M Database and Non-M Application Connectivity Utilizing ODBC

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Abstract

When Kaiser Permanente of the Mid Atlantic States replaced their M-based medical report system transcription with a non-M-based transcription system, a method of exchanging data between Kaiser's medical information system and the new transcription system was needed. Kaiser chose to use Open Database Connectivity (ODBC), an interface primarily developed by Microsoft Corporation to allow different relational database systems to exchange data. This paper discusses the implementation of ODBC to exchange data between Kaiser's M-based medical information system and the new non-M-based transcription system.

Introduction

Kaiser Permanente decided to replace their M-based medical report transcription system with Dolbey and Company, Inc.'s StatReport, a LAN based system utilizing WordPerfect for DOS as a front end and a relational database for data storage. A medical transcription system is used to create and edit transcripts of a healthcare provider's dictation of medical procedures. The M-based transcription system Kaiser is replacing is an M word processing program. The transcriptions are typed in this program and demographic and medical procedure order data is pulled from the medical information system's patient and order databases at the time the transcription is created. Because the M-based transcription system is part of the medical information system, data is retrieved from the databases through M routines.

The new transcription system, StatReport, needed to offer the same functionality as the M-based system it was replacing. This included pulling member demographic and order data into the transcript as it was created. Normally, StatReport uses an RS-232 connection to transfer required data from medical information databases when a trigger event occurs such as filing a medical procedure order. This was an unacceptable option for Kaiser because not all transcriptions had a trigger event such as an order to initiate a data transfer. Data would be transferred in scheduled download batches, usually once per day, from the medical information system and maintained in the StatReport database. Kaiser did not want to have data from the medical information system replicated on the StatReport system and wanted all data to be current at transcription time. Additionally, because only the transcriptionist would have access to the StatReport system, completed transcriptions needed to be transferred back to and filed in the M system for review and electronic signature by the provider on the M database.

The decision was made to utilize ODBC to transfer data between the StatReport system and Kaiser's M system. Even though ODBC is an established technology, the implementation of this technology in an M environment is new. The lack of a trigger event to initiate data transfer is resolved by using ODBC to get order and demographic data when a new transcription is initiated in StatReport. Because a database accessed with ODBC is seen by the program accessing the database as a local data source, the duplication of data on the StatReport system is not necessary. Demographic and order data are now available to the transcriptionists in real time. Completed transcriptions are batched for upload and sent to the M system over the ODBC connection.

ODBC, SQL and M

The Open Database Connectivity (ODBC) interface allows applications such as StatReport to access relational and non-relational databases using Structured Query Language (SQL), an ANSI standard programming language for retrieving, inserting and manipulat-

COLUMN	RELATIONAL DEFINITION	STRUCTURAL DEFINITION
MED_REC_NUM	Domain: Character Length: 10 Scale: 0 Format: Internal Required: Yes Header: Medical Record Num	Parent Column: Global Reference: ^PTN(Piece Reference: Extract From: To: Primary Key: Yes
NAME	Domain: Character Length: 30 Scale: 0 Format: Internal Required: No Header: Name	Parent Column: MED_REC_NUM Global Reference: ,0) Piece Reference: "^",1) Extract From: To: Primary Key: No
DOB	Domain: Date Length: 8 Scale: 0 Format: Internal Required: No Header: Date of Birth	Parent Column: MED_REC_NUM Global Reference: ,0) Piece Reference: "^",2) Extract From: To: Primary Key: No

Fig. 1. Example of a global mapping

ing data in relational database management systems (RDBMS). ODBC can be used to access databases that are not relational, but because of ODBC's use of SQL, the non-relational database system must have some way of translating its native database structure to a relational database structure.

ODBC follows a client/server model. The ODBC driver is usually written by the database management system (DBMS) vendor and is provided with the DBMS product. The client side of the driver is loaded on the PC that will be accessing the DBMS. An ODBC-enabled application selects the data source associated with the ODBC driver and using the ODBC-enabled application's SQL dialect, can access data from the ODBC data source as if it is a native data source. The ODBC driver translates the SQL statements from the ODBC-enabled application to the native statements of the data source.

