Study of synchronization mechanism between the databases for distributed database systems

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Abstract

How to efficiently and safely maintain data synchronization of between the databases of the hot issues of current database technology. Synchronous transmission technology for distributed database systems(DDS), through the study of database synchronization mechanism to solve the multi-level database information exchange process on the lower level database data inconsistencies. The study of database synchronization mechanism to solve the multi-level through database information exchange process between two entities source and destination. In our research to understand the database synchronization working, techniques and methods uses by the different database venders in the field of IT.

Keywords: SYNCHRONIZATION, REPLICATION, IT, DDS, SS, MDS, DBMS.

1 Introduction

1.1 Introduction to database synchronization

Data or information synchronization is one of the classic problems in software or database development world now a day. It becomes very impotent point while working on software production, where data and schema needs to be synchronized with live data as well as overall database structure. Having some basic conceptual complexity, developers often get troubled to use any automated tool considering the risk factors to lose of data or content. Mostly, in these cases a manual process has to involve making sure a safe data synchronization. However as human is also error prone, there still exists risk factor to lose of data, but also includes a huge human time and effort on it. Having a clear specific idea on database synchronization will greatly help to reduce such overheads. Although, the synchronization concept exists in disk space, network, database etc sectors, today we will basically focus on database synchronization concept, which will also help to understand and solves synchronization concept from a generic point of view.

Data replication and synchronization have been topics of research for quite some time in the area of databases and distributed databases. Through the advent of mobile computing the results of this research have to be applied to a new area of application. Synchronization is a process that ensures the same content among two participating entities (source and destination), having different set of content possibly. For example, a database table, named Employee, which has two instance on two different databases, and exact same schema definition, after a synchronization process, both table will updates the identical number of data rows and data column values. In a synchronization process, there involves two participants, generally as source and destination, where the data or information will be placed from source entity to destination entity [4].

Businesses operate from multiple locations in a city or across geographies. To have updated business information is the need of the hour for any business in order to take important decisions. The Synchronization feature use full for enables you to collect and consolidate information from multiple branch offices located in the same city or across geographies and make it available as per your requirement. Data Synchronization makes two sets of data identical, enabling a user to work with data that is current and as data at location[5].In the process of developing databases many developers and testers encounter a problem of synchronizing data

between local and remote database[1].Data synchronization mechanism we can designed to synchronize a single set of data between two or more devices, automatically copying changes back and forth. For example, a user's contact list on one mobile device can be synchronized with other mobile devices or computers. [3].

1.2 Working of Database Synchronization Process

Based on requirement and characteristics of data, the synchronization process can be works in two ways

1. Unidirectional synchronization: replacing destination entity with the source entity.
2. Bidirectional synchronization: merging data from both participating entities.

Trigger-based Database synchronization makes it possible to reflect changes made in one database to another databases in a distributed heterogeneous database system based on pre-created triggers. A new approach of trigger based sync process will be very usefulness to create synchronizer tools. It allows replicating data in near real-time by capturing and delivering updates of modified information as the changes occur and providing continuous data synchronization across homogeneous as well as heterogeneous database schema environments [2].

1.3 Usefulness for Software Development

Solution of Data synchronization problem is very useful and more required   in the world of software development now a day. It becomes very impotence point while working with software development and production, in the software development production data and schema needs to be synchronized with live updates data. This research will help to developers to create to automated synchronization tool without the risk factors of lose data or content.

In the process of developing databases many developers encounter a problem of synchronizing data between one to another database. This research on database synchronization will give the solution for the world of IT (Information Technologies) in the most important point of data update Changes made in a one database to another database.

