Name:	
Roll No:	
Class/Sem:	TE/V
Experiment No.:	2
Title:	Implementation of Dimension and Fact tables and perform OLAP operations.
Date of Performance:	
Date of Submission:	
Marks:	
Sign of Faculty:	

Aim: Implementation of Dimension and Fact tables and perform OLAP operations.

Objective: OLAP stands for Online Analytical Processing. The objective of OLAP is to analyze information from multiple database systems at the same time. It is based on multidimensional data model and allows the user to query on multi-dimensional data.

Theory:

- Online Analytical Processing Server (OLAP) is based on the multidimensional data model.
- The main aim of OLAP is to provide multidimensional analysis to the underlying data. Following is the list of OLAP operations:
  1. Roll-up
  2. Drill-down
  3. Slice
  4. Dice
  5. Pivot (rotate)

Roll-up:

- The roll-up operation (also called the drill-up operation) performs aggregation on a data cube, either by climbing up a concept hierarchy for a dimension or by dimension reduction.
- Figure 2.1 shows the result of a roll-up operation performed on the central cube by climbing up the concept hierarchy for location.
- This hierarchy was defined as the total order "street < city < province or state < country."
- The roll-up operation aggregates the data by ascending the location hierarchy from the level of city to the level of country.
- In other words, rather than grouping the data by city, the resulting cube groups the data by country.

Drill-down:

- Drill-down is the reverse of roll-up. It navigates from less detailed data to more detailed data.
- Drill-down can be realized by either stepping down a concept hierarchy for a dimension or introducing additional dimensions.
- Figure 2.1 shows the result of a drill-down operation performed on the central cube by stepping down a concept hierarchy for time defined as "day < month < quarter < year."
- Drill-down occurs by descending the time hierarchy from the level of quarter to the more detailed level of month.

- The resulting data cube details the total sales per month rather than summarizing them by quarter.

