

**INDIAN INSTITUTE OF INFORMATION TECHNOLOGY,
DHARWAD**

COURSE: DATABASE MANAGEMENT SYSTEM

Course Code: CS502

REPORT

**TOPIC: SQL QUERY OPTIMISATION, IMPORTANCE, TECHNIQUES,
TOOLS**

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CONTENTS

1. INTRODUCTION	3
2. SCOPE	3
3. QUERY OPTIMISER AS A SEARCH PROBLEM	3
4. IMPORTANCE OF QUERY OPTIMISER	3
5. BASIC TECHNIQUES USED FOR QUERY OPTIMISATION	4
6. SOME OF THE AVAILABLE TOOLS	6
7. REFERENCES	7

INTRODUCTION

Query optimization is an important skill for SQL developers and database administrators (DBAs). In order to improve the performance of SQL queries, developers and DBAs need to understand the query optimizer and the techniques it uses to select an access path and prepare a query execution plan. Query tuning involves knowledge of techniques such as cost-based and heuristic-based optimizers, plus the tools an SQL platform provides for explaining a query execution plan. The best way to tune performance is to try to write your queries in a number of different ways and compare their reads and execution plans.

SCOPE

This report basically defines the importance of basic SQL Query Optimisation Techniques which can be incorporated in daily query making by application developer and data administrator. These techniques do not require any use of algorithms or models. It is independent and more over focuses on query writing guidelines for optimization.

QUERY OPTIMISER AS A SEARCH PROBLEM

Query optimization can be viewed as a difficult search problem. In order to solve this problem, we need to provide:

- A space of plans (search space).
- A cost estimation technique so that a cost may be assigned to each plan in the search space. Intuitively, this is an estimation of the resources needed for the execution of the plan.
- An enumeration algorithm that can search through the execution space.

IMPORTANCE OF QUERY OPTIMISER

The goal of query optimization is to reduce the system resources required to fulfil a query, and ultimately provide the user with the correct result set faster.

- First, it provides the user with faster results, which makes the application seem faster to the user.
- Secondly, it allows the system to service more queries in the same amount of time, because each request takes less time than unoptimized queries.
- Thirdly, query optimization ultimately reduces the amount of wear on the hardware (e.g. disk drives), and allows the server to run more efficiently (e.g. lower power consumption, less memory usage).

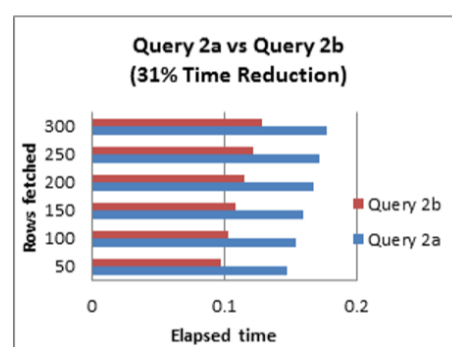
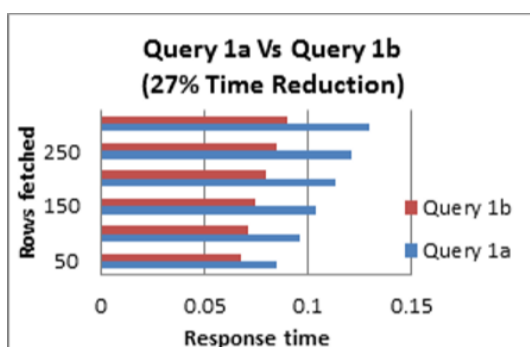
BASIC TECHNIQUES USED FOR QUERY OPTIMISATION

Each technique was tested by running both the original query and optimised query while retrieving information from the Oracle 11g sample database especially on Sales Schema represented as below:

- **sales** {prod_id, cust_id, quantity_sold, time_id}
- **customers** {cust_id, cust_marital_status, country_id}
- **products** {prod_id, prod_min_price, prod_list_price}
- **countries** {country_id, country_name}
- **costs** {prod_id, unit_price}

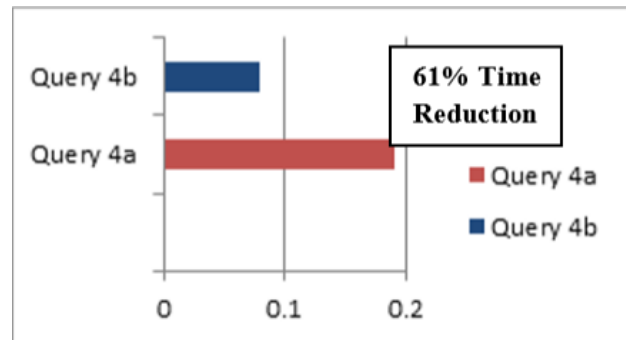
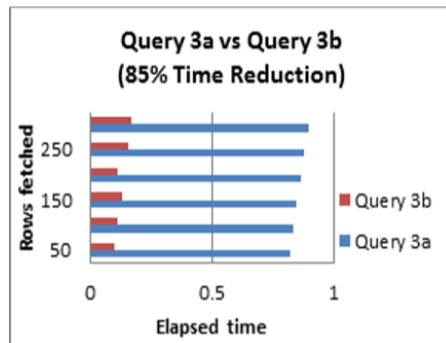
Following are the ten techniques:

1. Use Column Names Instead of * in a SELECT statement



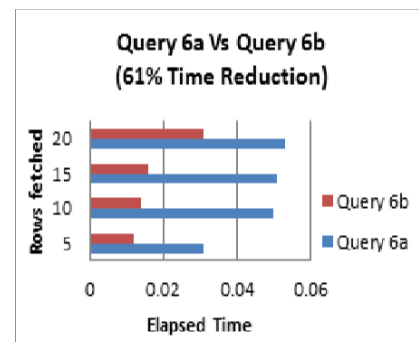
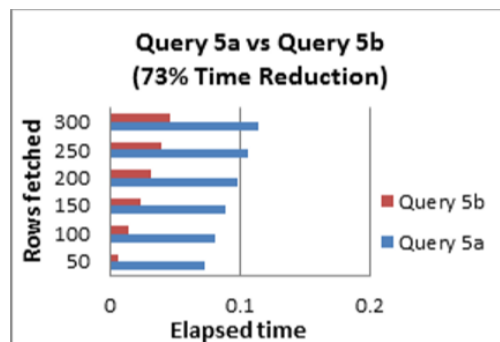
2. Avoid including a HAVING clause in SELECT statements

3. Eliminate unnecessary DISTINCT conditions



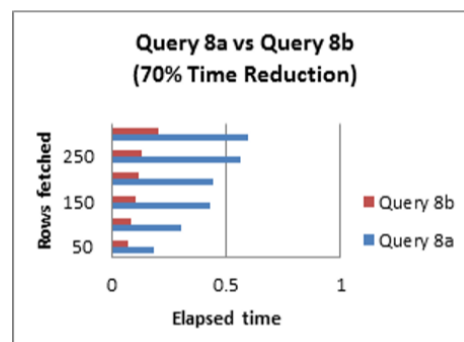
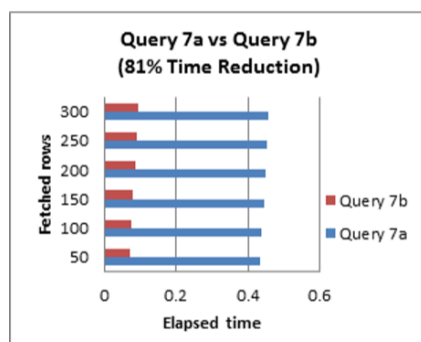
4. Un-nest sub queries

5. Consider using an IN predicate when querying an indexed column



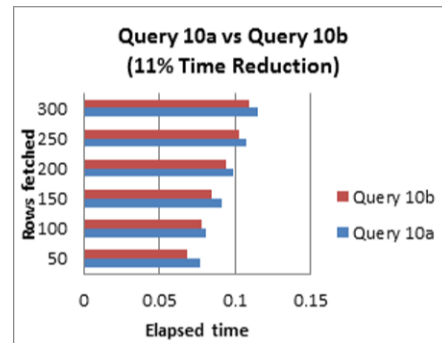
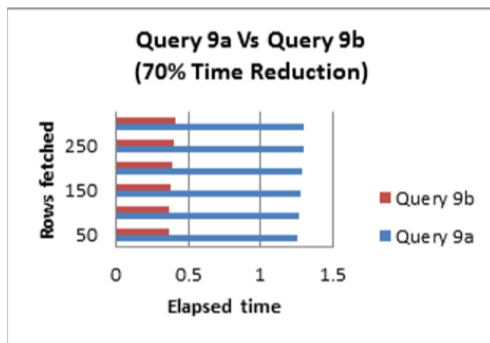
6. Use EXISTS instead of DISTINCT when using table joins that involves tables having one-to-many relationships

7. Try to use UNION ALL in place of UNION



8. Avoid using OR in join conditions

9. Avoid functions on the right hand side of the operator



10. Remove any redundant mathematics

SOME OF THE AVAILABLE TOOLS

- SolarWinds Database Performance Analyser
- SQL Server Management Studio(Microsoft SQL Sever)
- EverSQL (online tool)

REFERENCES

- An overview of Query optimization in Relational Systems (Research Paper by Surajit Chaudhuri)
- Query optimization techniques – Tips for writing efficient and faster SQL Queries (Research Paper by Jean HABIMANA)
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