

Standard Operating Procedure

Enabling the Z39.50 Server on Koha 23 and Adding a Library to PAKCAT

PakCat – Union Catalogue of Pakistani Libraries
CSTRDLP (Consortium of S&T and R&D Libraries of Pakistan)

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Before You Start – Prerequisites

- Koha 23.x installed and running on Ubuntu/Debian, with root or sudo access.
- Your Koha instance name (e.g. library). List instances with: `sudo koha-list`
- yaz-client installed for testing: `sudo apt install yaz`
- The server's **public IP address**. The Z39.50 port must be reachable from the internet for PAKCAT to harvest your records. If your Koha is behind a router or campus firewall, ask your network team to open / forward the Z39.50 port (default 2100) to the Koha server.

Note: This manual shows two ways to publish your catalogue over Z39.50. Use **Method A** (recommended for Koha 23). Use **Method B** only if Method A is not available on your installation. Do not apply both at the same time on the same port.

Method A (Recommended): koha-z3950-responder

Step 1: Enable the Z39.50 responder for your instance

```
sudo koha-z3950-responder --enable <instancename>
```

Step 2: Start the Z39.50 server

```
sudo koha-z3950-responder --start <instancename>
```

Step 3: Verify the configuration file

Open the responder configuration and check the listening port:

```
cd /etc/koha/sites/<instancename>/z3950
sudo nano config.xml
```

```

root@fahad-virtualbox: /etc/koha/sites/lib5466/z3950
GNU nano 7.2 config.xml
<yazgfs>
<!-- See z3950_responder.pl for available options. The options -c, ->
already passed automatically by koha-z3950-responder, note that>
add-item-status switch are escaped for XML compliance but shoul>
<!--
<config>
  <z3950_responder_options>\-\-add-item-status k -t 5</z3950_resp>
</config>
-->

<listen id="public">tcp:@:2100</listen>
<server>
  <cql2rpn>pqf.properties</cql2rpn>
  <explain xmlns="http://explain.z3950.org/dtd/2.0/">
    <retrievalinfo>
      <retrieval syntax="usmarc" name="marc21"/>
      <retrieval syntax="unimarc" name="unimarc"/>
      <retrieval syntax="xml" name="marcxml" identifier="info:srw/s>
    </retrievalinfo>
  </explain>
[ Read 22 lines ]
^G Help      ^O Write Out  ^W Where Is   ^K Cut        ^T Execute
^X Exit      ^R Read File  ^\ Replace    ^U Paste      ^J Justify

```

The line `<listen id="public">tcp:@:2100</listen>` defines the port. The default port is 2100; you may change it if required.

Step 4: Restart the responder if you changed the port

```
sudo koha-z3950-responder --restart <instancename>
```

Step 5: Open the port in the firewall

This step is often missed. Without it, the server works locally but PAKCAT and other libraries cannot connect from outside.

```

sudo ufw allow 2100/tcp
# or, if using iptables:
sudo iptables -A INPUT -p tcp --dport 2100 -j ACCEPT

```

If your server sits behind NAT or a campus/hosting firewall, also open or forward the same port there.

Step 6: Confirm the server is listening

```
sudo ss -tlnp | grep 2100
```

You should see a LISTEN entry on port 2100 (or your custom port).

