

Pazpar2 - User's Guide and Reference

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Abstract

Pazpar2 is a high-performance, user interface-independent, data model-independent metasearching middle-ware featuring merging, relevance ranking, record sorting, and faceted results.

This document is a guide and reference to Pazpar2 version 1.3.0.



Chapter 1

Introduction

Pazpar2 is a stand-alone metasearch client with a web-service API, designed to be used either from a browser-based client (JavaScript, Flash, Java, etc.), from server-side code, or any combination of the two. Pazpar2 is a highly optimized client designed to search many resources in parallel. It implements record merging, relevance-ranking and sorting by arbitrary data content, and facet analysis for browsing purposes. It is designed to be data model independent, and is capable of working with MARC, DublinCore, or any other XML-structured response format -- XSLT is used to normalize and extract data from retrieval records for display and analysis. It can be used against any server which supports the Z39.50 and SRU/SRW protocol. Proprietary backend modules can be used to support a large number of other protocols (please contact Index Data for further information about this).

Additional functionality such as user management, attractive displays are expected to be implemented by applications that use Pazpar2. Pazpar2 is user interface independent. Its functionality is exposed through a simple REST-style web-service API, designed to be simple to use from an Ajax-enabled browser, Flash animation, Java applet, etc., or from a higher-level server-side language like PHP or Java. Because session information can be shared between browser-based logic and your server-side scripting, there is tremendous flexibility in how you implement your business logic on top of Pazpar2.

Once you launch a search in Pazpar2, the operation continues behind the scenes. Pazpar2 connects to servers, carries out searches, and retrieves, deduplicates, and stores results internally. Your application code may periodically inquire about the status of an ongoing operation, and ask to see records or other result set facets. Result becomes available immediately, and it is easy to build end-user interfaces which feel extremely responsive, even when searching more than 100 servers concurrently.

Pazpar2 is designed to be highly configurable. Incoming records are normalized to XML/UTF-8, and then further normalized using XSLT to a simple internal representation that is suitable for analysis. By providing XSLT stylesheets for different kinds of result records, you can tune Pazpar2 to work against different kinds of information retrieval servers. Finally, metadata is extracted, in a configurable way, from this internal record, to support display, merging, ranking, result set facets, and sorting. Pazpar2 is not bound to a specific model of metadata, such as DublinCore or MARC -- by providing the right configuration, it can work with a number of different kinds of data in support of many different applications.

Pazpar2 is designed to be efficient and scalable. You can set it up to search several hundred targets in parallel, or you can use it to support hundreds of concurrent users. It is implemented with the same attention to performance and economy that we use in our indexing engines, so that you can focus on building your application, without worrying about the details of metasearch logic. You can devote all of your attention to usability and let Pazpar2 do what it does best -- metasearch.

If you wish to connect to commercial or other databases which do not support open standards, please contact Index Data. We have a licensing agreement with a third party vendor which will enable Pazpar2 to access thousands of online databases, in addition to the vast number of catalogs and online services that support the Z39.50/SRU/SRW protocols.

Pazpar2 is our attempt to re-think the traditional paradigms for implementing and deploying metasearch logic, with an uncompromising approach to performance, and attempting to make maximum use of the capabilities of modern browsers. The demo user interface that accompanies the distribution is but one example. If you think of new ways of using Pazpar2, we hope you'll share them with us, and if we can provide assistance with regards to training, design, programming, integration with different backends, hosting, or support, please don't hesitate to contact us. If you'd like to see functionality in Pazpar2 that is not there today, please don't hesitate to contact us. It may already be in our development pipeline, or there might be a possibility for you to help out by sponsoring development time or code. Either way, get in touch and we will give you straight answers.

Enjoy!

Pazpar2 is covered by the GNU license version 2. See [Appendix A](#) for further information.

Chapter 2

Installation

The Pazpar2 package is very small. It includes documentation as well as the Pazpar2 server. The package also includes a simple user interface `test1` which consists of a single HTML page and a single JavaScript file to illustrate the use of Pazpar2.

Pazpar2 depends on the following tools/libraries:

YAZ The popular Z39.50 toolkit for the C language. YAZ *must* be compiled with Libxml2/Libxslt support.

International Components for Unicode (ICU) ICU provides Unicode support for non-English languages with character sets outside the range of 7bit ASCII, like Greek, Russian, German and French. Pazpar2 uses the ICU Unicode character conversions, Unicode normalization, case folding and other fundamental operations needed in tokenization, normalization and ranking of records.

Compiling, linking, and usage of the ICU libraries is optional, but strongly recommended for usage in an international environment.

In order to compile Pazpar2, a C compiler which supports C99 or later is required.

2.1 Installation on Unix (from Source)

The latest source code for Pazpar2 is available from <http://ftp.indexdata.com/pub/pazpar2/>. Only few systems have none of the required tools binary packages. If, for example, Libxml2/libXSLT libraries are already installed as development packages use these.

Ensure that the development libraries + header files are available on your system before compiling Pazpar2. For installation of YAZ, refer to the YAZ installation chapter.

```
gunzip -c pazpar2-version.tar.gz|tar xf -
cd pazpar2-version
./configure
make
su
make install
```

The `make install` will install manpages as well as the Pazpar2 server, `pazpar2`, in `PREFIX/sbin`. By default, `PREFIX` is `/usr/local/`. This can be changed with configure option `--prefix`.

2.2 Installation on Windows (from Source)

Pazpar2 can be built for Windows using [Microsoft Visual Studio](#). The support files for building YAZ on Windows are located in the `win` directory. The compilation is performed using the `win/makefile` which is to be processed by the NMAKE utility part of Visual Studio.

Ensure that the development libraries + header files are available on your system before compiling Pazpar2. For installation of YAZ, refer to the YAZ installation chapter. It is easiest if YAZ and Pazpar2 are unpacked in the same directory (side-by-side).

The compilation is tuned by editing the makefile of Pazpar2. The process is similar to YAZ. Adjust the various directories `YAZ_DIR`, `ZLIB_DIR`, ..

Compile Pazpar2 by invoking `nmake` in the `win` directory. The resulting binaries of the build process are located in the `bin` of the Pazpar2 source tree - including the `pazpar2.exe` and necessary DLLs.

The Windows version of Pazpar2 is a console application. It may be installed as a Windows Service by adding option `-install` for the `pazpar2` program. This will register Pazpar2 as a service and use the other options provided in the same invocation. For example:

```
cd \MyPazpar2\etc
..\bin\pazpar2 -install -f pazpar2.cfg -l pazpar2.log
```

The Pazpar2 service may now be controlled via the Service Control Panel. It may be unregistered by passing the `-remove` option. Example:

```
cd \MyPazpar2\etc
..\bin\pazpar2 -remove
```

2.3 Installation of test1 interface

In this section we outline how to install a simple interface that is part of the Pazpar2 source package. Note that Debian users can save time by just installing package `pazpar2-test1`.

A web server must be installed and running on the system, such as Apache.

