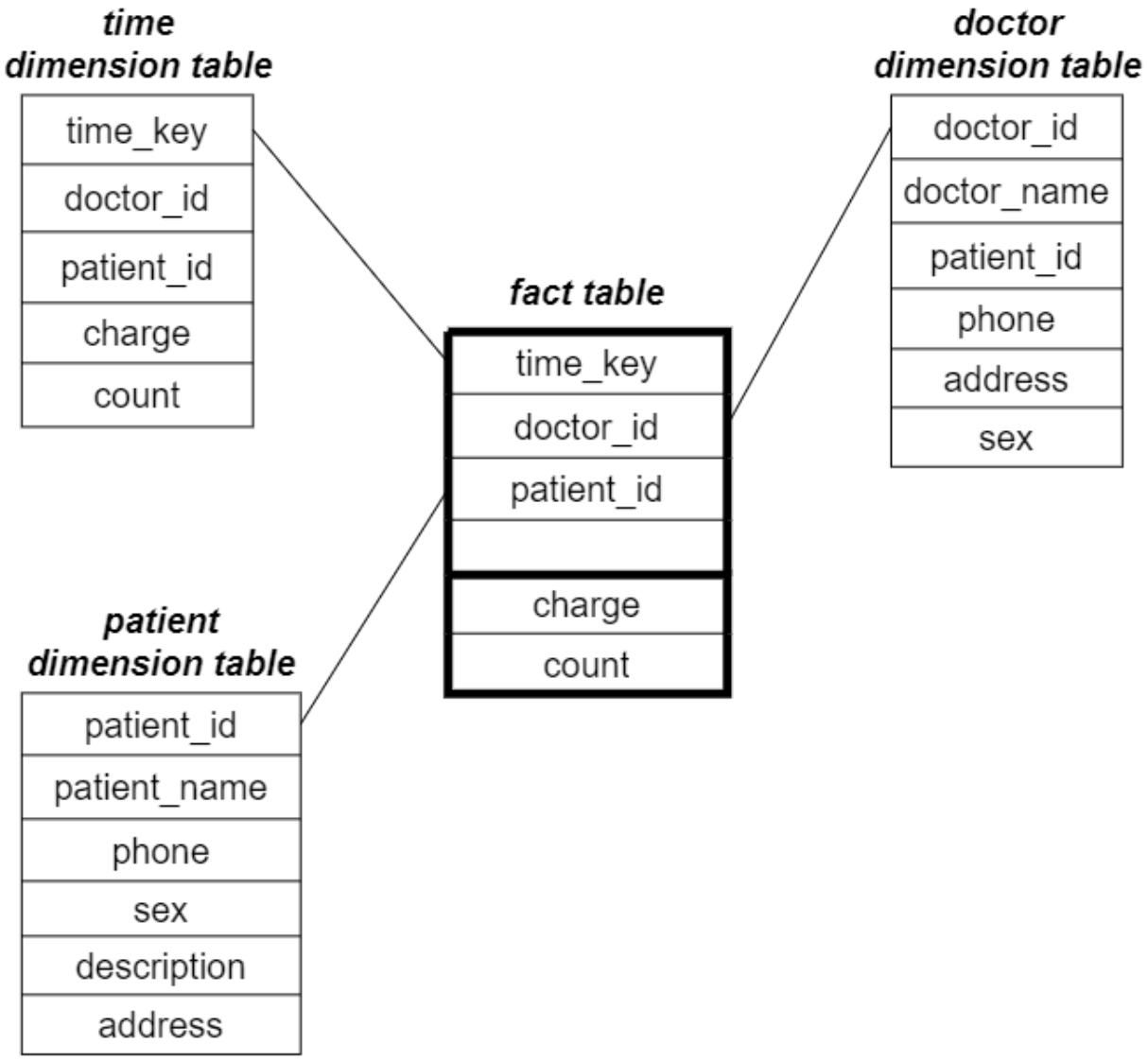
OLAP

Title: To perform various OLAP operations such as slice, dice, drilldown, rollup, pivot.

Problem statement:

Consider a data warehouse for a hospital where there are 3 dimensions. 1) Doctor 2) Patient 3) Time and the two measures 1. Count and 2. Charge, where charge is the fee that a doctor charges a patient for a visit.

