

# **z39.50 Information Retrieval Protocol**

**Dr. M Koganuramath \***

**Mr. Mallikarjun A \*\***

**Mr. B S Kademani \*\*\***

## **Abstract**

*This article describes the Internet information retrieval protocol z39.50 and its usage. Brief history, definition and the working of z39.50 are also depicted here. An attempt has also been made to study various versions of z39.50 and on freely available softwares on the web. Some of the problems encountered, current developments and new initiatives are also discussed here.*

## **Keywords**

*Information Retrieval Standards; z39.50 Client/Server ; History; Basic Structure; Problems; Developments.*

## **Introduction**

z39.50 ,formally known as the American National Standards Institute/National Information Standards Organisation z39.50-1995 Information Retrieval: Application Service Definition and Protocol Specification, is the American National Standard for Information search and retrieval. It is a network application standard that enables different computer systems, that run on different hardware and use different software, to interoperate and work together seamlessly . It is being developed to overcome the problems associated with multiple database searching such as having to know the unique menus, command language

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\* Librarian, Tata Institute of Social Sciences, Deonar, Mumbai 400 088

\*\* Information Scientist, Tata Institute of Social Sciences, Deonar, Mumbai 400 088

\*\*\* Scientist – D, Bhabha Atomic Research Centre, Anushakti Nagar, Mumbai 400085

and search procedures of each system accessed. z39.50 simplifies the search process by making it possible for a search to use the familiar user interface of the local system.

z39.50 - ANSI/NISO z39.50 defines a standard way for two computers to communicate for the purpose of information retrieval. z39.50 makes it easier to use large information databases by standardizing the procedures and features for searching and retrieving information. Specifically, z39.50 supports information retrieval in a distributed, client and server environment where a computer operating as a client submits a search request (query) to another computer acting as an information server. Software on the server performs a search on one or more databases and creates a set of records that meet the criteria of the search request as a result. The server returns records from the resulting set to the client for processing. The power of z39.50 is that it separates the user interface on the client side from the information servers, search engines, and databases. z39.50 provides a consistent view of information from a wide variety of sources and offers client implementers the capability to integrate information from a range of databases and servers.

### **Brief History of z39.50**

- Development began in early 80's; ie. NISO has established a standards committee in 1979 to work on an information retrieval protocol.
- Also in late 1970's funding by Council on Library Resources (CLR) supported the development of an experimental protocol as part of the Linked System Project (LSP) for searching bibliographic databases and transferring records among the Library of Congress, Online Computer Library Center(OCLC), The Research Libraries Group (RLG) and Washington Library Network.
- In 1988 the standard has been approved by the NISO and a group of z39.50 implementers began work to enhance and expand the utility of the standard .
- The z39.50 Implementers Group (ZIP) is responsible for the development of version 2 and 3.
- Version 4, development began in Autumn 1995.

### **Some current problems in Internet information retrieval**

- there is only a little meta-information about the Internet information resources,
- there are a lot of different search syntaxes,
- there are a lot of different user interfaces, and
- presentation of information (records) is not effective.

z39.50 has the capabilities to solve the problems mentioned above.

## **Clients and Servers versus Origins and Targets**

z39.50 follows what is known in Computing as a client/server model, where one computer (the client or, in z39.50 parlance, the 'Origin') submits a request to another computer (the server or, to z39.50, the 'Target') which then services the request and returns some kind of answer. As we saw above with queries being sent to multiple databases simultaneously, there can be more than one server/target, although the user will normally send a query from one client/origin at any given point of time.

## **Basic Structure of z39.50**

z39.50 is divided into eleven basic structural blocks, known as Facilities. These Facilities comprise Initialization, Search, Retrieval, Result-set-delete, Browse, Sort, Access Control, Accounting/ Resource Control, Explain, Extended Services, and Termination. Each Facility is divided into one or more Services, and it is these Services that people usually talk about. A Service facilitates a particular type of operation between the Origin and the Target, and z39.50 applications select those Services which will be needed in order to fulfill their function. The most basic services are Initialization (Init.), Search, and Present, and all of these should be found in the majority of z39.50 applications.

### **1. Initialization ( Init.)**

Initialization is the first step in any query process, and involves the Origin making itself known to the Target, and agreeing a few 'ground rules' for the manner in which subsequent queries will be handled. Systems which require passwords will also exchange authentication details at this stage.

### **2. Search**

Search is where the majority of the work is done, as it is this Service which enables the Origin to submit queries to the Target. These queries may range from a very simple to complex Boolean queries (AND, OR, NOT, >, <, etc.).

