

THE SERVER SPECIFICATION FOR INFORMATION RETRIEVAL OF BIBLIOGRAPHIC DATA

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Abstract.

A detailed specification of the share cataloguing server is presented. The librarian uses the server for taking over the bibliographic records from the accessible library databases on the Internet.

Keywords: bibliographic data, server

1. Library on the Internet

The amount of information accessible to the Internet users increases every day. Accessible information can be divided into several different categories (education, art, economy, etc.). Many Internet tools have been developed during the last few years, and they have improved access to the information on the Internet [1]. When it comes to libraries, the Internet allows access to a larger amount of information than it was the case with conventional libraries. The possibility of accessing millions of bibliographic records represents a significant increase of the library services, especially for small libraries with a few thousand titles in fund. All significant materials found this way, can be borrowed through the interlibrary loan, or even bought if the library services include that option.

There are several reasons for connecting the library to the Internet, but the most important are [2]: access to the enormous amount of information, access to the new services, etc. Access to the information is realized quickly regardless of the physical distance of the information source.

There is also the possibility of creating electronic journals and making them accessible to millions of users. While the publishing and distribution of the writing format last weeks and months, publishing on the Internet is measured by

seconds and minutes. Earlier, library catalogues were accessible only to the local library users during the working hours of the library. The Internet removes time and geographical boundaries, making the same sources accessible at any time, from any place. When it comes to the libraries, it is necessary to provide share cataloguing function on the Internet.

A detailed object-oriented specification of the share cataloguing server is presented in this paper. The object-oriented transformation methodology of the information system design was used for specification [3]. The cooperation of the librarian servers for supporting of the searching process through several libraries is based on the global repository and unique searches.

2. Share cataloguing process

Taking over the records on publications from one of the accessible library databases is called "share cataloguing". Librarians have an access to the databases on library funds and have also the possibility of taking over the data (records) from these funds.

The basic idea in the realization of the share cataloguing process was to improve publication treatment. Also, the process of data entering becomes easier for librarians. In the course of record formation for the particular publication form, the librarian can contact one of the libraries on the Internet. This means that he/she can contact the share cataloguing server of a particular library. If this library has already treated the publication, and there is a record on it in the database, the librarian can take over the record using the share cataloguing server. The records are thrown over through the network to the librarian computer (disc). The librarian can than proceed with the treatment and modification of the record. When the treatment of the record is complete, the record will be stored in the local library database. This means that the librarian is not allowed to alter anything in the remote library database. The time needed for the publication treatment becomes shorter by taking over the records on publications from the accessible Internet database. A *Record* is a set of data on the document while the document implies the source bibliographic unit (journal, book etc.). *Bibliographic material* is a set of records.

3. The library server functions

There are a large number of Internet servers that provide an access to the bibliographic data for the Internet users. In addition to the share cataloguing that takes a central place, there are many activities that are realized on the library server. These activities are grouped according to their content. The server activities can be presented in the form of a decomposition diagram (Figure 3.1).

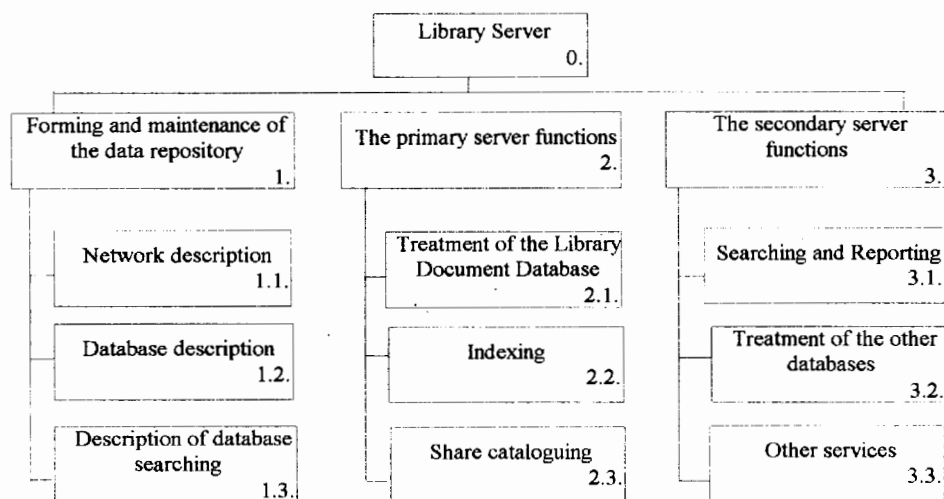


Fig. 3.1. The Library Server decomposition diagram

There are three processes on the first level: *Forming and maintenance of the data repository*, *The primary server functions* and *The secondary server functions*. Each of these processes can be decomposed into the second level process [4].