There are a number of products on the market that translate an M database's global structure to relational tables and allows the M system to act as an ODBC server. For this project, Micronetics' MSM-SQL was selected mainly because of the simplicity it offers in the process of mapping existing globals.

In order for the M globals to be accessed as relational tables, the global structures must be mapped. Mapping in MSM-SQL involves defining tables and columns and their relationship to the global structure. For example, Figure 1 shows an example of how a global node such as ^PTN (Medical Record Number,0)=Name; Date of Birth would be mapped in MSM-SQL. Figure 2 shows the primary data tables created in MSM-SQL for the StatReport project.

There are differences between relational databases and M databases, some of which are listed in Figure 3, that need to be taken into account when mapping an M database to a relational structure. Once an M database is mapped, it can be accessed by both SQL queries and M routines.

Using ODBC for Data Transfers

Upon startup of the StatReport server, the StatReport application makes the ODBC client connections to the ODBC server. The ODBC server is an M program running in the background on Kaiser's M system. These connections remain active unless StatReport or the ODBC server program is shut down.

Kaiser has two general types of transcriptions, radiology and regional. Radiology transcriptions require

Table	Purpose
TBL_MEMBER	Membership table used for demographic data, entry point for regional transcriptions
TBL_ORDER_CONTROL	Order table used for radiology order information
TBL_EXAM_ID	Exam table, used for radiology order information and is part of the order control global
TBL_ORDER_CONTROL_IDX	Order index table, entry point for radiology information
TBL_TRANS1	Input table for order data that needs to be updated for radiology transcriptions
TBL_TRANS2	Input table for the transcription

Fig. 2. Primary data tables mapped for the StatReport project

Item	Relational Database	M Database
Data Types	Multiple Data Types	One Data Type
Field Length	Fixed Maximum Field Length	Variable Length Field
Structure	Two Dimensional Tables	Hierarchical Sparse Arrays
Data Elements Per Field	One (1 inch Normalized Form)	One or many

Fig. 3. Some differences between relational and M databases

demographic and order data while regional transcriptions require only demographic data. The StatReport system knows whether the transcription is radiology or regional based upon the transcription template selected by the transcriptionist. For radiology transcriptions, the transcriptionist enters the order number while for regional transcriptions, the patient's medical record number is entered. With this data, the StatReport server queries the appropriate tables in the M system over ODBC. The entry point into the M database for radiology transcriptions is the TBL_ORDER_CONTROL_IDX table with the order number as the primary key. This table provides the patient's medical record number and internal order number. The medical record number and internal order number are the primary keys into the TBL_ORDER_CONTROL table. This table contains the order data. The medical record number is the primary key into the TBL_MEMBER table. This table is the entry point into the M database for regional transcriptions and is the source for patient demographic data for both regional and radiology transcriptions. The query results are returned to the StatReport server which in turn sends the data to the transcriptionist's workstation filling the data elements into the appropriate fields in the transcription template.

Once a transcriptionist completes a report, StatReport converts the transcription from a WordPerfect format to an ASCII format. All formatting codes except for bold, underline, and page breaks are removed. The bold and underline attributes are preserved to provide the same functionality as the M-based transcription system offered. If the transcription is a radiology transcription, then order data which needs to be updated in the M system such as date transcribed or dictating physician, is sent over the ODBC connection and filed in the TBL_TRANS1 table. The transcription is then sent to the M system over the ODBC connection one line of text at a time and is filed in the TBL_TRANS2 table. Order data, when applicable, is then filed in the M database by M filer routines. The transcription is transferred from the TBL_TRANS2 global to the M document global. Once this is done, the transcription is available to the provider to review and electronically sign the transcription.

Conclusion

The ODBC interface between StatReport and Kaiser's M-based medical information system was only one part of the StatReport project. The entire StatReport project took about a year and a half to complete. The ODBC interface design, global mapping, and M routine development took a programmer and an analyst two months to complete.

The availability of ODBC as a data access tool provides a new level of access to the M database. This tool provides a robust and effective data transfer method between the StatReport transcription system and Kaiser's medical information system. M

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