Theory:



Create Tables

```
CREATE TABLE doctor (
    doctor_id number(11) NOT NULL,
    doctor_name varchar2(50) NOT NULL,
    phone number(11) NOT NULL,
    address varchar2(50) NOT NULL,
    sex varchar2(1) NOT NULL,

    constraint doctor_pk primary key (doctor_id)
);
CREATE TABLE patient (
    patient_id number(11) NOT NULL,
    patient_name varchar2(50) NOT NULL,
    phone number(11) NOT NULL,
    sex varchar2(1) NOT NULL,
    description varchar2(50) NOT NULL,
    address varchar2(50) NOT NULL,

    constraint patient_pk primary key (patient_id)
);
CREATE TABLE time (
    time_key number(11) NOT NULL,
    day number(11) NOT NULL,
    day_of_week varchar2(3) NOT NULL,
    month varchar2(3) NOT NULL,
    quarter varchar2(2) NOT NULL,
    year number(11) NOT NULL,

    constraint time_pk primary key (time_key)
);
CREATE TABLE fact_table (
    time_key number(11) NOT NULL,
    doctor_id number(11) NOT NULL,
    patient_id number(11) NOT NULL,
    charge number(11) NOT NULL,
    count number(11) NOT NULL,

    constraint borrower_pk primary key (time_key, doctor_id, patient_id),
    constraint fact_table_time_fk foreign key (time_key) references time
(time_key),
    constraint fact_table_doctor_fk foreign key (doctor_id) references doctor
(doctor_id),
    constraint fact_table_patient_fk foreign key (patient_id) references patient
(patient_id)
);
```

Insert Data

```
INSERT INTO doctor VALUES (1, 'Amit Ramani', 5550256, '42 Foobar Lane', 'M');
INSERT INTO doctor VALUES (2, 'Grace Ritchie', 5550512, '37 Snafu Drive', 'F');
INSERT INTO doctor VALUES (3, 'Glenn Maxwell', 5551204, '101 Omgbbq Street', 'M');
INSERT INTO doctor VALUES (4, 'Manjunath Naik', 5552048, '1100 Foobaz Avenue',
'M');

INSERT INTO patient VALUES (1, 'John Dorian', 111111111, 'M', 'Skin disorders',
'9735 Green Lake Ave.\r\nHorn Lake, MS 38637');
INSERT INTO patient VALUES (2, 'Elliot Reid', 222222222, 'M', 'Jonumber
disorders', '8 Monroe Ave.\r\nBonita Springs, FL 34135');
INSERT INTO patient VALUES (3, 'Christopher Turk', 333333333, 'M', 'Back
problems', '455 Jennings Ave.\r\nBrainerd, MN 56401');
INSERT INTO patient VALUES (4, 'Pratham Mehta', 444444444, 'M', 'Mental disorder',
'487 York St.\r\nWaterbury, CT 06705');
INSERT INTO patient VALUES (5, 'Percival Cox', 555555555, 'F', 'Cholesterol
problems', '302 Railroad St.\r\nUtica, NY 13501');
INSERT INTO patient VALUES (6, 'Bob Kelso', 666666666, 'F', 'Corona', '32 John
St.\r\nCalhoun, GA 30701');

INSERT INTO time VALUES (1, 4, 'SAT', 'JUL', 'Q3', 2020);
INSERT INTO time VALUES (2, 19, 'SAT', 'SEP', 'Q3', 2020);
INSERT INTO time VALUES (3, 27, 'WED', 'JAN', 'Q1', 2021);
INSERT INTO time VALUES (4, 21, 'WED', 'OCT', 'Q4', 2020);
INSERT INTO time VALUES (5, 1, 'THU', 'APR', 'Q2', 2021);
INSERT INTO time VALUES (6, 15, 'SAT', 'AUG', 'Q3', 2020);

INSERT INTO fact_table VALUES (1, 1, 4, 100000, 3);
INSERT INTO fact_table VALUES (2, 3, 2, 5454, 5);
INSERT INTO fact_table VALUES (3, 2, 3, 534534, 3);
INSERT INTO fact_table VALUES (4, 4, 5, 2354680, 7);
INSERT INTO fact_table VALUES (5, 1, 6, 971331, 9);
INSERT INTO fact_table VALUES (6, 2, 1, 91354, 2);
```

