**Shaikh Salma Manjar**

**Practical No:05**

**272**

**AIM: Distributed Databases**

**Perform Horizontal Fragmentation**

**Create a global conceptual schema Emp(Eno;Ename;Address;Email;Salary) and insert 10 records. Divide Emp into verticall fragments using the condition that Emp1 contains the tuples with salary <= 10,000 and Emp2 with 10,000<salary<=20,000 on two different nodes**.

**THEORY**:

**What is Distributed Database?**

A distributed database **is basically** a database that **is** not limited to one **system, it** is spread over different **sites**, i.e**, on** multiple computers or over a network of computers. A distributed database system is located on various sites that don't share physical components. This may be required when **a** particular database needs to be **accessed** by various users globally**. It needs to be** managed such that for the **users** it looks **like** one single **database**.

**Distributed Data Storage**:

There are 2 **ways in** which data can be stored on different sites. These are: **1. Replication -**

**2. Fragmentation -**

**Fragmentation of relations can be done in two ways**:

➤ Horizontal fragmentation **-** Splitting **by rows**

> **Vertical** fragmentation **-** Splitting by columns

**What is Horizontal fragmentation?**

✓ Horizontal fragmentation **refers** to **the** process **of** dividing a table horizontally

**by assigning** each row or (a **group** of **rows) of** relation to one or **more** fragments.

✔ These fragments are then be assigned to different sides in the distributed

system.

Some of the **rows** or **tuples** of the table are placed in one **system** and the rest are placed in other **systems**.

**✔The rows that** belong to the horizontal fragments are specified **by** a condition

**on one** or more attributes **of** the relation**.**

In relational algebra horizontal fragmentation on **table T, can be** represented as **follows:**

Op*(T)*

***where*, σ is *relational* algebra operator for selection**

**p is the *condition* satisfied *by a horizontal* fragment**

**50**

**Shaikh Salma Manjar**

**Fire the following queries**:

(i) Find the salary **of all** employees.

(ii) Find the **Email of** all employees **where** salary=**12,000**.

(iii) Find the employee name and **Email** where employee number is known.

(iv) Find the employee name where salary>20,000.

**Open the sql with system/root user**.

**Check global database as**:

select \* from global\_name;

**Connect to global database first**.

**SQL**>Connect system**@**xe Enter password:

**Connected**.

**Alter session to get the access to create users**

**SQL**> alter session set "**\_ORACLE\_SCRIPT**"=true;

**Session altered**.

**Create different users and grant them various privileges**.

SQL**> create** USER **user1** IDENTIFIED **by** u1;

SQL**>** Grant **create** session, create **table**,create **sequence,**create **view,create** procedure**,**connect,resource**,** create database **link,** unlimited tablespace to user1;

SQL> **create** USER user2 IDENTIFIED by **u2;**

**SQL**> **Grant** create **session,** create table,create sequence,create view**,**create procedure**,**connect,resource**,** create **database link**, **unlimited** tablespace to user2;

SQL> create USER user3 IDENTIFIED **by** u3;

SQL> Grant create session,create table,create **sequence**,create view**,create procedure,**connect,resource, create database link, unlimited tablespace to user3;

**Creating table and inserting 10 data's**.

SQL> create **table** emp(eno number(3**)** primary key**,**ename varchar2(**20),**address varchar2**(30)**,email varchar2(30**),**sal number(6));

Table created.

SQL> **insert** into emp values(101,'ram','dadar','ram**@**gmail.com',10000);

SQL> insert into emp values(102,'tom**','cst**', 'tom**@gmail.com',25000)**;

**272**

**51**

**Shaikh Salma Manjar**

SQL> insert into emp values(103,'sam','wadala','sam@gmail.com',30000);

SQL> **insert** into emp values(104**,**'sonu', 'wadala','sonu**@gmail.com',12000)**;

SQL> insert into emp values(105**,**'**monu','**matunga','monu**@gmail.com**'**,**24000**)**;

**SQL**> insert **into** emp values(106,'**mona**','sion','mona**@gmail.com',**35000);

**SQL>** insert into emp values(107**,**'**sona**'**, 'sion**'**,'sona@gmail.com**',40000);

SQL> insert into emp values(108**,'**harry'**,'kurla**','harry**@**gmail.com',30000**)**;

**SQL> insert** into emp values(109**,'**marry'**,**'kurla','marry@gmail.com',**60000)**;

**SQL>** insert into emp values(110,'anni**'**,**'**kurla',**'anni@gmail.com**'**,10000)**;

**Perform the commit**.

SQL> commit;

Commit complete.

