Enhancing Information Management System performance by specializing the concept of Indexing

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Abstract: *For almost all the colleges and universities, having such a large amount of information, with regard to accurately and efficiently carry out the student's management on the basis of a full grasp of information, the extent of difficult task is incomprehensible. Through the SIMS, we can realize the management of students information network-based digitally, groove and gather the students information real-timely, precisely, minimize the workload of students information management, assist the scientific and effectiveness of students information management, thus to uphold the management of college students to carry out high efficiently. The common way to represent a relational database is a tabular structure, where each table represents a relation. The extent of difficult task is unimaginable for each of the colleges and universities, having such a large amount of data, in order to accurately and efficiently carries out the student's management on the basis of a full grasp of information. We now can realize the management of students information network-based digitally, groove and gather the students information real-timely, precisely, minimize the workload of students information management, stimulate the scientific and effectiveness of students information management through the SIMS, and hence we can uphold the management of college students to carry out high efficiently. The common way to represent a relational database is a tabular structure, where each table represents a relation.*

Keywords: Student Information Management System, Indexing, Database, Performance.

1. Introduction

1.1 Problem Definition
Given a data i.e., database of a Student Information System of some specific institute. Problem is to design a MIS system with the database which is indexed in such a way so as to enhance the performance of the existing system without making any changes in the existing database.

1.2 Scope of Problem
A Student Information Management System is used in each college and university. In such a large data management system, high speed of data retrieval is very important. Many software and tool are available to create databases and index them. So there is need for a method or technique that can make SIMS system work more efficiently than the existing one does.

Software Project Management is the art and science of planning and directing software projects. It is the software engineering study area that governs the implementation of Project Management principles for a outlined, checked, and controlled software project.

1.3 Reason for Selecting Problem
Research in the space of optimizing databases in any Database Management System (DBMS) has been emerging constantly. Now, programming languages are being combined into database systems to help professional programmers develop software quickly to meet cutoffs. Hence, the architecture of a database must pamper to both the needs of customers and the efficiency of database processes. In the existing student information management system we are implementing indexing over the single column only, it increases the information retrieval speed when we fire the query on the table over the column which is already indexed, but doesn't proved the same speed or performance while accessing the data over some other column which is not indexed.

1.4 Indexing Algorithm

Algorithm used for Indexing
Input: A database Dt, database relations Rel1, Rel2…Rel n   **Output**: An IndexTable IT   **Begin**   1. Scan database Dt and read the names of relations Rel1, Rel2...Rel n.   2. For each relation Rel i (i=1 to n) in Dt do   3. List Si[] ← Read structure of relation Rel i   4. Prefix ← Rel i (substRel ing (3))   5. For j=0 to (size of Si) -1   6. fnj ← field name of Si[]   7. dtj ← data type of Si[]   8. If (dtj == "text")   9. For each row rk (k=1 to (length of Rel i)) do   10. keyword ← values of fnj in rk

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11. mapId ← Prefix + "R" + rowId of rk
12. keyArray[k-1] ← keyword
13. mapArray[k-1] ← mapId
14. tempkey[k-1] ← keyword
15. End If
16. If (j >1 && dtj == ("text"))
17. keyword ← keyword + tempkey[k]
18. End If
19. End for
20. End for
21. For m=0 to (length of keyArray)-1
22. Insert into IndexTable values (keyArray[m],
mapArray[m])
23. End for

End
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1.5 Literature Survey

Keyword search is the bossy information discovery method in Information Retrieval (IR) systems and search engines on the Web. At this moment, there is an increase in the amount of data stored in structured databases (Relational Databases).

- In 2011, Phyo Thu Thu Khine, Htwe Pa Pa Win and Khin Nwe Ni Tun, proposed a keyword-based search system for relational database
- Ong Chun Lin describe an approach for a database application which uses novelty detection to detect new documents for readers who do not want redundant documents to be read again.
- Chakrabarti describe BANKS, a system which enables keyword-based search on relational databases, together with data and schema browsing.

2. System Development

2.1 Aim and Objective

Aim: - To enhance the performance of existing student information management system by indexing techniques and proper index selection for SIMS.

Objectives:
- Achieving higher data retrieval speed.
- Improve the level of indexing.
- Provide the SIMS system with proper indexing.

2.2 Research Methodologies to be used

Indexing

Indexes separate data structures that allow DBMS to locate particular records in the file of the base table more quickly. Small tables with a small data size usually do not pose much performance issues for MYSQL. However, as tables start growing, the performance with retrieving data records can get very inefficient resulting in long waiting time. Fortunately, indexing in the MYSQL helps in retrieving data records faster and more efficiently. For example, a simple SQL statement using indexing helps to retrieve and sort data faster is shown below.

