify each row in table and this constraint is used to specify a field as primary key.

```
SQL> CREATE TABLE student5(
  2  ID NUMBER,
  3  NAME VARCHAR2(20),
  4  ADDRESS VARCHAR2(20)
  5  );

Table created.

SQL>
```

FOREIGN KEY: A foreign key is a field which can uniquely each row in another table.

```
SQL> CREATE TABLE orders5(
  2  o_id NUMBER NOT NULL,
  3  c_id NUMBER,
  4  PRIMARY KEY(o_id),
  5  FOREIGN KEY(c_id)REFERENCES customer(c_id)
  6  );
```

```
Table created.

SQL>
```

UNIQUE: This constraint when specified with a column, tells that the values in the column must be unique i.e., the values in any row of a column must not be repeated.

```
SQL> CREATE TABLE student3(
  2  id NUMBER UNIQUE,
  3  name VARCHAR2(20),
  4  address VARCHAR2(20)
  5  );

Table created.

SQL>
```

NOT NULL: This constraint tells that we cannot store a null value in a column.

```
SQL> CREATE TABLE student3(
  2  ID NUMBER,
  3  NAME VARCHAR2(20) NOT NULL,
  4  ADDRESS VARCHAR2(20)
  5  );

Table created.

SQL>
```

DEFAULT: This constraint specifies a default value for the column when no value is specified by the user.

```
SQL> CREATE TABLE student6(
  2  ID NUMBER,
  3  NAME VARCHAR2(20) NOT NULL,
  4  AGE NUMBER DEFAULT 18
  5  );

Table created.

SQL>
```

CHECK: This constraint helps to validate the value for the column to meet a particular condition i.e. it helps to ensure that the value stored in a column meets a specific condition.

```
SQL> CREATE TABLE student8(
  2  id NUMBER NOT NULL,
  3  NAME VARCHAR2(20) NOT NULL,
  4  AGE NUMBER NOT NULL CHECK(AGE>=18)
  5  );

Table created.

SQL>
```

Conclusion: In this lab, we have practiced KEY CONSTRAINTS PRIMARY KEY, FOREIGN KEY, UNIQUE, NOT NULL, CHECK, DEFAULT on user created tables.

EXPERIMENT-10

AIM: To write a PL/SQL program for calculating the factorial of a given number.

SOURCE CODE & OUTPUT:

```
SQL> DECLARE
  2  FACT NUMBER:=1;
  3  N NUMBER;
  4  N1 NUMBER;
  5  BEGIN
  6  N:=&N;
  7  N1:=N;
  8  WHILE N>0 LOOP
  9  FACT:=N*FACT;
 10  N:=N-1;
 11  END LOOP;
 12  DBMS_OUTPUT.PUT_LINE('The Factorial of '||n1||' is '||FACT);
 13  END;
 14  /
Enter value for n: 5
old   6: N:=&N;
new   6: N:=5;
The Factorial of 5 is 120

PL/SQL procedure successfully completed.

SQL> SET VERIFY OFF
SQL> /
Enter value for n: 4
The Factorial of 4 is 24

PL/SQL procedure successfully completed.

SQL>
```

- To run the program '/' is used.
- To display the output, we use "SET SERVEROUT ON".
- To eliminate debugging message "SET VERIFY OFF" should be used.

Conclusion: In this lab, we have practiced a PL/SQL program to calculate factorial of given number.

EXPERIMENT-11

AIM: To write a PL/SQL program for finding the given number is prime or not.

SOURCE CODE & OUTPUT:

```
SQL> DECLARE
  2  N NUMBER;
  3  N1 NUMBER;
  4  I NUMBER;
  5  TEMP NUMBER;
  6  BEGIN
  7  N:=&N;
  8  N1:=N;
  9  I:=2;
 10  TEMP:=1;
 11  FOR I IN 2..N/2
 12  LOOP
 13  IF MOD(N,I)=0
 14  THEN
 15  TEMP:=0;
 16  EXIT;
 17  END IF;
 18  END LOOP;
 19  IF TEMP=1
 20  THEN
 21  DBMS_OUTPUT.PUT_LINE(N||' is a prime number');
 22  ELSE
 23  DBMS_OUTPUT.PUT_LINE(N||' is not a prime number');
 24  END IF;
 25  END;
 26  /
Enter value for n: 8
8 is not a prime number

PL/SQL procedure successfully completed.

SQL> /
Enter value for n: 11
11 is a prime number

PL/SQL procedure successfully completed.

SQL>
```

- To run the program '/' is used.
- To display the output, we use "SET SERVEROUT ON".
- To eliminate debugging message "SET VERIFY OFF" should be used.

