Data Warehouse Solutions for CRM

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Abstract: *A company's most important asset is information. A corporation's ability to compete, adapt and grow in a business climate of rapid change is dependent in large measure on how well the company uses information to make decisions - decisions that also impact partner and customer relationships. Employees throughout organizations need access to information on customers, vendors and suppliers, ultimately transforming data into critical business knowledge. The data warehouse provides a starting point and the data foundation for enabling CRM applications such as customer segmentation, targeted marketing, customer loyalty, profitability analysis, and other forms of combining customer touch points with external data to generate a valuable business asset.*

Keywords: *CRM (Customer Relationship Management), Data Warehouse, Business Knowledge*

INTRODUCTION

Customer relationship management (CRM) means generating high levels of profitable customer satisfaction through the use of knowledge generated from CRM applications using corporate and external data. CRM is based on the simple notion that the better one knows one's customers, the better one can maintain long-lasting, valuable relationships with them. The goal of CRM is to maximize relationships with customers over time, focusing on all aspects of the business, from marketing, sales, operations and service, to establishing and sustaining mutually beneficial customer relations. In order to accomplish that, the organization must develop a single, integrated view of each customer.

The mission of a data warehouse is to provide consistent and reconciled business intelligence, which is based on operational data, decision support data, and external data to all business units in the organization. In order to do that, corporate data must be analyzed, understood, transformed and delivered. Therefore, the data warehouse administration must coordinate and oversee the development, delivery, management and maintenance of the entire data warehouse environment. However, many of today's data warehouses are not ready for the challenges of CRM, and steps must be taken to make it possible. This involves additional or expanded subject areas, external data and high-volume accessible data. The biggest challenge in data warehousing today is supporting data warehouse expansion to provide a foundation for CRM. Data warehouses that meet the needs of CRM are aptly named customer data repositories (CDR) due to the need for low-level, granular customer transaction data. This need has many implications for the data warehouses that need to support CRM.

PROCESSING CUSTOMER INFORMATION USING DATA WAREHOUSING

CRM addresses both operational and analytic requirements. Effective CRM relies on the collection of data at every interaction with the customer and then the leveraging of this data through analysis. CRM's objective is to integrate all customer activities, from the initial prospect contact, purchase transaction, fulfillment, payment transaction and ongoing customer service. The data warehouse serves as the repository to collect and integrate the breadth of customer information found in operation systems as well as in external ones. The data warehouse supports a complete view of the customers, including customer data from typical sources such as: transactional data, interaction data (solicitations, call centers), demographic and behavioral data and self-provided profile data.

Analytic CRM is enabled through accurate, integrated and accessible data in the warehouse. Customer data can be leveraged to better identify selling opportunities, point inefficiencies, generate demand and improve retention. Historical data could also be leveraged to generate models for the operational side. The model could be described as in Figure 1., considering the major components of a data warehouse environment.

