**EXPERIMENT NO:02**

**AIM: To Perform Various OLAP Operations such as Slice,Dice,Drill Down,Roll up and Pivot.**

**THEORY:**

**Various OLAP Operations:**

There are five basic analytical operations that can be performed on an OLAP cube:

1. **Drill down:**In drill-down operation, the less detailed data is converted into highly detailed data. It can be done by:
   * Moving down in the concept hierarchy
   * Adding a new dimension

In the cube given in overview section, the drill down operation is performed by moving down in the concept hierarchy of *Time*dimension (Quarter -> Month).

1. **Roll up:**It is just opposite of the drill-down operation. It performs aggregation on the OLAP cube. It can be done by:
   * Climbing up in the concept hierarchy
   * Reducing the dimensions

In the cube given in the overview section, the roll-up operation is performed by climbing up in the concept hierarchy of *Location*dimension (City -> Country).

1. **Dice:**It selects a sub-cube from the OLAP cube by selecting two or more dimensions. In the cube given in the overview section, a sub-cube is selected by selecting following dimensions with criteria:
   * Location = “Delhi” or “Kolkata”
   * Time = “Q1” or “Q2”
   * Item = “Car” or “Bus”
2. **Slice:**It selects a single dimension from the OLAP cube which results in a new sub-cube creation. In the cube given in the overview section, Slice is performed on the dimension Time = “Q1”.
3. **Pivot:**It is also known as *rotation* operation as it rotates the current view to get a new view of the representation. In the sub-cube obtained after the slice operation, performing pivot operation gives a new view of it.

**Table Descriptions:**

SQL> desc client;

Name Null? Type

----------------------------------------- -------- ----------------------------

CLIENT\_ID NOT NULL VARCHAR2(5)

C\_NAME VARCHAR2(25)

ADDRESS VARCHAR2(50)

AGE NUMBER(3)

PHONE\_NO NUMBER(11)

GENDER VARCHAR2(2)

SQL> desc rooms;

Name Null? Type

----------------------------------------- -------- ----------------------------

ROOM\_ID NOT NULL VARCHAR2(5)

ROOM\_TYPE VARCHAR2(15)

ROOM\_OCCUPANCY NUMBER(2)

PRICE NUMBER(6)

SQL> desc rdate;

Name Null? Type

----------------------------------------- -------- ----------------------------

DATE\_ID NOT NULL VARCHAR2(5)

YEAR NUMBER(10)

MONTH VARCHAR2(10)

DAY VARCHAR2(10)

WEEK NUMBER(10)

DDATE DATE

SQL> desc city;

Name Null? Type

----------------------------------------- -------- ----------------------------

CITY\_ID NOT NULL VARCHAR2(5)

COUNTRY VARCHAR2(20)

C\_NAME VARCHAR2(25)

HOTLIER\_ID VARCHAR2(5)

HOTLIER\_NAME VARCHAR2(20)

SQL> desc factt;

Name Null? Type

----------------------------------------- -------- ----------------------------

CLIENT\_ID NOT NULL VARCHAR2(5)

CITY\_ID NOT NULL VARCHAR2(5)

DATE\_ID NOT NULL VARCHAR2(5)

ROOM\_ID NOT NULL VARCHAR2(5)

NO\_OF\_OVERNIGHT\_STAY NUMBER(3)

PROFIT NUMBER(8)

EXPENSE NUMBER(8)

**Analytical Queries for system:**

**1.Total number of rooms booked by gender country wise with subtotal and grandtotal (Use rollup()).**

SQL> select c.country,cl.gender,count(f.Room\_id) from city c,client cl,factt f where f.city\_id=c.city\_id and f.client\_id=cl.client\_id group by rollup(c.country,cl.gender);

COUNTRY GE COUNT(F.ROOM\_ID)

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USA F 9

USA M 19

USA 28

India F 7

India M 12

India 19

Spain F 14

Spain M 8

Spain 22

Berlin F 3

Berlin M 7

Berlin 10

France F 6

France M 4

France 10

Russia F 2

Russia M 9

Russia 11

100

19 rows selected.

**2.How many reservations have been made in all countries till date.**

SQL> select c.country,count(f.CITY\_Id) from factt f , city c where c.city\_id=f.city\_id group by (c.country);

COUNTRY COUNT(F.CITY\_ID)

-------------------- ----------------

Berlin 10

USA 28

Spain 22

France 10

India 19

Russia 11

6 rows selected.