Conclusion: In this lab, we have practiced a PL/SQL program for finding a given number is prime or not.

EXPERIMENT-12

AIM: To write a PL/SQL program for displaying the Fibonacci series up to an integer.

SOURCE CODE & OUTPUT:

```
SQL> DECLARE
  2  FIRST NUMBER:=0;
  3  SECOND NUMBER:=1;
  4  TEMP NUMBER;
  5  N NUMBER;
  6  N1 NUMBER;
  7  I NUMBER;
  8  BEGIN
  9  N:=&N;
 10  N1:=N;
 11  DBMS_OUTPUT.PUT_LINE('SERIES:');
 12  DBMS_OUTPUT.PUT_LINE(FIRST);
 13  DBMS_OUTPUT.PUT_LINE(SECOND);
 14  FOR I IN 2..N
 15  LOOP
 16  TEMP:=FIRST+SECOND;
 17  FIRST:=SECOND;
 18  SECOND:=TEMP;
 19  DBMS_OUTPUT.PUT_LINE(TEMP);
 20  END LOOP;
 21  END;
 22  /
Enter value for n: 6
SERIES:
0
1
1
2
3
5
8

PL/SQL procedure successfully completed.

SQL>
```

- To run the program '/' is used.
- To display the output, we use "SET SERVEROUT ON".
- To eliminate debugging message "SET VERIFY OFF" should be used.

Conclusion: In this lab, we have practiced a PL/SQL program for displaying Fibonacci series up to an integer.

EXPERIMENT-13

AIM: To write a PL/SQL program to implement Stored Procedure on table.

PL/SQL Procedure:

The PL/SQL stored procedure or simply a procedure is a PL/SQL block which performs one or more specific tasks. It is just like procedures in other programming languages.

The procedure contains a header and a body.

EXAMPLE-1:

```
SQL> CREATE TABLE SAILOR(ID NUMBER(10) PRIMARY KEY,NAME VARCHAR2(100));

Table created.

SQL> CREATE OR REPLACE PROCEDURE INSERTUSER
  2  (ID IN NUMBER,
  3  NAME IN VARCHAR2)
  4  IS
  5  BEGIN
  6  INSERT INTO SAILOR VALUES(ID,NAME);
  7  DBMS_OUTPUT.PUT_LINE('RECORD INSERTED SUCCESSFULLY');
  8  END;
  9  /

Procedure created.

SQL>
```

EXECUTION PROCEDURE:

```
SQL> DECLARE
  2  CNT NUMBER;
  3  BEGIN
  4  INSERTUSER(202,'CHINNU');
  5  SELECT COUNT(*) INTO CNT FROM SAILOR;
  6  DBMS_OUTPUT.PUT_LINE(CNT||' RECORD IS INSERTED SUCCESSFULLY');
  7  END;
  8  /

PL/SQL procedure successfully completed.

SQL>
```

DROP PROCEDURE:

```
SQL> DROP PROCEDURE insertuser;

Procedure dropped.

SQL>
```

Conclusion: In this lab, we have practiced a PL/SQL program to implement Stored Procedure on table.

EXPERIMENT-14

AIM: To write a PL/SQL program to implement Stored Function on table.

PL/SQL Function:

The Pl/SQL Function is very similar to PL/SQL Procedure. The main difference between procedure and a function is, a function must always return a value, and on the other hand a procedure may or may not return a value. Expect this, all other things of PL/SQL procedure are true for PL/SQL function too.