**Now open another sqlplus and login with user1 id and password**.

SQL> connect user1**@**xe

Connected.

**Create database link to global database in order to access the data of global database table.**

**SQL> create database** link 11 connect to system identified by system using **'**xe'; **Database** link created.

**Fire** select **query to check if the link to databases is functioning** well.

**SQL> select \* from** emp@11;

**ENO ENAME**

ADDRESS

**EMAIL**

SAL

**101** ram ram@gmail.com

**dadar**

10000

102 tom

**cst**

**tom@gmail.com**

25000

**103** sam

**wadala**

sam@gmail.com

30000

**272**

**52**

**Shaikh Salma Manjar**

**ENO** ENAME

ADDRESS

EMAIL

SAL

**104 sonu**

**wadala**

sonu@gmail.com

12000

**105 monu**

matunga

monu@gmail.com

24000

106 **mona**

**sion**

mona@gmail.com

35000

**ENO** ENAME

**ADDRESS**

EMAIL

SAL

**107** sona

sion

sona@gmail.com

40000

108 harry

**kurla**

harry@gmail.com

**30000**

109 marry

kurla

marry@gmail.com

60000

**ENO** ENAME

ADDRESS

EMAIL

SAL

110 anni

kurla

**10000**

anni@gmail.com

**Create table and insert the data from global database table where all sal<=10000**.

**SQL>** create table emp1 **as select** \* from emp**@**11 where sal<=10000;

Table **created**.

**View the inserted data into the created table**.

SQL> select \* from emp1;

**ENO ENAME**

EMAIL

**ADDRESS**

SAL

**272**

**53**

**Shaikh Salma Manjar**

**101** ram

**dadar**

ram@gmail.com

10000

110 **anni**

kurla

anni@gmail.com

10000

**272**

**Perform the commit**.

SQL> **commit**;

Commit complete.

**Now open another sqlplus and login with user2 id and password**.

SQL> connect user2**@**xe

Connected.

**Create database link to global database in order to access the data of global database table.**

**SQL> create** database link 122 connect **to** system identified by system using 'xe'; Database **link created**.

**Create table and insert the data from global database table where all 10000 < sal<= 20000.**

SQL> create **table** emp2 as select \* **from** emp@122 where sal**>10000** and sal<=20000; Table created.

**View the inserted data into the created table**.

SQL> select \* **from** emp2;

**ENO** ENAME

ADDRESS

EMAIL

SAL

**104 sonu**

wadala

**12000**

sonu@gmail.com

**Perform the commit**.

**SQL**> commit;

Commit complete.

**Now let's create insert trigger in global database table in order to maintain the consistency of the data in all the distributed tables**.

SQL> **create** database link 122 **connect** to user2 identified **by u2** using '**xe**'; **Database** link created.

SQL> **create** database link 11 connect to user1 identified by u1 using **'**xe'; **Database** link created.

**54**

**Shaikh Salma Manjar**

**272**

**Creating insert trigger**

**SQL> create** or replace trigger triginsertemp12

**2** after insert on emp

3 for each row

4 begin

5 **if:**new.sal>10000 and **:new.sal<=**20000 then

6 insert into emp2**@122** values

7 (:new.eno**,:**new.ename**,:**new.address**,**:new.email,**:**new.sal);

8 else

9 insert into emp1**@**l1 values

10 (:new.eno**,:new.ename,** :new.address**,:**new.email,**:**new.sal**)**;

11 end if**;**

**12** end;

13/

**Let's insert one row to the global table and check whether it is being available in the distributed table or not**.

SQL> **insert** into emp values(111,'ratan','bandra','ratan**@gmail.com**',**14500)**;

**1 row** created.

**Perform the** commit.

**SQL>** commit**;**

Commit complete.