Start the Pazpar2 daemon using the 'in-source' binary of the Pazpar2 daemon. On Unix the process is:

```
cd etc
cp pazpar2.cfg.dist pazpar2.cfg
../src/pazpar2 -f pazpar2.cfg
```

And on Windows:

```
cd etc
copy pazpar2.cfg.dist pazpar2.cfg
..\bin\pazpar2 -f pazpar2.cfg
```

This will start a Pazpar2 listener on port 9004. It will proxy HTTP requests to localhost - port 80, which we assume will be the regular HTTP server on the system. Inspect and modify `pazpar2.cfg` as needed if this is to be changed. The `pazpar2.cfg` includes settings from the file `settings/edu.xml` to use for searches.

Make a new console and move to the other stuff. For more information about pazpar2 options refer to the manpage.

The test1 UI is located in `www/test1`. Ensure this directory is available to the web server by either copying `test1` to the document root, create a symlink or use Apache's `Alias` directive.

The interface test1 interface should now be available on port 8004.

If you don't see the test1 interface. See if test1 is really available on the same URL but on port 80. If it's not, the Apache configuration (or other) is not correct.

In order to use Apache as frontend for the interface on port 80 for public access etc., refer to Section 2.5.

2.4 Installation on Debian GNU/Linux

Index Data provides Debian packages for Pazpar2. These are prepared for Debian versions Etch and Lenny (as of 2007). These packages are available at <http://ftp.indexdata.com/pub/pazpar2/debian/>.

2.5 Apache 2 Proxy

Apache 2 has a **proxy module** which allows Pazpar2 to become a backend to an Apache 2 based web service. The Apache 2 proxy must operate in the *Reverse Proxy* mode.

On a Debian based Apache 2 system, the relevant modules can be enabled with:

```
sudo a2enmod proxy_http
```

Traditionally Pazpar2 interprets URL paths with suffix `/search.pz2`. The **ProxyPass** directive of Apache must be used to map a URL path the the Pazpar2 server (listening port).

Note

The ProxyPass directive takes a prefix rather than a suffix as URL path. It is important that the Java Script code uses the prefix given for it.

Example 2.1 Apache 2 proxy configuration

If Pazpar2 is running on port 8004 and the portal is using `search.pz2` inside portal in directory `/myportal/` we could use the following Apache 2 configuration:

```
<IfModule mod_proxy.c>
  ProxyRequests Off

  <Proxy *>
    AddDefaultCharset off
    Order deny,allow
    Allow from all
  </Proxy>

  ProxyPass /myportal/search.pz2 http://localhost:8004/search.pz2
  ProxyVia Off
</IfModule>
```

Chapter 3

Using Pazpar2

This chapter provides a general introduction to the use and deployment of Pazpar2.

3.1 Pazpar2 and your systems architecture

Pazpar2 is designed to provide asynchronous, behind-the-scenes metasearching functionality to your application, exposing this functionality using a simple webservice API that can be accessed from any number of development environments. In particular, it is possible to combine Pazpar2 either with your server-side dynamic website scripting, with scripting or code running in the browser, or with any combination of the two. Pazpar2 is an excellent tool for building advanced, Ajax-based user interfaces for metasearch functionality, but it isn't a requirement -- you can choose to use Pazpar2 entirely as a backend to your regular server-side scripting. When you do use Pazpar2 in conjunction with browser scripting (JavaScript/Ajax, Flash, applets, etc.), there are special considerations.

Pazpar2 implements a simple but efficient HTTP server, and it is designed to interact directly with scripting running in the browser for the best possible performance, and to limit overhead when several browser clients generate numerous webservice requests. However, it is still desirable to use a conventional webserver, such as Apache, to serve up graphics, HTML documents, and server-side scripting. Because the security sandbox environment of most browser-side programming environments only allows communication with the server from which the enclosing HTML page or object originated, Pazpar2 is designed so that it can act as a transparent proxy in front of an existing webserver (see [Pazpar2 conf\(5\)](#) for details). In this mode, all regular HTTP requests are transparently passed through to your webserver, while Pazpar2 only intercepts search-related webservice requests.

If you want to expose your combined service on port 80, you can either run your regular webserver on a different port, a different server, or a different IP address associated with the same server.

Pazpar2 can also work behind a reverse Proxy. Refer to [Section 2.5](#)) for more information. This allows your existing HTTP server to operate on port 80 as usual. Pazpar2 can be started on another (internal) port.

Sometimes, it may be necessary to implement functionality on your regular webserver that makes use of search results, for example to implement data import functionality, emailing results, history lists, personal citation lists, interlibrary loan functionality, etc. Fortunately, it is simple to exchange information between Pazpar2, your browser scripting, and backend server-side scripting. You can send a session ID and possibly a record ID from your browser code to your server code, and from there use Pazpar2's webservice API to

access result sets or individual records. You could even 'hide' all of Pazpar2s functionality between your own API implemented on the server-side, and access that from the browser or elsewhere. The possibilities are just about endless.

3.2 Your data model

Pazpar2 does not have a preconceived model of what makes up a data model. There are no assumptions that records have specific fields or that they are organized in any particular way. The only assumption is that data comes packaged in a form that the software can work with (presently, that means XML or MARC), and that you can provide the necessary information to massage it into Pazpar2's internal record abstraction.

Handling retrieval records in Pazpar2 is a two-step process. First, you decide which data elements of the source record you are interested in, and you specify any desired massaging or combining of elements using an XSLT stylesheet (MARC records are automatically normalized to **MARXML** before this step). If desired, you can run multiple XSLT stylesheets in series to accomplish this, but the output of the last one should be a representation of the record in a schema that Pazpar2 understands.

The intermediate, internal representation of the record looks like this:

```
<record xmlns="http://www.indexdata.com/pazpar2/1.0"
mergekey="title The Shining author King, Stephen">

  <metadata type="title">The Shining</metadata>

  <metadata type="author">King, Stephen</metadata>

  <metadata type="kind">ebook</metadata>

  <!-- ... and so on -->
</record>
```

As you can see, there isn't much to it. There are really only a few important elements to this file.

Elements should belong to the namespace `http://www.indexdata.com/pazpar2/1.0`. If the root node contains the attribute 'mergekey', then every record that generates the same merge key (normalized for case differences, white space, and truncation) will be joined into a cluster. In other words, you decide how records are merged. If you don't include a merge key, records are never merged. The 'metadata' elements provide the meat of the elements -- the content. the 'type' attribute is used to match each element against processing rules that determine what happens to the data element next.

The next processing step is the extraction of metadata from the intermediate representation of the record. This is governed by the 'metadata' elements in the 'service' section of the configuration file. See the section called "**server**" for details. The metadata in the retrieval record ultimately drives merging, sorting, ranking, the extraction of browse facets, and display, all configurable.

3.3 Client development overview

You can use Pazpar2 from any environment that allows you to use webservices. The initial goal of the software was to support Ajax-based applications, but there literally are no limits to what you can do. You can

use Pazpar2 from Javascript, Flash, Java, etc., on the browser side, and from any development environment on the server side, and you can pass session tokens and record IDs freely around between these environments to build sophisticated applications. Use your imagination.

The webservice API of Pazpar2 is described in detail in [Pazpar2 protocol\(7\)](#).

In brief, you use the 'init' command to create a session, a temporary workspace which carries information about the current search. You start a new search using the 'search' command. Once the search has been started, you can follow its progress using the 'stat', 'bytarget', 'termlist', or 'show' commands. Detailed records can be fetched using the 'record' command.