Method B (Alternative): Classic Zebra publicserver

Add the following block inside `/etc/koha/sites/<instancename>/koha-conf.xml`. Change the highlighted IP address and port number according to your server. Replace library in the paths with your own instance name.

```
<listen id="publicserver">tcp:@:2100</listen>
<xi:include href="/etc/koha/zebradb/explain-biblios.xml"
  xmlns:xi="http://www.w3.org/2001/XInclude">
  <xi:fallback>
    <explain xmlns="http://explain.z3950.org/dtd/2.0/">
      <serverInfo>
        <host>YOUR.SERVER.IP.ADDRESS</host>
        <port>2100</port>
        <database>biblios</database>
      </serverInfo>
    </explain>
  </xi:fallback>
</xi:include>

<server id="publicserver" listenref="publicserver">
  <directory>/var/lib/koha/library/biblios</directory>
  <config>/etc/koha/sites/library/zebra-biblios-dom.cfg</config>
  <cql2rpn>/etc/koha/zebradb/pqf.properties</cql2rpn>
  <xi:include href="/etc/koha/marc21-retrieval-info-bib-dom.xml"
    xmlns:xi="http://www.w3.org/2001/XInclude">
    <xi:fallback>
      <retrievalinfo>
        <retrieval syntax="marc21" name="F"/>
        <retrieval syntax="marc21" name="B"/>
        <retrieval syntax="xml" name="F"/>
        <retrieval syntax="xml" name="B"/>
        <retrieval syntax="xml" name="marcxml"
          identifier="info:srw/schema/1/marcxml-v1.1">
          <backend syntax="marc21" name="F">
            <marc inputformat="marc" outputformat="marcxml"
              inputcharset="utf-8"/>
          </backend>
        </retrieval>
        <retrieval syntax="xml" name="dc">
          <backend syntax="marc21" name="F">
            <marc inputformat="marc" outputformat="marcxml"
              inputcharset="utf-8"/>
            <xslt stylesheet="/usr/share/koha/intranet/htdocs/intranet-tmpl/prog/en/xslt/MARC21slin
          </backend>
        </retrieval>
        <retrieval syntax="xml" name="mods">
          <backend syntax="marc21" name="F">
            <marc inputformat="marc" outputformat="marcxml"
              inputcharset="utf-8"/>
            <xslt stylesheet="/usr/share/koha/intranet/htdocs/intranet-tmpl/prog/en/xslt/MARC21slin
          </backend>
        </retrieval>
      </retrievalinfo>
    </xi:fallback>
  </xi:include>
</server>
```

Then add the matching serverinfo block:

```
<serverinfo id="publicserver">
  <ccl2rpn>/etc/koha/zebradb/ccl.properties</ccl2rpn>
  <user>kohauser</user>
```

```
<password>YOUR_ZEBRA_PASSWORD</password>  
</serverinfo>
```

Security note: Do not copy a password from any manual. Use your own Zebra password, which is already present in your instance's koha-conf.xml (look for the existing <serverinfo> block, or check /etc/koha/sites/<instancename>/zebra.passwd).

After saving the file, restart Zebra for this instance:

```
sudo koha-zebra --restart <instancename>
```

Then complete firewall Steps 5 and 6 from Method A for the port you used.

Testing the Z39.50 Server

1. Through the terminal

Type `yaz-client localhost:PORT`, for example:

```
yaz-client localhost:2100
```

If the output looks like the image below (Connecting...OK, connection accepted by v3 target), the Z39.50 server is successfully configured.

```

root@fahad-virtualbox: /home/fahad
z3950/ zebra-biblios-dom.cfg
zebra-authorities-dom.cfg zebra.passwd
root@fahad-virtualbox:/home/fahad# cd /etc/koha/sites/library/z3950/
attribute mappings.yaml config.xml pqf.properties
root@fahad-virtualbox:/home/fahad# cd /etc/koha/sites/library/z3950/
root@fahad-virtualbox:/etc/koha/sites/library/z3950# nano config.xml
root@fahad-virtualbox:/etc/koha/sites/library/z3950# koha-z3950-responder --rest
art library
* Z39.50/SRU not running for library.
* Starting Z39.50/SRU daemon for library [ OK ]
root@fahad-virtualbox:/etc/koha/sites/library/z3950#
login as: fahad
fahad@192.168.100.232's password:
Welcome to Ubuntu 24.04 LTS (GNU/Linux 6.8.0-49-generic x86_64)

* Documentation:  https://help.ubuntu.com
* Management:    https://landscape.canonical.com
* Support:       https://ubuntu.com/pro
Last login: Tue Nov 26 12:36:28 2024 from 192.168.100.8
fahad@fahad-virtualbox:~$ sudo su
[sudo] password for fahad:
root@fahad-virtualbox:/home/fahad# yaz-client localhost:2100
Connecting...OK.
Sent initrequest.
Connection accepted by v3 target.
ID      : 81
Name    : Koha/GFS/YAZ
Version: 23.11.06.000/5.34.0 dec0c8a0b762132468cc8264c1b220eae1c67bd7
Options: search present triggerResourceCtrl namedResultSets
Elapsed: 0.058274
Z>
  
```

Also test from a different machine using the public IP (`yaz-client YOUR.PUBLIC.IP:2100`) to confirm the firewall is open.