**Check in table emp2 if this data is being added or not, since the sal>14500 it should be added in emp2.**

**SQL>** select \* from emp2;

ENO ENAME

ADDRESS

**EMAIL**

SAL

**104** sonu

**wadala**

sonu@gmail.com

12000

111 ratan

bandra

ratan@gmail.com

14500

**Now open another sqlplus and login with user3 id and password**.

SQL> connect user3**@xe**

**Connected**.

**55**

**Shaikh Salma Manjar**

**272**

**Create database link for all the three tables here in order to access various types of data based on give question**

**SQL>** create database link **10 connect** to system identified by system using **'xe**';

**SQL> create database** link **122 connect** to **user2** identified by **u2** using **'xe'**;

SQL**> create database** link 11 connect to user1 identified by **u1** using 'xe';

**(i) Find the salary of all employees**.

SQL> **select** sal from emp@10**;**

SAL

**10000**

25000

**30000**

**12000**

24000

35000

40000

30000

60000

10000

14500

**(ii) Find the Email of all employees where salary=12,000**. **SQL>** select email from emp2@122 where sal=**12000**;

**EMAIL**

sonu@gmail.com

**(iii) Find the employee name and Email where employee number** is **known**. **SQL**> select ename,**email** from emp**@**10 where eno**=**109;

**ENAME**

marry

**EMAIL**

**marry@gmail.com**

**(iv) Find the employee name whose salary >20000** SQL> select ename from emp**@**10 where **sal>**20000;

**ENAME**

**56**

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**tom**

sam

monu

mona

**sona**

harry

marry

**272**

57

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**Practical No:06**

**272**

**AIM: Distributed Databases**

**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**.

**THEORY:**

**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 aatriubutes of*** *T*

***T* is the table** (relation)

**Fire the following queries**:

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

**b)** Find the Email where the employee name is known.

c) Find the employee name and email where employee **number is** known.

d) Find the employee name whose salary is **> 2000**.

**Open sqlplus with system user and connect to the global database**.

SQL**>** connect system**@**xe

Connected.

**Check if the table already exist. In our case the table already exist**.

SQL> select \* **from** emp;

**ENO ENAME**

**EMAIL**

ADDRESS

SAL

**58**

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**101 ram ram@gmail.com**

**dadar**

10000

102 **tom**

**cst**

tom@gmail.com

25000

**103** sam

**wadala**

sam@gmail.com

30000

**ENO** ENAME

**ADDRESS**

**EMAIL**

SAL

**104 sonu**

**wadala**

sonu@gmail.com

**12000**

105 **monu**

matunga

monu@gmail.com

24000

106 **mona**

**sion**

mona@gmail.com

35000

**ENO** ENAME

**ADDRESS**

**EMAIL**

SAL

107 **sona**

**sion**

**sona@gmail.com**

40000

108 harry

kurla

**harry@gmail.com**

30000

109 marry

kurla

**marry@gmail.com**

60000

**ENO ENAME**

**ADDRESS**

EMAIL

SAL

**110 anni** anni@gmail.com

kurla

10000

111 ratan ratan@gmail.com

bandra

14500

**272**

**59**

**Shaikh Salma Manjar**

11 **rows** selected.

**Now open another sqlplus and login with user1 id and password**.

SQL> connect user1**@xe**

Connected.

**Create database link to global database in order to access the data of global database table.**

SQL> create database link 11 connect to system identified **by** system using **'**xe'; Database link created.

**Create table and insert the data from global database table**

SQL> create table **e1** as select eno,ename,address from emp**@11**;

Table created.

**View the inserted data into the created table.**

SQL**>** select \* from e1;

**ENO ENAME**

**ADDRESS**

**101 ram**

dadar

102 **tom**

**cst**

**103** sam

**104 sonu**

**wadala**

wadala

105 **monu**

matunga

106 **mona**

**sion**

**107 sona**

**sion**

108 harry

kurla

**109** marry

kurla

**110** anni

kurla

111 ratan

bandra

**Perform the** commit.

SQL**> commit**;

Commit complete.

**Now open another sqlplus and login with user2 id and password**.

**SQL>** connect user2**@**xe

**Create database link to global database in order to access the data of global database table.**

SQL> create database link 122 connect to **system** identified by system using'xe'; **Create table and insert the data from global database table**

**272**

**60**

**Shaikh Salma Manjar**

SQL**>** create table e2 as select eno,email,sal from emp**@122**; Table created.

