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Obtaining relevant Data cubes in OLAP for Efficient Online Decision Support Systems

Kiruthika S[1], Umamaheswari E[2]

[1]Department of Computer Science and Engineering, Sona College of Technology, Salem.
kiruthika.cse@sonatech.ac.in
[2]Associate Professor Grade - II, Center Faculty - Cyber Physical Systems,
Vellore Institute of Technology, Chennai
umamaheswari.e@vit.ac.in

Abstract
Online trading requires a sharp Decision Support System that assists in rapid selection of stocks available in the market. This Decision Support System requires data about the pricing of stocks, the availability and the predictive updates in the market. Data gets accumulate day-to-day, forming huge volumes. This data needs multi dimensional modeling. Proper analysis has to be performed on the multi dimensional model to make an accurate decision, on investing in a stock. In the huge population of data, accurate data has to be selected and analyzed. Data cubes are very handy in an OLAP system as buyers always need personalized analysis in specific sets of data. This paper focuses on personalizing datacubes for traders which focuses on particular stocks and their specific data in an Online Analytical Processing System. The system also features the regular update of the database so as to include every new data is included in the analysis.
Keywords: Online Analytical Processing, Online trading, Data cubes, Multi dimensional modeling.

I. *ONLINE DECISION SUPPORT SYSTEMS* – NEED OF THE DAY!

Thanks to the advanced technical development in the field of information technology, most of the urban as well as rural population involve themselves in online transactions. Bank transactions, online shopping, online resale are the beginners' menu for many of the people. Now it has extended to online trading of stocks. People like to achieve their financial goals, invest their money in good stocks. When compared to normal savings, stock trading leads to achieve these goals in a stipulated time horizons. Therefore online trading became the need of the day worldwide. Online trading lets people to buy and sell stocks and avoids the assistance of brokers.Online trading platforms such as online trading websites, mobile apps allow people to buy and sell stocks from their places. These platforms allow the users to place orders, buy them, cancel orders and sell the stocks at convenient times. There are two important advantages of such platforms. One of the advantages is to monitor stocks frequently and regularly. As the second advantage, when there is an attractive price for a stock, it will be notified to the user.

II. PREDICTION OF GOOD STOCKS

Some users do not like advertisements to pop up in their apps or website screens. There are other types of users, who always expect an app or a portal to advice on something good. For online trading, users are really interested in good recommendations of shares and stocks. To make such recommendations available to the traders, huge amount of data has to be analyzed. These data may be quotes, numbers, trading reports or indicator values [1]. Online Analytical Processing (OLAP) systems are employed for making such huge analysis.

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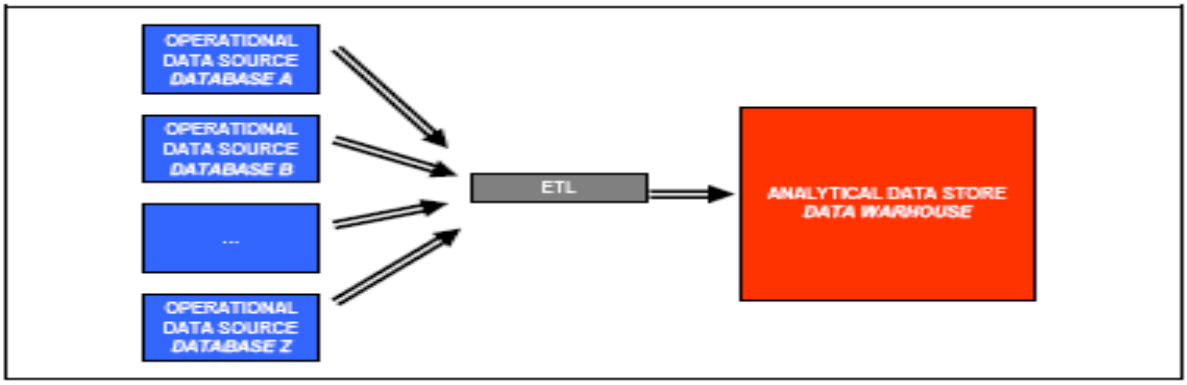

Data cubes are multidimensional arrays of values. A dimension is one of the building blocks of a data warehouse. Every data revolves around the dimension in a Data warehouse. OLAP systems use these cubes to make high definition analysis.

Fig.1 Three Dimensional Data cube

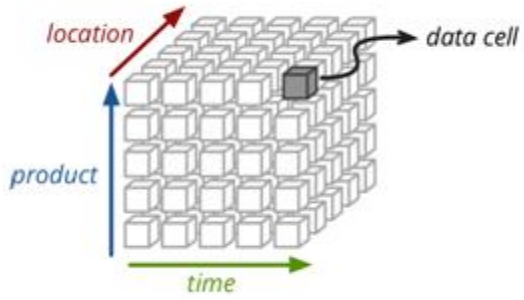

Figure 2 – Creation of Analytical Data store using ETL

Such a data cube is depicted in Figure 1.There are 3 dimensions in this data cube, which are Time, Product and location. Data cubes can be projected to any higher dimensions also.

