

z/OS



# Text Search: NetQuestion Solution

*Version 1.2*



z/OS



# Text Search: NetQuestion Solution

*Version 1.2*

**Note!**

Before using this information and the product it supports, be sure to read the general information under “Appendix B. Notices” on page 19.

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This edition applies to Version 1.2 of z/OS (5694-A01) and to all subsequent releases and modifications until otherwise indicated in new editions.

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## About this book

The NetQuestion Solution is part of the IBM z/OS Text Search element. The Program Directory for z/OS Version 1.2, GI10-4001, describes the SMP/E installation.

This book describes the final installation of the NetQuestion Solution and what to do after installation to produce a Web server search service. It also contains migration information to help you move existing applications written for the z/OS NetQuestion element to the z/OS Text Search element.

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## Who should read this book

This book is intended for Web masters who create and maintain Web sites and want to keep these sites searchable. This book is also for application programmers, who want to migrate existing z/OS-based Web applications to work with the NetQuestion Solution.

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## Conventions used in this book

The NetQuestion element shipped with z/OS Version 1.2 refers to the following FMIDs: HIMN110, HIMN120, and HIMN130.

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## The Text Search library

The following books are available for z/OS Text Search:

- z/OS Text Search: Installation and Administration for the Text Search Engine, SH12-6716
- z/OS Text Search: Programming the Text Search Engine, SH12-6717
- z/OS Text Search: NetQuestion Solution, SH12-6718



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## Chapter 1. Introduction

The NetQuestion Solution is an application layer built on top of the IBM Text Search Engine. It provides a powerful search application that allows you to build intelligent Internet or intranet Web sites. It is an ideal search solution for information that changes frequently, needs to be indexed quickly and efficiently, and made available almost immediately for searching.

The NetQuestion Solution includes the necessary CGI scripts, HTML forms, and HTML processing routines for constructing a Web search service. You can use these as delivered or customize them to the search requirements of your Web site.

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### NetQuestion Solution overview

Figure 1 shows the NetQuestion Solution. The NetQuestion Solution provides a CGI script that manages the communication between the Text Search Engine and the Web browser.

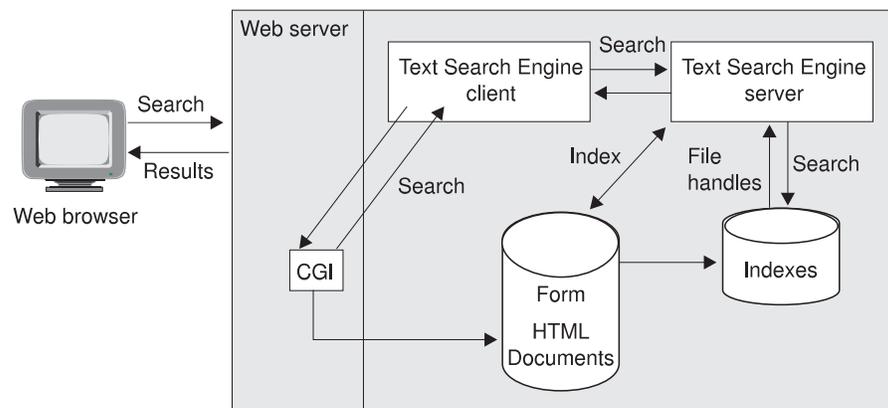


Figure 1. The NetQuestion Solution

The documents to be indexed are available on a local Web server. The Text Search Engine is used to build an index for them. When a search is started from the search form on a Web browser, the Web server uses the delivered CGI script to pass the search query to the Text Search Engine. The results of the search, in the form of file handles, are passed back to the CGI script. It transforms the file handles into URLs and then dynamically generates the search results page and displays this on the Web browser.

---

### Indexing services provided by the Text Search Engine

The Text Search Engine provides the services for creating and maintaining searchable indexes used by the Web search service. The NetQuestion Solution makes a number of assumptions about the search requirements for a typical Web search service including the types of documents to be indexed (HTML documents), the type of index used (a precise normalized index), and the use of a preconfigured instance of the Text Search Engine search service. These assumptions are reflected

in a number of default settings for Text Search Engine parameters and commands, such as default parameters for imorulix, a default library service, imolssht, and a default search instance name, inqsrch.

Additional index types and document formats are supported by the Text Search Engine. For more information on these index types and document formats, see *z/OS Text Search: Installation and Administration for the Text Search Engine*.