2. Through a web browser (SRU)

Type in the browser (replace the IP with your Koha server IP; the SRU port is typically the Z39.50 port + 1, e.g. 2101):

```
http://YOUR.SERVER.IP:2101/biblios?version=1.1&operation=searchRetrieve&query=islam&maximumRecords=
```

```
http://192.168.100.232:2101/biblios?version=1.1&operation=searchRetrieve&query=islam&maximumRecords=20&recordSchema=marcxml
```

your koha IP

Query string

Maximum
fetch records

URL parts: your Koha IP, the query string, and the maximum records to fetch.

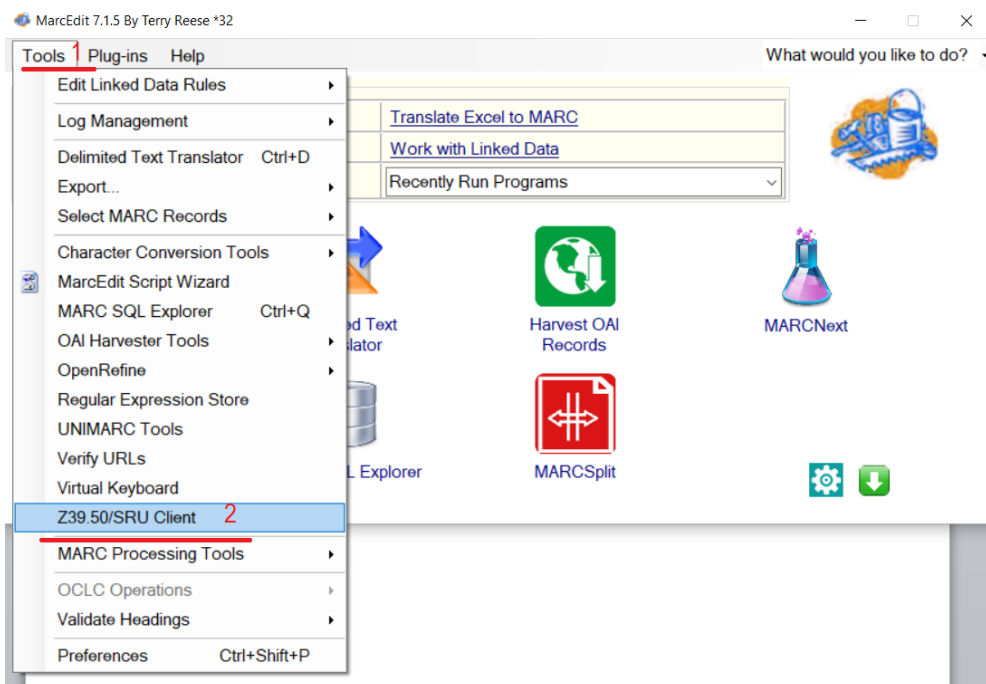
A successful response returns MARCXML records:

← → 🔍 Not secure 192.168.100.232:2101/biblio?version=1.1&operation=searchRetrieve&query=islam&maximumRecords=20&recordSchema=marcxml ☆ 🏠 📄 📁 📂 📅 📆 📇 📈 📉 📊 📋 📌 📍 📎 📏 📐 📑 📒 📓 📔 📕 📖 📗 📘 📙 📚 📛 📜 📝 📞 📟 📠 📡 📢 📣 📤 📥 📦 📧 📨 📩 📪 📫 📬 📭 📮 📯 📰 📱 📲 📳 📴 📵 📶 📷 📸 📹 📺 📻 📼 📽 📾 📿 📠 📡 📢 📣 📤 📥 📦 📧 📨 📩 📪 📫 📬 📭 📮 📯 📰 📱 📲 📳 📴 📵 📶 📷 📸 📹 📺 📻 📼 📽 📾 📿