### **3. Present**

Present is used to control the manner in which results are returned to the user. Within Present, a user could ask for the first ten records of a large result set, or request that the data be returned in a different Record Syntax ; for example UKMARC instead of USMARC,

## **What is z39.50**

- ANSI/NISO z39.50 is the American National Standard Information Retrieval Protocol.
- NISO, an ANSI accredited standards developer, approved the original standard in 1988 ( Version 1)
- ANSI/NISO z39.50 defines a standard way for two computers to communicate for the purpose of information retrieval.

- Makes it easier to use large databases by standardising the procedures and features for searching and retrieving information .
- It supports client and server environment, where a computer operating as a client(known as 'origin') submits a query to another computer acting as an information server( known as 'target'), the software on the server performs a search on one or more databases and sends the results back to the client.

### **What does z39.50 do**

- z39.50 recognises that IR consists of two primary components ie. selection of information and retrieval of that information, and it provides a common language for both the activities.
- z39.50 standardises the manner in which the client & server communicate and interoperate even when there are differences between computer systems , search engines and databases.
- The session starts with a series of messages passing between origin and target which establishes a connection.
- It negotiates expectations and limitations on the activities that will occur.
- z39.50 client translates the query into a standardized format and passes it to the server.
- The server executes the request against the databases and returns the results to the origin.

### **Significant features of z39.50**

- It does not require the searcher to be familiar with the details of the standard.
- The origin module within the searcher's system is responsible for establishing the connection to the target system, formatting the query according to the z39.50 standard, interpreting the results in a format familiar to the searchers, keeping track of results etc.
- z39.50 eliminates the need for expertise in the use of a large number of dissimilar systems.

### **z39.50 Versions 2 and 3**

- Version 2 was published in 1992 as ANSI/NISO z39.50-1992
  - The standard is capable of building simple and complex search queries using wide range of query qualifiers

- It can not be used conveniently for non-bibliographic records
- Version 3 was published in 1995
  - It incorporates many more features to support both bibliographic and non-bibliographic searching

### **z39.50 Client and Server Software on the Web**

There are several of z39.50 Client/Server softwares on the web. Many are available as free downloads, where as some on evaluation. Following are few such available softwares:

- ZNavigation: a z39.50 Client software is designed to run on Windows 3.11 and Windows 95 PCS  
<http://www.sbu.ac.uk/~litc/caselib/software.html> [1.6 MB]
- Bookwhere Database: Free evaluation version.  
<http://www.bookwhere.com> [2963 KB]
- UFO/Fiat Lux: Windows 95/NT z39.50 client  
[http://sun3.lib.uci.edu/~toyofuku/flat\\_lux.htm](http://sun3.lib.uci.edu/~toyofuku/flat_lux.htm)
- A Search Module for Apache: Implements z39.50 search from within the Apache HTTP Server  
[http://igsmtl.er.usgs.gov/apache/mod\\_search.html](http://igsmtl.er.usgs.gov/apache/mod_search.html)
- EndNote 3.0 - first z39.50 Mac Client (does Windows, too)  
<http://www.niles.com/>
- Netscape for Windows z39.50 plug-in (Alpha version)  
<http://www.markkelly.com/z3950/ciir.htm>
- SIRSI VIZION Pro : offers access to a series of z39.50 clients and servers  
<http://www.sirsi.com/Vizion/viziontoc.html>
- Isite: CNIDR,Center for Networked Information Discovery and Retrieval  
<http://www.cnidr.org/ir/isite.html>

### **Associated Organizations**

- U.S. Library of Congress, the z39.50 maintenance agency
- z39.50 Implementers Group (ZIG)
  - works out interoperability issues
  - drives evolution of standard

- National Information Standards Organization (NISO)
- American National Standards Institute (ANSI)
- International Organization for Standardization (ISO)
  - has accepted z39.50-1995 as ISO SR version 2.
  - is involved with development of new features important in Europe (e.g character set conversion).
- EWOS (European Workshop for Open Systems) Expert Group for Libraries
  - Coordinator of EFILA (European Forum for Implementers of Library Applications), the European ZIG.
  - Develops profiles (documents which define the network environments, or sets of standards from different network layers, in which to use a standard like z39.50)
  - Is involved with development of new features important in Europe (e.g character set conversion)

## **Analysis**

Znavigator, a z39.50 client software freely available on Internet has been installed for the analysis and its workability. Following are the few problems in general and some are specific that are encountered while testing the software.