3.4 Ajax client development

Pazpar2 offers programmer a simple Web Service protocol that can be used (queried in a request/response fashion) from any, server- or client-side, programming language with an XML support. However, when programming a Web-based client to Pazpar2, to achieve certain level of interactivity and instant notification of latest changes in the result set, Ajax (Asynchronous JavaScript and XML) technology may be used. An Ajax client allows user to browse the results before the lengthy process of information retrieval from the back-end targets is finished. Blocking and waiting for usually slow back-end targets is one of the biggest functionality issues in a federated search engine.

Pz2.js

Pazpar2 comes with a small JavaScript library called pz2.js. This library is designed to simplify development of an Ajax-based pazpar2 client and alleviate programmer from the low-level details like polling the web service, fetching and parsing returned XML output or managing timers, sessions and basic state variables.

The library supports most major browsers including Firefox 1.5+, IE 6+, Safari 2+, Opera 9+ and Konqueror.

The library can work in two modes: a session-aware mode and a session-less mode.

In the session-aware mode, the library assumes that the pazpar2 daemon is contacted directly (preferably via Apache proxy to avoid security breaches) and tracks the session Ids internally.

In the session-less mode the library assumes that the client is identified on the server and the session Ids are not managed directly. This way of operation requires more sophisticated pazpar2 proxy (preferably a wrapper written in a server-side scripting language like PHP that can identify clients and relate them to open pazpar2 sessions).

Using pz2.js

Client development with the pz2.js is strongly event based and the style should be familiar to most JavaScript developers. A simple client (jsdemo) is distributed with pazpar2's source code and shows how to set-up and use pz2.js.

In short, programmer starts by instantiating the pz2 object and passing an array of parameters to the constructor. The parameter array specifies callbacks used for handling responses to the pazpar2 commands.

Additionally, the parameter array is used to configure run-time parameters of the pz2.js like polling timer time-outs, session-mode and XSLT style-sheets.

Command callbacks

Callback naming is simple and follows “on” prefix plus command name scheme (like onsearch, onshow, onrecord, ... etc.). When programmer calls a function like show or record on the pz2 object, pz2.js will keep on polling pazpar2 (until the backend targets are idle) and with each command’s response an assigned callback will be called. In case of pazpar2’s internal error an error callback is called.

```
my_paz = new pz2 (
{
    "pazpar2path": "/pazpar2/search.pz2",
    "usesessions" : true,

    // assigning command handler, turns on automatic polling
    "onshow": my_onshow,
    // polling period for each command can be specified
    "showtime": 500,

    "onterm": my_onterm,
    // facet terms are specified as a comma separated list
    "termlist": "subject,author",

    "onrecord": my_onrecord
}
);
```

Each command callback is a user defined function that takes a hash object as a parameter. The hash object contains parsed pazpar2 responses (hash members that correspond to the elements in the response XML document). Within the handler programmer further processes the data and updates the viewed document.

```
function my_onstat(data) {
    var stat = document.getElementById("stat");
    stat.innerHTML = '<span>Active clients: ' + data.activeclients
        + '/' + data.clients + ' | </span>'
        + '<span>Retrieved records: ' + data.records
        + '/' + data.hits + '</span>';
}

function my_onshow(data) {
    // data contains parsed show response
    for (var i = 0; i < data.hits[0].length; i++)
        // update page with the hits
}

function on_record(data) {
    // if detailsstylesheet parameter was set data array
    // will contain raw xml and xsl data
    Element_appendTransformResult(someDiv, data.xmlDoc, data.xslDoc);
```

```
}
```

pz2.js on runtime

The search process is initiated by calling the search method on the instantiated pz2 object. To initiate short status reports and per-target status information methods stat and bytarget have to be called accordingly.

```
my_paz.search (query, recPergPage, 'relevance');
```

Managing the results (keeping track of the browsed results page and sorting) is up to the client's programmer. At any point the show method may be called to bring up the latest result set with a different sorting criteria or range and without re-executing the search on the back-end.

```
my_paz.show (1, 10, 'relevance');
```

To retrieve a detailed record the record command is called. When calling record command one may temporarily override its default callback by specifying the handler parameter. This might be useful when retrieving raw records that need to be processed differently.

```
my_paz.record (recId, 2, 'opac', { "callback": temp_callback, "args", ←  
  caller_args});
```

PARAMATERS ARRAY

pazpar2path server path to pazpar2 (relative to the portal), when pazpar2 is installed as a package this does not have to be set

usesessions boolean, when set to true pz2.js will manage sessions internally otherwise it's left to the server-side script, default true

autoInit boolean, sets auto initialization of pazpar2 session on the object instantiation, default true, valid only if usesession is set to true

detailstylesheet path to the xsl presentation stylesheet (relative to the portal) used for the detailed record display

errorhandler callback function called on any, pazpar2 or pz2.js' internal, error

oninit specifies init response callback function

onstat specifies stat response callback function

onshow specifies show response callback function

onterm specifies termlist response callback function

onrecord specifies record response callback function

onbytarget specifies bytarget response callback function

onreset specifies reset method callback function

termlist comma separated list of facets

keepAlive ping period, should not be lower than 5000 usec

stattime default 1000 usec

termtime

showtime

bytargettime

METHODS

stop () stop activity by clearing timeouts

reset () reset state

init (sessionId) session-mode, initialize new session or pick up a session already initialized

ping () session-mode, initialize ping

search (query, num, sort, filter, showfrom) execute piggy-back search and activate polling on every command specified by assigning command callback (in the pz2 constructor)

show (start, num, sort) start or change parameters of polling for a given window of records

record (id, offset, syntax, handler) retrieve detailed or raw record. handler temporarily overrides default callback function.

termlist () start polling for termlists

bytarget () start polling for target status

stat () start polling for pazpar2 status

Pz2.js comes with a set of cross-browser helper classes and functions.

AJAX helper class

pzHttpRequest a cross-browser Ajax wrapper class

constructor (url, errorHandler) create new request for a given url

get (params, callback) asynchronous, send the request with given parameters (array) and call callback with response as parameter

post (params, data, callback) asynchronous, post arbitrary data (may be XML doc) and call callback with response as parameter

load () synchronous, returns the response for the given request

XML helper functions

document.newXmlDoc (root) create new XML document with root node as specified in parameter

document.parseXmlFromString (xmlString) create new XML document from string

document.transformToDoc (xmlDoc, xslDoc) returns new XML document as a result

Element_removeFromDoc (DOM_Element) remove element from the document

Element_emptyChildren (DOM_Element)

Element_appendTransformResult (DOM_Element, xmlDoc, xslDoc) append xsl transformation result to a DOM element

Element_appendTextNode (DOM_Element, tagName, textContent) append new text node to the element

Element_setTextContent (DOM_Element, textContent) set text content of the element

Element_getTextContent (DOM_Element) get text content of the element

Element_parseChildNodes (DOM_Element) parse all descendants into an associative array

3.5 Connecting to non-standard resources

Pazpar2 uses Z39.50 as its switchboard language -- i.e. as far as it is concerned, all resources speak Z39.50, or its webservices derivatives, SRU/SRW. It is, however, equipped to handle a broad range of different server behavior, through configurable query mapping and record normalization. If you develop configuration, stylesheets, etc., for a new type of resources, we encourage you to share your work. But you can also use Pazpar2 to connect to hundreds of resources that do not support standard protocols.

