

-- === 1. Create Star Schema Tables (Dimensions) with Surrogate Key ===

-- Sequence for generating surrogate keys for dim\_auto

CREATE SEQUENCE seq\_dim\_auto\_id START WITH 1 INCREMENT BY 1;

-- Dimension Table for Auto (Vehicle) with Surrogate Key

```
CREATE TABLE dim_auto (  
    auto_id NUMBER PRIMARY KEY,  
    vehicle_type VARCHAR2(50),  
    driver_category VARCHAR2(50)  
);
```

-- Sequence for generating surrogate keys for dim\_location

CREATE SEQUENCE seq\_dim\_location\_id START WITH 1 INCREMENT BY 1;

-- Dimension Table for Location (Street) with Surrogate Key

```
CREATE TABLE dim_location (  
    location_id NUMBER PRIMARY KEY,  
    street_name VARCHAR2(50),  
    city VARCHAR2(50)  
);
```

-- Sequence for generating surrogate keys for dim\_time

CREATE SEQUENCE seq\_dim\_time\_id START WITH 1 INCREMENT BY 1;

-- Dimension Table for Time (Year, Month, Day) with Surrogate Key

```
CREATE TABLE dim_time (  
    time_id NUMBER PRIMARY KEY,  
    year NUMBER,  
    month NUMBER,  
    day NUMBER  
);
```

-- === 2. Create Fact Table ===

-- Sequence for generating surrogate keys for fact\_auto\_movement

CREATE SEQUENCE seq\_fact\_auto\_movement\_id START WITH 1 INCREMENT BY 1;

```
CREATE TABLE fact_auto_movement (  
    fact_id NUMBER PRIMARY KEY,  
    auto_id NUMBER,  
    location_id NUMBER,  
    time_id NUMBER,  
    movement_type VARCHAR2(50),  
    movement_date DATE  
);
```

```

fact_id NUMBER PRIMARY KEY,
auto_id NUMBER,
location_id NUMBER,
time_id NUMBER,
speed NUMBER,
FOREIGN KEY (auto_id) REFERENCES dim_auto(auto_id),
FOREIGN KEY (location_id) REFERENCES dim_location(location_id),
FOREIGN KEY (time_id) REFERENCES dim_time(time_id)
);

```

-- === 3. Insert Data into Star Schema ===

```

-- Insert data into dim_auto with surrogate key
INSERT INTO dim_auto (auto_id, vehicle_type, driver_category)
VALUES (seq_dim_auto_id.NEXTVAL, 'Car', 'Experienced');
INSERT INTO dim_auto (auto_id, vehicle_type, driver_category)
VALUES (seq_dim_auto_id.NEXTVAL, 'Truck', 'Novice');
INSERT INTO dim_auto (auto_id, vehicle_type, driver_category)
VALUES (seq_dim_auto_id.NEXTVAL, 'Motorcycle', 'Experienced');
INSERT INTO dim_auto (auto_id, vehicle_type, driver_category)
VALUES (seq_dim_auto_id.NEXTVAL, 'Bus', 'Experienced');
INSERT INTO dim_auto (auto_id, vehicle_type, driver_category)
VALUES (seq_dim_auto_id.NEXTVAL, 'Car', 'Novice');

-- Insert data into dim_location with surrogate key
INSERT INTO dim_location (location_id, street_name, city)
VALUES (seq_dim_location_id.NEXTVAL, 'Main Street', 'City A');
INSERT INTO dim_location (location_id, street_name, city)
VALUES (seq_dim_location_id.NEXTVAL, 'Broadway', 'City B');
INSERT INTO dim_location (location_id, street_name, city)
VALUES (seq_dim_location_id.NEXTVAL, '5th Avenue', 'City C');
INSERT INTO dim_location (location_id, street_name, city)
VALUES (seq_dim_location_id.NEXTVAL, 'Sunset Boulevard', 'City A');
INSERT INTO dim_location (location_id, street_name, city)
VALUES (seq_dim_location_id.NEXTVAL, 'Ocean Drive', 'City B');

-- Insert data into dim_time with surrogate key
INSERT INTO dim_time (time_id, year, month, day)
VALUES (seq_dim_time_id.NEXTVAL, 2025, 5, 1);
INSERT INTO dim_time (time_id, year, month, day)