---

## Web search services provided by the search CGI scripts

The CGI scripts, HTML forms, and associated Library Services delivered with the NetQuestion Solution provide the search services on the Web site. Table 1 contains the names of these elements.

*Table 1. HTML forms and CGI scripts*

HTML form	CGI script	Library Services
For SBCS languages: search.html, asearch.html	inqsea	imolssht
	inqseait	
For DBCS languages: dbsearch.html, dbsearchJ.html, dbsearchc.html	nqsmcgi.c	

The compiled CGI scripts and the search forms provide the following Web search service functions:

- Free-text search  
The search query is made up of words that describe what you are looking for. Free-text search is not available for double-byte character set (DBCS) languages.
- Boolean search  
Terms in the search query are connected using the logical connectors "must contain", "or", or "must not contain". Boolean search is provided on the form asearch.html and on the forms for the DBCS languages.
- Phrase searching  
You can include phrases in both boolean and free-text searches by enclosing the phrase in quotation marks.
- Character masking  
Use masking characters as placeholders for zero or more characters in a search term:
  - '\*' as a placeholder for zero or more characters
  - '%' as a placeholder for exactly one character

Character masking is only possible in a boolean search.

The file nqsmcgi.c contains sample code for a search CGI. You can use it to help you write your own search CGI. The sample code does not contain the same functionality as the compiled CGI scripts, inqsea and inqseait. Instead, nqsmcgi.c demonstrates how you can extend the CGI script to use any of the search utilities provided by the Text Search Engine. If you compile and link nqsmcgi.c as delivered, it can be called from a Web browser and it returns a search input form. For information on customizing the Web search services, see "Chapter 5. Customizing the Web search service" on page 13.

The library service, imo1ssht, is provided for indexing HTML documents.

---

## **Administration services provided by the administration CGIs**

A set of CGIs for administration functions, such as creating, updating, and deleting indexes, and starting and stopping the search service is also provided. To start the CGIs:

1. Go to the following URL from your Web browser:  
`http://servername/admin-bin/nqcgistr`
2. Enter the user ID and password of the Web server administration ID.  
The start page shows the administration functions.
3. Go to the function by clicking on it.

You cannot customize the administration CGIs.



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## Chapter 2. Installing and configuring the NetQuestion Solution

The NetQuestion Solution and the Text Search Engine are shipped together as z/OS Text Search, HIMN230. The Program Directory supplied with z/OS Version 1.1 describes the SMP/E installation of both components. This chapter describes how to install and configure the NetQuestion Solution.

---

### Getting started

Before you start the final installation, ensure that:

- The Text Search Engine is installed and configured as described in *z/OS Text Search: Installation and Administration for the Text Search Engine*.  
If you installed the Text Search Engine using the customizable installation, ensure that you run the installation verification procedure (step 6 in the imocust menu) and the installation step that configures a local instance and search service (step 7 in the imocust menu). *z/OS Text Search: Installation and Administration for the Text Search Engine* also contains information on the customizable installation.
- Your PATH environment variable contains either "." or "./". Use the command \$PATH to check the setting. To change the PATH setting to include the period:
  1. Enter

```
export PATH=$PATH:.
```
  2. Update the system profile (/etc/profile) or your user profile (/u/<user>.profile)
- You check the readme file for additional installation and migration information. If you used the default installation directories, the readme file is available in */usr/lpp/TextTools/install/readme* after the SMP/E APPLY step.

---

### Installing the NetQuestion Solution

To complete the NetQuestion Solution installation, do the following:

1. Log on with a user ID that has superuser privileges.
2. Go to the installation directory using one of the following commands:
  - For the default installation path, `cd /usr/lpp/TextTools/install`
  - For any other path, `cd <your path>/install`
3. Update the environment variables using the the command `oedit inqexport`.  
You can customize the Web server path, the Web server administration user ID and group, and the language.
4. Run the command `inqsetup`. This installs the NetQuestion Solution.

### Setting up the Web server

To set up the IBM HTTP Server (delivered as part of the IBM WebSphere™ Application Server) for the NetQuestion Solution:

1. To set up the environment, follow the steps described in the file *inq.httpd.envvars* located in the *.../install* directory.
2. If you changed the default environment values during installation, update the file */etc/imoisinf*, to set the environment for the CGI scripts. If you accepted the installation defaults, these values are already set.