**View the inserted data into the created table.**

SQL**>** select \* from e2;

ENO EMAIL

SAL

**101** ram@gmail.com

10000

102 **tom@gmail.com**

25000

**103** sam@gmail.com

30000

104 sonu@gmail.com

12000

**105** monu@gmail.com

24000

106 mona@gmail.com

35000

**107** sona@gmail.com

40000

108 harry@gmail.com

30000

**109** marry@gmail.com

60000

110 **anni@gmail.com**

10000

111 ratan@gmail.com

14500

**Perform the commit**.

SQL> commit;

Commit complete.

**Now open another sqlplus and login with user3 id and password**.

SQL> connect user3**@xe**

**Create database link** for **tables here in order to** access **various types of** data based **on give question**

**SQL>** create database link 111 connect to user1 identified by u1 using'xe';

SQL**>** create database link **122** connect to user2 identified by **u2** using **'xe';**

**(i) Find the salary of an employee where employee number is known**. **SQL> select** sal from **e2@**122 **where** eno**=&**eno**;**

Enter value for eno**: 105**

old **1:** select **sal** from **e2@122** where eno**=**&eno **new** 1**:** select **sal** from e2**@122** where eno=105

SAL

**24000**

**272**

**61**

**Shaikh Salma Manjar**

**(ii) Find the Email where the employee name is known**.

SQL**>** select email from **e2@122** where eno**=**(select eno from e1@111 where ename**='&ename')**;

Enter value for ename**:** mona

old 1: select email from e2@**122** where eno**=**(select eno **from** e1**@**111 where ename=**'&**ename**')**

**new** 1: **select email** from **e2**@122 where eno**=**(**select** eno from e1@111 where ename='mona')

EMAIL

mona@gmail.com

(iii**) Find the employee name and email where employee number is known**. SQL**>** select e11.ename,e22.email **from e1@111** e11,**e2@l22 e22** where e11.eno in (select e22.eno from e2@122 where e22.eno**=&**eno);

Enter value for eno**:** 110

old 1**: select** e11.ename,e22.email from e1**@**l11 e11,**e2@122 e22** where e11.eno in **(select** e22.eno from **e2@**122 where **e22.eno=**&eno**)**

new **1:** select e11.ename,e22.email from e1@111 e11,e2**@122 e22** where e11.eno in **(select e22.eno** from **e2@122** where e22.eno=110)

**ENAME**

anni

EMAIL

anni@gmail.com

**(iv) Find the employee name whose salary is > 2000**.

**SQL> select** ename from e1@111 where eno in (select eno **from e2@122** where sal>**2000)**;

**ENAME**

**ram**

**tom**

**sam**

**sonu**

**monu**

**mona**

**sona**

harry

marry anni

ratan

**272**

**62**

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**PRACTICAL NO:07**

**272**

**AIM: Distributed Databases**

**Perform Replication Fragmentation**

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

**Store the replication of Emp into two different nodes**.

**THEORY:**

**What is Database Replication?**

Data Replication is the process of storing data in more than one site or node. It is useful in improving the availability **of** data. It **is** simply copying **data from** a database **from** one server to **another** server **so that all** the **users** can share **the** same **data** without any inconsistency. **The** result **is** a distributed database **in** which users can **access** data relevant **to** their tasks without interfering **with** the work **of** others.

Data replication encompasses duplication **of** transactions on an **ongoing basis,** so **that** the replicate **is** in **a** consistently updated state and synchronized with **the source. However, in** data replication data is available at different **locations,** but a particular relation has to reside at only one **location**.

There can **be full** replication**,** in which **the** whole database **is** stored at **every site**. **There** can **also** be partial replication**,** in which some **frequently** used fragment of **the** database are replicated and others are not replicated.

**Advantages of** full **replication**

High Availability of Data.

✔ Improves the performance for retrieval **of global** queries as the **result** can be

obtained locally **from** any **of the** local site.

**✓** Faster execution of Queries.

**Disadvantages of full replication**

Concurrency **is** difficult to **achieve** in full **replication**.

**✓** Slow update process **as** a single update must be performed **at** different

databases to keep the **copies** consistent.

**Fire the following queries:**

a) Find **the** salary of all employees.

**b)** Find the email of all employees **where** salary=15,000.

c) Find the employee name **& email where** employee number **is** known.

**d)** Find the employee name & address where employee number is known.

**63**

**Shaikh Salma Manjar**

**Now open another sqlplus and login with user1 id and password**.

**SQL> connect** user1**@**xe

Connected.