1.4 At a Glance of Database Synchronization

Now a day In world, All the IT Companies or many developers and testers those who works with the process of developing databases design those are facing a problem of synchronizing data between local and remote database. Changes made in a local database must be reflected in a remote database. This research will more helpful to provide better solution to overcome the problem of data reflection between source databases to destination database.
Not only in the world but also in India specifically in Gujatat, All the small scale IT Companies or database developers and those who works with the process of developing databases deign, those are facing a problem of synchronizing data between tables or database. It helpful to for any update will make in a one database must be reflected in another or central database. This research will more helpful to give the good glance to overcome the problem of data update chances between one databases to another database. Implementation of Solution of the data synchronization also helpful to the final semester IT student for project work and to develop his future in the database side in the world of software development.

1.5 Research Gap

The quality of the data update changes from source database to destination database is a pre-requisite for software or database development industry to provide the data synchronization. The IT companies that offer the best software with synchronize database technologies and great quality with live data updates for the software end user. Most of the researchers are dealing with analysis of data replication. Database technologies are broad and have a wide scope in the field of IT.
Most of the database vender (Oracle, MySql, SqlServer) researchers are dealing database synchronization. But in the small scale IT companies and small private IT institute still not reach the data synchronization concept research. Some earlier studies had been done in other part of India and world of IT. The researcher has not come across any study specifically dealing with data synchronization concept to improve the knowledge of final semester IT project trainee student in Gujarat region.

2. Literature Review

1) Adaptive Replica Synchronization for Distributed File Systems(2015)

In this paper [6] authors (Shelake Seemadevi M.*, Prof. Yevale Ramesh S., Prof. Prakash. B. Dhainje) have reviewed and studied various replica synchronization at storage server (SS) and metadata server (MDS) for distributed file systems. There are various functions which must be fulfilled while replica management such as data consistency, reliability, etc. To ensure data consistency data structure is used to store the information about replicas and associated SSs corresponding to the replicas and to achieve reliability system should be low cost. Replica synchronization that is reliant on the MDS to trigger the synchronization, centralized mechanism is used. This contributing to I/O data rate in write-intensive workloads. The evaluation show that this newly presented mechanism can achieve attractive I/O performance enhancement with less synchronization overhead in specific application contexts.

2) Implementation of Database Synchronization Technique between Client and Server(2014)

In this paper [7] authors (Naveen Malhotra, Anjali Chaudhary) have explained that an algorithm to solve the problem that when all clients are with server. If that database becomes unavailable due to planned server downtime or from server failures, all of the remote workers will be disconnected from their data. Data is stored on their system (user system). When the user connected to the internet data automatically sink from their client system to the server in serial order. It also works on file handling. When the system is disconnected from the network all the files (images) uploaded by user, saved on the client machine folder when it is again connected to the server, automatically files (images) transferred from client to server.

3) Data Synchronization Using Cloud Storage (2012)

In this paper [8] authors (Sudha S, Brindha K, Sai Vamsy Krishna S, Gokul K and Sanath Kumar M) had explained that Cloud computing usually consists of front-end user devices and back-end cloud servers. This gives users to access a large volume of storage on the cloud. In this paper, the user can upload files from mobile or PC to the cloud storage. These files will be automatically synchronized to the user's devices when they are connected to the internet. So, user files can be viewed from anywhere, from any device. In the existing system, we need to download files manually. This paradigm provides the user to synchronize data automatically between devices. They had implemented this paradigm for windows platform.

4) Solving Problems in Software Applications through Data Synchronization in Case of Absence of the Network (2012)

In this paper [9] authors(Isak Shabani, Betim Çiço and Agni Dika) had presented an algorithm for data synchronization based on Web Services (WS), which allows software applications to work on both configurations "Online" and "Offline", in the absence of the network. For this purpose is in use Electronic Student Management System (ESMS) at the University of Prishtina (UP) with the appropriate module. Since the use of ESMS, because of a uncertain supply of electricity, disconnecting the network and for other reasons which are not under the control of professional staff that manages the performance of this system, has interruption to the online work. In order to continue working in such conditions, are founded solutions to work in offline mode and later data synchronization in normal conditions.