**3.Sum of expenses in all countries room and countrywise using cube().**

SQL> select c.country,r.room\_type,sum(f.expense) from factt f, city c,rooms r where f.city\_id=c.city\_id and r.room\_id=f.room\_id group by cube (c.country,r.room\_type);

COUNTRY ROOM\_TYPE SUM(F.EXPENSE)

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1562000

Deluxe 53000

Luxury 28500

Sea View 54500

Club Room 94500

Penthouse 510000

Signature 30500

Luxury Grand 112500

Presidential 291500

Super Deluxe 255000

Super Luxury 132000

USA 494000

USA Deluxe 18000

USA Luxury 9000

USA Sea View 18000

USA Club Room 25000

USA Penthouse 160000

USA Signature 9500

USA Luxury Grand 2500

USA Presidential 131500

USA Super Deluxe 75000

USA Super Luxury 45500

India 179500

India Deluxe 12000

India Luxury 15500

India Sea View 20000

India Club Room 5000

India Penthouse 10000

India Signature 1500

India Presidential 85000

India Super Deluxe 25000

India Super Luxury 5500

Spain 357500

Spain Deluxe 10000

Spain Sea View 11000

Spain Club Room 31500

Spain Penthouse 130000

Spain Signature 10000

Spain Luxury Grand 60000

Spain Presidential 75000

Spain Super Luxury 30000

Berlin 199000

Berlin Sea View 1000

Berlin Club Room 33000

Berlin Penthouse 10000

Berlin Luxury Grand 15000

Berlin Super Deluxe 140000

France 138500

France Deluxe 11000

France Penthouse 60000

France Signature 1500

France Super Deluxe 15000

France Super Luxury 51000

Russia 193500

Russia Deluxe 2000

Russia Luxury 4000

Russia Sea View 4500

Russia Penthouse 140000

Russia Signature 8000

Russia Luxury Grand 35000

60 rows selected.

**4.Which city gives the maximum profit with respective rooms for all(Use Rank()).**

SQL> select c.city\_id,f.room\_id,sum(f.profit),RANK() OVER (PARTITION BY f.room\_id ORDER by sum(f.profit)) AS Rank from factt f, city c where c.city\_id=f.city\_id group by (f.room\_id,f.profit,c.city\_id);

CITY\_ ROOM\_ SUM(F.PROFIT) RANK

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C07 R01 15000 1

C03 R01 25000 2

C10 R01 25000 2

C01 R01 25000 2

C06 R01 35000 5

C01 R01 40000 6

C09 R01 40000 6

C04 R01 45000 8

C09 R01 45000 8

C02 R01 50000 10

C10 R01 50000 10

C04 R01 75000 12

C09 R01 75000 12

C10 R01 85000 14

C07 R01 95000 15

C05 R01 95000 15

C02 R01 120000 17

C05 R02 2000 1

C03 R02 20000 2

C02 R02 25000 3

C03 R02 25000 3

C08 R02 30000 5

C05 R02 50000 6

C08 R02 50000 6

C02 R02 90000 8

C01 R02 100000 9

C10 R03 10000 1

C08 R03 32000 2

C04 R03 40000 3

C06 R03 60000 4

C06 R03 64000 5

C10 R03 69000 6

C08 R04 10000 1

C01 R04 10000 1

C07 R04 15000 3

C04 R04 20000 4

C07 R04 75000 5

C04 R04 80000 6

C05 R04 80000 6

C08 R05 1000 1

C02 R05 2000 2

C06 R05 4000 3

C06 R05 4000 3

C06 R05 8000 5

C02 R05 22000 6

C05 R05 35000 7

C07 R06 2000 1

C02 R06 2000 1

C09 R06 2000 1

C05 R06 7500 4

C09 R06 22500 5

C06 R06 35000 6

C04 R07 1500 1

C10 R07 1500 1

C05 R07 1500 1

C07 R07 3000 4

C07 R07 3000 4

C04 R07 3500 6

C02 R07 8000 7

C01 R07 8000 7

C07 R07 8000 7

C04 R07 8000 7

C09 R07 8000 7

C08 R07 8000 7

C03 R07 8000 7

C10 R07 16000 14

C01 R07 32000 15

C03 R07 32000 15

C03 R08 2000 1

C08 R08 3000 2

C05 R08 4000 3

C08 R08 5000 4

C09 R08 5000 4

C05 R08 5000 4

C08 R08 6000 7

C10 R08 6000 7

C01 R09 1500 1

C02 R09 1500 1

C06 R09 1500 1

C05 R09 5000 4

C02 R09 5000 4

C09 R09 6500 6

C03 R09 10000 7

C04 R10 2000 1

C03 R10 2000 1

C01 R10 2000 1

C07 R10 4000 4

C09 R10 6000 5

C07 R10 6000 5

C10 R10 8000 7

90 rows selected.

