

```
-- =====  
-- 1. STAR SCHEMA DIMENSION TABLES  
-- =====
```

```
-- Course Section Dimension
```

```
CREATE TABLE dim_course_section (  
    course_id INT,  
    section_id INT,  
    course_name VARCHAR2(100),  
    units INT,  
    room_id VARCHAR2(20),  
    room_capacity INT,  
    PRIMARY KEY (course_id, section_id)  
);
```

```
-- Professor Dimension
```

```
CREATE TABLE dim_professor (  
    professor_id INT PRIMARY KEY,  
    professor_name VARCHAR2(100),  
    title VARCHAR2(50),  
    department_id INT,  
    department_name VARCHAR2(100)  
);
```

```
-- Student Dimension
```

```
CREATE TABLE dim_student (  
    student_id INT PRIMARY KEY,  
    student_major VARCHAR2(100)  
);
```

```
-- Period Dimension
```

```
CREATE TABLE dim_period (  
    semester_id INT PRIMARY KEY,  
    year INT  
);
```

```
-- =====
```

```
-- 2. FACT TABLE
```

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-- =====
```

```
CREATE TABLE fact_course_grades (  

```

```

fact_id INT PRIMARY KEY,
course_id INT,
section_id INT,
professor_id INT,
student_id INT,
semester_id INT,
grade VARCHAR2(2),
FOREIGN KEY (course_id, section_id) REFERENCES
dim_course_section(course_id, section_id),
FOREIGN KEY (professor_id) REFERENCES dim_professor(professor_id),
FOREIGN KEY (student_id) REFERENCES dim_student(student_id),
FOREIGN KEY (semester_id) REFERENCES dim_period(semester_id)
);

-- =====
-- 3. INSERT DATA INTO STAR SCHEMA
-- =====

-- Course Section Data
INSERT INTO dim_course_section VALUES (101, 1, 'DBMS', 4, 'R101', 60);
INSERT INTO dim_course_section VALUES (102, 1, 'OS', 3, 'R102', 55);
INSERT INTO dim_course_section VALUES (103, 1, 'CN', 4, 'R103', 50);
INSERT INTO dim_course_section VALUES (104, 1, 'AI', 3, 'R104', 65);
INSERT INTO dim_course_section VALUES (105, 1, 'ML', 3, 'R105', 60);

-- Professor Data
INSERT INTO dim_professor VALUES (201, 'Dr. Mehta', 'Associate Prof', 301,
'Computer Science');
INSERT INTO dim_professor VALUES (202, 'Dr. Rao', 'Assistant Prof', 302, 'IT');
INSERT INTO dim_professor VALUES (203, 'Dr. Nair', 'Professor', 303,
'Electronics');
INSERT INTO dim_professor VALUES (204, 'Dr. Kapoor', 'Professor', 301,
'Computer Science');
INSERT INTO dim_professor VALUES (205, 'Dr. Sharma', 'Lecturer', 304, 'AI &
DS');

-- Student Data
INSERT INTO dim_student VALUES (1001, 'Computer Science');
INSERT INTO dim_student VALUES (1002, 'IT');
INSERT INTO dim_student VALUES (1003, 'Electronics');

```

```
INSERT INTO dim_student VALUES (1004, 'AI & DS');
INSERT INTO dim_student VALUES (1005, 'Computer Science');
```

-- Period Data

```
INSERT INTO dim_period VALUES (1, 2023);
INSERT INTO dim_period VALUES (2, 2023);
INSERT INTO dim_period VALUES (3, 2024);
INSERT INTO dim_period VALUES (4, 2024);
INSERT INTO dim_period VALUES (5, 2025);
```

-- Fact Table Data

```
INSERT INTO fact_course_grades VALUES (1, 101, 1, 201, 1001, 1, 'A');
INSERT INTO fact_course_grades VALUES (2, 102, 1, 202, 1002, 2, 'B');
INSERT INTO fact_course_grades VALUES (3, 103, 1, 203, 1003, 3, 'A');
INSERT INTO fact_course_grades VALUES (4, 104, 1, 204, 1004, 4, 'C');
INSERT INTO fact_course_grades VALUES (5, 105, 1, 205, 1005, 5, 'B');
```

-- =====

-- 4. SNOWFLAKE DIMENSIONS

-- =====

-- Department Snowflake

```
CREATE TABLE dim_department_snowflake (
    department_id INT PRIMARY KEY,
    department_name VARCHAR2(100)
);
```

-- Room Snowflake

```
CREATE TABLE dim_room_snowflake (
    room_id VARCHAR2(20) PRIMARY KEY,
    room_capacity INT
);
```

-- =====

-- 5. ALTER FACT TABLE TO ADD SNOWFLAKE FKs

-- =====

```
ALTER TABLE fact_course_grades ADD (department_id INT);
ALTER TABLE fact_course_grades ADD (room_id VARCHAR2(20));
```