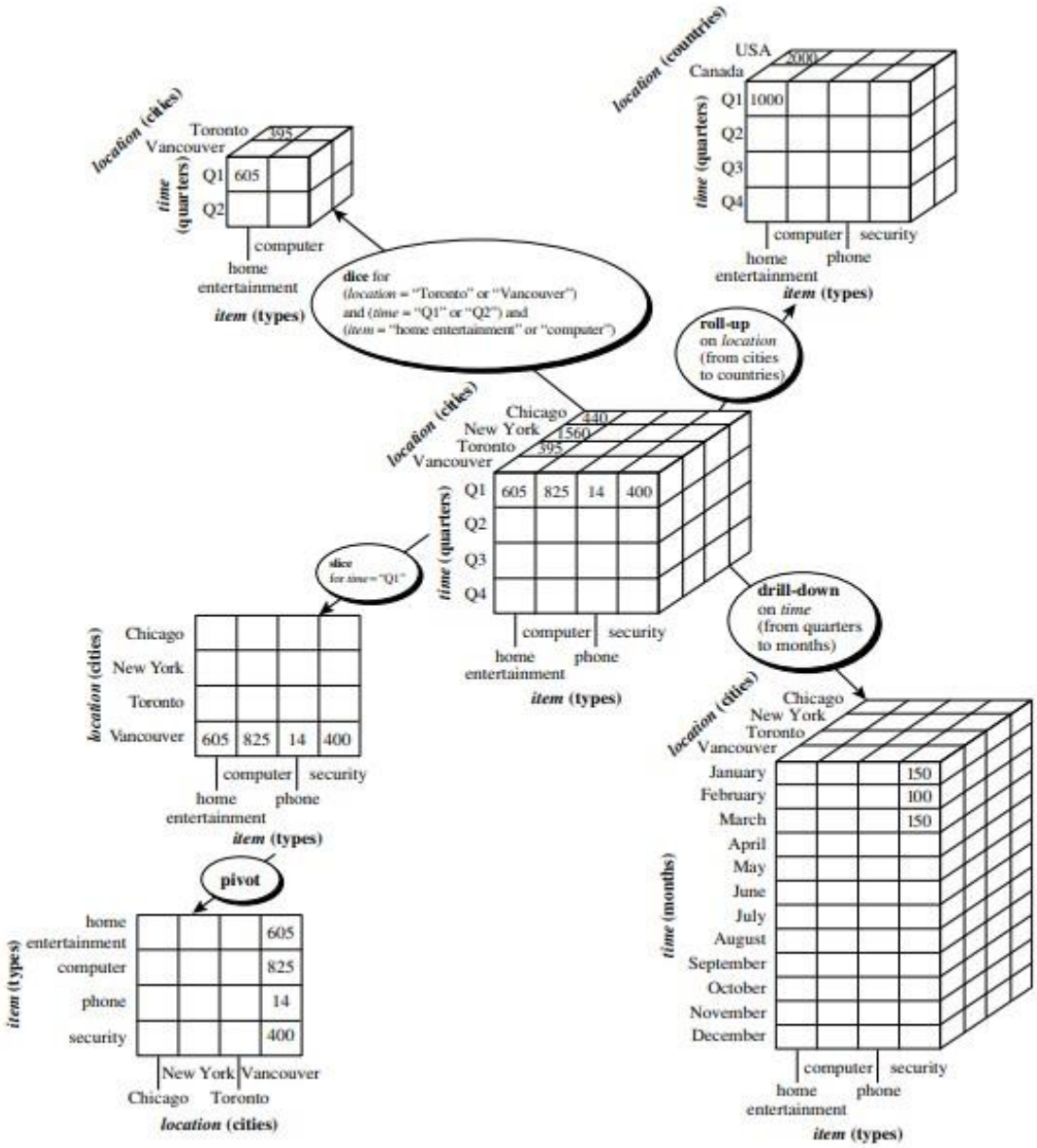


Figure 2.1: Examples of typical OLAP operations on multidimensional data.

Slice:

- The slice operation performs a selection on one dimension of the given cube, resulting in a subcube.

- Figure 2.1 below shows a slice operation where the sales data are selected from the central cube for the dimension time using the criterion time = "Q1."

Dice:

- The dice operation defines a subcube by performing a selection on two or more dimensions.
- Figure 2.1 shows a dice operation on the central cube based on the following selection criteria that involve three dimensions: (location = "Toronto" or "Vancouver") and (time = "Q1" or "Q2") and (item = "home entertainment" or "computer").

Pivot:

- Pivot (also called rotate) is a visualization operation that rotates the data axes in view to provide an alternative data presentation.
- Figure 2.1 shows a pivot operation where the item and location axes in a 2-D slice are rotated.

Problem Statement:

Suppose that a data warehouse consists of four dimensions as patient,doctor,location and treatment.The two measures are count and fees,where fees is the treatment charge paid by the patient to the doctor on a weekly basis. Draw a star and snowflake schema diagram for the above data warehouse.

Output:

1. Creating the Dimension Tables

```
Create Database Hospital;


CREATE TABLE patient(
    Patient_id int(10) PRIMARY KEY,
    Patient_name varchar(50),
    Patient_age int(10),
    Patient_address varchar(250),
    Report_id int(10)
    );
CREATE TABLE doctor(
  Doctor_id int(10) PRIMARY KEY,
  Doctor_name varchar(50),
```

```
Doctor_type varchar(50),
Doctor_age int(10),
Doctor_experience varchar(250),
1st_week int(10),
2nd_week int(10),
3rd_week int(10),
4th_week int(10)
);
    CREATE TABLE Location (
     location_id int(10) PRIMARY KEY,
     city  varchar(50),  state  varchar(50),
     pincode int(10), country varchar(50)
    );

create table treatment(
        Treatment_id int(10) PRIMARY KEY,
        Treatment_name varchar(50),
        Treatment_duration varchar(20),
        Treatment_type varchar(20)
    );
```