For a growing number of resources, Z39.50 is all you need. Over the last few years, a number of commercial, full-text resources have implemented Z39.50. These can be used through Pazpar2 with little or no effort. Resources that use non-standard record formats will require a bit of XSLT work, but that's all.

But what about resources that don't support Z39.50 at all? Some resources might support OpenSearch, private, XML/HTTP-based protocols, or something else entirely. Some databases exist only as web user interfaces and will require screen-scraping. Still others exist only as static files, or perhaps as databases supporting the OAI-PMH protocol. There is hope! Read on.

Index Data continues to advocate the support of open standards. We work with database vendors to support standards, so you don't have to worry about programming against non-standard services. We also provide tools (see [SimpleServer](#)) which make it comparatively easy to build gateways against servers with non-standard behavior. Again, we encourage you to share any work you do in this direction.

But the bottom line is that working with non-standard resources in metasearching is really, really hard. If you want to build a project with Pazpar2, and you need access to resources with non-standard interfaces, we can help. We run gateways to more than 2,000 popular, commercial databases and other resources, making it simple to plug them directly into Pazpar2. For a small annual fee per database, we can help

you establish connections to your licensed resources. Meanwhile, you can help! If you build your own standards-compliant gateways, host them for others, or share the code! And tell your vendors that they can save everybody money and increase the appeal of their resources by supporting standards.

There are those who will ask us why we are using Z39.50 as our switchboard language rather than a different protocol. Basically, we believe that Z39.50 is presently the most widely implemented information retrieval protocol that has the level of functionality required to support a good metasearching experience (structured searching, structured, well-defined results). It is also compact and efficient, and there is a very broad range of tools available to implement it.

3.6 Unicode Compliance

Pazpar2 is Unicode compliant and language and locale aware but relies on character encoding for the targets to be specified correctly if the targets themselves are not UTF-8 based (most aren't). Just a few bad behaving targets can spoil the search experience considerably if for example Greek, Russian or otherwise non 7-bit ASCII search terms are entered. In these cases some targets return records irrelevant to the query, and the result screens will be cluttered with noise.

While noise from misbehaving targets can not be removed, it can be reduced using truly Unicode based ranking. This is an option which is available to the system administrator if ICU support is compiled into Pazpar2, see Chapter 2 for details.

In addition, the ICU tokenization and normalization rules must be defined in the master configuration file described in the section called “**server**”.

Chapter 4

Reference

The material in this chapter is drawn directly from the individual manual entries.

4.1 Pazpar2

pazpar2 — Metasearch daemon.

Synopsis

```
pazpar2 [-d] [-D] [-f config] [-h ip:port] [-l logfile] [-p pidfile] [-t] [-u uid] [-V]
[-v level] [-X] [-install] [-remove]
```

DESCRIPTION

pazpar2 is the Pazpar2 Metasearch daemon and server. In normal operation it acts as a simple HTTP server which serves the Pazpar2 protocol. The HTTP listener address may be given on the command line using option `-h` or in the main configuration file. The main configuration must be specified using option `-f`.

OPTIONS

- `-d` Enables dump of XML records to the current log file. It is useful if stylesheets are being debugged.
This option may also be used together with option `-t` in which case the configuration, after include processing, will be dumped to stdout.
 - `-D` Puts the Pazpar2 server in the background.
 - `-f config` Specifies main configuration. This option must be specified in order for Pazpar2 to operate normally.
-

-
- h *ip:port*** Specifies the HTTP listener binding address. The *ip* may be a hostname or @ for "any" address. The *port* is an integer.
 - l *logfile*** Specifies log file. The log file must be specified when Pazpar2 is running in the background (-D).
 - p *pidfile*** Specifies PID file. If Pazpar2 is started and configured properly the file given holds the process ID of the Pazpar2 process.
 - t** Checks parameters and configuration. No service or daemon is started. Useful for checking a new configuration before a Pazpar2 is restarted.
The configuration, after include processing, may also be dumped to stdout by supplying option **-d** as well.

Note

In Pazpar2 1.2 and earlier releases, option **-t** specified a local target settings file.

- u *uid*** Makes the Pazpar2 server change user ID to the *uid* given. This, normally, requires root privilege.
- v** Shows Pazpar2 version and versions of some of the components that it is using (ICU and YAZ). Pazpar2 will exit immediately after displaying the version information (no daemon started).
- v *level*** Sets log level (YAZ log level system).
- x** Makes the Pazpar2 server operate in debugging mode. This prevents Pazpar2 from making separate threads and processes. This option should not be used in production.
- install** This is an option which is only recognized on Windows. It installs Pazpar2 as a Windows Service.

Note

Pazpar2 only supports Windows Service options if Pazpar2 is linked against YAZ 3.0.29 or later.

- remove** This is an option which is only recognized on Windows. It removes a Pazpar2 - Windows Service.

EXAMPLES

The Debian package of pazpar2 starts the server with:

```
pazpar2 -D -f /etc/pazpar2/pazpar2.cfg -l /var/log/pazpar2.log -p /var/ ↵  
run/pazpar2.pid -u nobody
```

(one line).

This will put pazpar2 in the background (-D), read config from from /etc/pazpar2/pazpar2.cfg, log messages to /var/log/pazpar2.log, create PID file /var/run/pazpar2.pid. When the daemon is properly started, the server will change effective user ID to nobody.

The server can be terminated with:

```
kill `cat /var/run/pazpar2.pid`
```

If Pazpar2 is to be debugged using GDB, we use option `-X`:

```
cd pazpar2/src
gdb ./pazpar2
(gdb) run -X -f ../etc/pazpar2.cfg
```

FILES

`/usr/sbin/pazpar2`: pazpar2 daemon

`/usr/share/pazpar2`: pazpar2 shared files

`/etc/pazpar2`: pazpar2 config area

SEE ALSO

Pazpar2 configuration: `pazpar2_conf(5)`

Pazpar2 protocol: `pazpar2_protocol(7)`

4.2 Pazpar2 protocol

`pazpar2_protocol` — The webservice protocol of Pazpar2

DESCRIPTION

Webservice requests are any that refer to filename "search.pz2". Arguments are GET-style parameters. Argument 'command' is always required and specifies the operation to perform. Any request not recognized as a webservice request is forwarded to the HTTP server specified in the configuration using the proxy setting. This way, a regular webserver can host the user interface (itself dynamic or static HTML), and AJAX-style calls can be used from JS (or any other client-based scripting environment) to interact with the search logic in Pazpar2.

Each command is described in sub sections to follow.

init

Initializes a session. Returns session ID to be used in subsequent requests.

Example:

```
search.pz2?command=init
```

Response:

```
<init>
  <status>OK</status>
  <session>2044502273</session>
</init>
```

The init command may take a number of setting parameters, similar to the 'settings' command described below. These settings are immediately applied to the new session. Other parameters for init are:

clear If this is defined and the value is non-zero, the session will not use the predefined databases in the configuration; only those specified in the settings parameters (per session databases).

service If this is defined it specifies a service ID. Makes the session use the service with this ID. If this is setting is omitted, the session will use the unnamed service in the Pazpar2 configuration.

ping

Keeps a session alive. An idle session will time out after one minute. The ping command can be used to keep the session alive absent other activity. It is suggested that any browser client have a simple alarm handler which sends a ping every 50 seconds or so once a session has been initialized.