**Create database link to global database in order to access the data of global database table**.

SQL> create database link 11 **connect** to system identified by system using '**xe**';

**Create view of global database**

SQL> create view v1 as select \* from emp@l1;

**Check if view has been created successfully**.

**SQL>** select \* **from** v1;

**ENO** ENAME

**ADDRESS**

EMAIL

SAL

**101 ram**

**dadar**

ram@gmail.com

10000

102 tom

**cst**

**tom@gmail.com**

25000

**103** sam

wadala

sam@gmail.com

30000

**ENO ENAME**

ADDRESS

EMAIL

SAL

**104 sonu** sonu@gmail.com

**wadala**

12000

105 **monu**

matunga

monu@gmail.com

24000

106 mona

**sion**

mona@gmail.com

35000

**ENO** ENAME

ADDRESS

**272**

**64**

**Shaikh Salma Manjar**

**EMAIL**

SAL

**107** sona

**sion**

sona@gmail.com

40000

108 harry

kurla

harry@gmail.com

30000

**109** marry

kurla

marry@gmail.com

60000

**ENO** ENAME

**ADDRESS**

EMAIL

SAL

110 anni

kurla

anni@gmail.com

10000

111 ratan

**bandra**

ratan@gmail.com

14500

**Perform the commit.**

SQL> commit;

Commit complete.

**Now open another sqlplus and login with user2 id and password**.

SQL> connect user2**@**xe

**Create database link to global database in order to** access **the data of global database table**.

SQL> create database link **122** connect to system identified by system using'xe';

**Create** view **of global database**

SQL> create view v2 **as** select \* from emp@122;

**Check if view has been created** successfully.

**SQL**> **select** \* from **v2**;

ENO ENAME

ADDRESS

**EMAIL**

SAL

**101** ram

**dadar**

**272**

**65**

**Shaikh Salma Manjar**

ram@gmail.com

10000

**102 tom** tom@gmail.com

**cst**

25000

**103** sam

**wadala**

sam@gmail.com

**30000**

ENO ENAME

ADDRESS

SAL

**EMAIL**

**104 sonu**

**wadala**

sonu@gmail.com

**12000**

105 **monu**

matunga

monu@gmail.com

24000

106 **mona**

**sion**

mona@gmail.com

35000

**ENO** ENAME

ADDRESS

**EMAIL**

SAL

**107 sona**

**sion**

**sona@gmail.com**

40000

108 harry

**kurla**

**harry@gmail.com**

30000

109 **marry**

kurla

marry@gmail.com

60000

ENO ENAME

ADDRESS

**EMAIL**

SAL

110 anni

kurla

anni@gmail.com

10000

**272**

**66**

**Shaikh Salma Manjar**

111 ratan

bandra

14500

ratan@gmail.com

**Perform the commit**.

**SQL**> commit;

Commit complete.

**Now open another sqlplus and login with user3 id and** password.

SQL**> connect** user3@xe

**Create database link for tables here in order to** access **various types of data based on give question**

**SQL**> create **database** link 111 connect to user1 identified **by u1** using'xe';

**SQL>** create database link 122 connect **to** user2 identified **by** u2 **using** 'xe'**;**

**(i) Find the salary of** all **employees**.

SQL**>** select sal from v1@111;

SAL

**10000**

**25000**

30000

12000

24000

35000

40000

**30000**

60000

**10000**

14500

**(ii) Find the email of all employees where salary=12000**

SQL**> select** email **from v2**@122 where sal=12000;

**EMAIL**

sonu@gmail.com

**(iii) Find the employee name & email where employee number is known**. SQL**> select** ename,email from v1@111 where eno**=&**eno**;**

Enter value **for** eno**: 103**

old 1**: select** ename**,**email from v1@111 where eno**=**&eno

**272**

**67**

**Shaikh Salma Manjar**

**new** 1**:** select ename,email from v1**@**111 where eno=103

**ENAME**

**sam**

EMAIL

sam@gmail.com

**(iv) Find the employee name & address where employee number is known SQL**> select ename**,**address from **v2@122** where eno**=**&eno;

Enter value for **eno: 105**

old 1: **select** ename,address **from** v2@122 where eno**=&**eno new 1**:** select ename,address from **v2@122** where eno=105

**ENAME**

ADDRESS

**monu**

matunga

**272**

**68**