```

```

VALUES (seq_dim_time_id.NEXTVAL, 2025, 5, 2);
INSERT INTO dim_time (time_id, year, month, day)
VALUES (seq_dim_time_id.NEXTVAL, 2025, 5, 3);
INSERT INTO dim_time (time_id, year, month, day)
VALUES (seq_dim_time_id.NEXTVAL, 2025, 5, 4);
INSERT INTO dim_time (time_id, year, month, day)
VALUES (seq_dim_time_id.NEXTVAL, 2025, 5, 5);

```

```

-- Insert data into fact_auto_movement with surrogate key
INSERT INTO fact_auto_movement (fact_id, auto_id, location_id, time_id,
speed)
VALUES (seq_fact_auto_movement_id.NEXTVAL, 1, 1, 1, 60);
INSERT INTO fact_auto_movement (fact_id, auto_id, location_id, time_id,
speed)
VALUES (seq_fact_auto_movement_id.NEXTVAL, 2, 2, 2, 50);
INSERT INTO fact_auto_movement (fact_id, auto_id, location_id, time_id,
speed)
VALUES (seq_fact_auto_movement_id.NEXTVAL, 3, 3, 3, 70);
INSERT INTO fact_auto_movement (fact_id, auto_id, location_id, time_id,
speed)
VALUES (seq_fact_auto_movement_id.NEXTVAL, 4, 4, 4, 40);
INSERT INTO fact_auto_movement (fact_id, auto_id, location_id, time_id,
speed)
VALUES (seq_fact_auto_movement_id.NEXTVAL, 5, 5, 5, 80);

```

-- === 4. Create Snowflake Schema Tables with Surrogate Key ===

```

-- Sequence for generating surrogate keys for dim_location_snowflake
CREATE SEQUENCE seq_dim_location_snowflake_id START WITH 1 INCREMENT
BY 1;

```

```

-- Snowflake Dimension Table for Location (Street -> City) with Surrogate Key
CREATE TABLE dim_location_snowflake (
    location_id NUMBER PRIMARY KEY,
    street_name VARCHAR2(50),
    city_id NUMBER
);

