

Performance Tuning in Database Management System based on Analysis of Combination of Time and Cost Parameter through Neural Network Learning

Bindu Sharma
M.tech Scholar
Department of computer
Science
A.I.T.M,Palwal

Mahesh Singh
Assistant Professor
Department of computer
Science
A.I.T.M,Palwal

ABSTRACT

Performance tuning in database management system means enhancing the performance of database, i.e. minimizing the response time at a very optimum cost. Query optimization is one of the important aspects of performance tuning. Lots of research work has been done in this field but it is still ongoing process. To achieve high performance at a very low cost identification of KPIs (Key performance indicators) is necessary, so that by altering these parameters dynamically minimum response time with optimum value can be achieved. This paper proposes how to filter cost and time parameters, to prioritize these parameters to get minimum response time. The approach proposes in this paper will be implemented by using neural network learning rules.

General Terms

KPIs (Key performance indicators), Analyze, Bucketize.

Keywords

Performance tuning of database based on cardinality estimation, Analysis of cost and time parameters..

1. INTRODUCTION

Database management system is heart of any organization and it works on ETL, i.e. Extract, Transform and Load principal. But these steps include various processes to give decision. Good decision making is more of science than an art, that's why analysis is very important. Decisions are highly dependent on analysis. Analysis of parameters leads to performs tuning.

The KPIS are needs to be identified and then they need to be tuned to get high performance.

Now every organization is highly customer centric .One of the core value of any organization is customer centricity. After arrival of OLTP, OLAP, BI, etc performance tuning is highly desirable and Customers needs to be satisfied.

The management of database is the job of DBA. DBA has two customers one is management, one who is investing on resources and other is end user. For end user time is important and for management of any organization cost is equally important.

When performance tuning comes into picture DBA become more focused towards tuning time parameters but cost is equally important. DBA need to consider combination of both cost and time parameters, as DBA's job is to satisfy both his customers i.e. management and end user. If organization is

offering a solution which is very good but at a very high rate is not desirable to cover whole market, it will be able to cover only a part of market. By giving solution at a very optimum cost is highly desirable. This work is presenting a paper with a approach that can cater the demand of market and this work would be beneficial for practitioners as well as for researchers. And I believe that this work can be directly implemented by any DBA for analysis and prioritizing tuning

This paper focuses on cost as well as time. From management perspective, performance is defined as minimizing the response time at a very optimum cost.

In this paper we limit our discussion to dynamic approach of analyzing inputs and selecting only as limited parameters to tune based on the analysis.

The paper contains following sections. Section 2 present Literature Survey, section 3 presents proposed work, section 4 presents conclusion.

2. LITERATURE SURVEY

A lot of research work has been done for performance tuning in database management system. A literature review is done for arrival of this paper and this is presented as follows:

In the paper of SreeKumar Vobugari, D.V.L.N. Somayajulu on "A model for building Dynamic indexes and storage and reuse of optimal query plans generated thru progressive optimization", they have presented the idea to reusing the concept of query plans by building dynamic indexes and this approach is extension of Robust query processing through progressive optimization. Cardinality estimation is also used in this [1].

In the paper of Gaozheng Zhang, he has presented a model for application oriented database performance tuning and describes the main parameters affect the performance .This helped me in arriving at query level analysis[5].

From the paper of Biplob K. Debnath on Statistical approach for ranking database tuning parameters, we have arrived to the conclude cardinality estimation for ranking and analyzing.

In the paper of David J. Montana and Lawrence Davis on Training feedforward neural network using genetic algorithms, this paper illustrates the improvement gained by using genetic algorithm [2].

In the paper of S.F. Rodd and Dr. U.P.Kulkarni on "Adaptive tuning algorithm for performance tuning of database management system ",presents how the neural network adapt

dynamically changing input and how we can use them for performance tuning [4].

In the paper of Hitesh Kumar Sharma and Aditya Shastri on “Architecture of Automated database tuning using SGA parameters” presents addressing the challenge of total cost of ownership is by making information system more self managing [3].

3. PROPOSED WORK

As soon as the query gets triggered gather information about all the parameters associated with it or used in it. This paper presents a model for analyzing parameters that need to feed as input in a query in terms of cost and time and then prioritize for giving input to automated tuning optimizer.

The analysis is based on cardinality estimation of time and cost thru neural network

Every time bucketization is done thru neural network learning.

Based on the bucketization tuning is prioritized.

The complete process follow the below mentioned steps:

- Analyze
- Bucketize
- Prioritize to tune / Prune from tune

3.1 Analyze

For tuning, analyze two parameters i.e. cost parameter and time parameter

First step is analyze the response time of query fired or triggered based on cardinality estimation and do FMS analysis of response time of the parameters involved in the query.

F – Contribute in 70% of the time consumption

M – Contribute in 20% of the time consumption

S – Contribute in 10% of the time consumption

Also do the analysis of cost associated with the query fired/triggered and categorize in terms of ABC.

A – 70% of the cost associated

B – 20% of the cost associated

C – 10% of the cost associated

3.2 Bucketize

Bucketization of analysis is important to show the impact of that particular parameter on query and bucketization is also important for prioritize the tuning.

In this paper this bucketization process is important for prioritizing the tuning/pruning from tuning.

