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Application of Data Warehouse in Modern Financial Sector with Business Intelligence in Financial Industry

Dibyajyoti Saikia

Assistant Professor, Department of Computer Science, Majuli College, Assam India

ABSTRACT:Data warehouse will become a robust to perform a role to enhance the present financial system. This paper studies the application of data warehouse in the modern financial sector. Financial institutions have long been at the forefront of innovation in the use of information. Financial system uses Centralized Online Real-time Exchange (CORE) applications to support their operations. Core is mainly associated with bank. All the banks that use core banking system have a centralized data center. They access all the applications from the centralized data center and treat the customers as their core banking customers. This study can help financial institute to analyze products, profit & cost and become stronger to increase productivity by managing cost.

KEYWORDS: Data Warehouse, Financial Sector, Business Intelligence

I. INTRODUCTION

Learning about how your business running in every passing hour is the best way to act in a particular way to process of innovating and secure the competitive advantages. A data warehouse is a subject oriented, integrated, time-variant, and non-volatile collection of data. This data helps analysts to take informed decisions in an organization. Warehouse industry is estimated to grow at an accelerated rate in accordance with the growth in trade and commerce. Now a days banking sector has circumspectly realized the massive majority of the core business that uses computer processing system that accumulated a large amount of customer data and operational data, which is a valuable asset of the bank. To use these data to travel through valuable information is very important part in modern financial sector in order to improve the variety of business. The key to solving this problem is to establish a banking enterprise-class data warehouse, to achieve effective management of all information stored on bank and customer information, and the need for management decision-making in different sectors of banking, multi-level data processing, in many ways presents truly valuable information, management decisions and meet the needs of customer's analysis [1-2]. That is to say, particularly to set up functional data integration management mechanism for the financial sector's scientific management decisions and develops a new business services, they needed to effectively deal with the data warehouse technology. From this point of view, the data warehouse will not only help in the short term to expand business scope, improve customer service levels, strengthen internal management, and also to further the healthy development financial sector [3].

II. DATA WAREHOUSE

A data warehouse is a subject-oriented, integrated, time varying, non-volatile collection of data in support of the management's decision-making process. A data warehouse is a centralized repository that stores data from multiple information sources and transforms them into a common, multidimensional data model for efficient querying and analysis. The traditional data warehouse has served us well for many years, but new trends are causing it to break in four different ways: data growth, fast query expectations from users, non-relational/unstructured data, and cloud-born data. Data warehouse system is included in the complete decision support system for the purpose of data warehousing,

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OLAP and data mining entity, it can target specific industries and specific companies specific implementations [4-5]. Figure 1 is a block diagram of the architecture of data warehouse system.