Example:

```
search.pz?command=ping&session=2044502273
```

Response:

```
<ping>
  <status>OK</status>
</ping>
```

settings

The settings command applies session-specific settings to one or more databases. A typical function of this is to enable access to restricted resources for registered users, or to set a user- or library-specific username/-password to use against a target. Each setting parameter has the form name[target]=value, where name is the name of the setting (e.g. pz:authentication), target is a target ID, or possibly a wildcard, and value is the desired value for the setting.

Because the settings command manipulates potentially sensitive information, it is possible to configure Pazpar2 to only allow access to this command from a trusted site -- usually from server-side scripting, which in turn is responsible for authenticating the user, and possibly determining which resources he has access to, etc.

Note

As a shortcut, it is also possible to override settings directly in the init command.

Example:

```
search.pz?command=settings&session=2044502273&pz:allow[search.com ↔  
:210/db1]=1
```

Response:

```
<settings>  
  <status>OK</status>  
</settings>
```

search

Launches a search, parameters:

session Session ID

query CCL query

filter Limits the search to a given set of targets specified by the filter. The filter consists a comma separated list of `setting+operator+args` pairs. The setting is a Pazpar2 setting (such as `pz:id`). The operator is either `=` (string match) or `~` (substring match). The args is a list of values separated by `|` (or `,` one of the values). The idea is that only targets with a setting matching one of the values given will be included in the search.

startrecs Specifies the first record to retrieve from each target. The first record in a result set for a target is numbered 0, next record is numbered 2. By default `maxrecs` is 0.

maxrecs Specifies the maximum number of records to retrieve from each target. The default value is 100. This setting has same meaning as per-target setting `pz:maxrecs` . If `pz:maxrecs` is set, it takes precedence over argument `maxrecs`.

Example:

```
search.pz2?session=2044502273&command=search&query=computer+science
```

Response:

```
<search>  
  <status>OK</status>  
</search>
```

stat

Provides status information about an ongoing search. Parameters:

session Session ID

Example:

```
search.pz2?session=2044502273&command=stat
```

Output

```
<stat>
  <activeclients>3</activeclients>
  <hits>7</hits>                -- Total hitcount
  <records>7</records>          -- Total number of records fetched in ↔
    last query
  <clients>1</clients>         -- Total number of associated clients
  <unconnected>0</unconnected> -- Number of disconnected clients
  <connecting>0</connecting>  -- Number of clients in connecting state
  <initializing>0</initializing> -- Number of clients initializing
  <searching>0</searching>    -- ... searching
  <presenting>0</presenting>  -- ... presenting
  <idle>1</idle>              -- ... idle (not doing anything)
  <failed>0</failed>          -- ... Connection failed
  <error>0</error>           -- ... Error was produced somewhere
</stat>
```

show

Shows records retrieved. Parameters:

session Session ID

start First record to show - 0-indexed.

num Number of records to show If omitted, 20 is used.

block If block is set to 1, the command will hang until there are records ready to display. Use this to show first records rapidly without requiring rapid polling.

sort Specifies sort criteria. The argument is a comma-separated list (no whitespace allowed) of sort fields, with the highest-priority field first. A sort field may be followed by a colon followed by the number '0' or '1', indicating whether results should be sorted in increasing or decreasing order according to that field. 0==Decreasing is the default. Sort field names can be any field name designated as a sort field in the pazpar2.cfg file, or the special name 'relevance'.

Example:

```
search.pz2?session=2044502273&command=show&start=0&num=2&sort=title:1
```

Output:

```
<show>
  <status>OK</status>
  <activeclients>3</activeclients> -- How many clients are still ↔
    working
```

```
<merged>6</merged>           -- Number of merged records
<total>7</total>             -- Total of all hitcounts
<start>0</start>             -- The start number you requested
<num>2</num>                 -- Number of records retrieved
<hit>
  <md-title>How to program a computer, by Jack Collins</md-title>
  <count>2</count>           -- Number of merged records
  <recid>6</recid>          -- Record ID for this record
</hit>
<hit>
  <md-title>
Computer processing of dynamic images from an Anger scintillation camera ↔
  :
the proceedings of a workshop /
  </md-title>
  <recid>2</recid>
</hit>
</show>
```

record

Retrieves a detailed record. Unlike the **show** command, this command returns metadata records before merging takes place. Parameters:

session Session ID

id record ID as provided by the **show** command.

offset This optional parameter is an integer which, when given, makes Pazpar2 return the raw record for a target. The raw record from first target is numbered 0, second numbered 1, etc. When a raw record is returned Pazpar2 will XSLT transform the record but an XML version is returned. All ISO2709 records are returned as MARCXML. OPAC records are returned as YAZ' OPAC with an MARCXML sibling.

When offset is not given the Pazpar2 metadata for the record is returned and with metadata for each targets' data specified in a 'location' list.

syntax This optional parameter is the record syntax used for raw transfer (i.e. when offset is specified). If syntax is not given, but offset is used, the value of pz:requestsyntax is used.

esn This optional parameter is the element set name used to retrieval of a raw record (i.e. when offset is specified). If esn is not given, but offset is used, the value of pz:elements is used.

binary This optional parameter enables "binary" response for retrieval of a raw record (i.e. when offset is specified). For binary responses the record is *not* converted to XML and the HTTP content type is application/octet-stream.

Example:

```
search.pz2?session=605047297&command=record&id=3
```

Example output:

```
<record>
  <md-title>
    The Puget Sound Region : a portfolio of thematic computer maps /
  </md-title>
  <md-date>1974</md-date>
  <md-author>Mairs, John W.</md-author>
  <md-subject>Cartography</md-subject>
</record>
```

termlist

Retrieves term list(s). Parameters:

session Session Id.

name comma-separated list of termlist names (default "subject")

Example:

```
search.pz2?session=2044502273&command=termlist&name=author,subject
```

Output:

```
<termlist>
  <activeclients>3</activeclients>
  <list name="author">
    <term>
      <name>Donald Knuth</name>
      <frequency>10</frequency>
    </term>
    <term>
      <name>Robert Pirsig</name>
      <frequency>2</frequency>
    </term>
  </list>
  <list name="subject">
    <term>
      <name>Computer programming</name>
      <frequency>10</frequency>
    </term>
  </list>
</termlist>
```

For the special termlist name "xtargets", results are returned about the targets which have returned the most hits. The 'term' subtree has additional elements, specifically a state and diagnostic field (in the example below, a target ID is returned in place of 'name'. This may or may not change later.

Example

```
<term>
  <name>library2.mcmaster.ca</name>
  <frequency>11734</frequency>           -- Number of hits
  <state>Client_Idle</state>             -- See the description of 'bytarget' ↔
    below
  <diagnostic>0</diagnostic>             -- Z39.50 diagnostic codes
</term>
```

bytarget

Returns information about the status of each active client. Parameters:

session Session Id.

