I. Overview

According to NISO, Z39.50 is “a client/server based service and protocol for Information Retrieval” ([http://www.niso.org/](http://www.niso.org/)). It is an ANSI standard maintained by the U.S. Library of Congress ([http://www.loc.gov/z3950/agency/](http://www.loc.gov/z3950/agency/)).

CyberTools Z39.50 Technology is comprised of three parts: the Server, the Mini-Client, and the Client Server.

A. The Server

The Server is the most important module. CyberTools for Libraries supports Z39.50 version 3, the standard for information retrieval among disparate library automation systems. The Z39.50 standard is designed to support searching and retrieval of full-text documents, bibliographic data, images and multimedia. The standard is based on Client Server architecture and is fully operational over the Internet. The CyberTools Z39.50 server meets the Bath and Texas profiles: any Z39.50 client can access this server. For example, a librarian in your consortium could search your catalog with his or her favorite (thus familiar) Z39.50 client. Or, your patrons and staff can simultaneously search your catalog and other catalogs of interest, for example, those of neighboring libraries that also have Z39.50 servers. As a bonus, the CyberTools for Libraries Z39.50 server uses the same powerful search engine as the Online Catalog, insuring identical and powerful search results.
Our server can be used with a number of popular Z39.50 clients such as products as BookWhere, EndNotes, or our Mini-Client.

BookWhere (http://www.bookwhere.com/) allows simultaneous searching of multiple libraries that have Z39.50 servers: this is very powerful! If your catalog is part of a consortium, (e.g., state, federal agency, etc.), then all associated libraries should have Z39.50 servers, and use BookWhere to seamlessly search the combined catalogs. This is why Z39.50 is called an information server.

EndNote (http://www.niles.com/) is a popular bibliography tool.

Our Mini-Client is described next.

**B. Mini-Client**
This is a standalone traditional Z39.50 client. It can be used for testing your Z39.50 server and for browsing other servers. It is not very fancy but it helps to determine that the server is working.

**C. Client Server**
This program listens for connections from CyberTools for Library. A user (typically a cataloger) can specify a number of bibliographic records (identified by a control number, e.g., ISSN, ISBN, LCCN, etc) and a target server from which the MARC bibliographic records should be retrieved.

Once a connection is established the user can make Z39.50 requests to Z39.50 servers anywhere and this server will deliver the results to the user.

**D. Requirements**
The server will need a Java Virtual Machine (JVM) installed. If you are already running any CyberTools servlets (e.g., CyberHTML for the HTML OPAC), then you already have a JVM. The Z39.50 software will need port 210 open on your firewall. You may change the port number but that is not wise since users will typically not know your Z39.50 port number.
II. Installation
Installation is easy. CyberTools uses the popular ZeroG’s InstallAnywhere ® technology. This package allows the installation to come directly from the web or from a CD-ROM. Installation is targeted for generic UNIX, Linux, or Windows.

This installation will create the shortcuts:

- Z39.50 Installation & User Guide
- Z3950 Server Start
- Z39.50 Server Stop
- Z39.50 Mini-Client
- Z3950 Client Server

A. UNIX/Linux Installation
The installation kit will arrive either on a CD-ROM or downloaded from a provided URL. In either case, the installation kit will be called install.bin. You may optionally rename it to more recognizable name, e.g.

```
mv install.bin CyberTools_Z39.50_install.bin
```

You must have a Java Virtual Machine (JVM) installed on the server to run the Z39.50 software. You should know the path to JVM, although the installation software will attempt to find the JVM.

The installation must be performed on the server’s console with an X-Windows Desktop. As root account or superuser, install the software:

```
sh install.bin
```

For example:

```
[root@pine tmp]# sh install.bin
Preparing to install...
Extracting the JRE from the installer archive...
Unpacking the JRE...
Extracting the installation resources from the installer archive...
Configuring the installer for this system's environment...
Launching installer...
```
Introduction

InstallAnywhere will guide you through the installation of CyberTools for Libraries Z39.50.

It is strongly recommended that you quit all programs before continuing with this installation.

This installation offers 3 components: The Z39.50 Server, what we call the Z39.50 Client-Server, and a standalone minimal Z39.50 client that can be used in testing the other 2 components. It is recommended that the first two components be installed on the system containing the CyberTools for Libraries Cache database.

Click the 'Next' button to proceed to the next screen. If you want to change something on a previous screen, click the 'Previous' button.

You may cancel this installation at any time by clicking the 'Cancel' button.

Choose Java Virtual Machine

Please Choose a Java VM for Use by the Installed Application

- Install a Java VM specifically for this application
- Choose a Java VM already installed on this system

/usr/java/jre1.4.1_04/bin/java

Search For Others  Choose Another...
On the following window, change from /root/CyberTools/Z39.50 to /home/CyberTools/Z39.50, i.e., replace the /root with the path where you keep your user accounts.
On the following window, change from /root/CyberTools/ to /home/CyberTools/, i.e., replace the /root with the path where you keep your user accounts.
Using the above installation as an example:

```
[root@plum CyberTools]# cd /home/CyberTools
[root@plum CyberTools]# ls
Z3950              Z39.50_Mini-Client  Z39.50_Server_Stop
Z39.50_Client_Server_Start  Z3950.properties
Z39.50_Installation_and_User_Guide  Z39.50_Server_Start
```

To start the Z3950 server, change directories to your link folder and enter:

```
sh Z39.50_Server_Start &
```

To stop the server:

```
sh Z39.50_Server_Stop
```

To test the server:

```
sh Z39.50_Mini-Client &
```

To have the server start each time the server is booted, add to the rc.local file (typically found in /etc/rc.d) the following:

```
echo "starting z39.50 server"
sh /home/CyberTools/Z3950/Z3950Server &
```
Once the CyberTools for Libraries is actively using the Z39.50 Client Server, then add to rc.local:

```bash
echo "starting z39.50 Client Server"
sh /home/CyberTools/Z3950/239.50_CyberTools_Client_Server &
```

For the above rc.local modifications, /root/ was used since it was the installation folder for the example. Please use your installation folder in place of /root/.