3.1. Forming and maintenance of the data repository

Forming and maintenance of the data repository of the Searching Information System (*SIS Dictionary*) is one of the library server's first level processes. Data repository has a double role in the public distributed system such as a library. First, it serves as a user's guide (passive role of the store). Second, it represents one of the basis of the particular system components functioning and the application design (active role of the store). This function is decomposed into several processes: *Network description*, *Database description* and *Description of database searching* (processes with the serial numbers 1.1, 1.2, 1.3.). Within

these processes, various institutions can input data on the computer network and its sites, databases, and standards for database searching. These processes form the *SIS Dictionary* content needed for normal functioning of the library server.

3.2. The primary server functions

The primary server functions imply the activities associated with the library database maintenance, indexing, and share cataloguing. System administrator is in charge for the library database maintenance and this is performed locally. *Indexing* stands for two operations: preparation of the document for indexing and the document indexing. This process forms and arranges the data store *Index Database*. The system performs indexing and searching the documents on prefixes. This means that data are separated on prefixes from the UNIMARC record for the system needs. If the database has a different record structure it is necessary to provide separation of the data on prefixes from the database. Share cataloguing is represented by the same name process. The share cataloguing server accepts queries and user's requests through the network system support. Through this system clients, e.g. server users, forward query results and records that were taken over. The librarian is an outside user which sends searching request or the request for taking over the suitable records. Searching process is performed in the *Index Database* while taking over the records in ASCII format is performed from the *Library Documents Database*. For the implementation, *Share cataloguing* process is decomposed on physical processes suitable for the implementation in a particular implementation environment. This decomposition is presented in Section 4.

3.3. The secondary server functions

The secondary server functions perform different network services that (in addition to the share cataloguing) are placed at the server users disposal. One of the services is World Wide Web (WWW). Because of that, during the decomposition process, as a separate process we can single out *Searching and Reporting*. The users have an access to the database on library funds. Data retrieval from funds is provided for the user [5]. The databases can have the specific structures, start from strictly structured databases (for example, relational, represented by a set of tables), to the *full text* databases that are formed according to some specific standard. Each network site can have (in

addition to the library databases) a different sort of databases and files. Specific network services that can be performed on these databases and file systems are represented by the *Other services* process. These server activities, however, are not the central subject of this paper. System administrator takes care about the database and file system treatment. These activities are represented by the *Treatment of the other databases*.

4. Share cataloguing decomposition

The *Share cataloguing* process is decomposed on physical processes suitable for the implementation in the concrete implementation environment (Figure 4.1.) [6]. During the physical design, each of these processes is decomposed into the processes that directly communicate with each other. This is the decomposition into inter-related processes.

Session of the S.C. server accepts the user's request on standard application gate. Depending on whether it is a query or request for taking over the records, one of the processes *Searching the local database* or *Taking over the records* will be started. Searching and taking over the records is performed in local databases (*Index Database* and *Library Documents Database*). The result of these processes is given an appropriate form and thus forwarded to the user. If it was a searching process, the number of successful shots satisfying the query is written on the user's terminal. If it was a taking over process, specific records are transferred to the client disc through the socket.

Index Database contains the conceptions and phrases dictionary. Use of these conceptions and phrases allows a direct access to the document. Depending on the type, the user can carry out searching on different concepts. These concepts are called searching prefixes, and they are stored in the store *SIS Dictionary*. *Catalogues and Reports* is a database that contains information on different formats for data retrieval from the *Library Documents Database* that can be used in the librarian's practice. Complete library fund is stored in the *Library Documents Database* in the form of Unimarc records [7].