III. CREATION OF ANALYTICAL DATA STORE

Historical data available in various databases are fed into an ETL (Extract, Transform, and Load) system to obtain an Analytical Data Store, which will further be used by OLAP systems. The scope of the data is then confined to meet the requirements of the analysis process accurately. OLAP tools further allow users to query fact and dimension tables by using simple point-and-click query-building applications. Users will be allowed to select their own options upon stocks. As a result, the users get a clear insight about stocks they wish to buy or sell.

IV. DATABASE MODELS

There are two contemporary data models used for data warehousing and OLAP. They are Relational OLAP which uses Relational data models, consisting of records and fields. Multidimensional OLAP is based on facts and dimensions. The difference between the two models is the search method. In the relational model, in order to locate a record, some type of search has to take place on the table. Appropriate sorting and indexing of records contribute to the search speed in the relational model.

In the multidimensional cube every record can be looked up directly, eliminating the need for a

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search. For large data cubes where the users are allowed to Slice and Dice data, explicit indexing is cumbersome. Therefore Multidimensional model is incorporated in our system.

V. OLAP OPERATIONS ON DATA CUBES

There are a handful of OLAP functionalities, such as Pivot / Rotate, Slice and Dice, Drill down / up. Among these, we use slice and dice functionality to obtain relevant and useful data from our data cubes created. Generally, data cubes are very large and huge and thus sometimes called as a hypercube. Obtaining data manually or with normal algorithms from such huge data volumes is really a harder task and thus we opt for Slice and Dice tools. The key idea of Slice and Dice tools is to cut down dimensions that are not necessary for that particular analysis in OLAP. An interface is given to the user and the user is allowed to choose which attributes from which dimensions to use in the query, via the drag and drop method [3]. Still, sometimes the user may need more dimensions for analysis. Therefore, incorporating new dimensions is also included in the proposed system. This feature is available in existing Slice and Dice systems as well. The granularity of the data can again be adjusted using the Drill down / Drill up functionality.

VI. FUNCTIONALITY AND INTERFACE DESIGN

The proposed system uses the ETL processed background data about the stocks, which are formed into huge data cubes. The OLAP tools are used to carry out operations such as Slicing and Dicing are in the data cube. As a lot of data from the World Wide Web is involved, web caching techniques depicted in [7] can be employed.

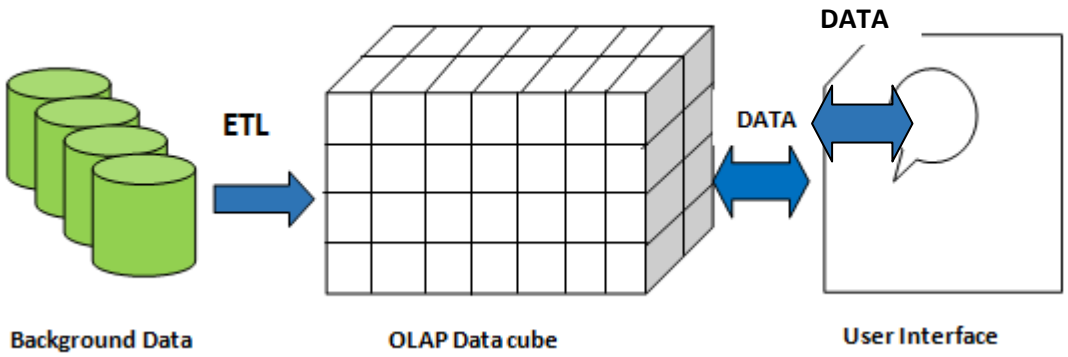

Fig. 3 Online Trading Decision Support System Design

The user interface is designed such that the user selects the appropriate dimensions in which the analysis has to be done. These selected dimensions are sent to the data cubes for further OLAP operations. As depicted in Figure 3, the analysis is done and the result is made available in the user interface, so as to make the user to take appropriate decisions about the online trading. The system can be used as such for share trading by beginners. According to the expertise level of the users, the system should allow the users to select the granularity of data. As a future scope, this can be incorporated using other OLAP function called Drill down / Drill up. More precise data can be obtained while incorporating this new feature.

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Dr. S. Kiruthika is working as an Assistant Professor in the Department of Computer Science and Engineering at Sona College of Technology. She has completed her PhD in Information and Communication Engineering at Anna University in 2016. She has completed her ME from Anna University in the year 2006 and her BE from Bharathiyar University in the year 2003. Her Research interests include Natural Language Processing, Data Science and Business Analytics.

Dr. E. Umamaheswari is an Associate professor Grade II , Centre for Cyber Physical Systems, VIT University, Chennai. She completed her PhD in Anna University, 2015. Her area of specialization includes, Software Engineering (Testing, Metrics), Cloud Security, ERP, Machine Learning, Network Security, IoT. She had published various papers in SCI, Elsevier, Springer indexed journals .She is guiding more number of research scholars in the said specialization. She is an active ACM member and IEEE member. She is a gold medallist and a star performer in her master of science. She is an editor for many journals in IGI global, Wiley publications etc., She is a reviewer in many journals to name a few Mobile Network and Applications. She was a PhD and Poster Track Chair in ICBCC from 2016 onwards, ICRTAC from 2019 onwards. She is a reviewer in Journal of software, Future generation of computer system, MONET, wireless network, IGI global. She is also an editor of International Journal of web portal.