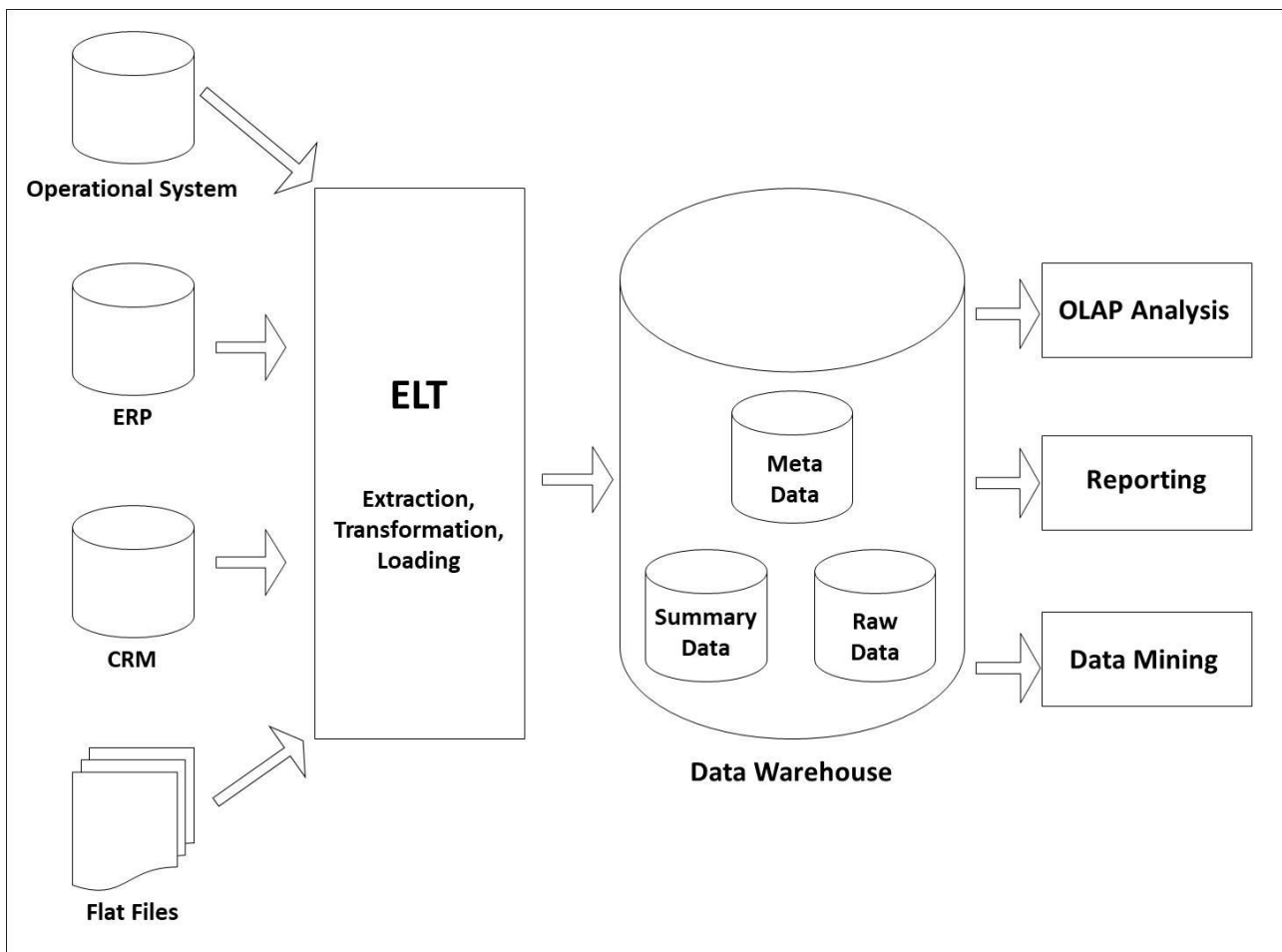


Figure 1: Data Warehouse Architecture

III. DATA WAREHOUSE LAYERS

All data warehouse architecture includes the following layers:

- Data Source Layer
- Data Staging Layer
- Data Storage Layer
- Data Presentation Layer



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i. Data source layer

The data source layer of data warehouse architecture is where original data, collected from variety internal and external sources, resides in the relational database. Examples of source data types include but are not limited to: These stores disparate data types including:

- Operational Data — Product data, inventory data, marketing data, or HR data.
- Social Media Data — Web site hits, content popularity, contact page completion.
- Third-party data — Demographic data, survey data, census data.

While most data warehouse architecture deals with structured data, consideration should be given to the future use of unstructured data sources, such as voice recordings, scanned images, and unstructured text. These streams

ii. Data Staging Layer

The data staging layer resides between data sources and the data warehouse. In this layer, data is extracted from different internal and external data sources. Because source data comes in many different formats, the data extraction layer will utilize multiple technologies and tools to extract the required data. Once the extracted has been loaded, it will be subjected to high-level data quality checks. The final result will be clean and organized data that you will load into your data warehouse. The staging layer contains the following components:[6]

- Landing Database and Staging Area
- Data Integration Tool (ETL)

Landing Database and Staging Area

The landing database stores the data retrieved from the data source. Staging is used to apply quality checks on the data before moving it to the data warehouse. Staging is an essential step in data warehouse architecture. Poor data will amount to inadequate information and result is poor business decision making. The staging layer s also where you want to make adjustments to the schema to handle unstructured data sources.[6-7]

Data integration tool

Extract, Transform and Load tools (ETL) are the data integration tools used to extract data from source systems, transform and prepare data and load into the data warehouse. Panoply.io product provides this entire process, easily and quickly. All you need to do is point it to your data source(s).

iii. Data Storage Layer

The data storage layer is where data that was cleansed in the staging area is stored as a single central repository. Depending on your business and your data warehouse architecture requirements, your data storage may be a data warehouse, data mart (data warehouse partially replicated for specific departments), or an Operational Data Store (ODS).

iv. Data Presentation Layer

The presentation layer is where users interact with the cleansed and organized. This layer of the data warehouse architecture provides users with the ability to query the data for product or service insights, analyze the information to conduct hypothetical business scenarios, and develop automated or ad-hoc reports. You may employ an OLAP or reporting tool with a user-friendly Graphical User Interface (GUI) to help users build their queries, perform analysis, or design their reports.



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IV. HOW MODERN DATA WAREHOUSING SOLVES PROBLEMS FOR BUSINESSES

Today, if companies only look at historical statistics, they will be behind the curve before they even begin. Some of the solutions to this, which new data warehousing techniques and software provide, include:

- Data lakes
- Data divided across organizations
- IOT streaming data

Data lakes

Instead of storing data in hierarchical files and folders, as traditional data warehouses do, a data lake is a storage repository that holds a vast amount of raw data in its native format until it is needed.

Data divided across organization

Modern data warehousing allows for quicker information assortment and analysis across organizations and divisions. This is in keeping with the agility model and promotes more alliance and sooner results.

IOT streaming data

The Internet of Things has completely transformed the scenario, as customers, companies, units, etc. share and stock data across multiple devices.