**5.Which city gives the maximum profit with respective rooms (Use DENSE Rank()).**

SQL> select c.city\_id,f.room\_id,sum(f.profit),DENSE\_RANK() OVER (PARTITION BY f.room\_id ORDER by sum(f.profit)) AS Rank from factt f, city c where c.city\_id=f.city\_id group by (f.room\_id,f.profit,c.city\_id);

CITY\_ ROOM\_ SUM(F.PROFIT) RANK

----- ----- ------------- ----------

C07 R01 15000 1

C03 R01 25000 2

C10 R01 25000 2

C01 R01 25000 2

C06 R01 35000 3

C01 R01 40000 4

C09 R01 40000 4

C04 R01 45000 5

C09 R01 45000 5

C02 R01 50000 6

C10 R01 50000 6

C04 R01 75000 7

C09 R01 75000 7

C10 R01 85000 8

C07 R01 95000 9

C05 R01 95000 9

C02 R01 120000 10

C05 R02 2000 1

C03 R02 20000 2

C02 R02 25000 3

C03 R02 25000 3

C08 R02 30000 4

C05 R02 50000 5

C08 R02 50000 5

C02 R02 90000 6

C01 R02 100000 7

C10 R03 10000 1

C08 R03 32000 2

C04 R03 40000 3

C06 R03 60000 4

C06 R03 64000 5

C10 R03 69000 6

C08 R04 10000 1

C01 R04 10000 1

C07 R04 15000 2

C04 R04 20000 3

C07 R04 75000 4

C04 R04 80000 5

C05 R04 80000 5

C08 R05 1000 1

C02 R05 2000 2

C06 R05 4000 3

C06 R05 4000 3

C06 R05 8000 4

C02 R05 22000 5

C05 R05 35000 6

C07 R06 2000 1

C02 R06 2000 1

C09 R06 2000 1

C05 R06 7500 2

C09 R06 22500 3

C06 R06 35000 4

C04 R07 1500 1

C10 R07 1500 1

C05 R07 1500 1

C07 R07 3000 2

C07 R07 3000 2

C04 R07 3500 3

C02 R07 8000 4

C01 R07 8000 4

C07 R07 8000 4

C04 R07 8000 4

C09 R07 8000 4

C08 R07 8000 4

C03 R07 8000 4

C10 R07 16000 5

C01 R07 32000 6

C03 R07 32000 6

C03 R08 2000 1

C08 R08 3000 2

C05 R08 4000 3

C08 R08 5000 4

C09 R08 5000 4

C05 R08 5000 4

C08 R08 6000 5

C10 R08 6000 5

C01 R09 1500 1

C02 R09 1500 1

C06 R09 1500 1

C05 R09 5000 2

C02 R09 5000 2

C09 R09 6500 3

C03 R09 10000 4

C04 R10 2000 1

C03 R10 2000 1

C01 R10 2000 1

C07 R10 4000 2

C09 R10 6000 3

C07 R10 6000 3

C10 R10 8000 4

90 rows selected.

**6.What is the overall profit from 13-May-12 to 04-Nov-15 per city ?(SLICE)**

SQL> select c.city\_id,sum(f.profit) from factt f,rdate r,city c where (r.ddate >= '13-May-12' and r.ddate <='04-NOV-15') and r.date\_id=f.date\_id and c.city\_id=f.city\_id group by(c.city\_id) order by c.city\_id asc;

CITY\_ SUM(F.PROFIT)

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C01 169000

C02 90000

C03 82000

C04 15000

C05 159000

C06 34000

C07 97000

C08 40000

C09 61500

C10 119500

10 rows selected.

**7. What is the overall profit and expense from 15-Oct-15 to 01-Jul-19 ?(DICE)**

SQL> select c.city\_id,ro.room\_id,sum(f.expense) from factt f,rdate r,city c,rooms ro where (r.ddate >= '15-Oct-15' and r.ddate <='01-Jul-19') and r.date\_id=f.date\_id and c.city\_id=f.city\_id and c.city\_id ='C02'and ro.room\_id=f.room\_id group by(c.city\_id,ro.room\_id);

CITY\_ ROOM\_ SUM(F.EXPENSE)

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C02 R06 30000

C02 R01 20000

C02 R05 31500

C02 R02 75000

**8.What is the total number of overnight stays overall in all hotels.**

SQL> select sum(no\_of\_overnight\_stay) as Total\_stay\_days from factt;

TOTAL\_STAY\_DAYS

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330

**9.Total number of rooms allocated of all locations in India.**

SQL> select count(room\_id) from factt where CITY\_ID='C03'or CITY\_ID='C08';

COUNT(ROOM\_ID)

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19

**10.What are the total Expenses of a Spain Branches ?**

SQL> select sum(expense) from factt where CITY\_ID='C07' or CITY\_ID='C02';

SUM(EXPENSE)

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357500

**Conclusion:**

In this experiment, we understood what is OLAP that is Online analytical Processing and how it differs from OLTP that is online transaction processing. We then learnt the operations we can perform in OLAP. We implemented all operations like roll up, drill down ,rank ,dense rank on the problem statement of hotel management system.