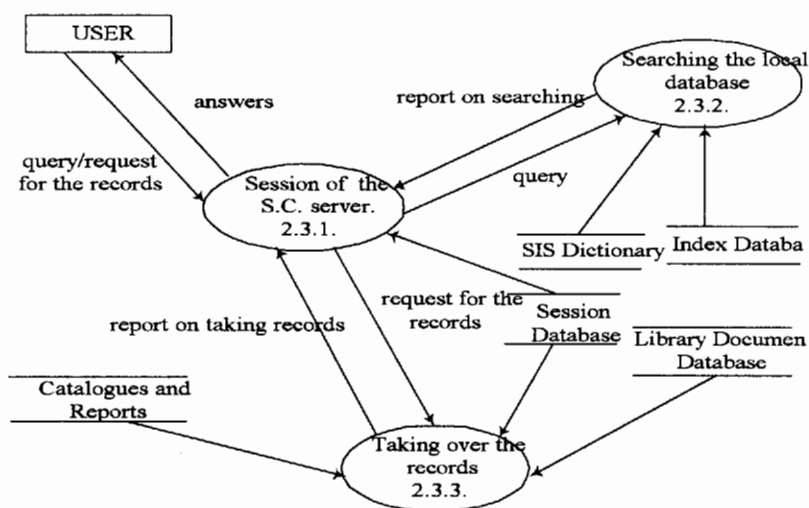


Fig. 4.1. The decomposition of the *Share* cataloguing process

4.1. Session of the S.C. server

The decomposition of the *Session of the S.C. server* process is presented in Figure 4.1.1.

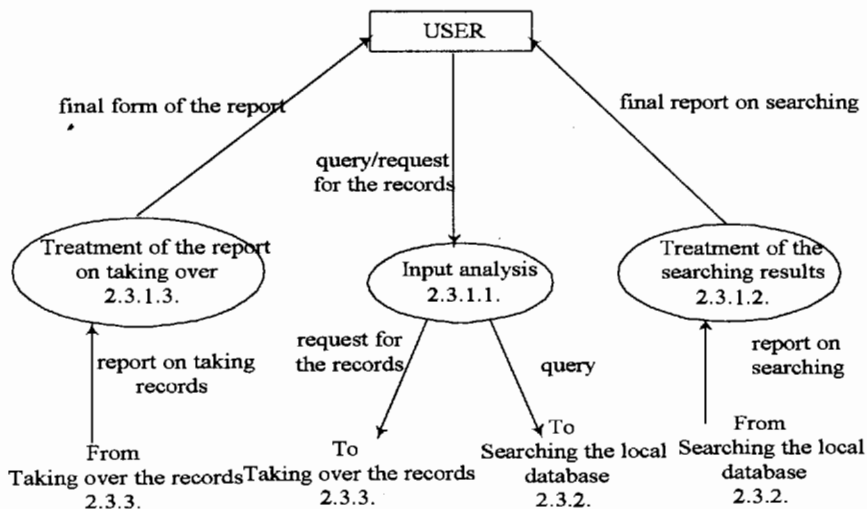


Fig. 4.1.1. The decomposition of the *Session of the S.C. server* process

The process *Input analysis* accepts the input string from the standard application gate and performs syntax and semantic analyses. After accepting the searching results, e.g. the number of successful shots, the *Treatment of the searching results* generates an appropriate report for the user. *Treatment of the report on taking over* creates an appropriate ASCII file for the user on the basis of the data from the *Library Documents Database* and the number of successful shots.

4.2. Searching the local database

In Figure 4.2.1. is presented the decomposition of the *Searching the local database* process. Processes *Query analysis*, *Forming the query for the dictionary* and *Searching* present the decomposition of this process.

The process *Query analysis* performs syntax and semantic analyses of the query. *Forming the query for the dictionary* performs separation of the searching codes and searching arguments. Searching of the *Index Database* is presented with the same name process.