2. Creating the Fact Table

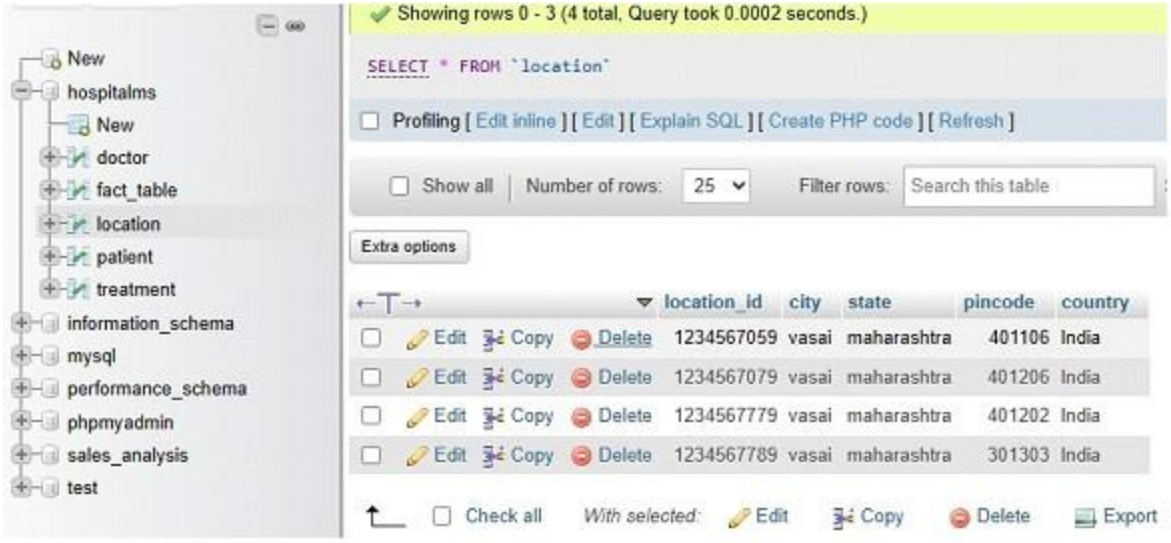
```
CREATE TABLE fact_table(
Doctor_id int(10) REFERENCES doctor(Doctor_id),
Patient_id int(10) REFERENCES patient(Patient_id),
location_id int(10) REFERENCES location(location_id),
treatment_id int(10) REFERENCES treatment(Treatment_id),
Count int(10),
```

```
    Fees int(10)
);
```

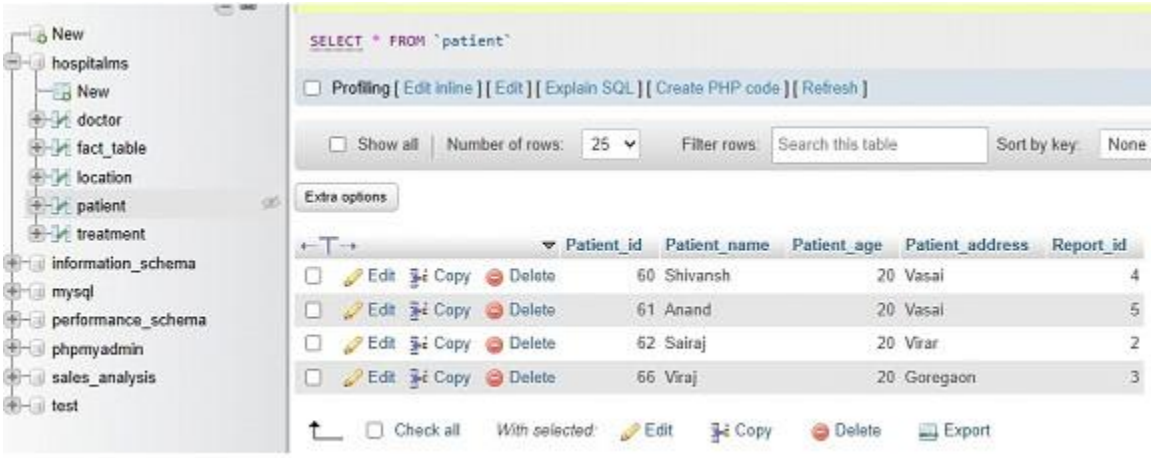
3. Inserting values in both dimension and fact tables

```
INSERT INTO location(location_id,city,state,pincode,country)
VALUES(1234567789,'vasai','maharashtra',301303,'India'),
                                        (1234567779,'vasai','maharashtra',401202,'India'),
  (1234567079,'vasai','maharashtra',401206,'India'),
    (1234567059,'vasai','maharashtra',401106,'India');

INSERT INTO
treatment(Treatment_id,Treatment_name,Treatment_duration,Treatment_type)
VALUES(101,"Angioplasty","3 Hours","Heart Disease"),
  (102,"Chemotherapy","8 Hours","Lungs Disease"),
  (103,"Heart Bypass Surgery","14 Hours","Heart Disease"), (104,"Lead
  Extraction","12 Hours","Heart Disease"),
      (105,"Dialysis","5 Hours","Kidney Disease");

INSERT INTO fact_table(Doctor_id,Patient_id,location_id,treatment_id,Count,Fees)
VALUES (01,62,1234567789,101,31,500),
   (02,66,1234567779,102,32,700),
    (01,60,1234567079,103,33,800),
    (02,61,1234567059,104,34,900);

INSERT INTO
doctor(Doctor_id,Doctor_name,Doctor_type,Doctor_age,Doctor_experience,1st_week,2nd
_week,3rd_week,4th_week)
VALUES (01,'Sairaj','Brain',20,'1 years',100,200,100,100),
      (02,'Viraj','Kidney',20,'5 years',200,100,100,300),
      (03,'Shivansh','Heart',21,'7 years',200,200,200,200),
      (04,'Anand','Lung',19,'4 years',300,300,200,100);
```