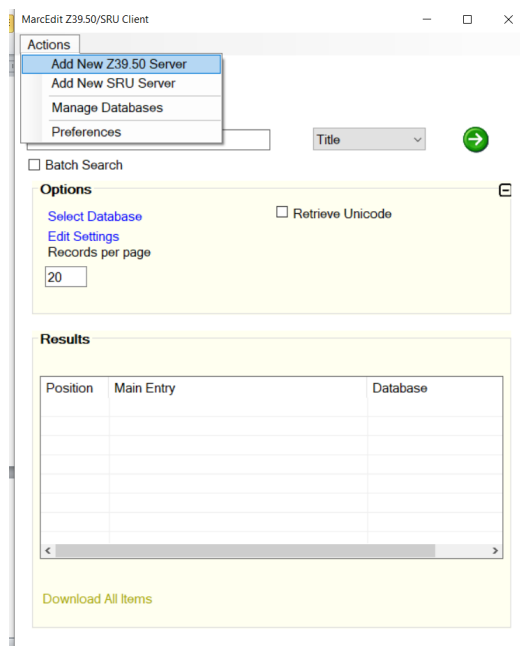
```
<?xml:searchRetrieveResponse xmlns:z39="http://www.loc.gov/z39.50-2001/">
  <z39:version>1.1</z39:version>
  <z39:numberOfRecords>20</z39:numberOfRecords>
  <z39:records>
    <z39:record>
      <z39:recordSchema>marcxml</z39:recordSchema>
      <z39:recordPacking>xml</z39:recordPacking>
      <z39:recordData>
        <?record xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xmlns="http://www.loc.gov/MARC21/slim" xsi:schemaLocation="http://www.loc.gov/MARC21/slim http://www.loc.gov/standards/marcxml/schema/MARC21slim.xsd">
          <leader>nam a22 1a 4500</leader>
          <controlfield tag="008">240717s9999 xx 000 0 und d</controlfield>
          <datafield tag="000" ind1="1" ind2="1">
            <subfield code="a">(NULL)</subfield>
          </datafield>
          <datafield tag="100" ind1="1" ind2="1">
            <subfield code="a">Zia Ul Islam Janjua</subfield>
          </datafield>
          <datafield tag="245" ind1="1" ind2="0">
            <subfield code="a">Encyclopaedia of Electricity, Petroleum, SUI Gas, MINERALS WATER SUPPLY Laws with Wapda Act & Rules</subfield>
          </datafield>
          <datafield tag="250" ind1="1" ind2="1">
            <subfield code="a">(NULL)</subfield>
          </datafield>
          <datafield tag="260" ind1="1" ind2="1">
            <subfield code="a">Lahore Pakistan</subfield>
            <subfield code="b">Nadeem Law Book House</subfield>
            <subfield code="c">2012</subfield>
          </datafield>
          <datafield tag="300" ind1="1" ind2="1">
            <subfield code="a">1568</subfield>
          </datafield>
          <datafield tag="365" ind1="1" ind2="1">
            <subfield code="b">1600</subfield>
          </datafield>
          <datafield tag="440" ind1="1" ind2="1">
            <subfield code="v">(NULL)</subfield>
            <subfield code="a">(NULL)</subfield>
          </datafield>
          <datafield tag="600" ind1="1" ind2="1">
            <subfield code="a">(NULL)</subfield>
          </datafield>
          <datafield tag="942" ind1="1" ind2="1">
            <subfield code="c">BK</subfield>
          </datafield>
          <datafield tag="952" ind1="1" ind2="1">
            <subfield code="0">0</subfield>
          </datafield>
        </?record>
      </z39:recordData>
    </z39:record>
  </z39:records>
</z39:searchRetrieveResponse>
```

3. Through MarcEdit 7.15

- Open the application.
- Go to **Tools** from the top menu bar and select **Z39.50/SRU Client** as shown below.



