

Group B3, task 6

1 INDEXES

1.1 QUERY 1

1.1.1 B-tree index

```
CREATE INDEX idx_DietLog_UserID_MealDate ON DietLog (UserID, MealDate);
```

1.1.2 Bitmap index

```
CREATE BITMAP INDEX idx_DietLog_UserID_MealDate ON DietLog (UserID, MealDate);
```

Index: idx_DietLog_UserID_MealDate

- **Type:** BTREE/BITMAP
- **Purpose:** Improves retrieval performance based on the "UserID" and "MealDate" columns.
- **Link to Operations:**
 - Benefits queries filtering, joining, or sorting by "UserID."

1.2 QUERY 2

1.2.1 B-tree index and function index

```
CREATE INDEX idx_HealthRecords_UserID_RecordDate ON HealthRecords (UserID, RecordDate)
```

Index: idx_HealthRecords_UserID_RecordDate

- **Type:** BTREE
- **Purpose:** Improves performance for queries that involve retrieving the most recent health records for each user by creating an index on the combination of UserID and RecordDate. This index supports the subquery within the RecentHealthRecords CTE.

- **Link to Operations:** Benefits queries that seek the latest health records for each user, which is essential for monitoring and analyzing recent health data.

2 QUERIES

2.1 Q₁ ORIGINAL

```

WITH SubqCTE AS (
    SELECT
        BM.UserID,
        MAX(CASE WHEN BM.MeasurementDate = Subq.LastMeasurementDate THEN BM.Weight END) AS
        LastWeight,
        MIN(CASE WHEN BM.MeasurementDate = Subq.FirstMeasurementDate THEN BM.Weight END) AS
        FirstWeight
    FROM
        BodyMeasurements BM
    JOIN (
        SELECT
            BM.UserID,
            MAX(BM.MeasurementDate) AS LastMeasurementDate,
            MIN(BM.MeasurementDate) AS FirstMeasurementDate
        FROM
            BodyMeasurements BM
        GROUP BY
            BM.UserID
        ) Subq
    ON BM.UserID = Subq.UserID
    GROUP BY
        BM.UserID, Subq.LastMeasurementDate, Subq.FirstMeasurementDate
)

SELECT
    U.UserID,
    U.FirstName,
    U.LastName,
    (SubqCTE.LastWeight - SubqCTE.FirstWeight) / SubqCTE.FirstWeight AS WeightChangeRatio,
    U.Gender,
    D2.MEALDESCRIPTION
FROM
    Members U
JOIN SubqCTE ON U.UserID = SubqCTE.UserID
JOIN DIETLOG D2 ON U.USERID = D2.USERID
WHERE
    (SubqCTE.LastWeight - SubqCTE.FirstWeight) / SubqCTE.FirstWeight > 0.06
    AND EXISTS (
        SELECT 1
        FROM DietLog D
        WHERE U.UserID = D.UserID
        AND D.MealDate >= TO_DATE('2018-01-01', 'YYYY-MM-DD')
        AND D.MealDate < TO_DATE('2019-01-01', 'YYYY-MM-DD')
    )
    AND DBMS_LOB.INSTR(D2.MEALDESCRIPTION, 'the') > 0;

```

2.2 Q2 ORIGINAL

```
WITH RecentHealthRecords AS (  
  SELECT  
    hr.UserID,  
    hr.HeartRate,  
    hr.CholesterolLevel  
  FROM  
    HealthRecords hr  
  WHERE  
    (hr.UserID, hr.RecordDate) IN (  
      SELECT UserID, MAX(RecordDate)  
      FROM HealthRecords  
      GROUP BY UserID  
    )  
)  
SELECT  
  u.UserID,  
  u.FirstName,  
  u.LastName,  
  rhr.HeartRate,  
  rhr.CholesterolLevel  
FROM  
  Members u  
JOIN  
  RecentHealthRecords rhr ON u.UserID = rhr.UserID  
WHERE  
  u.Gender = 'M'  
  AND TRUNC(MONTHS_BETWEEN(TO_DATE('2023-01-01', 'YYYY-MM-DD'), u.BirthDate) / 12) BETWEEN  
25 AND 35  
  AND u.UserID IN (  
    SELECT UserID  
    FROM ExerciseActivities  
    WHERE EXTRACT(YEAR FROM ActivityDate) = 2017  
    GROUP BY UserID  
    HAVING COUNT(*) > 0  
  )  
ORDER BY u.UserID;
```