4. Displaying the tables Location:



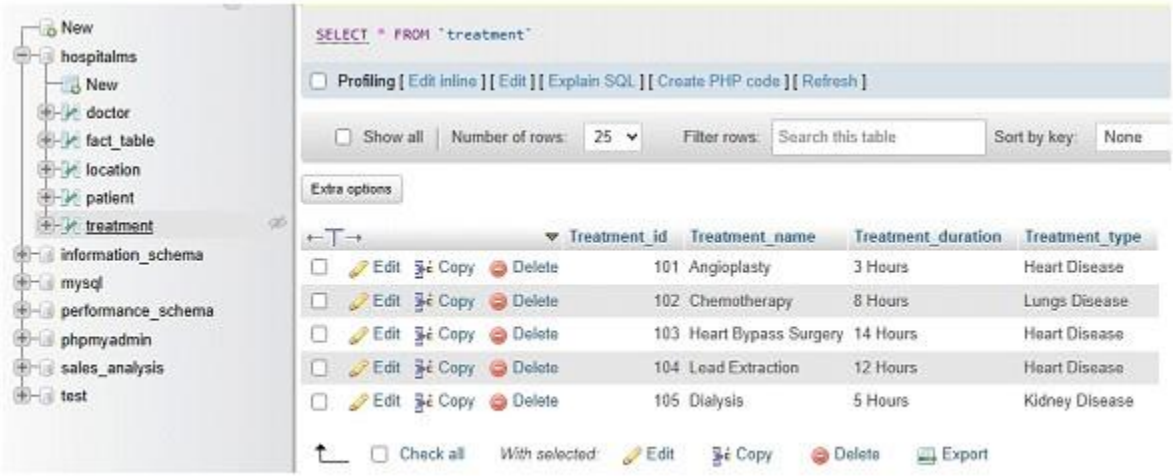
Patient:



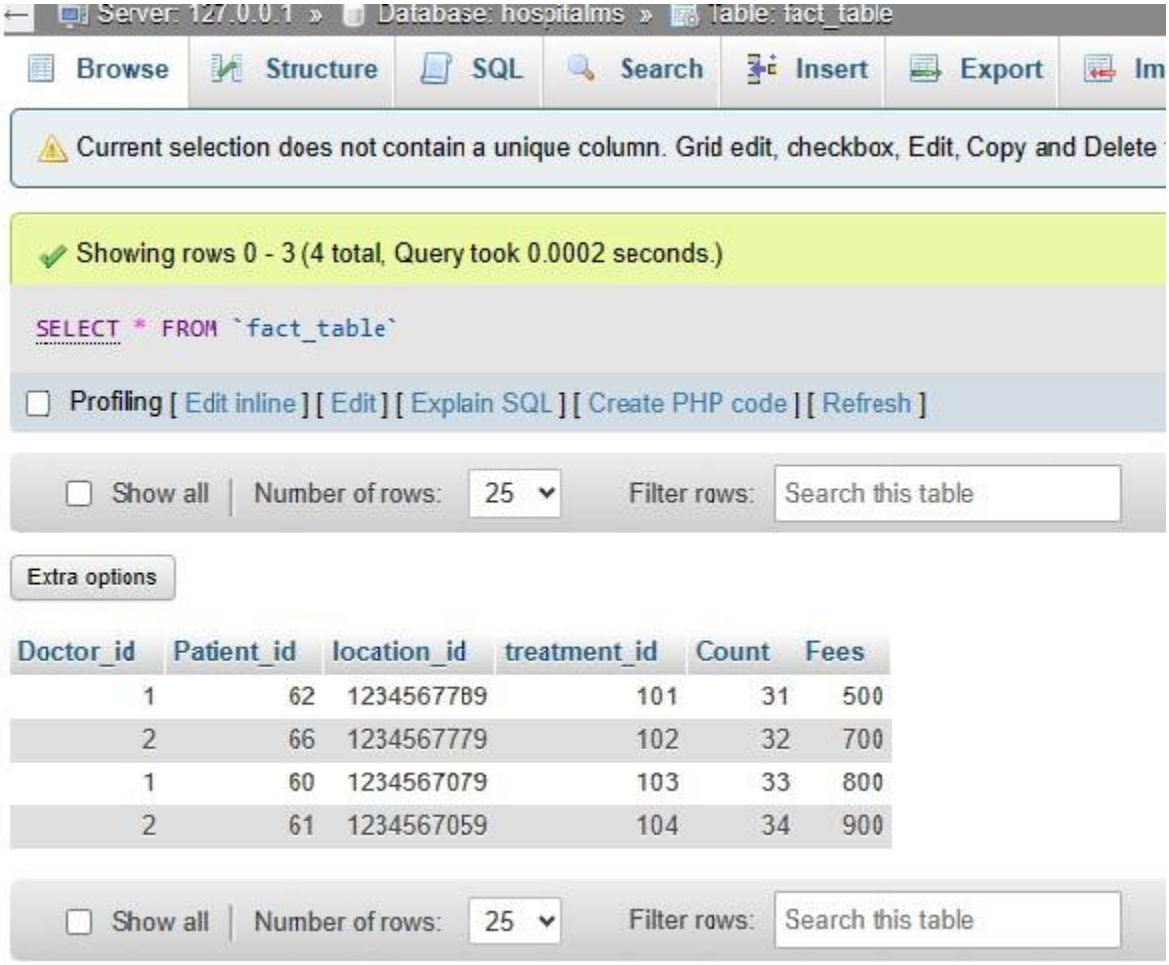
.

Doctor:

Treatment:



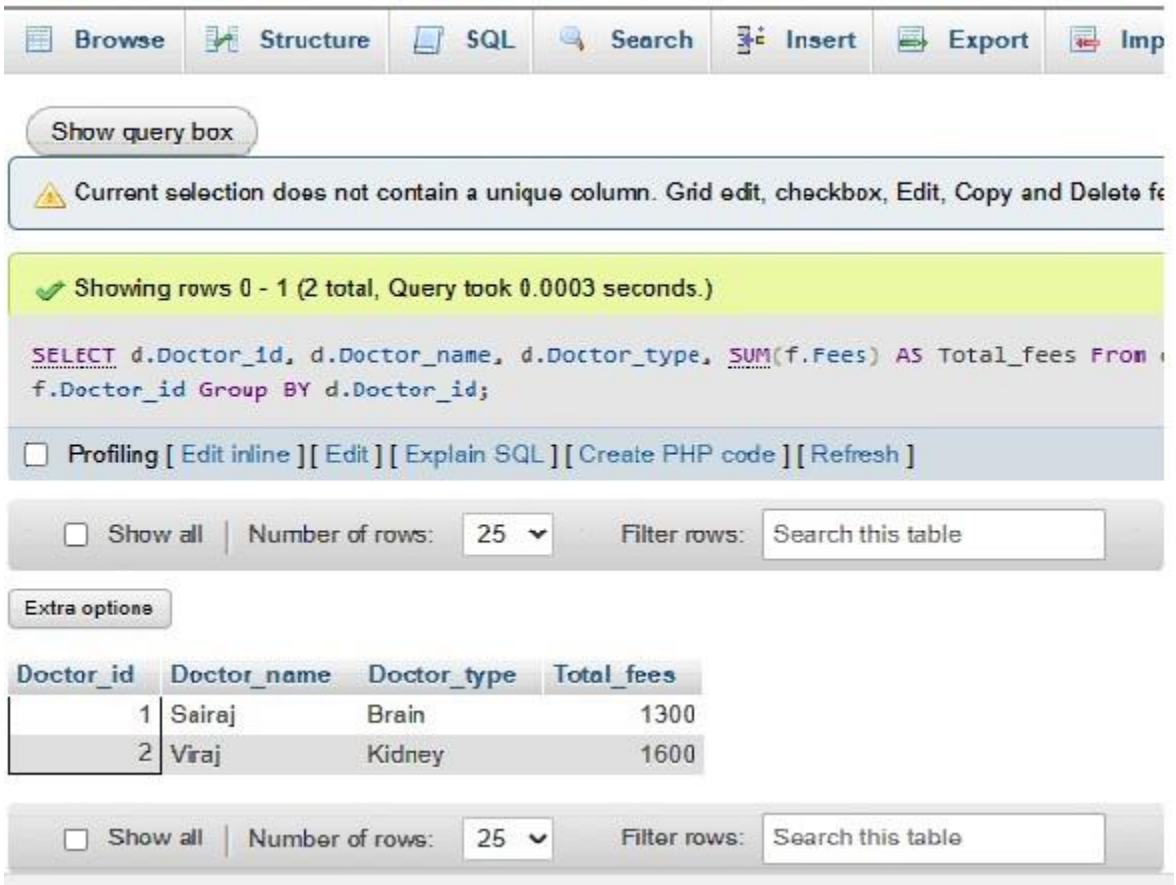
Fact Table:



5. Write SQL Queries for all the above OLAP operations.

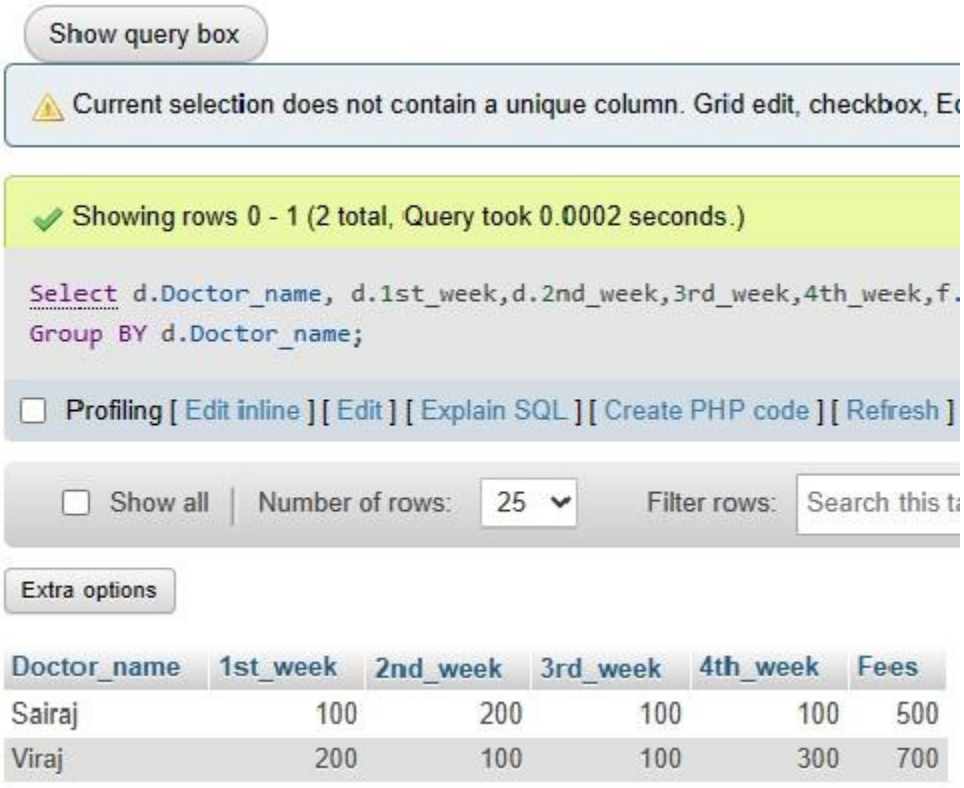
Roll Up :

```
SELECT d.Doctor_id, d.Doctor_name, d.Doctor_type, SUM(f.Fees) AS Total_fees
From doctor AS d
JOIN fact_table AS f
Where d.Doctor_id = f.Doctor_id
Group BY d.Doctor_id ;
```



