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Developing and Creating an RDBMS Database for the National Stock Exchange

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ABSTRACT :

Information Technology has significantly impacted the means and mechanism of carrying out day to day operations such as dealing with stock markets. This is possible due to computer- based application programs which are designed to run on the client server model. One of the important component of a client server based model is the database wherein we store the data which we use to query our operations.

There are various types of databases and one such database is the relational database which is commonly addressed as RDBMS. This paper explores the process of developing and creating an RDBMS for the National Stock Exchange.

The papers address the issues of the principle of designing databases and optimizing issues related to the design of the database such as normalization. By addressing these issues, the database functions in an optimal manner.

Keywords: RDBMS, National Stock Exchange, Database Design, Data Integrity, Financial Transactions

Introduction

The National Stock exchange of India is an important component of the Indian economy. This is on account of the fact that on daily basis millions and billions of shares, stocks, debentures and bonds are either purchased or sold. These transactions are an indicator of our economy.

On account of large number of transactions, the design of the databases used during the trading operations assumes great importance. However, designing a relational database is not an easy task. It involves careful consideration to various aspects such as the number of the tables in the databases that is where the information is stored. This consideration is relates to the context of optimizing, designing and fine tuning the database including the tables and the table spaces

Literature Review

Information technology has made our life simpler in the sense that we are now highly dependent on the use of web based or an app-based applications. However, whatever information is entered into these systems it is stored in the databases. These databases, thus can be considered as the repository of the stored data. Hence the process of the design of the database assumes critical importance (Powell, G. ,2006).

The more complex the web based or an app-based the system is the more complex and complicated the process of designing the database. (Finkelstein, S., Schkolnick, M., & Tiberio, P. (1988). Fro example, the design of the database for a National Stock Exchange is complex and complicated on account of the various factors which are required to be taken into consideration. Some of these considerations include the growth of the database usage, the design of the tables, the type of the database whether it is hierarchical or network database and in today's technology whether it is a large language model databases wherein the
concepts of artificial intelligence is widely used and adopted (Muppala, M. (2025); Sreenivasan, A., & Suresh, M. (2024); Zhou, X., Sun, Z., & Li, G. (2024).

RDBMS Design for the National Stock Exchange

The national stock exchange is a platform wherein trading of stocks and shares take place. The transactions carried out in highly volatile and voluminous environment. This means that large number of people access the database server of national stock exchange in given second. Hence the design of the database is a crucial component.

The process of designing the database.

The following steps enumerate the process of creating database.

- **A.** The estimations pertaining to the requirements of the system which will be using the database
- **B.** The estimations involve in database growth size
- **C.** The design of the schema which includes design of the tables
- **D.** The various operations to be performed on the database

This paper addresses the design of the schema as the other points are pertaining to operations which are out of bound for the database

Database Schema Design

The fundamental component of the database are the tables. It is actually the tables which store the information entered by the user. Hence the design of the table is a crucial component. It is to be noted that the process of designing the tables is also known as schema design. Refer to **figure 1 below**

The following are the basic tables which are used in the national stock exchange

- **Stock Data Table** (Stock ID, Name, Current Price, Previous Close, Volume Traded)
- **User Portfolio Table** (User ID, Stock ID, Quantity, Purchase Price)
- **Trade Transactions Table** (Transaction ID, User ID, Stock ID, Transaction Type, Date, Amount)
- **Market Indices Table** (Index ID, Name, Current Value, Percentage Change)
- **Audit Log Table** (Log ID, User ID, Activity, Timestamp)

The entities mentioned in within the brackets are the contents of the table

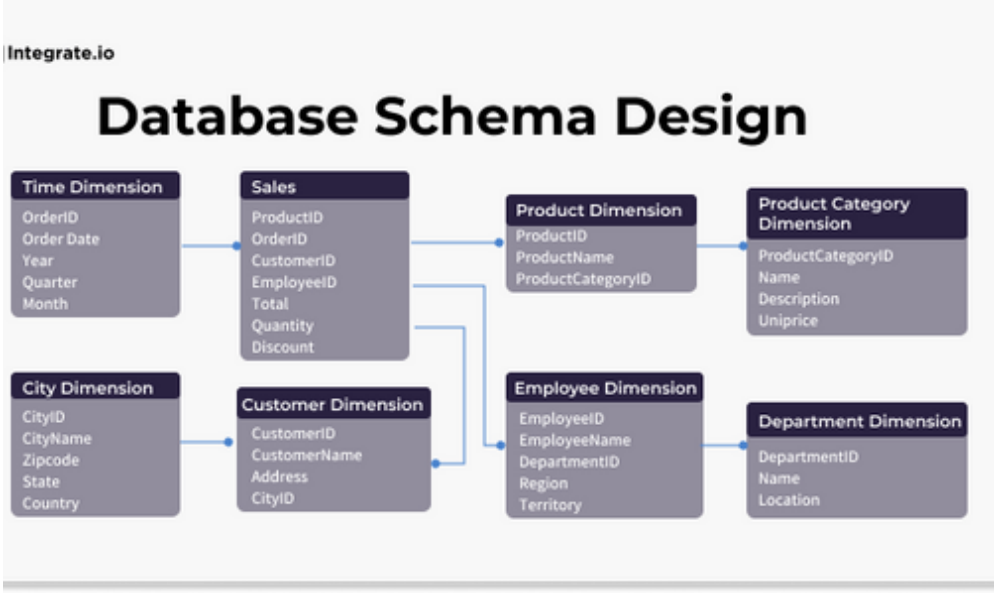

Figure 1: The design of a database schema Source:

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Normalization and Indexing

While designing the tables, one of the crucial points of consideration is the concept of normalization and indexes.

The normalization of the database tables is carried out to reduce the concept of redundancy which translates to the concept of removing the duplicity of the data in the tables. This means the information or the data is stored in one place only.

The concept of indexing pertains to the process of faster retrieval of the records from the tables. It is one of the most important concept as the delay in the retrieval of information may lead to significant loss of revenue

Security Measures

When dealing with database of National Stock Exchange, the concept of security is a paramount critical component as the large number of financial transactions are involved. Hence security assumes an important role.

The following are the security measures which are involved and implemented

- Role-Based Access Control (RBAC): this implements the security in the database on account of the role allocated to the user
- Data Encryption: This security measures is designed to store the information in an encrypted manner so that the data is protected from an unauthorized access
- Audit Logging: This security measure is design to keep a track of the activities of the user during the time period he has used the system

Conclusion

In todays' highly complicated and complex commercial world, database designing has assumed a great significance. This is due to the fact that database is accessed not only from desktop machines but also from various devices such as smart phone, iPad and other form of devices for which the design of the database must be taken into consideration. Any lapses must be rectified before the database is implemented.

For complex systems and high velocity systems such as national stock exchange, the design and development of the database is a well brainstormed activity. This includes the logical design of the database as well as the physical design of the database

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