- Click **Actions** from the top menu bar and select **Add New Z39.50 Server**.



- Enter the following details, then click **Save**:

Name: your library name | Host: your server IP | Database: biblios | Port: 2100 | Syntax: MARC21. Username and Password stay empty for a public server.

Database Properties

Z39.50 Database Settings:

Database Properties Advanced Properties

Name:
library Name

Host:
192.168.100.232

Database:
biblios

Port:
2100

Syntax:
MARC21

Username:

Password:

☐ Override pause (6 secs.)

☐ Show Database

Save Delete Close

- Click on **Select Database**.

MarcEdit Z39.50/SRU Client

Actions

Query Database:

Search: Title

☐ Batch Search

Options

[Select Database](#) ☐ Retrieve Unicode

[Edit Settings](#)

Records per page
20

Results

Position	Main Entry	Database

Download All Items

- Select your library from the list.

[illegible]

- Then search anything on the given interface. If results appear, your server is working correctly.

MacEdit Z39.50/SRU Client

Actions

Query Database:
library Name

Search: 

☐ Batch Search

Options

[Select Database](#) ☐ Retrieve Unicode

[Edit Settings](#)

Records per page

Results

Position	Main Entry	Database
0	Denizens of Alien Worlds :\$ba study of e...	library Name
1	Student engagement techniques :\$ba han...	library Name
2	Higher education in the digital age /\$cWill...	library Name
3	Guide to the successful thesis and disser...	library Name
4	Studying @ university :\$bhow to be a suc...	library Name
5	A larger sense of purpose :\$bhigher educ...	library Name
6	Software engineering : a practitioner's ap...	library Name
7	A problem-solving approach to aquatic ch...	library Name

Get Next 20

[Download All Items](#)

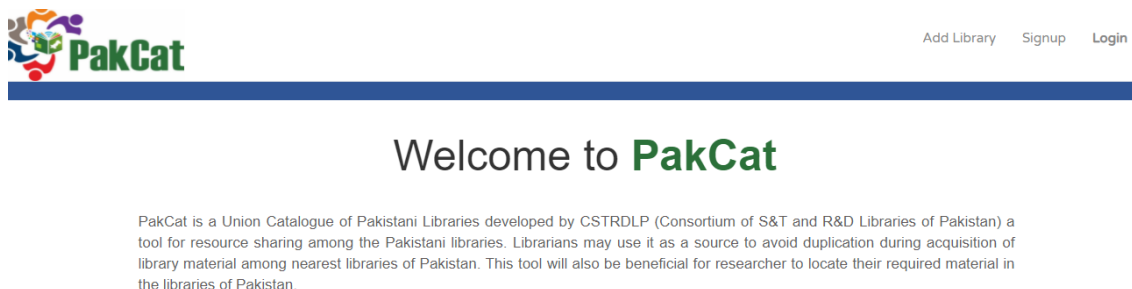
SOP for Adding a Library to PAKCAT

Once your Z39.50 server is running and reachable on a public IP, register the library on PakCat, the Union Catalogue of Pakistani Libraries developed by CSTRDLP. Librarians can use it to avoid duplication during acquisition and researchers can locate material across libraries of Pakistan.

Step 1: Open the following link

<http://pakcat.pastic.gov.pk/>

The screen will look like below.