## Providing access to the Text Search Engine administrative functions

The Text Search Engine provides the administrative functions for the indexing services. Provide users of your administrative group (IMWEB) access to these functions in one of the following ways:

- Have each user call the `. imoexport` (period blank imoexport) command from the `.../bin` subdirectory. This updates the user environment with the appropriate environment variables.
- Add the `imoexport` shell script to each user profile.

---

## Migrating from the NetQuestion element

Indexes you created using the z/OS NetQuestion Version 1.x cannot be used by z/OS Text Search. You must reindex your documents.

If you have written applications using the z/OS NetQuestion Version 1.x APIs or you have scripts that include the NetQuestion commands, “Appendix A. Migrating from the z/OS NetQuestion Version 1.x to z/OS Text Search” on page 17 contains information to help you convert these to the Text Search Engine APIs and commands.

The *z/OS Text Search: Installation and Administration for the Text Search Engine* also contains information to help you migrate NetQuestion indexes, applications, and scripts to z/OS Text Search.

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## Chapter 3. Creating and maintaining indexes

This chapter describes how to create and maintain indexes using the NetQuestion Solution.

### Tip

Before you begin, ensure that you have started a Text Search Engine server. Check this with:

```
imoss -status inqsrch
```

To create and maintain as described here, it is assumed that you are using the default search service, *SERVER*, which was created during installation of the Text Search Engine.

#### 1. Build an index:

- a. Create an input file that lists all the files to be included in the index.

For example:

```
find /usr/local/webdocs -name "*.html" -type f  
-print > /tmp/inputlist
```

- b. Create the index:

```
imocrix -s SERVER -x WEBINDEX -t NORM -p <index data path>  
-lsse imolssht
```

The <index data path> is the fully-qualified name of the directory for the index data files. This directory is created if it does not already exist. A precise normalized index is created. To use other index types, see “Changing the index type” on page 10.

Use the library service, *-lsse imolssht*, when you are indexing HTML documents. It ensures that the mapping of the HTML file name to the URL is handled correctly. If you do not specify a library service, the *imolssf* library service is assumed. This can be used for indexing plain text files.

- c. Define the rules for the index:

```
imorulix -s SERVER -x WEBINDEX -dfmt HTML
```

- d. Queue the documents:

```
imoqueue -s SERVER -x WEBINDEX -add -l <document list>
```

The <document list> is the fully-qualified name of the file that contains the names of the files to be indexed. For example, /tmp/inputlist.

- e. Update the index:

```
imoupdix -s SERVER -x WEBINDEX
```

#### 2. Maintain the index:

To keep your index up-to-date, you need to carry out index updates regularly. How often you do this depends on how quickly documents are added and updated on your Web server.

To update the index, you:

a. Create an input file as described in step 1a on page 7 that lists all the files to be included in the index update. If you are deleting documents, create a separate input file that lists these files.

b. Queue the documents:

To add documents to the index, enter:

```
imoqueue -s SERVER -x WEBINDEX -add -l <document list>
```

To delete documents from the index, enter:

```
imoqueue -s SERVER -x WEBINDEX -delete -l <document list>
```

c. Update the index:

```
imoupdix -s SERVER -x WEBINDEX
```

d. Reorganize the index:

After several index updates, it is recommended that you reorganize the index to optimize the space it uses and to improve the search time for queries against it:

```
imoreoix -s SERVER -x WEBINDEX
```

**Tip**

If you use the SpellWizard, now is a good time to re-create the list of alternative spellings. For more information on the SpellWizard, see “Enabling the SpellWizard” on page 9.

The Text Search Engine provides other commands to help you maintain your index. For further information on these commands, see *z/OS Text Search: Installation and Administration for the Text Search Engine*.

---

## Chapter 4. Customizing the NetQuestion Solution

This chapter describes how you can customize the delivered NetQuestion Solution. To customize the Web search services, see “Chapter 5. Customizing the Web search service” on page 13.

You can do the following to customize the NetQuestion Solution:

- Change the language used for messages and forms.
- Enable the SpellWizard.
- Change the index type.
- Create a server instance and a search service.

---

### Changing the language for messages and forms

By default, the HTML forms and messages from the CGI scripts are shown in U.S. English, however other languages are also supported. Only one language can be active at any one time.

To change the language after installation:

1. Change the current working directory to the directory that contains the REXX procedures and z/OS UNIX<sup>®</sup> shell scripts by using the command:

```
cd usr/lpp/TextTools/install
```

2. To see the list of the available languages, enter:

```
inqlang
```

This list also shows the language number assigned to each language.