    SELECT

AVG (AGE) FROM USER
GROUP BY CITY;

In the event that the column AGE and CITY are not indexed, MYSQL will have to scan the whole table for AGE. Then, it scans the whole table to do sorting GROUP BY CITY. This makes the selecting and sorting processes a slow one. Since index is always sorted, similar to that of an index in an encyclopedia, the MYSQL doesn't need to do a full-length table look-up. Hence, an index on AGE and CITY will increase the process speed.
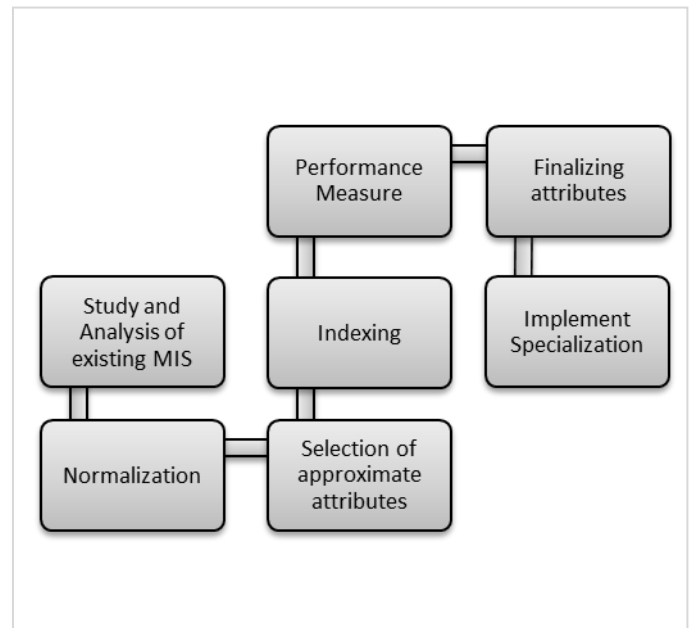
Figure 1: System Architecture Workflow

2.3 Proposed Workflow

In this approach, we are using indexing, where indexing will play little different role than the existing indexing techniques.
We are specializing the concept of indexing for Student Information Management System.
We increase the information retrieval speed when we fire the query over the column which is not indexed by indexing it before firing the query
In this approach, we are using indexing, where indexing will play little different role than the existing indexing techniques.
We are specializing the concept of indexing for Student Information Management System.
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Input: Database of SIMS.

Output: Modified database without changing the semantics.

1. Study of the existing SIMS System:
- Study the existing system as a third party (general) user to check if any flaws in the existing system.
- Study the existing system as an administrator to

check if any flaws in the existing system at that level.

2. Normalize the available data with suitable form of normalization

3. Find the columns which would provide high retrieval rate if indexed by studying the overall system

4. Perform Indexing on the selected columns

5. Calculate the performance for different columns when indexed and when not and compare the performance of those

6. Finalize the best selected columns

7. Specialize the existing database for an application of Student Information Management System

2.4 Software Proficiency

Software proficiency used for project will be MICROSOFT VISUAL STUDIO and MySQL Workbench which is comprehensive and easy to use environment for technical computations. MICROSOFT VISUAL STUDIO is used in project for high-level GUI and a good user-interface that quickly develop the applications. The MICROSOFT VISUAL STUDIO supports good elements for a web application that gives a very decent look and a very friendly environment for thee user. It enables fast development and execution. MySQL Workbench provides a good database server for managing a college/university level database.

2.5 Contribution in Future Work

- The system will be useful to be used in almost all the college and university related information management systems
- The system developed can also be implemented in this Institute also for testing it for few years
- Most advantageous thing after implementation of this idea of specializing the concept of indexing for Student Information Management System will be the a better speed of retrieval i.e., a enhanced performance hence the most important contribution in future will be to change the whole Student Information Management System.

3.   Conclusion

Large data (information) management is a challenging problem in the field of computer science and data analysis. Student Information Management System has a number of applications and we had to give special attention over this area. Research has been conducted in this area for the past four decades, and huge progress has been made. There are several result has been obtained and our current Student Information Management System will be reached on certain degree of maturity. The Student Information Management System using indexing techniques is the basic method for the Student Information Management System development. But again each one has their own pros and cons.

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Author Profile

A. S. Dhanadhya received his B.Tech. degree in Computer Science and Engineering from Shri Guru Gobind Singhji Institute of Engineering and Technology, Nanded, Maharashtra, India in 2013, pursuing M.Tech degree in Computer Science and Engineering from Government College of Engineering, Amravati, Maharashtra, India. His research interest includes database performance. At present he is engaged in Student Information Management System which will be giving a better performance than the existing Student Information Management Systems.

Dr. P. N. Chatur has received his M.E degree in Electronics Engineering from Government College of Engineering Amravati, Maharashtra, India and Ph.D. degree from Amravari University. He has published twenty papers in international journals. His area of research includes Artificial Neural Network, Data Mining, Data Stream Mining and Cloud Computing. Currently, he is Head of Computer Science and Engineering & Electronics Engineering Department at Government College of Engineering Amravati, Maharashtra, India. At present he is engaged with large database mining analysis and stream mining.