	<u>F</u>	<u>M</u>	<u>S</u>
<u>A</u>	AF	AM	AS
<u>B</u>	BF	BM	BS
<u>C</u>	CF	CM	CS

Figure 1: Matrix to map ABC and FMS

The matrix mapped is for categorizing the parameters for a given query. The categorization is according to the combination of cost and time parameter so that both the important parameters are to catered as result in high performance

CAT1: AF, AM and BF (cells in greenish shade are categorized as CAT1)

CAT2: AS, AM and CF (cells in orange shade are categorized as CAT2)

CAT3: BS, CM and CS (cells in purple shade are categorized as CAT3)

The matrix formation is always thru neural network learning and the rules stored will be for matrix formation.

Neural network has an ability of learning based on rules.

3.3 Prioritize to tune/Prune from Tuning

In this paper, for tuning we consider only CAT1 because CAT1 is contributing in maximum share.

Provide only those parameters as input for tuning which are coming under coming under CAT1.

If our focus is to tune only CAT1, this will lead to less time, less cost in tuning and high results.

The outline of the work proposed is as follows:

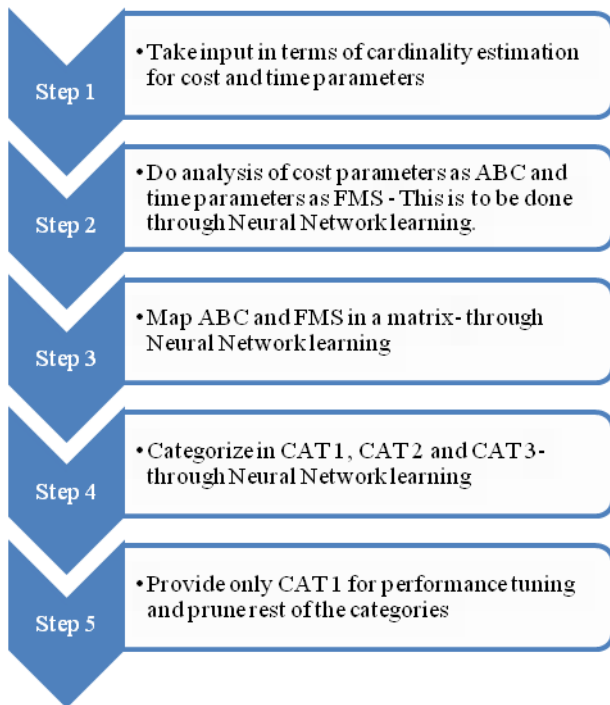


Figure 2: Steps of the proposed work

4. CONCLUSION:

Analysis is the key for improvement; if you do something and you do not do reality check by analyzing your work then you will never be able to get insights. And if you do analysis but you do not use it for betterment then again it is of no worth. The work proposes a frame work how to analyze the performance by keeping eye on both the important parameters and tune only critical parameters that will result in high output.

The inspiration of this paper is based on extensive literature review. The ideas are from many papers are combined with a new approach and bit different analytical approach

This work can be extended for further analysis and for limited scope and can directly be implemented. It is just a part of tuning approach

5. REFERENCES

[1] Sreekumar Vobugari, D.V.L.N. Somayajulu, and B.M. Subraya ,2012, A model for building dynamic indexes & storage and Re-use of optimal query plans Generated thru progressive Optimization

[2] David J. Montana and Lawrence Davis, Training Feedforward Neural Networks Using Genetic Algorithms.

[3] Hitesh Kumar Sharma, Aditya Shastri , Ranjit Biswas , 2012, Architecture of Automated Database Tuning Using SGA parameter.

[4] S.F. Rodd, Dr, U.P. Kulkarni , 2010, Adaptive Tuning Algorithm for performance Tuning of database Management System

[5] Gaozheng Zhang, Mengdong Chen , Lianzhong Liu, A model for Application –oriented Database performance Tuning

[6] Debnath, B. K.; Lilja, D. J.; Mokbel, M. F., SARD: A Statistical Approach for Ranking database Tuning parameters, Data Engineering Workshop, 2008. ICDEW 2008. IEEE 24th International Conference, April 2008.

[7] Sanjay Agarwal, Nicolas Bruno, Surajit Chaudhari, AutoAdmin: Self Tuning Database System Technology, IEEE Data Engineering Bulletin, 2006.

[8] Chaudhuri, S.; Weikum G, Foundations of Automated Database Tuning, Data Engineering, April 2006.

[9] Michael L. Rupley, 2008. Jr. Introduction to Query Processing and Optimization. Indiana University at South Bend..

[10] Surjit Choudhuri, Vivek Narasayya, Self Tuning Database Systems : A Decade progress, Microsoft Research. 2007.

[11] Gerhar Weikum, Axel Moenkerngerg et. al. , Self-tuning Database Technology and Information Services :From wishful thing to viable Engineering, Parallel and Distributed Information System 1993.

[12] Gennadi Rabinovitch, David Wiese, Non-linear Optimization of Performance functions Autonomic Database Performance Tuning, IEEE Conference, 2007.

[13] Satish, S. K. ; Saraswatipura, M. K. ; Shastry, S. C, DB2 Performance Enhancements using Materialized Query Table for LUW Systems, 2007. ICONS '07. Second International Conference, April 2007.