The Application of Data Warehouse Technology in Modern Finance

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Abstract. This paper studies the application of data warehouse in the modern financial industry, can help Banks to products, departments, institutions of profit and cost analysis, by strengthening cost management to increase efficiency, will largely change bank management departments at all levels of management, control and means of cooperation, make whole bank management more efficient, more scientific, more standardized. At the same time, through the establishment of data warehouse, and constantly improve its function, can effectively help Banks gradually standardize the management process and optimize business processes, improve asset utilization, and gradually realize the transformation of modern commercial bank management pattern..

Introduction

In the development process, banking sector has gradually realized the computer processing of the vast majority of the core business, has accumulated a large amount of customer data and operational data, which is a valuable asset of the bank. How to use these data to explore valuable information, is today China's banking reform to achieve a variety of business is a very important part. 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 bank customer's analysis [1-2]. In other words, in order to establish an effective data integration management mechanism for the bank's scientific management decisions and develop new business services, the banking data warehouse technology needed to solve start.

From this point of view, the data warehouse will not only help in the short term the bank to expand business scope, improve customer service levels, strengthen internal management, and also to further the healthy development banks, and international banking giant showdown of power and protection [3]. The use of advanced technology to establish a centralized data warehouse, containing detailed transaction data business intelligence solutions, has become the major banks to strengthen internal management and decision support, foreign better understand customer needs, develop new products or services, the use of important means of existing channels to cross-sell to customers, increase profitability, and provide differentiated services in specific business areas.

The related theory and technology analysis

A data warehouse is a subject-oriented, integrated, stable, time-varying data sets to support management decision-making process. Data warehouse data in the data source (including the operation of the database, the external market data, work data, file data, etc.) is collected, and its standardization, filtration, purification treatment, cover the timestamp into the data warehouse (Data Ware house), and then through a variety of tools (OLAP tools, reporting tools, DSS tools, data mining tools, etc.) for the data in the data warehouse knowledge discovery, and applied in practice, for clients to provide theoretical support for scientific decision-making . Data warehouse system is included in the complete decision support system for the purpose of data warehousing, 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 general case of data warehouse system.
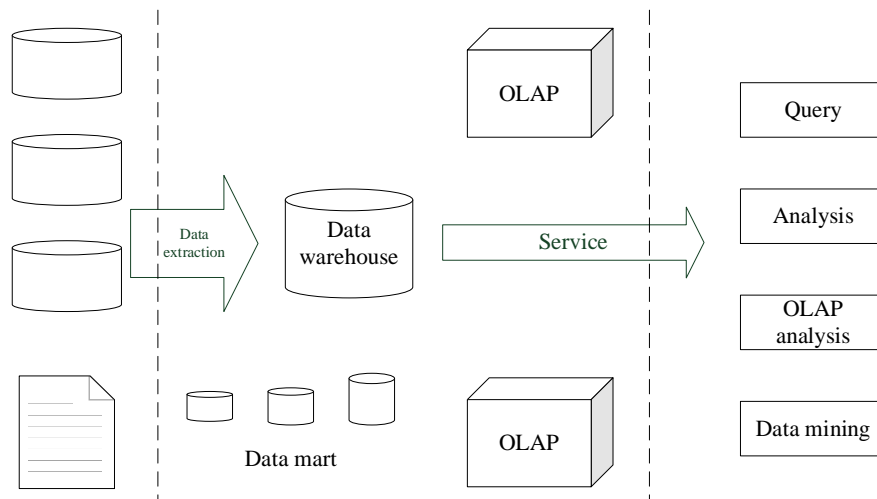
Figure 1. System structure of the data warehouse

Data organization data warehouse includes three, namely, virtual storage, storage-based storage methods and multidimensional database relational tables which multidimensional database storage is directly facing the organization in the form of data mining, data analysis required for the operation, it DW on the angle of the massive amounts of data from a client interested hierarchical processing, abstraction, and set the appropriate dimensional indexing and metadata management file to correspond to the data warehouse data and virtual storage, storage-based relational tables organizational relationships are way more complicated compared to the more applicable to organize, store massive amounts of data in the data warehouse.

Needs analysis for the modern finance

Bank-based customer relationship management data warehouse related technologies segment customers, in order to better meet customer needs, and connect customers and banks to maximize customer profitability and increase customer satisfaction and loyalty [6]. The data warehouse system construction of the overall objective is to establish a banking enterprise data base systems, integrate customer information resources to achieve comprehensive customer information management functions include: a single customer information management, customer comprehensive analysis, target customers and business search query and statistical functions, providing decision for the bank support management information to improve their competitiveness in the market.