```
ALTER TABLE fact_course_grades ADD CONSTRAINT fk_department FOREIGN
KEY (department_id)
REFERENCES dim_department_snowflake(department_id);
```

```
ALTER TABLE fact_course_grades ADD CONSTRAINT fk_room FOREIGN KEY
(room_id)
REFERENCES dim_room_snowflake(room_id);
```

```
-- =====
```

```
-- 6. INSERT DATA INTO SNOWFLAKE TABLES
```

```
-- =====
```

```
INSERT INTO dim_department_snowflake VALUES (301, 'Computer Science');
INSERT INTO dim_department_snowflake VALUES (302, 'IT');
INSERT INTO dim_department_snowflake VALUES (303, 'Electronics');
INSERT INTO dim_department_snowflake VALUES (304, 'AI & DS');
INSERT INTO dim_department_snowflake VALUES (305, 'Data Science');
```

```
INSERT INTO dim_room_snowflake VALUES ('R101', 60);
INSERT INTO dim_room_snowflake VALUES ('R102', 55);
INSERT INTO dim_room_snowflake VALUES ('R103', 50);
INSERT INTO dim_room_snowflake VALUES ('R104', 65);
INSERT INTO dim_room_snowflake VALUES ('R105', 60);
```

```
-- =====
```

```
-- 7. OLAP OPERATIONS
```

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-- =====
```

```
-- === SLICE OPERATIONS ===
```

```
BEGIN
```

```
    DBMS_OUTPUT.PUT_LINE('SLICE 1: Show grades for Course_ID = 101');
END;
```

```
/
```

```
SELECT f.fact_id, s.student_id, f.grade
FROM fact_course_grades f
JOIN dim_student s ON f.student_id = s.student_id
WHERE f.course_id = 101;
```

```
BEGIN
```

```
    DBMS_OUTPUT.PUT_LINE('SLICE 2: Show all records for Semester_ID = 3');
END;
```

```

/
SELECT * FROM fact_course_grades
WHERE semester_id = 3;

-- === DICE OPERATIONS ===
BEGIN
    DBMS_OUTPUT.PUT_LINE('DICE 1: Show grades where department is CS and
grade = A');
END;
/
SELECT f.fact_id, p.professor_name, f.grade
FROM fact_course_grades f
JOIN dim_professor p ON f.professor_id = p.professor_id
WHERE p.department_name = 'Computer Science' AND f.grade = 'A';

BEGIN
    DBMS_OUTPUT.PUT_LINE('DICE 2: Show students from IT major who got
grade B');
END;
/
SELECT f.fact_id, s.student_id, f.grade
FROM fact_course_grades f
JOIN dim_student s ON f.student_id = s.student_id
WHERE s.student_major = 'IT' AND f.grade = 'B';

-- === DRILL-DOWN OPERATIONS ===
BEGIN
    DBMS_OUTPUT.PUT_LINE('DRILL-DOWN 1: Count of Grades by Year and
Semester');
END;
/
SELECT p.year, p.semester_id, COUNT(f.grade) AS grade_count
FROM fact_course_grades f
JOIN dim_period p ON f.semester_id = p.semester_id
GROUP BY p.year, p.semester_id
ORDER BY p.year, p.semester_id;

BEGIN
    DBMS_OUTPUT.PUT_LINE('DRILL-DOWN 2: Grades by Course and Student');
END;

```

```

/
SELECT f.course_id, f.student_id, f.grade
FROM fact_course_grades f
ORDER BY f.course_id;

-- === ROLL-UP OPERATIONS ===
BEGIN
    DBMS_OUTPUT.PUT_LINE('ROLL-UP 1: Grade count by Year only');
END;
/
SELECT p.year, COUNT(f.grade) AS total_grades
FROM fact_course_grades f
JOIN dim_period p ON f.semester_id = p.semester_id
GROUP BY p.year
ORDER BY p.year;

BEGIN
    DBMS_OUTPUT.PUT_LINE('ROLL-UP 2: Grade count by Department ID only');
END;
/
SELECT f.department_id, COUNT(*) AS total
FROM fact_course_grades f
GROUP BY f.department_id;

-- === PIVOT OPERATIONS ===
BEGIN
    DBMS_OUTPUT.PUT_LINE('PIVOT 1: Grade distribution by course');
END;
/
SELECT * FROM (
    SELECT f.course_id, f.grade
    FROM fact_course_grades f
)
PIVOT (
    COUNT(grade) FOR grade IN ('A' AS A, 'B' AS B, 'C' AS C)
);

BEGIN
    DBMS_OUTPUT.PUT_LINE('PIVOT 2: Grade distribution per year');
END;

```

```
/
SELECT * FROM (
  SELECT p.year, f.grade
  FROM fact_course_grades f
  JOIN dim_period p ON f.semester_id = p.semester_id
)
PIVOT (
  COUNT(grade) FOR grade IN ('A' AS A, 'B' AS B, 'C' AS C)
);
```