V. FUTURE SUPPORT OF DATA WAREHOUSE

Most of the new necessities relate to big data and advanced analytics, so the data warehouse of the future must support these in multiple ways.

- Enhanced Business Intelligence
- Increased Query and System Performance
- Business Intelligence from Multiple Sources
- Timely Access to Data
- Improved Data Quality and Consistency
- Historical Intelligence
- Competitive Advantage
- High Return on Investment
- More Cost-effective Decision-Making

The Benefits of data warehouse in banks operations:

- Associates meaningful financial data.
- Supports compliance and risk reporting requirements.
- Helps minimize errors and development costs.
- A Data Warehouse Delivers Enhanced Business Intelligence.
- A Data Warehouse Saves Time.
- Enhances Data Quality and Consistency.
- Provides Historical Intelligence. 8. Generates a High ROI.

Obstacles facing banks with data warehousing:

- Emerging types of both structured and unstructured data.
- Rising data security concerns that continue to plague banks.



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- The performance gain from data compression outweighs the cost of compression.
- The time spent on loading data.
- Big data (processing and analyzing of big chunks of structured, unstructured or semi-structured data quickly.)
- Potentially expensive (Cost allocation & Profitability).
- Maintenance issues of data warehousing. 8. Processes and Quality Issues.

VI. BUSINESS INTELLIGENCE AND FINANCIAL INDUSTRY

We researched the space to better understand where AI comes into play in business intelligence in the finance industry and to answer the following questions:

- What types of AI-based business intelligence applications are currently in use in the finance industry?
- What tangible results have AI-based business intelligence applications driven in finance?
- Are there any common trends among these innovation efforts? How could these trends affect the future of finance?

The vendors that offers software across three applications:

- Predictive Analytics
- Sentiment Analysis
- Customer Analytics

i. **Predictive Analytics**

RapidMiner

RapidMiner is a Boston-based company founded in 2007. The company offers software called RapidMiner Platform, which they claim can help financial service businesses predict a customer's lifetime value using machine learning.

RapidMiner claims users can integrate the RapidMiner platform with their existing enterprise sales systems, such as CRMs. The RapidMiner Platform can be input with data from CRMs or customer transactional data. Then, RapidMiner Platform uses machine learning to find patterns in the customer's data, such as their purchase history and social media posts, to predict their possible next purchase. The system then provides customer service representatives at banks with the customer's predicted lifetime value on the RapidMiner dashboard.[7]

According to RapidMiner's website, their predictive analytics platform can be used for several applications in banking, such as:

- Identifying patterns in a customer's data to determine if they might have a high lifetime value
- Using that prediction to determine if other users also might have a high lifetime value
- Identifying major customer service issues from feedback forms or customer interactions with the bank through emails, calls, messages, and social media.

Domo

Domo offers software which they claim can help financial institutions businesses gain business intelligence insights from data collected by business software, such as CRMs, using machine learning.



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Domo claims users can integrate data from their enterprise financial systems, such as Salesforce, NetSuite, SAP, Concur, or QuickBooks into the Domo software. Then, Domo can analyse the data coming in from across the systems using data science to identify key metrics for the company, such as profitability from SAP data combined with Salesforce or NetSuite data. The system then provides an overview of several company performance indicators on a dashboard, and users can look at each of the metrics in more detail.[8]

ii. Sentiment Analysis

Amenity Analytics

Amenity Analytics is a New York-based company that offers a cloud-based text analytics API service, which they claim can help banks and financial institutions analyze customer sentiments using natural language processing.

Amenity Analytics claims users can integrate their text AI service into their existing software network. Employees at financial institutions might sign into a web portal to see customer sentiment insights (such as positive responses for an online banking system) generated by the software from real-time and historical social media data.[9] Then, the software parses through social media mentions for the finance company and uses NLP and machine learning to extract key customer sentiments by scoring each post.

iii. Customer Analytics

Avanade

Avanade is a Seattle-based company with over 12,000 employees. The company is a joint venture between Microsoft and Accenture that leverages the Cortana Intelligence Suite. The company offers predictive analytics software which they claim can help financial institutions automate, digitize, and streamline compliance processes and help create custom trading tools using data science and machine learning.

Avanade claims businesses can work with their team to build analytics platforms that can give their employees perspective and insight on their business. A financial firm might leverage Avanade's solution to gain insights from customer data and transactional data to help drive more growth. Avanade software uses NLP and machine learning to extract and identify trends from the customer personal data and transactional history data, such as ways to improve regulatory compliances or predict customer behavior to improve engagement. The system then provides a list of these recommendations as alerts on the Avanade dashboard.

VII.CONCLUSION

Data mining techniques can be very helpful to the financial sector in this technical province for better targeting and obtaining new customers and analyzing the purchase patterns of any customer for better continued possession and relationship. In this paper some application of data warehouse is proposed based on the data mining techniques. This mutually beneficial relationship of business and information technology is still becoming apparent but its unambiguous obligation has long been in the expanse of Business intelligence.

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