Drill Down :

Select d.Doctor_name, d.1st_week,d.2nd_week,3rd_week,4th_week,f.Fees
FROM doctor as d
JOIN fact_table AS f Where d.Doctor_id = f.Doctor_id
Group BY d.Doctor_name ;



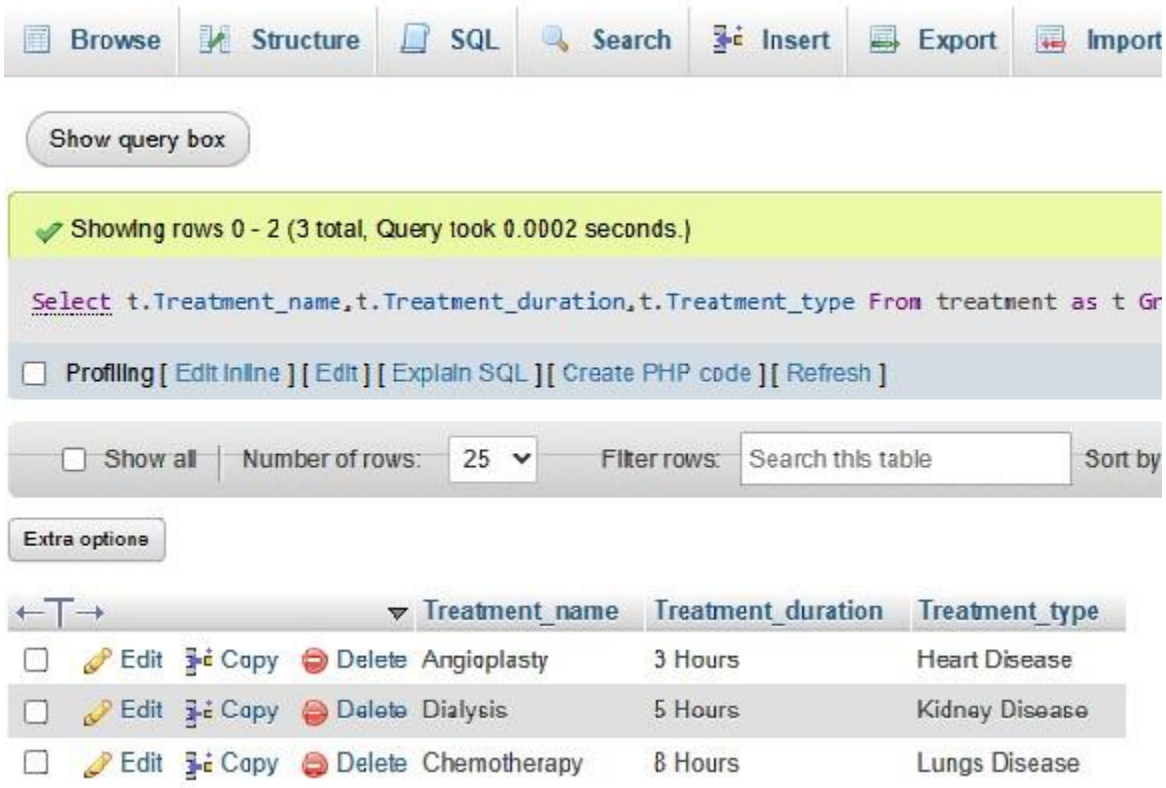
Doctor_name	1st_week	2nd_week	3rd_week	4th_week	Fees
Sairaj	100	200	100	100	500
Viraj	200	100	100	300	700

Slice :

