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Practical 6

AIM: Distributed databases- Vertical Fragmentation

Perform Vertical Fragmentation

Create a global conceptual schema Emp (Eno; Ename; Address; email; Salary) and insert 10 records.

Divide Emp into vertical fragments

Emp1(Eno; Ename; Address) and Emp2(Eno; Email; Salary) on two different nodes.

What is vertical fragmentation?

- Vertical fragmentation refers to the process of decomposing a table vertically by attributes are columns.
- In this fragmentation, some of the attributes are stored in one system and the rest are stored in other systems.
- This is because each site may not need all columns of a table.
- In order to take care of restoration, each fragment must contain the primary key field(s) in a table.
- The fragmentation should be in such a manner that we can rebuild a table from the fragment by taking the natural JOIN operation and to make it possible we need to include a special attribute called Tuple-id to the schema.

For this purpose, a user can use any super key. And by this, the tuples or rows can be linked together.

The projection is as follows:

πa1, a2 ,..., an (T)
where, π is relational algebra operator
al...., an are the attributes of T
T is the table (relation)

Fire the following queries:

1. Find the salary of an employee where employee number is known.
2. Find the Email where the employee's name is known.
3. Find the employee's name and email where employee number is known.
4. Find the employee's name whose salary is > 2000.

Step 1: Connect to Global database using the following command:

SQL> Connect system@xe

```
SQL> Connect system@xe
Enter password:
Connected.
```

Step 2: Now our table already exists. But just to be sure use the command to check if our table exists:

SQL> select * from emp;

```
SQL> select * from emp;

       ENO ENAME                ADDRESS
---------- -------------------- ------------------------------
EMAIL                                SAL
------------------------------ ----------
       101 sadiq                bandra
sadiq@gmail.com                     21000

       102 sova                 cst
sova@gmail.com                       9000

       103 reyna                dadar
reyna@gmail.com                     12000


       ENO ENAME                ADDRESS
---------- -------------------- ------------------------------
EMAIL                                SAL
------------------------------ ----------
       104 sage                 andheri
sage@gmail.com                       8600

       105 viper                marine lines
viper@gmail.com                     18000

       106 harbor               chruchgate
harbor@gmail.com                    24000
```

```
       ENO ENAME                ADDRESS
---------- -------------------- ------------------------------
EMAIL                                SAL
------------------------------ ----------
       107 brim                 mahim
brim@gmail.com                       9900

       108 omen                 sandhrust road
omen@gmail.com                      16000

       109 pheonix              cotton green
pheonix@gmail.com                    9999


       ENO ENAME                ADDRESS
---------- -------------------- ------------------------------
EMAIL                                SAL
------------------------------ ----------
       110 fade                 khar
fade@gmail.com                      10001

       111 swordx               pearl
swordx@gmail.com                    14500


11 rows selected.
```

So our table exists

Step 3: Perform commit for system

SQL> commit;

```
SQL> commit;

Commit complete.

SQL> spool end;
SQL>
```

Step 4: Now open another sqlplus and login with user1 id and password

SQL> connect user1@xe

```
SQL> Connect user1@xe
Enter password:
Connected.
```

Step 5: Create database link to global database in order to access the data of global database table.

SQL> create database link l1 connect to system identified by rdnc using 'xe';

```
SQL> create database link l1 connect to system identified by rdnc using 'xe';

Database link created.
```

Step 6: Create table and insert the data from global database table:

SQL> create table e1 as select eno, ename, address from emp@l1;

```
SQL> create table e1 as select eno,ename,address from emp@l1;

Table created.
```

Step 7: We have inserted data from the global database into our e1 table. Now view that table:

SQL> select * from e1;

```
SQL> select * from e1;

       ENO ENAME                ADDRESS
---------- -------------------- ------------------------------
       101 sadiq                bandra
       102 sova                 cst
       103 reyna                dadar
       104 sage                 andheri
       105 viper                marine lines
       106 harbor               chruchgate
       107 brim                 mahim
       108 omen                 sandhrust road
       109 pheonix              cotton green
       110 fade                 khar
       111 swordx               pearl

11 rows selected.
```

Step 8: Perform commit for User1

SQL> commit;

```
SQL> commit;

Commit complete.
```

Step 9: Now open another sqlplus and login with user2 id and password

SQL> connect user2@xe

```
SQL> spool 'D:\SADIQ\MSc\SEM 1\ADT\PRAC\VF\u2.txt'
SQL>
SQL> Connect user2@xe
Enter password:
Connected.
```

Step 10: Create database link to global database in order to access the data of global database table.