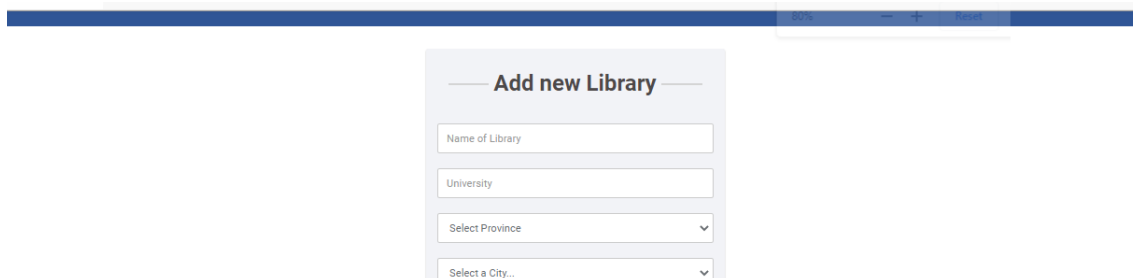
Step 2: Click on "Add Library" in the top right corner

The following form will open.

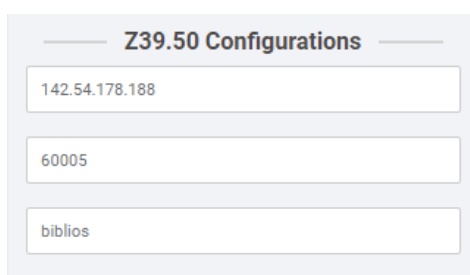
The screenshot shows the 'Add Library' form. It contains several input fields and dropdown menus. The first field is for an email address, with the example 'librarian@admin.mueta.edu.pk'. The second field is for the library name, with the example 'Library'. The third field is for the library address, with the example 'Mehran University of Engineering & Technology'. The fourth field is a dropdown menu for the province, with 'Sindh' selected. The fifth field is a dropdown menu for the city, with 'Jamshoro' selected. The sixth field is a dropdown menu for the library type, with 'Engineering Library' selected. The seventh field is for the Z39.50 server URL, with the example 'http://142.54.178.188:5107'.

Step 3: Fill in the form as shown in the example below

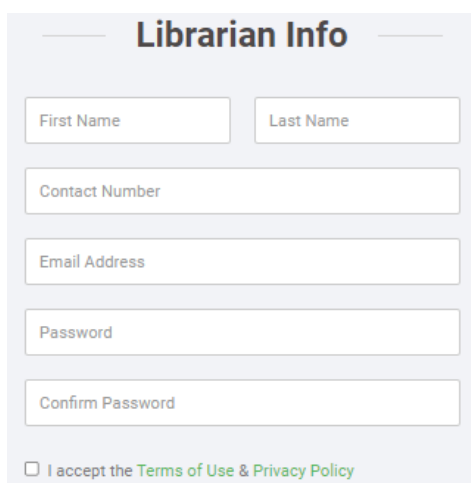
Example (Mehran University of Engineering & Technology): librarian email, library name, university, province, city, library type, and the OPAC/catalogue URL.



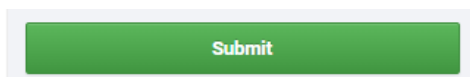
In the **Z39.50 Configurations** section, enter your public IP, the Z39.50 port you opened earlier, and the database name biblios:



Fill in the **Librarian Info** section (name, contact number, email, password) and accept the Terms of Use & Privacy Policy:



Step 4: Click on the Submit button



Step 5: Activation and verification

After submission, the request is reviewed by the PASTIC/PakCat team, who will verify that your Z39.50 endpoint is reachable before activating the library on the union catalogue. Keep the Z39.50 service running at all times so that records remain searchable.

Quick Troubleshooting

Problem	Likely cause / fix
yaz-client works on localhost but not from outside	Port not open in firewall/router. Open the port (Step 5, Method A) and confirm with an online port checker.
Connection refused on localhost	Responder not running. Run: <code>sudo koha-z3950-responder --start <instancename></code>
Search connects but returns no records	Zebra index empty or stale. Run: <code>sudo koha-rebuild-zebra -f -v <instancename></code>
Changed port but old port still in use	Restart the responder (Method A) or Zebra (Method B) after editing the configuration.

For assistance with Z39.50 setup or PakCat registration, contact: **Nabi Bux, Web Manager, PASTIC** – webmaster@pastic.gov.pk