Data Retrieval from Library Systems based upon the Open Systems Model

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ABSTRACT: This article describes an important advantage of relational, SQL-compliant databases: that they enable a library to employ standard report building software to retrieve data from multiple data sources. The ability of a library's integrated library system and other major systems to support this type of data retrieval is of critical importance. Two SQL reporting tools, Cognos Impromptu and Seagate Crystal Reports, are briefly reviewed.
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Introduction

Typically, libraries build their automation efforts around an integrated library system (ILS). In addition to the ILS, libraries may employ other supporting automated systems for specific functions, such as the processing and delivery of interlibrary loan requests and the delivery of image collections over the Internet. It is critically important that the ILS and supporting systems employed by a library provide the ability for library staff members to retrieve data directly in a precise and effective manner. Below are a few specific examples of library data needs:

- Data that enable libraries to monitor specific types of transactions. One example is the development of circulation and booking reports, with transaction counts divided by categories such as patron type and item type.

- Data that enable libraries to track the processing of an individual transaction. In the case of interlibrary loan request processing, a library should be able to identify the status of any request currently in the processing stream and the history of a previously processed request.

- Data that provide information on specific problems in integrated library system records. For example, as part of a record clean-up process, a library may need to identify bibliographic records in its ILS catalog lacking MARC 001 numbers.

- Data that enable libraries to monitor resource use. In the case of a library’s image collection that is made available online, information is needed on collection use (for
example, the specific collection images that are retrieved by searchers and the IP address/domain of each searcher’s workstation).

In this article, a model is proposed in which a library uses one or more library-selected reporting software packages in order to access data stored in its major information systems. This model is dependent upon data retrieval based upon the Structured Query Language (SQL) in both the ILS and in supporting systems. The ability of these systems to support this open systems model is critical in ensuring that a library can meet its data retrieval needs.

**Data retrieval from library systems**

The application of relational databases and SQL to library data retrieval needs was envisioned in the late 1980s for use in circulation control and other library automation systems (1). The evolution of computing technologies in the intervening years has led to the development of powerful SQL-based data retrieval software packages with the following characteristics:

- Software that is microcomputer or UNIX-based
- Software that offers a graphical user interface
- Software that permits end users to directly access and manipulate data
- Software that does not require custom programming for its use (2)

In spite of the development of a standardized query language and reporting tools, data retrieval to support staff monitoring of library systems is an often-neglected system attribute. The development of data retrieval technologies – powerful and user-friendly data retrieval software, relational database management systems (RDBMS) - offers an opportunity for libraries. The data
needs examples in the Introduction underscore the fact that the ability to retrieve customized reports from the ILS and major supporting systems is closely related to the continuous improvement of library services. For example, the ability to build customized reports tracking specific categories of transactions enables libraries to ameliorate workflow problems. Additionally, the ability to build a report tracking the status of a request currently in a production workflow, such as an interlibrary loan request, enables libraries to serve their customers more effectively.

**SQL reporting software**

Rob Mattison noted that the emergence of SQL as a standard data access language, replacing prerelational, proprietary languages, enables users to employ a standard report tool in data retrieval (3). Two specific SQL tools that can be used by libraries and other organizations to retrieve data from their RDBMS are Cognos Impromptu and Seagate Crystal Reports. Both products provide system administrators with powerful tools for building custom catalogs for database access while insulating end users from the complexities of SQL and the underlying database structure.

Cognos Impromptu is produced by Cognos Incorporated of Ottawa, Ontario (4). Two versions of the Impromptu client software can be purchased: an Administrator version in which an Impromptu catalog can be built in order to provide access to a relational database; and a User version which can be used by end users to build and access data reports. Database administrators may build a hierarchical catalog of folders and data items in Impromptu corresponding to a logical organization of the database, with Impromptu data items being mapped to data items in database tables (see Figure 1). The database view presented to end users insulates them, to a great degree, from the intricacies of the SQL query language (see Figure 2). Impromptu has
strong query building and reporting features that enable users to build customized reports (5). Cognos also offers an Impromptu Web Reports product that permits existing Impromptu reports to be distributed over the Internet. Reports can be created and maintained using the Cognos Impromptu software, then distributed using the Web Reports package (6). By responding to prompts and making selections on pick-lists, users working over the World Wide Web (WWW) can run the distributed reports against a database, thus ensuring that they are building reports based upon current database data (7). A partial listing of database types supported by Cognos Impromptu includes Oracle, Microsoft SQL Server, Sybase SQL Server, and ODBC (Open Database Connectivity) data sources, including Microsoft Access databases (8).