The purpose of establishing the bank CRM data warehouse system is from the customer demand, timely and accurate decisions to develop the market, continue to maintain and expand its customer base, while optimizing the bank's internal resources and improve the bank's operational efficiency, tap more revenue opportunities, in order to achieve sustained growth in earnings. Accordance with certain criteria to classify customers, identify the basic characteristics of each type of consumer customers, it can obtain the true value and consumption characteristics of customers, commercial banks customers targeted marketing, sales and service delivery basis by establishing the bank's data warehouse system for CRM to provide comprehensive and accurate data in order to achieve support decision-making to make an accurate and fast decisions.

Data mining is the use of CRM data mining theory and technology to create a model to describe and predict customer behavior in order to achieve effective customer relationship management business. Data mining capabilities statistical and machine learning, data mining tools by banks, dig out potential customers, including predicting customer behavior, found the key customers of the investment behavior of customer's suggestions and warnings to help banks adjust the marketing strategy decision makers reduce risk, make the right decisions. General Banking CRM data mining process shown in Figure 2.

Technology selection   Report Data visualization

| Bank business database | → | Data preprocessing | → | Bank CRM data warehouse | → | Model design | → | Data analysis | → | Results elements |

Problem definition
Data selection
Data preparation

Data conversion
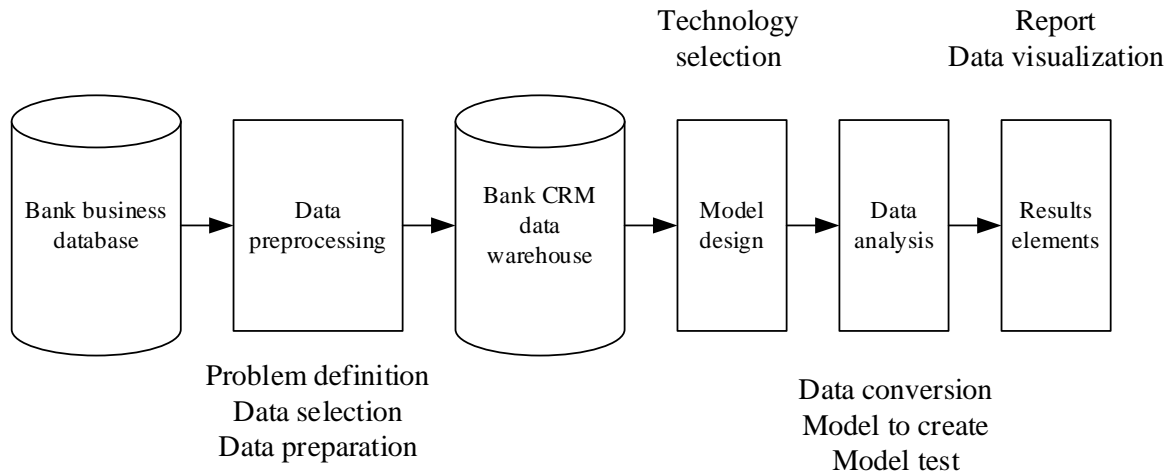Model to create
Model test

Figure 2. The bank CRM system of data mining process

Data preprocessing stage. At this stage, we must first ask questions correctly. What is clear in this operation is the main task, which can be targeted for data mining. After asking relevant questions can be extracted from the database banking-related business in the data, and the data for data extraction, cleaning and summary. On the basis of domain knowledge on issues related to business, export verification, selection and preparation of the data were asked to discuss the problem. Preprocessing of data requires a lot of time, because the data must be culled from the system, and then matching, screening and classification.

Model design phase. This phase requires in-depth examination of data and extract those issues most relevant fields. For example, through a variety of in-depth analysis of customer data to understand customer behavior, modeling, and predicting future behavior of customers. Minimize the general breakdown of the data needs to be trimmed into a set and one or more test sets. Subdivision may also include the use of data aggregation technology into subsets based on common characteristics, and then were analyzed for each subdivision.

Data analysis phase. After the preparation of the first two stages, this stage is for data mining work. We need to build data mining models for this task in the design after a good model, and then the selected data mining tools applied to the data, with at least one of the last independent set of test data to validate the model. Further, the accuracy and validity of this model can be effectively interpreted and assessed.