Example:

```
search.pz2?session=605047297&command=bytarget&id=3
```

Example output:

```
<bytarget>
  <status>OK</status>
  <target>
    <id>z3950.loc.gov/voyager/</id>
    <hits>10000</hits>
    <diagnostic>0</diagnostic>
    <records>65</records>
    <state>Client_Presenting</state>
  </target>
  <!-- ... more target nodes below as necessary -->
</bytarget>
```

The following client states are defined: Client_Connecting, Client_Connected, Client_Idle, Client_Initializing, Client_Searching, Client_Searching, Client_Presenting, Client_Error, Client_Failed, Client_Disconnected, Client_Stopped, Client_Continue.

SEE ALSO

Pazpar2: pazpar2(8)

Pazpar2 Configuration: pazpar2_conf(5)

4.3 Pazpar2 conf

pazpar2_conf — Pazpar2 Configuration

Synopsis

pazpar2.conf

DESCRIPTION

The Pazpar2 configuration file, together with any referenced XSLT files, govern Pazpar2's behavior as a client, and control the normalization and extraction of data elements from incoming result records, for the purposes of merging, sorting, facet analysis, and display.

The file is specified using the option `-f` on the Pazpar2 command line. There is not presently a way to reload the configuration file without restarting Pazpar2, although this will most likely be added some time in the future.

FORMAT

The configuration file is XML-structured. It must be valid XML. All elements specific to Pazpar2 should belong to the namespace `http://www.indexdata.com/pazpar2/1.0` (this is assumed in the following examples). The root element is named `pazpar2`. Under the root element are a number of elements which group categories of information. The categories are described below.

server

This section governs overall behavior of the server. The data elements are described below. From Pazpar2 version 1.2 this is a repeatable element.

listen Configures the webservice -- this controls how you can connect to Pazpar2 from your browser or server-side code. The attributes 'host' and 'port' control the binding of the server. The 'host' attribute can be used to bind the server to a secondary IP address of your system, enabling you to run Pazpar2 on port 80 alongside a conventional web server. You can override this setting on the command line using the option `-h`.

proxy If this item is given, Pazpar2 will forward all incoming HTTP requests that do not contain the filename 'search.pz2' to the host and port specified using the 'host' and 'port' attributes. The 'myurl' attribute is required, and should provide the base URL of the server. Generally, the HTTP URL for the host specified in the 'listen' parameter. This functionality is crucial if you wish to use Pazpar2 in conjunction with browser-based code (JS, Flash, applets, etc.) which operates in a security sandbox. Such code can only connect to the same server from which the enclosing HTML page originated. Pazpar2's proxy functionality enables you to host all of the main pages (plus images, CSS, etc) of your application on a conventional webserver, while efficiently processing webservice requests for metasearch status, results, etc.

relevance / sort / mergekey Specifies character set normalization for relevancy / sorting and the mergekey - for the server. These definitions serve as default for services that don't have these given. For the meaning of these settings refer to the "relevance" element inside service.

settings Specifies target settings for the server.. These settings serves as default for all services which don't have these given. The settings element requires one attribute 'src' which specifies a settings file or a directory . If a directory is given all files with suffix .xml is read from this directory. Refer to the section called "**TARGET SETTINGS**" for more information.

service This nested element controls the behavior of Pazpar2 with respect to your data model. In Pazpar2, incoming records are normalized, using XSLT, into an internal representation. The 'service' section controls the further processing and extraction of data from the internal representation, primarily through the 'metadata' sub-element.

Pazpar2 version 1.2 and later allows multiple service elements. Multiple services must be given a unique ID by specifying attribute `id`. A single service may be unnamed (service ID omitted). The service ID is referred to in the `init` webservice command's `service` parameter.

metadata One of these elements is required for every data element in the internal representation of the record (see Section 3.2. It governs subsequent processing as pertains to sorting, relevance ranking, merging, and display of data elements. It supports the following attributes:

name This is the name of the data element. It is matched against the 'type' attribute of the 'metadata' element in the normalized record. A warning is produced if metadata elements with an unknown name are found in the normalized record. This name is also used to represent data elements in the records returned by the webservice API, and to name sort lists and browse facets.

type The type of data element. This value governs any normalization or special processing that might take place on an element. Possible values are 'generic' (basic string), 'year' (a range is computed if multiple years are found in the record). Note: This list is likely to increase in the future.

brief If this is set to 'yes', then the data element is includes in brief records in the webservice API. Note that this only makes sense for metadata elements that are merged (see below). The default value is 'no'.

sortkey Specifies that this data element is to be used for sorting. The possible values are 'numeric' (numeric value), 'skiparticle' (string; skip common, leading articles), and 'no' (no sorting). The default value is 'no'.

rank Specifies that this element is to be used to help rank records against the user's query (when ranking is requested). The value is an integer, used as a multiplier against the basic TF*IDF score. A value of 1 is the base, higher values give additional weight to elements of this type. The default is '0', which excludes this element from the rank calculation.

termlist Specifies that this element is to be used as a termlist, or browse facet. Values are tabulated from incoming records, and a highscore of values (with their associated frequency) is made available to the client through the webservice API. The possible values are 'yes' and 'no' (default).

merge This governs whether, and how elements are extracted from individual records and merged into cluster records. The possible values are: 'unique' (include all unique elements), 'longest' (include only the longest element (strlen), 'range' (calculate a range of values across all matching records), 'all' (include all elements), or 'no' (don't merge; this is the default);

mergekey If set to 'required', the value of this metadata element is appended to the resulting mergekey if the metadata is present in a record instance. If the metadata element is not

present, the a unique mergekey will be generated instead.

If set to 'optional', the value of this metadata element is appended to the resulting mergekey if the the metadata is present in a record instance. If the metadata is not present, it will be empty.

If set to 'no' or the mergekey attribute is omitted, the metadata will not be used in the creation of a mergekey.

setting This attribute allows you to make use of static database settings in the processing of records. Three possible values are allowed. 'no' is the default and doesn't do anything. 'postproc' copies the value of a setting with the same name into the output of the normalization stylesheet(s). 'parameter' makes the value of a setting with the same name available as a parameter to the normalization stylesheet, so you can further process the value inside of the stylesheet, or use the value to decide how to deal with other data values.

The purpose of using settings in this way can either be to control the behavior of normalization stylesheet in a database- dependent way, or to easily make database-dependent values available to display-logic in your user interface, without having to implement complicated interactions between the user interface and your configuration system.

relevance Specifies ICU tokenization and transformation rules for tokens that are used in Pazpar2's relevance ranking. The 'id' attribute is currently not used, and the 'locale' attribute must be set to one of the locale strings defined in ICU. The child elements listed below can be in any order, except the 'index' element which logically belongs to the end of the list. The stated tokenization, transformation and charmapping instructions are performed in order from top to bottom.

casemap The attribute 'rule' defines the direction of the per-character casemapping, allowed values are "l" (lower), "u" (upper), "t" (title).

transform Normalization and transformation of tokens follows the rules defined in the 'rule' attribute. For possible values we refer to the extensive ICU documentation found at the [ICU transformation](#) home page. Set filtering principles are explained at the [ICU set and filtering](#) page.

tokenize Tokenization is the only rule in the ICU chain which splits one token into multiple tokens. The 'rule' attribute may have the following values: "s" (sentence), "l" (line-break), "w" (word), and "c" (character), the later probably not being very useful in a pruning Pazpar2 installation.

