International Journal on Recent and Innovation Trends in Computing and Communication ISSN: 2321-8169
Volume: 4 Issue: 3 415 - 417

SQL Tools and Optimization

Ankita Pange[1], Manisha Ghembad[2], Sheetal Dandge[3],
Computer Engineering[1, 2, 3]
Rajiv Gandhi Institute of Technology, Versova, Mumbai[1, 2, 3,]
Email: ankitapange@gmail.com[1], manishaghembad03@gmail.com[2], Sheetalrocker@gmail.com [3]

***Abstract*—** Query optimization gives the good performance of the system and manages heavy workload on the database when transmission on data occurs and the effective usage of database engine and lesser memory consumed. For better performance we need to use best, faster and well-ordered queries. Since we need SQL query tuning based on the customer requirements. Firstly the data in database is optimized and then query. In this paper we propose database watermarking technique which is an effective method for database security. To improve query response time is to reduce the number of disk Inputs/Outputs by partitioning the database vertically and/or horizontally which we achieve using clustering. We present a technique for structured database decomposition based on the relational data.

***Keywords*—** *SQL tuning,data fragmentation, indexing, syntax tunning,decomposition, data tool,database watermarking*

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I. Introduction

Query optimization is an essential skill for SQL developers and Database Administrators (DBAs). In order to increase the efficiency of SQL queries, developers and DBAs need to analyze the query optimization methods it uses to select an access path and construct a query execution process plan. Query optimization includes knowledge of techniques such as heuristic-based, cost based algorithm, and the tools an SQL platform provides for explaining a query execution plan. The normal context in today's industry is whenever a programmer writes a query; for tuning it they have to send the query to the DBA of the company. Even DBA was not able to optimize the fullest query and even if it has been optimized it would take extra time and resources of the database administrator during the crunch time it is not possible to optimize each and every query. As there are no rules for tuning it. Sometimes even the DBA was not able to optimize the query. [3]

SQL query Statements are used to retrieve data from the database. By writing distinct query we may get same results. But use of the best query is essential for considering performance. So we need to optimize SQL query based on the requirement. The cluster theory is used to cluster the input data and the clustering results calculate the amount of embedded watermark information and position. This method makes the watermark information more hidden**.**

Database watermarking technology determines the patent of digital products and protects copyright.

II. LITERATURE SURVEY

In the last two decades of database system performance tuning has been an interesting and active area of research. Although the preliminary work in this area was parameters to help the Database administrator to carry out the actual tuning task limited to generate values of the tuning, however, the recent direction has been in developing database system which provides minimal interference of human, which is self-tuning database systems.

IBM in the year 2001 take initiative in autonomic computing which proposed a framework for building autonomic computing system that have self-configuring, self-optimizing and self-securing functionalities with minimal human interferences.[6]

Query optimization has a very big trend on the performance of a DBMS and it continuously evolves with novel, more advanced optimization strategies. Query tuning is a common task performed by database administrators and program designers in order to tune the overall execution of the database system. Optimizing SQL query in such a way that it minimized the time conducted by the query during its actual runtime and also filters some keywords that are not required to use in the query.

BENEFITS OF TUNING.[2]

1. Reduction in SQL processing response time
2. Join data efficiently between two or more tables
3. More efficient way to process workload
4. Improve search time by using indexes

It's found in our survey that the DBA uses different software for optimizing query, for security reason they have some different methodology. Our idea is to provide one tool which provides DBA a complete package which optimized their work.

III. PROPOSED MODULE

In today's computerized world is that the user or the programmer who is using the query for working with the database often faces the problems of tedious execution of the query. One reason behind this problem could be that many users are trying to gain access the SQL Server at the same time. But user can reduce the time taken by the SQL Server for the execution of the query by optimizing the query.

COMPARISON OF EXISTING SYSTEM WITH IMPLEMENTED SYSTEM

Existing system	Implemented system
Poor indexing	Proper indexing
Inaccurate statistics	Accurate statistics
Poor query design	Proper query design
Poor database design	Proper database design
Excessive fragmentation	Less fragmentation
Less security	More security
Less decompose	More decomposed

Table 1.

A. SQL Tuning [1]:

The main objective of this project is to optimize the SQL queries provided by the programmer. Tuning means making the query efficient; this can be done by decreasing the Total CPU time taken by the query. There are different methods to determine the best way to write SQL queries. Out of which two methods are emphasize at the number of logical records reads consumed by the query and other emphasize at graphical execution plans facilitated by SQL Server Management Studio.

Example: Query can be write as

```
Select Student_Name
From Student
Where (marks, average) =Select max (marks), max (Average)
From Student_Details
AND Student_Department=”Computer”;

Instead of
Select Student_Name
From Student
Where marks= (Select marks= (select max (marks) from
Student _Details)
AND Average= (Select max (Average) from student _details)
AND Student_Department=”Computer”;
```

a. Syntax Tuning [4]

Syntax Tuning can be done by checking the Logical Arithmetic, Relational Operators of the queries provided by the user.

1) Logical Operators:

These are the operators which are used to combine two or more clauses present in the where clause of the query given by the user. AND, OR, NOT these are some logical operator.

2) Arithmetic Operators:

User can obtain some calculated values by using arithmetic operator. The basic arithmetic operators are Addition (+), subtraction (-), Division (/), Multiplication (*) and Exponentiation (^).

3) Relational Operators:

These operators are used to give a relation between the column name and its expression to be found in the where clause. The relational operator’s performance is decided by their decreasing operator order list.

