

SQL Query Optimization Task

In this exercise, you will be given a set of SQL queries that are not optimized. Your task is to identify the inefficiencies and optimize each query. Consider adding appropriate indexes, improving join conditions, and using alternative SQL strategies to enhance the performance of these queries.

For each query, provide the optimized version and explain the changes you made.

Task 1: Join without Indices

Query:

```
SELECT p.firstname, p.lastname, s.name AS subject_name, e.title, pr.role
FROM Person p
JOIN Participant pt ON p.id = pt.person_id
JOIN Exam e ON pt.exam_id = e.id
JOIN Subject s ON e.subject_id = s.id
JOIN ExamRole pr ON pt.exam_role_id = pr.id
WHERE e.exam_date BETWEEN TO_DATE('2023-01-01', 'YYYY-MM-DD') AND
TO_DATE('2023-12-31', 'YYYY-MM-DD');
```

Instructions: This query lacks the use of appropriate indexes for the joins, making it inefficient. Identify how to improve the performance by adding indexes and optimizing the join order.

Task 2: Aggregation without Proper Conditions

Query:

```
SELECT s.name AS subject_name, COUNT(c.id) AS competence_count
FROM Subject s
JOIN Competence c ON s.id = c.subject_id
GROUP BY s.name;
```

Instructions: This query aggregates data without filtering irrelevant rows. Optimize the query by improving the efficiency of the aggregation and adding appropriate filtering conditions.

Task 3: Inefficient use of Subquery

Query:

```
SELECT p.firstname, p.lastname,  
       (SELECT COUNT(*) FROM Competence c WHERE c.person_id = p.id) AS  
competence_count  
FROM Person p;
```

Instructions: The subquery is executed for every row, causing poor performance. Optimize this query by avoiding the use of a subquery and using a more efficient approach.

Task 4: Cartesian Product

Query:

```
SELECT p.firstname, p.lastname, r.designation  
FROM Person p, Room r;
```

Instructions: This query results in a Cartesian product as it does not specify any join conditions. Optimize the query by adding a meaningful join condition to avoid the Cartesian product and improve performance.