SQL> create database link l2 connect to system identified by rdnc using 'xe';

```
SQL> create database link l2 connect to system identified by rdnc using 'xe';

Database link created.
```

Step 11: Create table and insert the data from global database table:

SQL> create table e2 as select eno, email, sal from emp@l2;

```
SQL> create table e2 as select eno,email,sal from emp@l2;

Table created.
```

Step 12: We have inserted data from the global database into our e2 table. Now view that table:

SQL> select * from e2;

```
SQL> select * from e2;

       ENO EMAIL                                SAL
---------- ------------------------------ ----------
       101 sadiq@gmail.com                     21000
       102 sova@gmail.com                       9000
       103 reyna@gmail.com                     12000
       104 sage@gmail.com                       8600
       105 viper@gmail.com                     18000
       106 harbor@gmail.com                    24000
       107 brim@gmail.com                       9900
       108 omen@gmail.com                      16000
       109 pheonix@gmail.com                    9999
       110 fade@gmail.com                      10001
       111 swordx@gmail.com                    14500

11 rows selected.
```

Step 13: Perform commit for User2

SQL> commit;

```
SQL> commit;

Commit complete.

SQL> spool end;
SQL>
```

Step 14: Now we will fire our queries in the third user. So open another sqlplus and login with user3 id and password.

SQL> connect user3@xe

```
SQL> spool 'D:\SADIQ\MSc\SEM 1\ADT\PRAC\VF\u3.txt'
SQL>
SQL> Connect user3@xe
Enter password:
Connected.
```

Step 15: Create database link for both the tables here in order to access various types of data based on given queries:

SQL> create database link l1 connect to user1 identified by u1 using 'xe';

Database link created.

SQL> create database link l2 connect to user2 identified by u2 using 'xe';

Database link created.

```
SQL> create database link l1 connect to user1 identified by u1 using'xe';

Database link created.

SQL> create database link l2 connect to user2 identified by u2 using 'xe';

Database link created.
```

Step 16: Fire the Queries:

1. **Find the salary of an employee where employee number is known.**

SQL> select sal from e2@l2 where eno=&eno;

Enter value for eno: 106

```
SQL> select sal from e2@l2 where eno=&eno;
Enter value for eno: 106
old   1: select sal from e2@l2 where eno=&eno
new   1: select sal from e2@l2 where eno=106

       SAL
----------
     24000
```

2. **Find the Email where the employee's name is known.**

SQL> select email from e2@l2 where eno=(select eno from e1@l1 where ename='&ename');

Enter value for ename: fade

```
SQL> select email from e2@l2 where eno=(select eno from e1@l1 where ename='&ename');
Enter value for ename: fade
old   1: select email from e2@l2 where eno=(select eno from e1@l1 where ename='&ename')
new   1: select email from e2@l2 where eno=(select eno from e1@l1 where ename='fade')

EMAIL
------------------------------
fade@gmail.com
```

3. **Find the employee's name and email where employee number is known.**

SQL> select e1.ename,e2.email from e1@l1 e1,e2@l2 e2 where e1.eno in (select e2.eno from e2@l2 where e2.eno=&eno);

Enter value for eno: 101

```
SQL Plus
SQL> select e1.ename,e2.email from e1@l1 e1,e2@l2 e2 where e1.eno in (select e2.eno from e2@l2 where e2.eno=&eno);
Enter value for eno: 101
old   1: select e1.ename,e2.email from e1@l1 e1,e2@l2 e2 where e1.eno in (select e2.eno from e2@l2 where e2.eno=&eno)
new   1: select e1.ename,e2.email from e1@l1 e1,e2@l2 e2 where e1.eno in (select e2.eno from e2@l2 where e2.eno=101)

ENAME                EMAIL
-------------------- ------------------------------
sadiq                sadiq@gmail.com
```

4. **Find the employee's name whose salary is > 2000.**

SQL> select ename from e1@l1 where eno in (select eno from e2@l2 where sal>2000);

```
SQL> select ename from e1@l1 where eno in (select eno from e2@l2 where sal>2000);

ENAME
--------------------
sadiq
sova
reyna
sage
viper
harbor
brim
omen
pheonix
fade
swordx

11 rows selected.

SQL> spool end;
SQL>
```

We have successfully performed Vertical Fragmentation.