Highest performance is given by Equal to (=) then comes Greater than (>) and Less than (<), then comes Greater than or equal to (>=) and Less than or equal to (<=), then comes Like operator and then the least performance is given by Not equal to (<>).

B. Index Tuning [1]

Indexing is one of the most crucial elements in increasing the performance of SQL Server. A well-written query will not show its usability unless powered by an appropriate index or indexes on the table(s) used in a query, especially if the tables are large. Indexes exist to make data selection faster, so the focus of this process is on ways you can select the best indexes for faster data viewing. This process include following steps.

First: collection of Information

Second: Process of Information

C. Data Tool:

Data dump functionality is provided in a data tool application where the encryption and decryption of file is done. It is Database Backup.

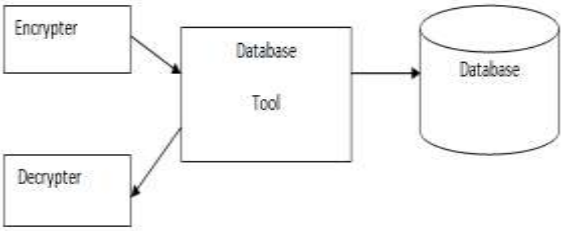

Fig.1: Data Tool

D. Database watermarking: .[5]

The main idea behind implementing database watermarking is to provide security to the database. Data is crucial aspects for any organization. It contains invisible tag into media data to differentiate the legal possessors, checking out the illegal change of data and trail users by generating text.

This technique is more powerful against any attacks or modifications such as deleting or updating cell values, and thus Database watermarking provides support to DBA.

Here we use PBAES algorithm for generating watermarking.

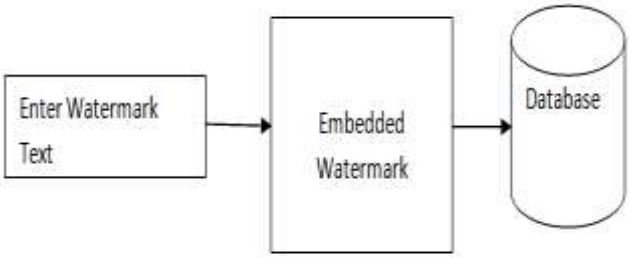

Fig.2: database watermarking process

E. Schema Decomposition:

Decomposition is process of converting high level language (SQL) query into low level language. Decomposing relations consist of methods given below: vertical, horizontal concatenation, qualified vertical concatenation, and qualified stacking. Decomposition is done in order to maintain the normalized database system. Here in our project we were implementing decomposition of schema using direct mapping on vertical track.

F. Data Fragmentation:

Fragments are the multiple smallest units of decomposing database, which is logically related and has corrected parts. We use two common types of fragmentation that is horizontal fragmentation and Vertical fragmentation. In horizontal fragmentation those tuples which satisfy selection condition were selected in horizontal rule.

In vertical fragmentation it divides relation vertically by columns.

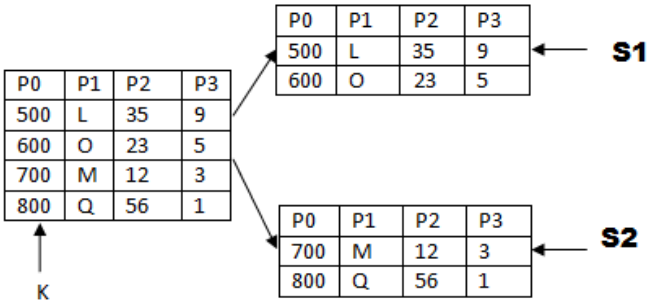

*Fig.3.*Vertical approach

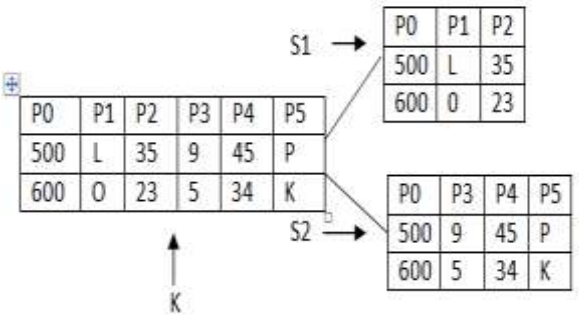

Fig.4.Horizontal approach

IV. Conclusion

Query optimization has a very big influence on the performance of a Database system and it continuously evolves with new, more revolutionary optimization strategies. Query optimization is a ordinary task performed by database administrators and application originator in order to tune the overall performance of the database system. Even if you have an influential infrastructure, the performance can be significantly degraded by inefficient queries. So, we should follow the generated methods as mentioned above to get a better performance of queries . It also provides security to the database by applying watermark effect and data tools which is used to encrypt and decrypt the file. Optimization can be finished with some efforts if we make it a general practice to follow the rules. The techniques described in this paper allow optimization of queries.

Acknowledgment

We wish to express our sincere gratitude to Dr. U. V. Bhosle, Principal and Dr. S. B. Wankhede, H.O.D of Computer Department of RGIT for providing us an opportunity to do our project work on "SQL OPTIMIZER "This project bears on imprint of many peoples. We sincerely thank our project guide Dr. Satish Y. Ket for his guidance and encouragement in carrying out this research work. Finally, we would like to thank our colleagues and friends who helped us in completing the project work successfully.

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