3. To change the language, enter

```
inqlang <language number>
```

---

### Enabling the SpellWizard

The SpellWizard allows you to build a list of alternative spellings for words in an indexed document collection, for example, color and colour. If you then enable the SpellWizard in your search form, the search CGI returns variations of the word from the list of alternative spellings in addition to the search results. You can then refine your query to use words from the list of alternative spellings and submit the search query again.

**Note**

The SpellWizard is not available for NGRAM or NGRAMCS indexes.

To enable the SpellWizard:

1. Reorganize the index to ensure that it contains only primary index entries:

```
imoreoix -s SERVER -x WEBINDEX
```

2. Create the list of alternative spellings:

```
inqixspl WEBINDEX
```

If you are enabling the SpellWizard for another index, substitute its name for WEBINDEX.

3. Uncomment the following line in the search form:  
`<td><input type="checkbox" name="SPCHK" value="SPELL">`

**Tip**

The list of alternative spellings is not automatically updated after each index update (imoupdix). To keep the SpellWizard up-to-date, you should reorganize the index and run inqixspl after each index update.

---

## Changing the index type

The default setup creates a precise normalized index (NORM). However, you can also create the following index types:

- Linguistic index (LING). Words are indexed in their base form.
- A precise index (PREC). Words are indexed in the grammatical form in which they occur in the original text. This index has case-sensitive search.
- An index for SBCS and DBCS languages (NGRAM).
- An index with case-sensitive search SBCS and DBCS languages (NGRAMCS).

**Note**

If you create an NGRAM or an NGRAMCS index, you can only use the boolean search services. Ensure that you install the appropriate search form.

If you want to use any of these index types, you must create a new index and specify the rules to be used for it.

1. To create the index:

```
imocrix -s SERVER -x <index name> -t <index type> -p <index data path>
        -lsse imolssht -ccsid <code page>
```

Because WEBINDEX is the default index name used by the single Web server solution, it is recommended that you do not use this name as the new index name. The index type is one of LING, PREC, NGRAM, or NGRAMCS. If you create an NGRAM or an NGRAMCS index, you must also specify a code page.

2. To specify the rules for the index:

```
imorulix -s SERVER -x <index name> -dfmt HTML
```

3. To make your index available for searching, update the search form with the name of the index. For information on how to do this, see "Adding the name of an index to the search form" on page 13.

---

## Creating a server instance and a search service

During installation of the Text Search Engine, a default server instance, *inqsrch*, and a default search service, *SERVER*, are set up. However, you can also create your own server instances and search services and then create indexes that run on the new search service. You might want to do this if you have different index types for different document collections. To ensure that you offer the same search service across different indexes, you could create server instances and search services for each different index type.

For example, to create a new server instance *myInst* that runs on the search service *MYSRVICE*:

```
imocrins -c local -i myInst -r /usr/lpp/TextTools/dict
imocrcl -c local -i myInst -s MYSRVICE -r /usr/lpp/TextTools/dict
```

where */usr/lpp/TextTools/dict* is the default resource path. If you have installed the resources in another directory, then use *<your path>/dict* with the *imocrins* and *imocrcl* commands.

These commands establish the link between the server instance and the search service. You can now create indexes for use with this search service:

```
imocrix -s MYSRVICE -x <index name> -t <index type> -p <index data path>
        -lsse imolsst -ccsid <code page>
```

To make these indexes searchable:

1. Update the search form with information about the search service, *MYSRVICE*:  
`<input type="hidden" name="search_service_name" value="MYSRVICE">`
2. Update the following lines in the file *imoisinf*. By default, this file is located in the */etc* directory.  
INSTANCE=myInst  
SERVER=MYSRVICE
3. Update the following environment variables in the *imoexport* script:  
IMOINSTANCE=myInst  
IMOSEARCHSERVICE=MYSRVICE
4. Call the `. imoexport` (period blank *imoexport*) command from the *.../bin* subdirectory.



---

## Chapter 5. Customizing the Web search service

The NetQuestion Solution provides compiled CGI scripts and HTML forms to get a search service running on your Web server with a minimum of effort. A sample source CGI is also provided so that you can develop a customized Web search service.

This chapter describes:

- How to modify the HTML search form for your search service.
- How to customize the CGI scripts.