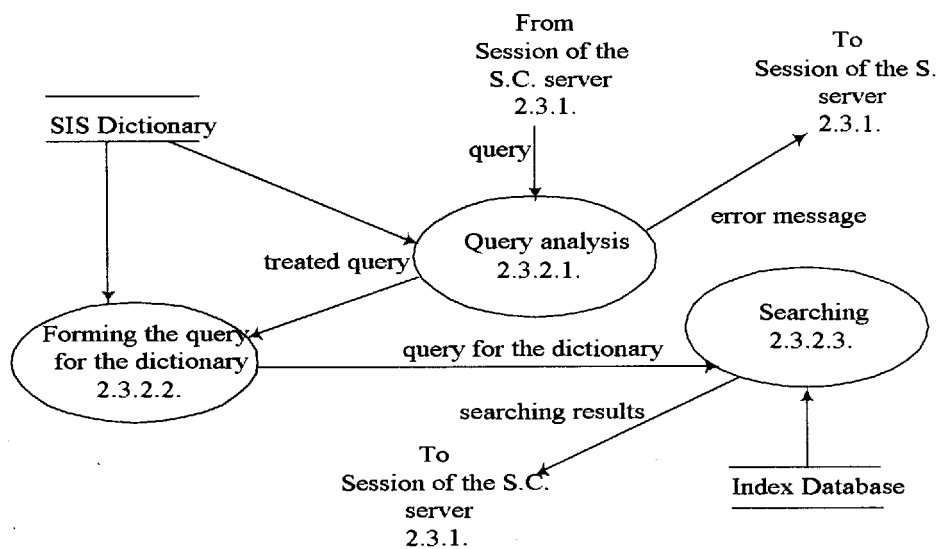


Fig. 4.2.1. The decomposition of the *Searching the local database* process

4.3. Taking over the records

The process *Taking over the records* is decomposed into processes: *Request analysis* and *Taking over the data* (Figure 4.3.1.). The process *Request analysis* checks if the user has properly selected the number of shots for which the records will be taken over. If there is a mistake, an appropriate message will be returned to the user. The process *Taking over the data* takes over the records for selected shots that should be returned from the *Library Documents Database*.

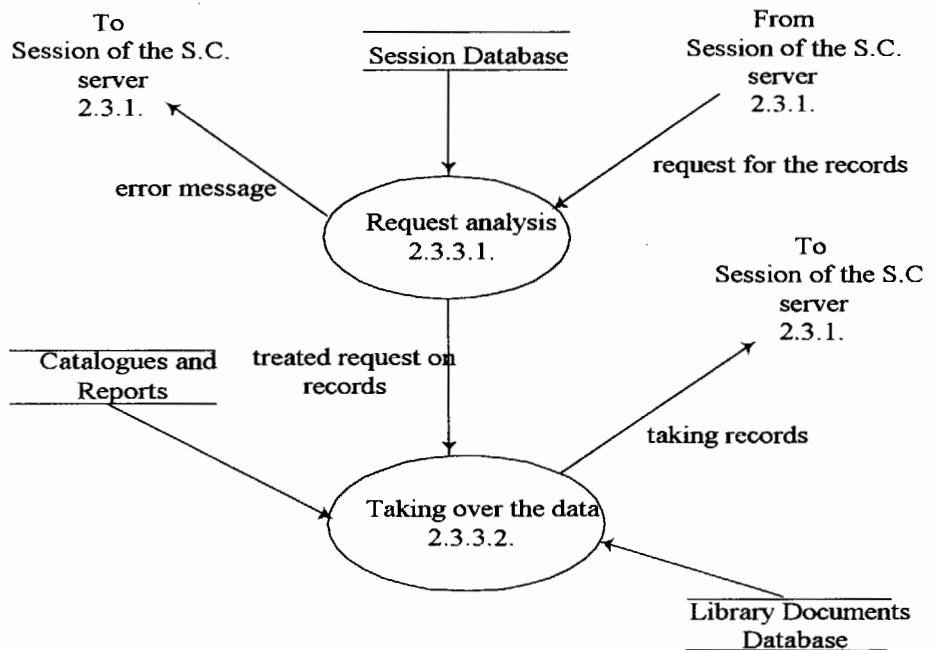


Fig. 4.3.1. The decomposition of the process *Taking over the records*

5. Conclusion

The presented specification of the Share cataloguing server is the basis for the server implementation in the concrete environment. It is necessary to realize a module on the server side that will treat the accepted client's requests. The module performs syntax and semantic analyses of the requests. Depending

on the sort of the document, the module communicates with the appropriate server (*Index Database server* or *Library Document Database server*) and forms the appropriate report for the client. Searching results return to the client in the appropriate report form that is sent to the client's terminal. The appropriate ASCII file is created on the client's computer if some records were taken over. The necessary activities are realized using some basic TCP/IP functions. On the client side, it is necessary to create a module that will enable creating of the client's requests. The module should also send the requests to the server. The request should have several parameters. If it is a query these are: the server address, type of the query (SELECT or EXPAND), and the query. If it is a request for taking over the records, the request contains the server address and the number of records that should be taken over.

On the basis of a detailed share cataloguing server specification, the implementation was carried out on an SCO UNIX platform, in the programming language C. Some basic TCP/IP functions were used for the implementation of the server. The specification could be used (with some modifications) for the realization of the user's searching process. Also, it is possible to use the application as a sample for designing diverse Internet applications that are basic on electronic data exchange.

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