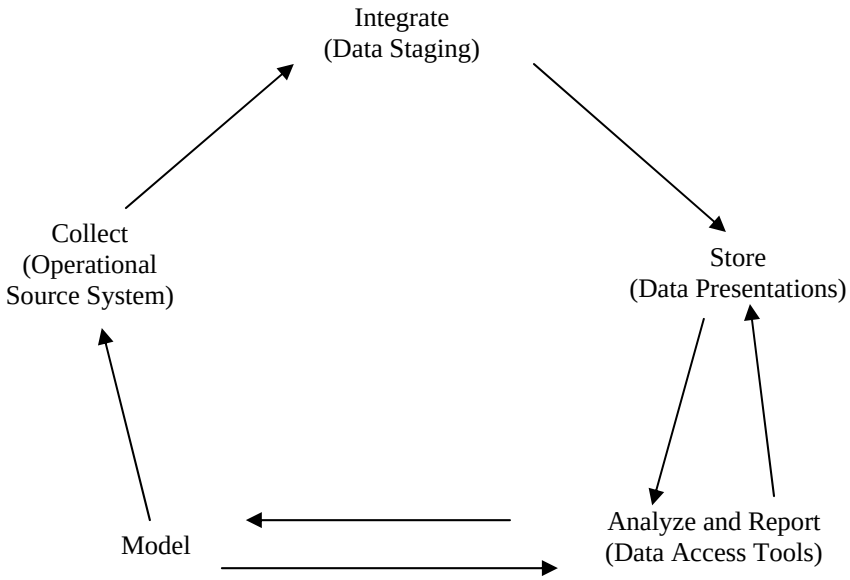

Figure 1. Analytic CRM

As the organization becomes more centered on the customer, so should the data warehouse. The data warehouse will grow as more information about customers is collected. The process becomes more complicated as data from multiple sources is being integrated and a new customer dimension is needed.

The customer dimension is the most challenging dimension for any data warehouse. In a large organization, the customer dimension is very deep (millions of rows), very wide (dozens of attributes) and subject to various changes and represents a mixture of data from multiple internal and external sources.

Further on some common customer attributes will be presented, such as name and address parsing. Whether the client is a human being or an organization, the name and address attributes are always important, but their operational handling is usually too simplistic to be useful in a data warehouse. Designing the name and location columns in a generic way may result in low quality data. The name and location attributes should be broken down into as many elemental parts as possible. An example on how a generic customer dimension can be transformed is presented in Table 1 and Table 2.

Table 1. Generic Customer Dimensions

Attribute	Value
Name	Mr. John Smith
Address-1	25 Pta. Romana
Address-2	CP 101 OP1
City	Bucharest
State	Sector 1
Postal Code	70000
Phone Number	2223344; fax 2223345

Table 2. Customer Dimension with parsed name and address elements

Attribute	Values
Salutation	Mr.
First and Middle Name	John
Last Name	Smith
Ethnicity	Romanian
Title	Professor
Street Name	Pta Romana
Suite	25
Post Box	101
City	Bucharest
District	Sector 1
Country	Romania
Postal Code	70000
Telephone Country Code	0040
Telephone Area Code	21
Telephone Number	2223344
Fax Number	2223345
E-Mail Address	JSmith@company.ro
Web Site	www.company.com
Unique Customer ID	1234567

This structure would be followed for all of the addresses a customer has. Maintaining the complete set of name and address characteristics supports communication channels, such as telephone, fax, e-mails, directly from the data warehouse.

A different issue appears when dealing with international customers, suppliers or personnel records. Additional to the elements presented above some new requirements appear:

- The design should be consistent from country to country (similar data should appear in similar places in the customer dimension table)
- Appropriate salutations and personalization for letters should be available

Other common customer attributes that must be considered are segmentation attributes and scores, among which:

- Gender
- Ethnicity
- Age
- Income
- Status (e.g.: new, active, inactive, closed)
- Referring source
- Recency (for instance date of last purchase), frequency (for instance total purchase transaction count) and intensity (for instance total net purchase amount). There should also be included cluster labels generated by data mining cluster analysis of recency, frequency and intensity.
- Business specific market segment
- Scores that characterize the customer (purchase behavior, payment behavior, product preferences). The scores are generated through statistical models and become attributes of the customer dimension.

A different issue addresses the customers' aggregate performance metrics, as how much a customer has purchased during his lifetime. Rather than using separate queries to determine all customers who satisfied a certain criteria like the amount of money spent, a new attribute could be included in order to store the aggregate fact. These attributes are

designed for constraining and labeling and are not part of numeric calculations. The disadvantage comes from testing the accuracy and consistency with actual data.

CONCLUSIONS

Companies are beginning to realize the integral part that data warehousing and analysis plays in the process of effective sales, marketing, customer service, and overall business performance management. Data warehouses that meet the needs of CRM are named customer data repositories (CDR) due to the need for low-level, granular customer transaction data, which has many implications for the data warehouses that need to support CRM. Besides, when implementing enterprise resource planning (ERP) systems or data mining solutions, the status of the database can have considerable impact on the final success.

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