You cannot customize the administration services provided by the administration CGIs.

---

### Modifying the HTML search form

The NetQuestion Solution provides two sets of search forms; one for SBCS languages and one for DBCS languages. These forms are listed in Table 1 on page 2.

You can make a number of changes to the forms that affect the 'look and feel' of your Web search service but do not require that you modify the search CGI script. For example, you can include introductory text on the search page, change the layout of the form to a frames version of the page, or add text to the header or footer.

If you make any of the following changes, you do not need to modify or rebuild the CGI scripts:

- Add the name of the index to the search form.
- Replace the image files.
- Hide fields or show fields.
- Rename the search form.

If you want to include indexes in one of the supported DBCS languages in your Web search service, you must also specify the language of the index in the search form. For information on specifying the language, see "Specifying the search language for DBCS indexes" on page 15.

If you want to make any other changes, you must create your own CGI script based on the sample provided.

### Adding the name of an index to the search form

The search forms are delivered with the name of the default index, WEBINDEX. If you have created customized indexes, you must add the names of these new indexes to the search form. You can do this in one of the following ways:

- Edit the search form to add the name.
- Use the administration CGIs to automatically add and remove index names.

## Editing the search form

The search form has a <SELECT> tag near the beginning of the file. Modify this tag to include an <OPTION> tag for each index on the Web site. If, for example, you create indexes named *mypages* and *dptpages*, you might add the following <OPTION> tags:

```
<SELECT NAME="SelectIndex">
<OPTION Selected value="DPTPAGES">Department Pages
<OPTION value="MYPAGES">My Pages
</SELECT>
```

Department Pages and My Pages are descriptive names for the indexes. These are the names that appear in the drop-down list on the search form.

### Tip

You must type the index names on the <OPTION> tags in uppercase, even if you used lowercase letters when creating the index. If you do not use all uppercase letters, the Text Search Engine will not be able to find your index.

If you don't want to specify descriptive names on the <OPTION> tags, you can specify just the names of the indexes, like this:

```
<SELECT NAME="SelectIndex">
<OPTION Selected value="DPTPAGES">
<OPTION value="MYPAGES">
</SELECT>
```

In this case, DPTPAGES and MYPAGES appear as the index names in the drop-down list on the search form.

## Using the administration CGIs

If you haven't renamed the search forms *asearch.html* and *search.html*, you can use the administration CGIs to add and remove the index names. To do this, in the **Add/Remove Index Name in search/asearch.html** part of the Index List, click **add**, or **remove** respectively.

For information on how to start the administration CGIs, see "Administration services provided by the administration CGIs" on page 3.

## Replacing the image files

Both the search page and the search results page include images. To replace these images, do the following:

1. Create your own graphic and save it as a GIF file.
2. Make copies of the delivered image files. If you are replacing the search-page image, copy *inqsrch.gif*. If you are replacing the image on the search results page, copy *inqsrchr.gif*.
3. Rename the new graphics files to *inqsrch.gif* for the search page or *inqsrchr.gif* for the search results page.
4. Store the files in the appropriate directory on your Web server.

## Hiding fields

Hiding fields allows you to tailor the search form so that it offers only the search functions that you intend to provide on your Web site. To hide fields, use `INPUT TYPE="hidden"` on the search form.

For example, you can offer sorting of the search results based on the rank value of each of the documents found. You might want to let visitors to your Web site decide individually whether they want to sort the search results. In this case, you would include the sorting option as a checkbox on the search form. If you think that the results of a search should always be sorted according to the rank value, use the "hidden" attribute on the rank option:

```
<INPUT TYPE="hidden" NAME="rank" VALUE="Y">
```

## Renaming the search form

If you offer your Web search service on several Web sites, you might also want to provide different search forms for each of these sites. If you change the name of the form, you must update the search form itself with the new name. This ensures that the link on the bottom of the search results page to the search page is also updated with the new form name.

The search form contains a field with the name "form\_name". Update this field with the new form name.

## Specifying the search language for DBCS indexes

To enable the search CGI for searching indexes in one of the DBCS languages Japanese, Korean, Simplified Chinese, or Traditional Chinese, you must include the corresponding language identifier in the search form. Your Web server must also be configured for the DBCS language.