From Pazpar2 version 1.1 the ICU wrapper from YAZ is used. Refer to the [yaz-icu](#) utility for more information.

sort Specifies ICU tokenization and transformation rules for tokens that are used in Pazpar2's sorting. The contents is similar to that of `relevance`.

mergekey Specifies ICU tokenization and transformation rules for tokens that are used in Pazpar2's mergekey. The contents is similar to that of `relevance`.

settings Specifies target settings for this service. Refer to the section called "[TARGET SETTINGS](#)".

timeout Specifies timeout parameters for this service. The `timeout` element supports the following attributes: `session`, `z3950_operation`, `z3950_session` which specifies 'session timeout', 'Z39.50 operation timeout', 'Z39.50 session timeout' respectively. The Z39.50 operation timeout is the time Pazpar2 will wait for an active Z39.50/SRU operation before it gives up (times out). The Z39.50 session time out is the time Pazpar2 will keep the session alive for an idle session (no operation).

The following is recommended but not required: z3950_operation (30) < session (60) < z3950_session (180) . The default values are given in parantheses.

EXAMPLE

Below is a working example configuration:

```
<?xml version="1.0" encoding="UTF-8"?>
<pazpar2 xmlns="http://www.indexdata.com/pazpar2/1.0">

  <server>
    <listen port="9004"/>
    <service>
      <metadata name="title" brief="yes" sortkey="skiparticle"
        merge="longest" rank="6"/>
      <metadata name="isbn" merge="unique"/>
      <metadata name="date" brief="yes" sortkey="numeric"
        type="year" merge="range" termlist="yes"/>
      <metadata name="author" brief="yes" termlist="yes"
        merge="longest" rank="2"/>
      <metadata name="subject" merge="unique" termlist="yes" rank="3"/>
      <metadata name="url" merge="unique"/>
      <relevance>
        <icu_chain id="relevance" locale="el">
          <transform rule="[:Control:] Any-Remove"/>
          <tokenize rule="1"/>
          <transform rule="[:WhiteSpace:][:Punctuation:]] Remove"/>
          <casemap rule="1"/>
        </icu_chain>
      </relevance>
      <settings src="mysettings"/>
      <timeout session="60"/>
    </service>
  </server>
</pazpar2>
```

INCLUDE FACILITY

The XML configuration may be partitioned into multiple files by using the `include` element which takes a single attribute, `src`. The of the `src` attribute is regular Shell like glob-pattern. For example,

```
<include src="/etc/pazpar2/conf.d/*.xml"/>
```

The include facility requires Pazpar2 version 1.2.

TARGET SETTINGS

Pazpar2 features a cunning scheme by which you can associate various kinds of attributes, or settings with search targets. This can be done through XML files which are read at startup; each file can associate one or more settings with one or more targets. The file format is generic in nature, designed to support a wide range of application requirements. The settings can be purely technical things, like, how to perform a title search against a given target, or it can associate arbitrary name=value pairs with groups of targets -- for instance, if you would like to place all commercial full-text bases in one group for selection purposes, or you would like to control what targets are accessible to users by default. Per-database settings values can even be used to drive sorting, facet/termlist generation, or end-user interface display logic.

During startup, Pazpar2 will recursively read a specified directory (can be identified in the pazpar2.cfg file or on the command line), and process any settings files found therein.

Clients of the Pazpar2 webservice interface can selectively override settings for individual targets within the scope of one session. This can be used in conjunction with an external authentication system to determine which resources are to be accessible to which users. Pazpar2 itself has no notion of end-users, and so can be used in conjunction with any type of authentication system. Similarly, the authentication tokens submitted to access-controlled search targets can similarly be overridden, to allow use of Pazpar2 in a consortial or multi-library environment, where different end-users may need to be represented to some search targets in different ways. This, again, can be managed using an external database or other lookup mechanism. Setting overrides can be performed either using the **init** or the **settings** webservice command.

In fact, every setting that applies to a database (except pz:id, which can only be used for filtering targets to use for a search) can be overridden on a per-session basis. This allows the client to override specific CCL fields for searching, etc., to meet the needs of a session or user.

Finally, as an extreme case of this, the webservice client can introduce entirely new targets, on the fly, as part of the **init** or **settings** command. This is useful if you desire to manage information about your search targets in a separate application such as a database. You do not need any static settings file whatsoever to run Pazpar2 -- as long as the webservice client is prepared to supply the necessary information at the beginning of every session.

Note

The following discussion of practical issues related to session and settings management are cast in terms of a user interface based on Ajax/Javascript technology. It would apply equally well to many other kinds of browser-based logic.

Typically, a Javascript client is not allowed to directly alter the parameters of a session. There are two reasons for this. One has to do with access to information; typically, information about a user will be stored in a system on the server side, or it will be accessible in some way from the server. However, since the Javascript client cannot be entirely trusted (some hostile agent might in fact 'pretend' to be a regular ws client), it is more robust to control session settings from scripting that you run as part of your webserver. Typically, this can be handled during the session initialization, as follows:

Step 1: The Javascript client loads, and asks the webserver for a new Pazpar2 session ID. This can be done using a Javascript call, for instance. Note that it is possible to submit Ajax HTTPXMLRequest calls either to Pazpar2 or to the webserver that Pazpar2 is proxying for. See (XXX Insert link to Pazpar2 protocol).

Step 2: Code on the webserver authenticates the user, by database lookup, LDAP access, NCIP, etc. Determines which resources the user has access to, and any user-specific parameters that are to be applied during this session.

Step 3: The webserver initializes a new Pazpar2 settings, and sets user-specific parameters as necessary, using the `init webservice` command. A new session ID is returned.

Step 4: The webserver returns this session ID to the Javascript client, which then uses the session ID to submit searches, show results, etc.

Step 5: When the Javascript client ceases to use the session, Pazpar2 destroys any session-specific information.

SETTINGS FILE FORMAT

Each file contains a root element named `<settings>`. It may contain one or more `<set>` elements. The settings and set elements may contain the following attributes. Attributes in the set node overrides those in the setting root element. Each set node must specify (directly, or inherited from the parent node) at least a target, name, and value.

target This specifies the search target to which this setting should be applied. Targets are identified by their Z39.50 URL, generally including the host, port, and database name, (e.g. `bagel.indexdata.com:210/marc`). Two wildcard forms are accepted: `*` (asterisk) matches all known targets; `bagel.indexdata.com:210/*` matches all known databases on the given host.

A precedence system determines what happens if there are overlapping values for the same setting name for the same target. A setting for a specific target name overrides a setting which specifies target using a wildcard. This makes it easy to set defaults for all targets, and then override them for specific targets or hosts. If there are multiple overlapping settings with the same name and target value, the 'precedence' attribute determines what happens.

name The name of the setting. This can be anything you like. However, Pazpar2 reserves a number of setting names for specific purposes, all starting with 'pz:', and it is a good idea to avoid that prefix if you make up your own setting names. See below for a list of reserved variables.

value The value of the setting. Generally, this can be anything you want -- however, some of the reserved settings may expect specific kinds of values.

precedence This should be an integer. If not provided, the default value is 0. If two (or more) settings have the same content for target and name, the precedence value determines the outcome. If both settings have the same precedence value, they are both applied to the target(s). If one has a higher value, then the value of that setting is applied, and the other one is ignored.