EXAMPLE-1:

```
SQL> CREATE OR REPLACE FUNCTION ADDER(N1 IN NUMBER, N2 IN NUMBER)
  2  RETURN NUMBER
  3  IS
  4  N3 NUMBER(8);
  5  BEGIN
  6  N3:=N1+N2;
  7  RETURN N3;
  8  END;
  9  /

Function created.

SQL>
```

EXECUTION PROCEDURE:

```
SQL> DECLARE
  2  N3 NUMBER(2);
  3  BEGIN
  4  N3:=ADDER(22,44);
  5  DBMS_OUTPUT.PUT_LINE('ADDITION IS: '||N3);
  6  END;
  7  /

PL/SQL procedure successfully completed.

SQL> SET SERVEROUT ON
SQL> /
ADDITION IS: 66

PL/SQL procedure successfully completed.

SQL>
```

```
SQL> DROP FUNCTION ADDER;

Function dropped.

SQL>
```

EXAMPLE-2:

```
SQL> CREATE FUNCTION FACT(X NUMBER)
  2  RETURN NUMBER
  3  IS
  4  F NUMBER;
  5  BEGIN
  6  IF X=0 THEN
  7  F:=1;
  8  ELSE
  9  F:=X*FACT(X-1);
 10  END IF;
 11  RETURN F;
 12  END;
 13  /

Function created.

SQL>
```

EXECUTION PROCEDURE:

```
SQL> DECLARE
  2  NUM NUMBER;
  3  FACTORIAL NUMBER;
  4  BEGIN
  5  NUM:=4;
  6  FACTORIAL:=FACT(NUM);
  7  DBMS_OUTPUT.PUT_LINE(' FACTORIAL '||NUM||' IS '|| FACTORIAL);
  8  END;
  9  /
FACTORIAL 4 IS 24

PL/SQL procedure successfully completed.

SQL>
```

```
SQL> DROP FUNCTION FACT;

Function dropped.

SQL>
```

EXPERIMENT-15

AIM: To write PL/SQL program to implement Trigger on table.

Tigger:

Trigger is invoked by Oracle engine automatically whenever a specified event occurs. Trigger is stored into database and invoked repeatedly, when specific condition match. Triggers are stored programs, which are automatically executed or fired when some event occurs. Triggers are written to be executed in response to any of the following events.

A database manipulation (DML) statement (DELETE, INSERT, UPDATE).

A database definition (DDL) statement (CREATE, ALTER, DROP).

A database operation (SERVERERROR, LOGON, LOGOFF, STARTUP, SHUTDOWN).

CREATING A TABLE:

```
SQL> CREATE TABLE INSTRUCTOR(
  2  ID NUMBER PRIMARY KEY,
  3  NAME VARCHAR2(50) NOT NULL,
  4  DEPT_NAME VARCHAR2(20) NOT NULL,
  5  SALARY NUMBER(10,2) CHECK(SALARY>45000)
  6  );

Table created.

SQL>
```

INSERTING VALUES INTO THE TABLE:

```
SQL> INSERT INTO INSTRUCTOR VALUES(41,'ALLURI','CSE',55000);

1 row created.
```

```
SQL> INSERT INTO INSTRUCTOR VALUES(43,'RAMA','CSM',50000);

1 row created.

SQL> INSERT INTO INSTRUCTOR VALUES(44,'RAJU','CSE',60000);

1 row created.

SQL> SELECT * FROM INSTRUCTOR;

        ID NAME
---------- --------------------------------------------------
DEPT_NAME               SALARY
-------------------- ----------
        41 ALLURI
CSE                      55000

        43 RAMA
CSM                      50000

        44 RAJU
CSE                      60000
```

AN EXAMPLE TO CREATE TRIGGER:

```
SQL> CREATE OR REPLACE TRIGGER display_changes
  2  BEFORE UPDATE ON instructor
  3  FOR EACH ROW
  4  WHEN (NEW.ID=OLD.ID)
  5  DECLARE
  6  sal_diff NUMBER;
  7  BEGIN
  8  sal_diff:=:NEW.SALARY- :OLD.SALARY;
  9  DBMS_OUTPUT.PUT_LINE('OLD SALARY: '|| :OLD.SALARY);
 10  DBMS_OUTPUT.PUT_LINE('NEW SALARY: '|| :NEW.SALARY);
 11  DBMS_OUTPUT.PUT_LINE('SALARY DIFFERENCE: '|| sal_diff);
 12  END;
 13  /

Trigger created.

SQL>
```