System architecture design

Banking information based on data warehouse management systems need to implement features include: first solve customer relationship management, business systems will organize the data into customer-centric data warehouse, the customer structure, customer behavior, customer groups and market activities analysis and management. While the results of the analysis and e-mail system closely integrated and timely market information will be passed to the customer. Secondly, the companies analyzed in terms of revenue, cost, budget, and so on. From a variety of different angles, using statistical analysis techniques, to provide relevant key performance indicators and income statements. While revenue development, project status, budget and other aspects of the use of a detailed analysis of the situation, city leaders can gain business development report. Taking into account the needs of all aspects of the above system, based on the data warehouse management information systems from basic banking information network, warehouse management, data warehousing and data presentation of five parts, the interaction between them, together form a structured data warehouse-based bank information systems environment.

From the logic of the overall architecture, CRM system by the application layer, data integration layer and external data layer. Preclude the use of IBM's System database DB2, ETL tools preclude

the use Data stage, application services preclude the use Cognos8, ACRM Figure 3 is a diagram of the overall architecture.
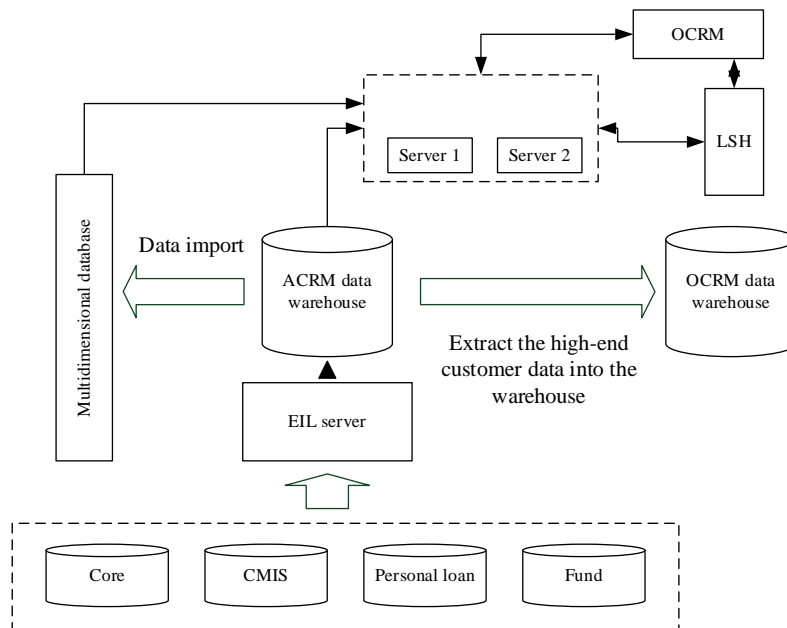

Figure 3. The application of data warehouse technology in bank

1. External data layer mainly refers to external data layer ODS, and business systems as a data source, ETL data after ODS. ODS in the customer information system on the one hand by smoking-related post-integration into the data warehouse, ETL complete customer segmentation, customer loyalty and contribution analysis and other applications. On the other hand supports the complete database query record OLTP (online transaction processing), reporting, monitoring, etc., to account managers provide comprehensive information window recently accessed. Any level, the Bank established business system unique view of customers, banks need through any channel data table is the same information, such as customer name, contact details, address and other data.

2. Data integration layer data integration layer data warehouse metadata organization and storage, including data loading frequency, the recording system definition, data transformation rules, data warehousing, data dictionary and business rules and other information. Moreover, it is the bank's core ACRM systems, data extraction, transformation and loading, and organized by topic, and ultimately determine the physical storage structure of data warehouse.

3. The application layer application layer to show the front of the entire system, traffic control authority, providing services and reporting tools JAVA services, database access and related reporting, query, analysis, generate data; Access database implementation and operation of the front-end and the corresponding provides HTTP services to end users. At the same time, develop appropriate reports based on business needs, provide OCRM report query.

Conclusion

Data mining is a preclude banks from each system set found in the database and extract the information needed to find the correlation between various data and rules to provide effective decision support solutions. In this paper, to solve the bank customer relationship management system is proposed based on the data warehouse, data mining techniques, the data warehouse to obtain initial data from the various sources of information systems, through the data processed, stored in the database of the banking system by system access tools to provide a unified and integrated data information to the user, the enterprise global depth and comprehensive analysis of the decision-making process and contribute to business management, in order to provide customers with services and products adjunct marketing. Based on the actual needs of the banking industry, the basic realization of the demand bank account management and other related work requirements solutions.

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