By setting defaults for target, name, or value in the root settings node, you can use the settings files in many different ways. For instance, you can use a single file to set defaults for many different settings, like search fields, retrieval syntaxes, etc. You can have one file per server, which groups settings for that server or target. You could also have one file which associates a number of targets with a given setting, for instance, to associate many databases with a given category or class that makes sense within your application.

The following examples illustrate uses of the settings system to associate settings with targets to meet different requirements.

The example below associates a set of default values that can be used across many targets. Note the wildcard for targets. This associates the given settings with all targets for which no other information is provided.

```
<settings target="*">

  <!-- This file introduces default settings for pazpar2 -->

  <!-- mapping for unqualified search -->
  <set name="pz:cclmap:term" value="u=1016 t=l,r s=al"/>

  <!-- field-specific mappings -->
  <set name="pz:cclmap:ti" value="u=4 s=al"/>
  <set name="pz:cclmap:su" value="u=21 s=al"/>
  <set name="pz:cclmap:isbn" value="u=7"/>
  <set name="pz:cclmap:issn" value="u=8"/>
  <set name="pz:cclmap:date" value="u=30 r=r"/>

  <!-- Retrieval settings -->

  <set name="pz:requestsyntax" value="marc21"/>
  <set name="pz:elements" value="F"/>

  <!-- Query encoding -->
  <set name="pz:queryencoding" value="iso-8859-1"/>

  <!-- Result normalization settings -->

  <set name="pz:nativesyntax" value="iso2709"/>
  <set name="pz:xslt" value="../etc/marc21.xsl"/>

</settings>
```

The next example shows certain settings overridden for one target, one which returns XML records containing DublinCore elements, and which furthermore requires a username/password.

```
<settings target="funkytarget.com:210/db1">
  <set name="pz:requestsyntax" value="xml"/>
  <set name="pz:nativesyntax" value="xml"/>
  <set name="pz:xslt" value="../etc/dublincore.xsl"/>

  <set name="pz:authentication" value="myuser/password"/>
</settings>
```

The following example associates a specific name/value combination with a number of targets. The targets below are access-restricted, and can only be used by users with special credentials.

```
<settings name="pz:allow" value="0">
  <set target="funkytarget.com:210/*"/>
  <set target="commercial.com:2100/expensiveDb"/>
</settings>
```

RESERVED SETTING NAMES

The following setting names are reserved by Pazpar2 to control the behavior of the client function.

pz:cclmap:xxx This establishes a CCL field definition or other setting, for the purpose of mapping end-user queries. XXX is the field or setting name, and the value of the setting provides parameters (e.g. parameters to send to the server, etc.). Please consult the YAZ manual for a full overview of the many capabilities of the powerful and flexible CCL parser.

Note that it is easy to establish a set of default parameters, and then override them individually for a given target.

pz:requestsyntax This specifies the record syntax to use when requesting records from a given server. The value can be a symbolic name like marc21 or xml, or it can be a Z39.50-style dot-separated OID.

pz:elements The element set name to be used when retrieving records from a server.

pz:piggyback Piggybacking enables the server to retrieve records from the server as part of the search response in Z39.50. Almost all servers support this (or fail it gracefully), but a few servers will produce undesirable results. Set to '1' to enable piggybacking, '0' to disable it. Default is 1 (piggybacking enabled).

pz:nativesyntax The representation (syntax) of the retrieval records. Currently recognized values are iso2709 and xml.

For iso2709, can also specify a native character set, e.g. "iso2709;latin-1". If no character set is provided, MARC-8 is assumed.

If pz:nativesyntax is not specified, pazpar2 will attempt to determine the value based on the response from the server.

pz:queryencoding The encoding of the search terms that a target accepts. Most targets do not honor UTF-8 in which case this needs to be specified. Each term in a query will be converted if this setting is given.

pz:negotiation_charset Sets character set for Z39.50 negotiation. Most targets do not support this, and some will even close connection if set (crash on server side or similar). If set, you probably want to set it to UTF-8.

pz:xslt Is a comma separated list of files that specifies how to convert incoming records to the internal representation.

The suffix of each file specifies the kind of transformation. Suffix ".xsl" makes an XSL transform. Suffix ".mmap" will use the MMAP transform (described below).

The special value "auto" will use a file which is the **pz:requestsyntax**'s value followed by ' .xsl' .

When mapping MARC records, XSLT can be bypassed for increased performance with the alternate "MARC map" format. Provide the path of a file with extension ".mmap" containing on each line:

```
<field> <subfield> <metadata element>
```

For example:

```
245 a title
500 $ description
773 * citation
```

To map the field value specify a subfield of '\$'. To store a concatenation of all subfields, specify a subfield of '*'.

pz:authentication Sets an authentication string for a given server. See the section on authorization and authentication for discussion.

pz:allow Allows or denies access to the resources it is applied to. Possible values are '0' and '1'. The default is '1' (allow access to this resource). See the manual section on authorization and authentication for discussion about how to use this setting.

pz:maxrecs Controls the maximum number of records to be retrieved from a server. The default is 100.

pz:id This setting can't be 'set' -- it contains the ID (normally ZURL) for a given target, and is useful for filtering -- specifically when you want to select one or more specific targets in the search command.

pz:zproxy The 'pz:zproxy' setting has the value syntax 'host.internet.address:port', it is used to tunnel Z39.50 requests through the named Z39.50 proxy.

pz:apduolog If the 'pz:apduolog' setting is defined and has other value than 0, then Z39.50 APDUs are written to the log.

pz:sru This setting enables SRU/SRW support. It has three possible settings. 'get', enables SRU access through GET requests. 'post' enables SRU/POST support, less commonly supported, but useful if very large requests are to be submitted. 'srw' enables the SRW variation of the protocol.

pz:sru_version This allows SRU version to be specified. If unset Pazpar2 will the default of YAZ (currently 1.2). Should be set to 1.1 or 1.2.

pz:pqf_prefix Allows you to specify an arbitrary PQF query language substring. The provided string is prefixed the user's query after it has been normalized to PQF internally in pazpar2. This allows you to attach complex 'filters' to queries for a given target, sometimes necessary to select sub-catalogs in union catalog systems, etc.

pz:pqf_strftime Allows you to extend a query with dates and operators. The provided string allows certain substitutions and serves as a format string. The special two character sequence '%' gets converted to the original query. Other characters leading with the percent sign are conversions supported by strftime. All other characters are copied verbatim. For example, the string @and @attr 1=30 @attr 2=3 %Y %% would search for current year combined with the original PQF (%%).

pz:sort Specifies sort criteria to be applied to the result set. Only works for targets which support the sort service.

pz:recordfilter Specifies a filter which allows Pazpar2 to only include records that meet a certain criteria in a result. Unmatched records will be ignored. The filter takes the form name[~value] , which will include only records with metadata element (name) that has the substring (value) given. If value is omitted all records with the metadata present will be included.

SEE ALSO

pazpar2(8) yaz-icu(1) pazpar2_protocol(7)

Appendix A

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