To uninstall the software, run Uninstall_Z3950 from your Z39.50 install folder, e.g.,

```bash
sh /home/CyberTools/Z3950/UninstallerData/Uninstall_Z3950
```
B. Microsoft Windows
Your installation kit will arrive either as an e-mail attachment, on a CD-ROM, or as a
download from a provided URL. The kit is named install.exe. We recommend renaming
it to CyberTools_Z3950_install.exe.

To install the software, run the executable. This can be accomplished by Opening the file
via Windows Explorer, or by using the Task Bar’s Start->Run and typing in the path and
the file name, either of which will yield the following windows:
Choose Java Virtual Machine

Please Choose a Java VM for Use by the Installed Application

- C:\java\jdk1.1.6bin\java.exe
- C:\java\j2sdk1.4.2_01\bin\java.exe
- C:\Program Files\Java\jdk1.4.2_03\bin\java.exe

Search For Others  Choose Another...

Choose Product Features

- Typical
  All of the application features will be installed. This option is recommended for most users.

- Minimal
  Only required application features will be installed. This option is recommended only for users with limited disk space.
To start the Z3950 server, open the Program Group CyberTools and then open Z39.50 Server Start.

To stop the server, open the Program Group CyberTools and then open Z39.50 Server Stop.

To test the server, open the Program Group CyberTools and then open Z39.50 Mini-Client.

To have the server start each time the server is booted, open Program Group CyberTools and then copy the Z39.50 Server Start (it is actually a shortcut). Now right click on the Task Bar’s Start and select Open. Navigate to Startup (typically by double clicking on Programs, then double clicking on Startup). Paste the Z39.50 Server Start contents into to Startup.

Once CyberTools for Libraries is actively using the Z39.50 Client Server, consider having it start when the server is booted. Open Program Group CyberTools and then copy the Z39.50 Client Server Start (it is actually a shortcut). Now right click on the Task Bar’s Start and select Open. Navigate to Startup (typically by double clicking on Programs, then double clicking on Startup). Paste the Z39.50 Client Server Start contents into to Startup.
III. Server Configuration
Configuration is accomplished by editing the Z3950.properties file found in your installation folder. Below is a sample.

```plaintext
# Z39.50 server parameters
# listen port number
PortNo = 210
# interval to check for unused database connections (seconds)
TimerSecs = 180
# cache server node
mnode = 127.0.0.1
# cache server port
mport = 20001
# maximum simultaneous database connections
MaxRequests = 1
# maximum client connections
MaxConnections = 20
# authorization key to connect to M database
MAuthId = Z3950
# log file name
LogFile = z3950.log
```

Note that the lines beginning with # are comments. If your Z39.50 Server is installed on a different computer from the Cache database computer, you will need to set the mnode parameter to the DNS node name of IP Address of that computer. MaxRequests is set to 1; if you set it higher your server when it is busy might use up that many licensed process slots. If you comment out MaxConnections, the server will accept a number of client connections equal to 20 times MaxRequests.

If you configure your Server to listen on a different port from the default (210), you will need to edit the "Z39.50 Server Stop" shortcut to have a command line parameter that is the new port number.

IV. Client Server Configuration
There should be no set up necessary for this program. Its listening port is 20099. If this needs to be changed, you can edit the shortcut to have a command line parameter of that port number. If this software is running on the same server as the CyberTools for Libraries, it should be unnecessary to change this port.

We recommend that this server be set up to run on the computer with the CyberTools for Libraries Cache database. If it is not, a CyberTools site parameter will have to be set designating the node where this server is running.
V. How to Use the Mini-Client
This is a traditional standalone Z39.50 client. It can be used for testing your Z39.50 server and for browsing other servers. When you run it you will see six buttons:

- Define Server
- New Session
- Search
- Present
- Close Session
- Quit

Each of the push buttons is discussed below. Procedurally, you use Define Server to specify the target server, then use New Session to connect to that server. Once a connection is made, Search will find define and execute a search, and Present will show the results of the search.

Define Server
This button will bring up a window that lets you enter parameters for a particular Z39.50 server. The Server node is an IP address or node name and the Server Port is the TCP port number. The default port number for Z39.50 is 210, but the Voyager servers at the Library of Congress and NLM both use port 7090. XXDEFAULT is the default database name. If a server has multiple databases, you will need to know the name of the one you want. To connect to your CyberTools for Libraries Z39.50 Server, use IP# 127.0.0.1, port 210, and database XXDEFAULT.

New Session
This button makes a connection to the server you set up with Define Server. A window will come up to display whether you are successful. An A-Association is a communication session. A Z-Association is an application session.

Search
This button brings up the search window that allows you to enter a search expression or a Boolean combination of two search expressions. In each search expression you enter a "Search By" parameter with the first drop-down, and match criterion with the second drop down. In the third field enter the string to search for. If the second search string is blank, only one expression will be used. The central drop-down lets you select the Boolean operator AND, OR, or AND NOT. If you push the Start Search button the search will be executed, and when it is finished the number of hits and starting record number is displayed.

Present
After a successful search, you can push this button to bring up the Present window and fetch one or more MARC records. You enter the starting record number and the number to fetch, and hit the Fetch Records button. The MARC records fetched will be displayed in the window.
**Close Session**
This Button ends a session with a Z39.50 server. You may then connect with another server or push the Quit button.

**Quit**
Press this button to stop the program.

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