

# An Overview of Data Warehouse and OLAP Technology Used in Banking System

Nikhita Mathur

Research Scholar, Department of Computer Science, Pacific University, Udaipur, Rajasthan, India

**Abstract** — A data warehouse is a very large database system that collects, summarizes and stores data from multiple remote and heterogeneous information sources. The data warehouse supports an OLAP tool for the interactive analysis of multidimensional data. The user analyst abstracts the data from various resources by using the OLAP operations. The basic objective of database is to provide and share information anywhere at any time. The banking system in many countries is reorganizing the communication through internet as the way of transaction. As technology developed new computerized decision support applications were studied.

This paper provides detailed picture of how data warehouse and OLAP technology used in banking sector

**Keywords** —Data warehouse, OLAP, Data cubes, Decision Support System, Data Mining.

## I. INTRODUCTION

The term "Data Warehouse" was first invented by Bill Inmon in 1990. According to him, "a data warehouse is an integrated, time-invariant, subject oriented, and non-volatile collection of data. This data will help to analysts to take informed decisions in an organization." [1]

Data warehouse is defined as a large store of data. It is also known as enterprise data warehouse (EDW). Which mean from multiple different sources that support analytical reporting, structured and/or ad hoc queries, and decision making is made by integrating the data. Data warehousing consists of data cleaning, data integration, and data consolidations.

Data warehouse can be defined as "A repository of integrated information available for queries and analysis. Data and information are extracted from heterogeneous source as they are generated. This makes it much easier and more efficient to run

**Information Processing** –By mean of querying, basic statistical analysis, reporting using crosstabs, charts, tables, or graphs the data can be processed which is stored in data warehouse.

queries over data that originally come from different source" [2]

### 1.1 Data warehouse features:

**Subject Oriented** – For a particular subject area we can use data warehouse. For example subjects as a product, customers, suppliers, revenue, sales, etc. An ongoing operations does not be forces by data warehouse, rather it emphasis on modelling and analysis of data for decision making.

**Integrated** - A data warehouse integrates data from heterogeneous sources. Those sources can be relational databases, flat files, etc. This strengthens the effective analysis of data.

**Time Variant** - The data warehouse kept the historical data. For example, from a data warehouse one can retrieve data from 5months, 10 months, 15 months, or even older data.

**Non-volatile** - Non-volatile means the once the data stored in data warehouse it will retaining the data and not erased when new data is added to it.

### 1.2 Application of Data warehouse

A data warehouse assist business executives to analyse, organise, and use their data for decision making. It works as a heart of a plan-execute-assess "closed-loop" feedback system for the enterprise management. Data warehouses are widely used in the following fields:

- Banking services
- Financial services
- Consumer goods
- Retail sectors
- Controlled manufacturing

### 1.3 Types of Data warehouse

There are 3 types of data warehouse: [3]

**Analytical Processing** – By means of basic OLAP operations, including slice-and-dice, drill down, and drill up, and pivoting the information can be analyzed which is stored in data warehouse.

**Data Mining** – Data mining supports knowledge discovery by finding hidden patterns and associations, constructing analytical models, performing classification and prediction. We can present the mining results by using visualization tool.

## II. OLAP

OLAP stand for Online Analytical Processing, based on multidimensional data model [4]. The user analyst and managers easily and selectively extract and view data from different points of view by using computer processing technique i.e. OLAP. The managers and user analyst get a vision of the information through consistent, fast, and interactive access to information.

OLAP is an effective technology for data discovery that consists capabilities for complex analytical calculations limitless report viewing, and predictive “what if” scenario (budget, forecast) planning. This technology is been used in many Business Intelligence (BI) applications.

### 2.1 Types of OLAP Techniques

There are 4 types of OLAP techniques [5]

- **Relational OLAP (ROLAP):-** this serves are placed between relational back-ends server and client front-end tools. ROLAP product access a relational database by using SQL that is used to define and manipulate data in RDBMS.
- **Multidimensional OLAP (MOLAP):-** It uses array based multidimensional storage engines for multidimensional views of data.
- **Hybrid OLAP (HOLAP):-** it is a combination of MOLAP and ROLAP. It

## III. OLAP IN BANKING SECTOR

The basic objective of the database is to provide and share information anywhere at any time. The Banking system in many countries is reorganizing

offers faster computation of MOLAP and higher scalability of ROLAP.

- **Specialized SQL Servers:** - It provides advance query language and query processing support for SQL queries over star and snowflake schemas in read only environment.

### 2.2 Types of OLAP Operations

There are 4 types of OLAP Operations

- Roll-up
- Drill-down
- Slice and dice
- Pivot (rotate)

### 2.3 How OLAP technologies used?

As we know OLAP performs multidimensional analysis of business data and provides the capability for complex calculations, trend analysis, and sophisticated data modelling. It is the foundation for many kinds of business applications for

- Data Warehouse Reporting
- Business Performance Management,
- Forecasting Planning, Budgeting
- Planning, Budgeting
- Analysis
- Financial Reporting Analysis
- Knowledge Discovery
- Simulation Models

OLAP permit end-users to perform ad hoc analysis of data in multiple dimensions, thereby providing the vision and understanding they need for better decision making.

the communication through Internet as the way of transaction. As technology evolved new computerized decision support applications were developed and studied. Researchers used multiple frameworks to help in building and understanding

these systems. Today one can organize the history of DSS into five broad DSS categories namely: knowledge-driven, document- driven, data-driven, communication-driven, and model-driven decision support systems.