A PL/SQL Procedure to execute a trigger:

```
SQL> DECLARE
  2  tot_rows NUMBER;
  3  BEGIN
  4  UPDATE instructor
  5  SET SALARY=SALARY*1.5;
  6  IF sql%notfound THEN
  7  DBMS_OUTPUT.PUT_LINE(' NO INSTRUCTORS UPDATED');
  8  ELSIF sql%found THEN
  9  tot_rows:=sql%rowcount;
 10  DBMS_OUTPUT.PUT_LINE(tot_rows||' INSTRUCTORS UPDATED');
 11  END IF;
 12  END;
 13  /
OLD SALARY: 55000
NEW SALARY: 82500
SALARY DIFFERENCE: 27500
OLD SALARY: 50000
NEW SALARY: 75000
SALARY DIFFERENCE: 25000
OLD SALARY: 60000
NEW SALARY: 90000
SALARY DIFFERENCE: 30000
3 INSTRUCTORS UPDATED

PL/SQL procedure successfully completed.

SQL>
```

Conclusion: In this lab, we have practiced a PL/SQL program to implement Trigger on table.

EXPERIMENT-16

AIM: To write a PL/SQL program to implement Cursor on table.

CREATING A TABLE:

```
SQL> CREATE TABLE people(
  2  ID NUMBER PRIMARY KEY,
  3  NAME VARCHAR2(20) NOT NULL,
  4  AGE NUMBER(5) NOT NULL,
  5  SALARY NUMBER(10,2) NOT NULL
  6  );

Table created.

SQL>
```

INSERTING VALUES INTO TABLE:

```
SQL> INSERT INTO people VALUES(61,'SREE',24,60000);

1 row created.

SQL> INSERT INTO people VALUES(62,'LAKSHMI',35,66000);

1 row created.

SQL> INSERT INTO people VALUES(63,'DEEPU',28,78000);

1 row created.

SQL> INSERT INTO people VALUES(64,'YUVAN',30,55000);

1 row created.
```

```
SQL> SELECT* FROM people;

        ID NAME                      AGE     SALARY
---------- -------------------- ---------- ----------
        61 SREE                         24      60000
        62 LAKSHMI                      35      66000
        63 DEEPU                        28      78000
        64 YUVAN                        30      55000

SQL>
```

CREATE UPDATE PROCEDURE:

CREATE PROCEDURE:

```
SQL> DECLARE
  2  total_rows NUMBER(2);
  3  BEGIN
  4  UPDATE people
  5  SET SALARY=SALARY+6000;
  6  IF sql%notfound THEN
  7  DBMS_OUTPUT.PUT_LINE('NO CUSTOMERS UPDATED');
  8  ELSIF sql%found THEN
  9  total_rows:=sql%rowcount;
 10  DBMS_OUTPUT.PUT_LINE(total_rows||' CUSTOMERS UPDATED');
 11  END IF;
 12  END;
 13  /
4 CUSTOMERS UPDATED

PL/SQL procedure successfully completed.

SQL>
```

PL/SQL Program using Explicit Cursors:

```
SQL> DECLARE
  2  p_id people.id%type;
  3  p_name people.name%type;
  4  p_age people.age%type;
  5  CURSOR p_people IS
  6  SELECT id,name,age FROM people;
  7  BEGIN
  8  OPEN p_people;
  9  LOOP
 10  FETCH p_people INTO p_id,p_name,p_age;
 11  EXIT WHEN p_people%notfound;
 12  DBMS_OUTPUT.PUT_LINE(p_id||' '||p_name||' '||p_age);
 13  END LOOP;
 14  CLOSE p_people;
 15  END;
 16  /
61 SREE 24
62 LAKSHMI 35
63 DEEPU 28
64 YUVAN 30

PL/SQL procedure successfully completed.

SQL>
```

Conclusion: In this lab, we have practiced a PL/SQL program to implement Cursor on table.