Show Tables

```
SELECT * FROM doctor;
```

DOCTOR_ID	DOCTOR_NAME	PHONE	ADDRESS	SEX
1	Amit Ramani	5550256	42 Foobar Lane	M
2	Grace Ritchie	5550512	37 Snafu Drive	F
3	Glenn Maxwell	5551204	101 Omgbbq Street	M
4	Manjunath Naik	5552048	1100 Foobaz Avenue	M

```
SELECT * FROM patient;
```

PATIENT_ID	PATIENT_NAME	PHONE	SEX	DESCRIPTION	ADDRESS
1	John Dorian	111111111	M	Skin disorders	9735 Green Lake Ave.\r\nHorn Lake, MS 38637
2	Elliot Reid	222222222	M	Jonumber disorders	8 Monroe Ave.\r\nBonita Springs, FL 34135
3	Christopher Turk	333333333	M	Back problems	455 Jennings Ave.\r\nBrainerd, MN 56401
4	Pratham Mehta	444444444	M	Mental disorder	487 York St.\r\nWaterbury, CT 06705
5	Percival Cox	555555555	F	Cholesterol problems	302 Railroad St.\r\nUtica, NY 13501
6	Bob Kelso	666666666	F	Corona	32 John St.\r\nCalhoun, GA 30701

```
SELECT * FROM time;
```

TIME_KEY	DAY	DAY_OF_WEEK	MONTH	QUARTER	YEAR
1	4	SAT	JUL	Q3	2020
2	19	SAT	SEP	Q3	2020
3	27	WED	JAN	Q1	2021
4	21	WED	OCT	Q4	2020
5	1	THU	APR	Q2	2021
6	15	SAT	AUG	Q3	2020

```
SELECT * FROM fact_table;
```

TIME_KEY	DOCTOR_ID	PATIENT_ID	CHARGE	COUNT
1	1	4	100000	3
2	3	2	5454	5
3	2	3	534534	3
4	4	5	2354680	7
5	1	6	971331	9
6	2	1	91354	2

OLAP Operations:

1) Slice

```
SELECT fact_table.doctor_id, charge FROM fact_table
    INNER JOIN doctor ON fact_table.doctor_id = doctor.doctor_id
    WHERE doctor_name ='Grace Ritchie';
```

DOCTOR_ID	CHARGE
2	534534
2	91354

2) Dice

```
SELECT fact_table.doctor_id, charge FROM fact_table
    INNER JOIN doctor ON fact_table.doctor_id = doctor.doctor_id
    WHERE doctor_name = 'Grace Ritchie' AND patient_id = '1' OR patient_id = '3';
```

DOCTOR_ID	CHARGE
2	534534
2	91354

3) Rollup

```
SELECT year, SUM(charge) FROM fact_table
    INNER JOIN doctor ON fact_table.doctor_id = doctor.doctor_id
    INNER JOIN time ON fact_table.time_key = time.time_key
    WHERE doctor_name ='Grace Ritchie'
    GROUP BY year;
```

YEAR	SUM(CHARGE)
2021	534534
2020	91354

4) Drill Down

```
SELECT quarter, SUM(charge) FROM fact_table
    NATURAL JOIN doctor
    INNER JOIN time ON fact_table.time_key = time.time_key
    WHERE doctor_name ='Grace Ritchie'
    GROUP BY quarter;
```

QUARTER	SUM(CHARGE)
Q1	534534
Q3	91354

5) Pivot

```
SELECT doctor_name, SUM(charge) FROM fact_table
INNER JOIN doctor ON fact_table.doctor_id = doctor.doctor_id
GROUP BY doctor_name;
```

DOCTOR_NAME	SUM(CHARGE)
Grace Ritchie	625888
Manjunath Naik	2354680
Glenn Maxwell	5454
Amit Ramani	1071331

```
SELECT * FROM
    (SELECT doctor_name, charge FROM fact_table
    INNER JOIN doctor ON fact_table.doctor_id = doctor.doctor_id)
    PIVOT
    (SUM(charge) AS total_charge FOR (doctor_name)
    IN ('Grace Ritchie' AS Grace_Ritchie, 'Manjunath Naik' AS Manjunath_Naik,
'Glenn Maxwell' AS Glenn_Maxwell, 'Amit Ramani' AS Amit_Ramani));
```

GRACE_RITCHIE_TOTAL_CHARGE	MANJUNATH_NAIK_TOTAL_CHARGE	GLENN_MAXWELL_TOTAL_CHARGE	AMIT_RAMANI_TOTAL_CHARGE
625888	2354680	5454	1071331