1. Its acceptance, lack of recognition and use of z39.50 is the major barrier for advancement of cooperative information network.
2. Implementation of z39.50 complaint servers and clients has been relatively slow.
3. Although a mechanism for MARC format conversion is in place, there are no general purpose MARC conversion tools available in the public domain.
4. Most of the new services in z39.50-1995 have not been implemented yet.
5. It is different to get "human readable" information about z39.50  
Some background knowledge of networking techniques in general is required to understand how the protocol works.
6. Less documentation has been done on z39.50
7. For a layman, it is very difficult to understand the protocol itself.

## **Current Developments and New Initiatives**

1. Version 4 development has begun in ZIG. Most features relevant to the search of bibliographic data have already been included into version 3 ; the most important current work is ranked list query specification.
2. Testbeds for Version-3, Scan, and explain facilities are under development.
3. Inclusion of Interlibrary Loan (ILL) services in z39.50 clients via the Extended Services Item Order service is being examined.
4. Various implementation projects, including the European German DBV-OSI II and EC's. OPAC Network in Europe (ONE), will produce high quality public domain z39.50 applications during 1996.
5. The Government Information Locator Service (GILS) is intended to help the public to locate and access information throughout the US government GILS will use z39.50 to provide a seamless connection between distributed GILS servers.
6. The Consortium for the Computer Interchange of Museum Information (CIMI) is examining z39.50 to assist CIMI in its goals of developing museum resources on digital networks and assuring standards-based open interchange of museum information.

## **Conclusion**

z39.50 is often attacked on a variety of levels by those who see it as overly complex, old fashioned, not sufficiently web-like, or simply no match for the latest 'great idea' (currently, this 'great idea' is usually cited as being some combination of XML and RDF). It is undoubtedly true that z39.50 has quirks and limitations, some of which have been outlined in this paper. It appears for the moment that, whatever its limitations, z39.50 remains the only effective means of enabling simultaneous queries upon distributed heterogeneous databases, and this remains something that the broader user community wants to use.

z39.50 is definitely a move towards standardisation. It is a building block in bringing library and bibliographic services more fully onto the network. Although it is not yet very popular, it has many perceived strengths and it is safe to say that within library circle it is considered the finest innovation since the OPAC and as a matter of fact z39.50 should soon be adopted on a larger scale. With information resource sharing becoming a major current feature, the z39.50 protocol can definitely not be ignored.

## References

1. z39.50-1995: Information retrieval protocol. by Juha Hakala. January 1996
2. An overview of the z39.50 Information Retrieval Standard by Fay Turner, Revised, June 1996
3. z39.50 in a Nutshell - (an introduction to z39.50 ) by John A Kunze and R P C Rodgers, July 1995
4. The z39.50 Protocol: literature review by Michael L Smith, Nov 1996  
<http://istweb.syr.edu/~ist667/z3950.htm>
5. z39.50 Search and Retrieval protocol-an update. by Andrew Wells, NSP project.  
<http://www.nla.gov.au/nla/staffpaper/awells1.html>
6. z39.50 : An overview of development and the future by Iltsis, Susannah.
7. z39.50 and the World Wide Web. by Hammer, Sebastian and John Favaro.
8. Arts and Humanities Data Service.  
<http://ahds.ac.uk/>
9. Melvyl  
<http://www.melvyl.ucop.edu/>
10. AHDS Gateway  
[http://prospero.ahds.ac.uk:8080/ahds\\_live/](http://prospero.ahds.ac.uk:8080/ahds_live/)
11. California Digital Library  
<http://www.cdlib.org/>



**Dr. Muttayya M. Koganuramath**  
**University Librarian**  
**Tata Institute of Social Sciences**  
**P.O.B.No.8313, Deonar,**  
**Mumbai - 400 088.**  
**Phone No.: 5563290 Ext. 281 Fax: 5562912**  
**E.Mail : [muttayya@bom3.vsnl.net.in](mailto:muttayya@bom3.vsnl.net.in)**

**Mr. Mallikarjun Angadi**  
**Information Scientist**  
**Tata Institute of Social Sciences**  
**P.O.B.No.8313, Deonar,**  
**Mumbai - 400 088.**  
**Phone No.: 5563290 Ext. 282 Fax: 5562912**  
**E.Mail : [muttayya@bom3.vsnl.net.in](mailto:muttayya@bom3.vsnl.net.in)**

**Mr. B S Kademani**  
**Scientist - D**  
**Library and Information Services Division**  
**Bhabha Atomic Research Centre**  
**Anushakthinagar - 400085**  
**Phone: 5592793 (Off)**  
**E.Mail: [bskademani@yahoo.co.in](mailto:bskademani@yahoo.co.in)**