And also in Financial system uses core applications to support their operations where CORE stands for "centralized online real-time exchange"[6]. Core banking solutions is new slang frequently used in banking circles. This basically means that the entire financial institute branches access applications from centralized data centres. These applications now also have the capability to address the needs of corporate customers, providing a comprehensive banking solution but still core banking solution have some limitation that the system cannot identify the customer accounts transactions of different bank's branches [7].

### 3.1 Working process of OLAP in banking sector

In fig 1 it is showing the ETL (extract, transform and load) process. This refer to a process in database usage and especially in data warehousing that extracts data from homogeneous data sources transform the data for storing it in proper format or structure for querying and analysis purpose.

In fig 2 it shows the whole working process of OLAP in banking system. How data is collected, then from ETL process data store in data warehouse and from data warehouse data is analysis, data mining is done and finally get the report.

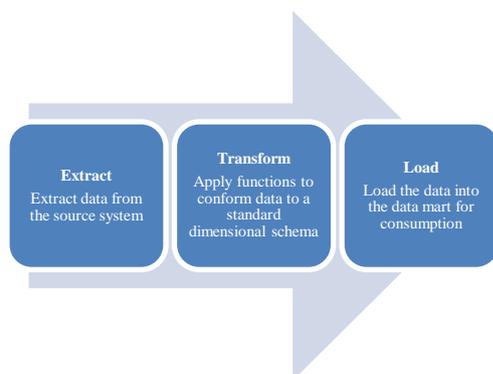


Fig 1: ETL Process

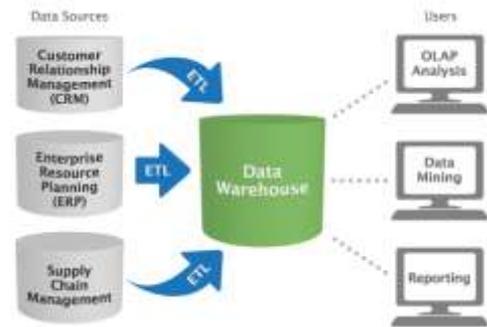


Fig 2: Working Description of OLAP in banking sector

## IV. DATA CUBE

As we know that OLAP is a multi dimensional data modeling technique. The view model of data is in the form of data cube. The data cube is the combination of facts and dimension. In data cube data are categorized by multi dimension. The multi dimension analysis of business data is performed by data cube[8]. It is also capable of doing complex calculation, provide patterns and trends also. It provides intelligent solution that may be related to forecasting, budgeting, knowledge discovery and financial reporting.

In data cube dimension are perspective or entities to which an organization wants to keep records that is dimension table. In other words each dimension has a table associate with it that table is known as dimension table. In multi dimension model it organized around a central theme. That theme represent by fact table. Fact table has two parts that contain the name of fact or measures and other contain foreign key. Data cube is a numeric measures. For example: The three dimensional (3-D) view of the sales datasheet with respect to time, customer, and product is shown in Fig 3 the data cube below:

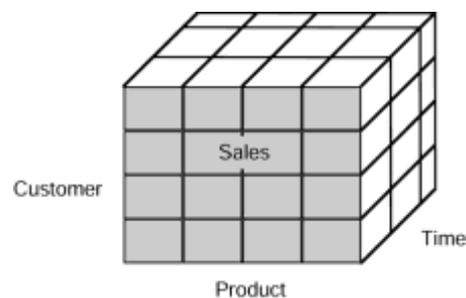


Fig 3: Multidimensional view of cube

## **V. CONCLUSION**

From the above work, it can be concluded that data warehouse have become base for OLAP tool for manage and retrieve information from large amount of database and implement technique on database that suitable for fast search of data within fraction of seconds. Through data cube and data mining the bulk of banking data is store and retrieves with the help of OLAP technique. To get the final product i.e. Reports. In banking sector this technique is very helpful for analysist, administrators, and users for their work.

## **ACKNOWLEDGEMENT**

I especially extend my sincere and grateful thanks to Dr. Arpita Mathur, Assistant Professor Faculty of Computer Science, Lachoo Memorial College, Jodhpur, Rajasthan, India.

## **REFERENCES**

- [1] Paulraj Ponniah, "Data Warehousing Fundamental", New Delhi, Jonh Wiley & Sons, 2001.
- [2] IDRBT Working Paper No.4, "An Approach to Establish Data Warehouse for Banks in India" ,May 2000
- [3] Chuck Ballard, Dirk Herreman, Don SchauRhonda Bell,Eunsaeng Kim, Ann Valenci, , "Data Modeling Techniques for Data Warehousing", International Technical Support Organization, <http://www.redbook.ibm.com>, February 1998.
- [4] White Paper, "OLAP Council"
- [5] Erik Thomsen, "OLAP Solutions: Building Multidimensional Information Systems", second edition
- [6] M/S S. Sathnanakrishanan, "Information System for Banks", M/S/, Taxman publication, Pvt. Ltd, 2005.
- [7] Qiuju Yin, Ke Lu, "Data Mining Based Reduction on Credit Evaluation Index of Bank Personal Customer", International Conference on Future Information Technology and Management Engineering, 2010
- [8] Dr. Dev. Harsh., Mishra. Suman. Kumar., "Design of Data Cubes and Mining for Online Banking System" , International Journal of Computer Applications (0975 – 8887) Volume 30– No.3, September 2011