Select t.Treatment_name,t.Treatment_duration,t.Treatment_type

From treatment as t

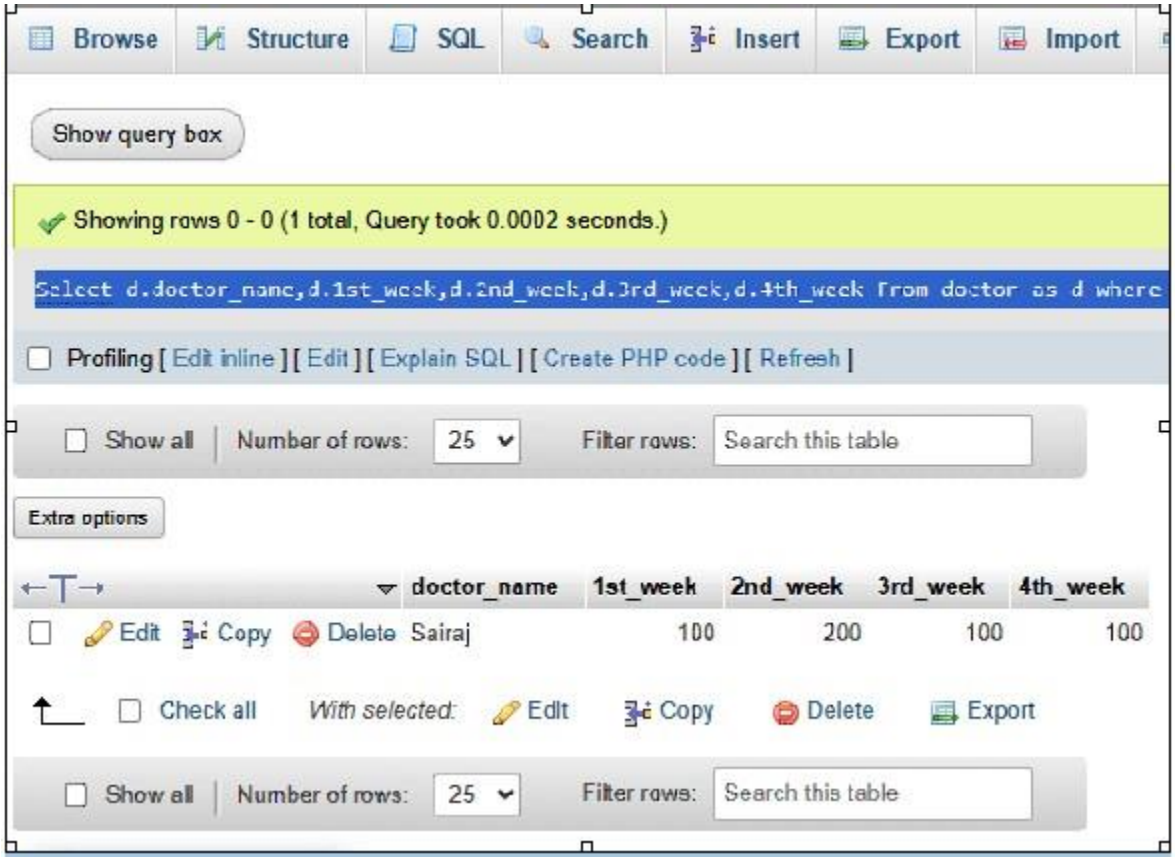
Group by t.Treatment_type;



Dice :

Select d.doctor_name,d.1st_week,d.2nd_week,d.3rd_week,d.4th_week

From doctor as d where d.Doctor_id = 1;



pivot:

```
SELECT
    doctor_name,
    MAX(CASE WHEN 1st_week = 300 THEN 1st_week END) AS week1,
    MAX(CASE WHEN 2nd_week = 200 THEN 2nd_week END) AS week2,
    MAX(CASE WHEN 3rd_week = 100 THEN 3rd_week END) AS week3,
    MAX(CASE WHEN 4th_week = 100 THEN 4th_week END) AS week4
FROM
    doctor
WHERE
    Doctor_id = 1

GROUP BY
```

doctor_name;

Conclusion:

Thus, we have learned implementation of Dimension and Fact tables and perform OLAP operations on database. OLAP stands for Online Analytical Processing. The objective of OLAP is to analyze information from multiple database systems at the same time