```

```

-- Sequence for generating surrogate keys for dim_city_snowflake

```

```
CREATE SEQUENCE seq_dim_city_snowflake_id START WITH 1 INCREMENT BY 1;
```

```
-- Snowflake Dimension Table for City with Surrogate Key
```

```
CREATE TABLE dim_city_snowflake (  
    city_id NUMBER PRIMARY KEY,  
    city_name VARCHAR2(50)  
);
```

```
-- === 5. Alter Fact Table to Add References to Snowflake Schema ===
```

```
ALTER TABLE fact_auto_movement  
ADD (city_id NUMBER, FOREIGN KEY (city_id) REFERENCES  
dim_city_snowflake(city_id));
```

```
-- === 6. Insert Data into Snowflake Schema with Surrogate Key ===
```

```
-- Insert data into dim_city_snowflake with surrogate key
```

```
INSERT INTO dim_city_snowflake (city_id, city_name)  
VALUES (seq_dim_city_snowflake_id.NEXTVAL, 'City A');  
INSERT INTO dim_city_snowflake (city_id, city_name)  
VALUES (seq_dim_city_snowflake_id.NEXTVAL, 'City B');  
INSERT INTO dim_city_snowflake (city_id, city_name)  
VALUES (seq_dim_city_snowflake_id.NEXTVAL, 'City C');
```

```
-- Insert data into dim_location_snowflake with surrogate key
```

```
INSERT INTO dim_location_snowflake (location_id, street_name, city_id)  
VALUES (seq_dim_location_snowflake_id.NEXTVAL, 'Main Street', 1);  
INSERT INTO dim_location_snowflake (location_id, street_name, city_id)  
VALUES (seq_dim_location_snowflake_id.NEXTVAL, 'Broadway', 2);  
INSERT INTO dim_location_snowflake (location_id, street_name, city_id)  
VALUES (seq_dim_location_snowflake_id.NEXTVAL, '5th Avenue', 3);  
INSERT INTO dim_location_snowflake (location_id, street_name, city_id)  
VALUES (seq_dim_location_snowflake_id.NEXTVAL, 'Sunset Boulevard', 1);  
INSERT INTO dim_location_snowflake (location_id, street_name, city_id)  
VALUES (seq_dim_location_snowflake_id.NEXTVAL, 'Ocean Drive', 2);
```

```
-- === 7. Perform OLAP Operations ===
```

```
-- === SLICE OPERATION ===
```

```
BEGIN
```

```

    DBMS_OUTPUT.PUT_LINE('=== SLICE OPERATION ===');
    DBMS_OUTPUT.PUT_LINE('Description: Slice by Auto ID (Car)');
    DBMS_OUTPUT.PUT_LINE('Extracting data for Auto ID = 1 (Car)');
END;
/
SELECT f.fact_id, a.vehicle_type, l.street_name, t.year, t.month, t.day, f.speed
FROM fact_auto_movement f
JOIN dim_auto a ON f.auto_id = a.auto_id
JOIN dim_location_snowflake l ON f.location_id = l.location_id
JOIN dim_time t ON f.time_id = t.time_id
WHERE a.auto_id = 1;

-- === DICE OPERATION ===
BEGIN
    DBMS_OUTPUT.PUT_LINE('=== DICE OPERATION ===');
    DBMS_OUTPUT.PUT_LINE('Description: Filter data for Speed > 50 and
Location = Main Street');
END;
/
SELECT f.fact_id, a.vehicle_type, l.street_name, t.year, t.month, t.day, f.speed
FROM fact_auto_movement f
JOIN dim_auto a ON f.auto_id = a.auto_id
JOIN dim_location_snowflake l ON f.location_id = l.location_id
JOIN dim_time t ON f.time_id = t.time_id
WHERE f.speed > 50 AND l.street_name = 'Main Street';

-- === DRILL-DOWN OPERATION ===
BEGIN
    DBMS_OUTPUT.PUT_LINE('=== DRILL-DOWN OPERATION ===');
    DBMS_OUTPUT.PUT_LINE('Description: Drill down from Year → Month for
Vehicle Movements in 2025');
    DBMS_OUTPUT.PUT_LINE('Drilling down from Year to Month for Movements
in 2025');
END;
/
SELECT t.year, t.month, COUNT(f.fact_id) AS movements
FROM fact_auto_movement f
JOIN dim_time t ON f.time_id = t.time_id
WHERE t.year = 2025
GROUP BY t.year, t.month

```

```
ORDER BY t.year, t.month;
```

```
-- === ROLL-UP OPERATION ===
```

```
BEGIN
```

```
    DBMS_OUTPUT.PUT_LINE('=== ROLL-UP OPERATION ===');
```

```
    DBMS_OUTPUT.PUT_LINE('Description: Roll-up from Day → Month for  
Vehicle Movements');
```

```
    DBMS_OUTPUT.PUT_LINE('Rolling up from Day to Month');
```

```
END;
```

```
/
```

```
SELECT t.year, t.month, SUM(f.speed) AS total_speed
```

```
FROM fact_auto_movement f
```

```
JOIN dim_time t ON f.time_id = t.time_id
```

```
GROUP BY t.year, t.month
```

```
ORDER BY t.year, t.month;
```

```
-- === PIVOT OPERATION ===
```

```
BEGIN
```

```
    DBMS_OUTPUT.PUT_LINE('=== PIVOT OPERATION ===');
```

```
    DBMS_OUTPUT.PUT_LINE('Description: Pivot by Month to Show Total Speed  
for Each Vehicle');
```

```
END;
```

```
/
```

```
SELECT *
```

```
FROM (
```

```
    SELECT a.vehicle_type, t.month, f.speed
```

```
    FROM fact_auto_movement f
```

```
    JOIN dim_auto a ON f.auto_id = a.auto_id
```

```
    JOIN dim_time t ON f.time_id = t.time_id
```

```
)
```

```
PIVOT (
```

```
    SUM(speed)
```

```
    FOR month IN (1 AS "January", 2 AS "February", 3 AS "March", 4 AS "April", 5  
AS "May")
```

```
);
```