The DBCS search forms, dbsearch.html, dbsearchJ.html, and dbsearchc.html, all contain the following section:

```
<!-- Replace CHS by a language code of your choice:          -->
<!--                JAP for Japanese                CCSID_5035          -->
<!--                CHT for Traditional Chinese        CCSID_0937          -->
<!--                CHS for Simplified Chinese        CCSID_1388          -->
<!--                KOR for Korean                    CCSID_0933          -->
```

Change the value of the hidden parameter qlang to the correct language identifier for your language.

---

## Customizing the CGI script

If the search service provided by the search forms and CGI script does not meet your requirements, the NetQuestion Solution includes a sample CGI file (nqsmcgi.c), header files, and link libraries you can use to create a customized CGI script. In addition, a sample file (nqsm.c) is provided for writing a command-line search utility.

### Note

The sample search CGI, nqsmcgi.c, does not provide the same functionality as the compiled search CGIs, inqsea and inqseait. The compiled CGIs are optimized for performance, whereas the sample search CGI shows how to extend the the script to use any of the search utilities provided by the Text Search Engine.

The following lists the prerequisites you need for writing your own search script. It also describes the processing steps in the search script.

## Prerequisites

The sample CGI script is written in the C programming language. If you customize the search script or you are writing your own, you need to compile and link your changes.

To compile the files, you need:

- IBM C/C++ for MVS/ESA™ Version 3.2.

If you want to use a different compiler, changes to the code might be necessary.

- A make utility for your operating system. (A sample makefile is provided.)
- Access to the Text Search Engine header files and library files.

## Search script processing

The search CGI script for the NetQuestion Solution search service contains the following processing steps:

1. Initialize the working environment.
2. Call the parse-form function to parse the URL-encoded search form and store the field name/value pairs in an internal structure.
3. Write the header for the results page.
4. Start a session with the Text Search Engine server.
5. Open the index selected in the search form.
6. Build the search input data.
7. Run the search function.
8. Output the number of documents found.
9. Build the document result list and convert file names to URLs.
10. Delete the result information.
11. Close the index.
12. End the session with the Text Search Engine server.
13. Clean up.

The *z/OS Text Search: Installation and Administration for the Text Search Engine* contains a more detailed description of the Text Search Engine processing steps.

---

## Appendix A. Migrating from the z/OS NetQuestion Version 1.x to z/OS Text Search

This appendix describes the differences in the commands and APIs provided by the Text Search Engine component of the Text Search element and those provided by the z/OS NetQuestion Version 1.x.

---

### Migrating commands

If you developed applications using commands provided the z/OS NetQuestion Version 1.x, Table 2 shows the corresponding Text Search Engine command you should now use for these applications. For the full syntax of the Text Search Engine commands, see *z/OS Text Search: Installation and Administration for the Text Search Engine*.

Table 2. Command cross-reference

z/OS NetQuestion Version 1.x command	Text Search Engine command	Comments
nqcreat	imocrix and imorulix	Create an index.
nqupdat	imoupdix	Update an index with the queued documents.
nqdelet	imodelix	Delete an index file and its related files.
nqreorg	imoreoix	Reorganize the index.
nqreset	imorstix	Reset an index.
nqclear	imoclix	Remove terms from an index.
nqlisti	imolstix	List all the indexes for a search service.
nqidxsta	imostaix or imostfix	Display status information for an index.
nqadd	imoqueue -add	Add documents to the indexing queue.
nqdel	imoqueue -delete	Delete documents from the indexing queue.
netq	imoss	Maintain search service.
nqtrace	imotrace	Enable trace facility.
nqwrmsr	not required	Write master table.
nqurl	not required	Map URLs.

---

## Migrating APIs

Table 3 shows the differences in the APIs used by the search CGI. For more information on the APIs, see *z/OS Text Search: Programming the Text Search Engine*.

*Table 3. API cross-reference*

NetQuestion Version 1.x API	Text Search Engine API	Changes
EhwStartSession()	EhwStartSession()	None.
EhwOpenIndex()	EhwOpenIndex()	None.
EhwSearch()	EhwSearch()	Data stream changed. Some items are no longer supported, for example, precision qualifiers.
EhwRank()	EhwRank()	None.
EhwCreateResultList()	EhwCreateResultView()	Function name changed.
EhwSort()	EhwSort()	None.
EhwGetResultList()	EhwGetResultView()	Function name changed.
EhwDeleteResult()	EhwDeleteResult()	None.
EhwCloseIndex()	EhwCloseIndex()	None.
EhwStartSession()	EhwStartSession()	None.

---

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Version 1.2

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