Seagate Crystal Reports is produced by Seagate Software of Scotts Valley, California (9). Standard, Professional, and Developer editions of Crystal Reports can be used to build reports against SQL-compliant databases. The Professional and Developer editions can be used to serve reports over the Internet (10). Like Cognos Impromptu, Crystal Reports enables users to build customized reports against a relational database while helping to insulate them from the complexities of SQL. This software package has a number of strengths, including built-in wizards that ease the creation of queries and reports and a WWW server component that allows reports to be distributed over the Internet. It is relatively easy to use the advanced features of Crystal Reports such as constructing running totals in a report and adding prompts to reports so that search values can be entered through a prompt or pick-list when a report is generated (11). Its current Web Server version allows reports to be viewed in Dynamic HTML, thus improving report appearance, and for hyperlinks to be embedded into reports (12). Databases supported by Crystal Reports include a wide range of SQL-compliant databases, ODBC data sources, and other data sources such as NT Server, Microsoft Internet Information Server (IIS), and NCSA Standard WWW server activity logs (see Figure 3) (13).
There are numerous other Windows-based SQL query and report tools available on the market. Libraries with an ILS and supporting systems based on the open systems model can perform research, evaluate competing SQL report packages, and select the package that works best for that specific library setting, taking factors such as cost, database administrator preference, and end user and organizational needs into account.

Application of SQL to library systems

In describing the possible application of relational database management systems to libraries in 1993, Georgina Verity noted that "the library systems market is dominated by a number of established suppliers whose systems have been developed using technology that is becoming outdated and inflexible" (14). This statement is less true today with the emergence of a range of integrated library system products built upon the open systems model. A partial listing of integrated library systems with RDBMS/SQL-compliant databases includes Endeavor Voyager, SIRSI Unicorn, and VTLS Virtua (15). Innovative Interfaces has recently ported its INNOPAC integrated library system to the Oracle RDBMS (16). In short, there is clear movement in the library integrated systems market from system-specific and vendor-specific report tools to the use of RDBMS enabling the use of customer-selected SQL query and report tools. With an open systems model ILS, libraries have a great deal of flexibility in terms of data retrieval.

Data from library systems that employ other relational/SQL-compliant databases, such as Microsoft SQL Server or Oracle Enterprise Server, can also be accessed using the same reporting tool. An example supporting system that uses an SQL-compliant database is Relais International's Relais product, which can be used to automate library document delivery. Relais libraries can use an SQL report tool to build reports showing the status of requests currently moving through the
document delivery process and reports showing requests that have previously been processed (17). Additionally, as noted earlier, both of the tools briefly described, Cognos Impromptu and Seagate Crystal Reports, can be used to retrieve data from Microsoft Access databases using ODBC, a Microsoft standard that enables applications to retrieve data from a variety of relational database management systems (18).

In limited cases, the Seagate Crystal Reports software package can be used to build reports against proprietary data sources. Two specific applications are relevant to libraries. First, as noted, Seagate Crystal Reports can be used to build reports from Microsoft Internet Information Server logs, enabling libraries to track the use of Internet resources. For example, the Center for Information Systems Optimization's CONTENT product, which can be used to serve multimedia objects over the Internet, employs Internet Information Server as a supporting application (19). As a result, libraries that use the CONTENT software to serve image collections can track collection use using Crystal Reports, with the IIS logs serving as a data source. Second, the CONTEC Group International C3 product, which can be used to manage and distribute electronic reserves, is compatible with Crystal Reports. Data in the C3 system is accessible in Crystal Reports using ODBC. CONTEC provides C3 libraries with a set of standard Crystal Reports and offers Crystal Reports training that focuses on retrieving data from the C3 system (20).

Summary

The ability of a library’s integrated library system and major supporting systems to support SQL data retrieval is a critical system attribute. This capability shifts the model for data retrieval from one in which the vendor provides all data access tools to one in which a library can evaluate and select one or more data retrieval packages based upon its own needs. Libraries
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should carefully weigh the ability to use a standard reporting tool to retrieve data from its integrated library system and from other important systems in making new system purchases and in evaluating whether current systems are capable of supporting a library's automation efforts.
Figure 1: Building a catalog in the Cognos Impromptu (version 4.0) administrator software. The database administrator can create a hierarchical arrangement of folders and items that are mapped to data items in relational database tables (as shown below, with the Journal Title item, which is mapped to the TITLE item in the database’s JOURNAL_LIST table). The administrator organizes and names folders and items in order to aid end users in generating database reports.
Figure 2: Constructing a query in the Cognos Impromptu (version 4.0) software. The end user works with the folders and items created by the administrator in order to generate reports. Typically, the user will have the ability to view the SQL query in the user software but will generate reports solely through the use of these folders and items.

Note: The report shown in the screen shot contains sample data. Report results differ from reports shown in the Cognos Impromptu software documentation.
Figure 3: A Seagate Crystal Reports (version 7) report built using data retrieved from Microsoft Internet Information Server logs. This report provides information on user access to database images from outside of the local domain. The Insert Fields window from Crystal Reports, listing database fields that can be added to the report, is shown at right.
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