5) A Distributed Architecture for Transactions Synchronization in Distributed Database Systems (2010)

In this paper [10] authors (Arun Kumar Yadav and Dr. Ajay Agarwal) explained that various concurrency control algorithms have been proposed for use in distributed database systems. But, the number of algorithms available for the distributed concurrency control, come into one of three basic classes: locking algorithms, Timestamp algorithms and optimistic (or certification) algorithms. In this paper, they were presenting a Distributed Transaction Processing Model and an approach for concurrency control in distributed database systems. The analysis of our approach is a decomposition of the concurrency control problem into two major sub-problems: read-write and write-write synchronization. They describe a series of synchronization techniques for solving each sub-problem and will show how to combine these techniques into algorithms for solving the entire concurrency control problem. Such algorithms are called "concurrency control methods". His approach concentrates on the structure and correctness of concurrency control methods and also the performance of such methods up to some extent.

6) The Impact of Data Synchronization Adoption on Organizations (2009)

In this paper [11] authors (Susan G. Zucker and Shouhong Wang) had explained that Data synchronization is required for supply chain management in the B2B e-commerce environment. This case study examined the impact of the adoption of data synchronization on three large consumer product goods organizations. The study how these organizations recognized benefits and future opportunities after data synchronization adoption. They were findings revealed the significance of internal position around data cleansing and accuracy, as well as opportunities for improved external position from a systems perspective. The synergy created between product item management, data synchronization, and internal champions existed at all three companies. They re-design workflow, process improvements and standards development imposed on these organizations by the clean data requirement of data

synchronization provided the greatest benefits from the data synchronization process.

7) Synchronization in an Embedded DBMS Environment (2006)

In this paper [12] author (Sang-Wook, Kim) had explained that the embedded DBMS is a lightweight DBMS for effective management of quite small databases contained in small mobile devices. Synchronization is a core function of the embedded DBMS to preserve the consistency of data replicated in the server and client databases. This paper presents a framework for synchronization in embedded DBMS environment. His first address key issues for realizing synchronization, and then propose solutions to them obtained from our development. The main issues touched here are (1) classifying conflicts, (2) identifying changes in a client database, (3) detecting conflicts, and (4) resolving conflicts. The proposed framework would help to reduce the trial-and errors of embedded DBMS developers in implementing their synchronization server.

3. Importance of proposed research work

3.1 To Provide Disconnected Data Architecture

This research work very useful to create the disconnected data architecture that means that user does not need to take the continue connection link between source database to destination database for data reflection. When any modification taken place at that time source and destination connecter and after the reflection of that modification, it will again disconnected.

3.2 Automatically updates

This research helpful to create automated data synchronization process. It will automatically reflect data from source database to destination database whenever any modification taken place in any database.

3.3 Response time

Data Retrieval rates are faster because requests are processed on a local server, without accessing a wide area network or remote server as well as only changes are carry out.

3.4 Data availability

Data is accessible locally even in the absence of any connection to a central database, so you are not cut off from data in the event of a failure of a network connection.

3.5 Less Data Movement over Network

Only affected record or data carry out for reflection from source database to destination database no need to replicate the entire source database to destination database.

This research will also useful For steps forward in the concept of data synchronization in educational institutes in Gujarat as well as To enhance the knowledge the level of students in the field of database synchronization in Gujarat region.How to efficiently and safely maintain data synchronization of between the databases of the hot issues of current database technology. Synchronous transmission technology for distributed database systems, through the study of database synchronization mechanism to solve the multi-level database information exchange process between two entities source and destination [4].

5. Conclusion

The objective of the propose research is to present an analysis to solve the problem that when all clients are dependent on a single server on the network. Database becomes unavailable due to server failures. All of the isolated user will be disconnected from their data. When the user connected to the internet data automatically synchronization taken place from their client system to the server to overcome data lose problem. In the future, application developers should work with serial data synchronization should be in order between online and offline application on reliable network. In our research to understand the database synchronization framework, techniques and methods uses by the different database venders in the field of IT and In the future, researcher or software developer can solved the problem of data synchronization.

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