

[MS-FSSADM]: Search Administration and Status Protocol Specification

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1 Introduction

This document specifies the protocol used by a protocol client to retrieve information from the query matching component of a search service application.

1.1 Glossary

The following terms are defined in [\[MS-GLOS\]](#):

fully qualified domain name (FQDN)
Hypertext Transfer Protocol (HTTP)
XML

The following terms are defined in [\[MS-OFCGLOS\]](#):

abstract object reference (AOR)
attribute vector
base port
client proxy
exclusion list
FAST Search Interface Definition Language (FSIDL)
host name
index column
index partition
indexer row
indexing node
name server
node
query matching node
search row
search service application

The following terms are specific to this document:

MAY, SHOULD, MUST, SHOULD NOT, MUST NOT: These terms (in all caps) are used as described in [\[RFC2119\]](#). All statements of optional behavior use either MAY, SHOULD, or SHOULD NOT.

1.2 References

1.2.1 Normative References

We conduct frequent surveys of the normative references to assure their continued availability. If you have any issue with finding a normative reference, please contact dochelp@microsoft.com. We will assist you in finding the relevant information. Please check the archive site, <http://msdn2.microsoft.com/en-us/library/E4BD6494-06AD-4aed-9823-445E921C9624>, as an additional source.

[MS-FSDQE] Microsoft Corporation, "[Distributed Query Execution Protocol Specification](#)"

[MS-FSMW] Microsoft Corporation, "[Middleware Protocol Specification](#)"

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997, <http://www.rfc-editor.org/rfc/rfc2119.txt>

1.2.2 Informative References

[MS-GLOS] Microsoft Corporation, "[Windows Protocols Master Glossary](#)".

[MS-OFCGLOS] Microsoft Corporation, "[Microsoft Office Master Glossary](#)".

1.3 Protocol Overview (Synopsis)

This protocol is used by a protocol client to communicate with a **query matching node** part of the **search service application**, collecting information about **fully qualified domain name (FQDN)**, port number, **index column** number, usage cost, and overall status of the **node**. A typical protocol client would be an application monitoring the search service application.

1.4 Relationship to Other Protocols

The protocol uses Middleware, an **HTTP** based protocol, as specified in [\[MS-FSMW\]](#). The following diagram shows the underlying messaging and transport stack used by the protocol:

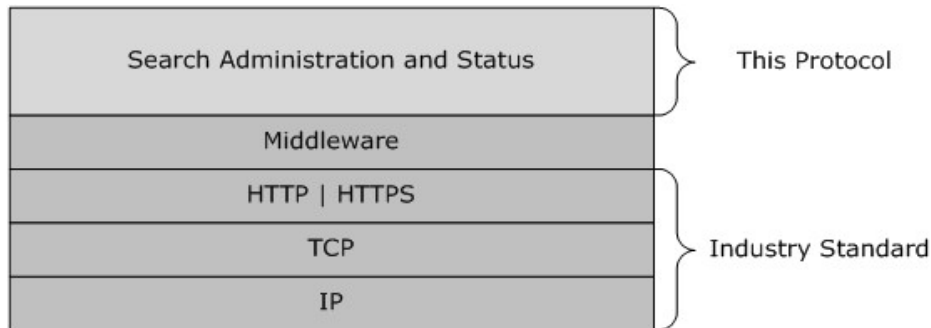


Figure 1: This protocol in relation to other protocols

1.5 Prerequisites/Preconditions

The protocol client and protocol server are aware of the location and connection information associated with the shared **name server**.

1.6 Applicability Statement

This protocol is applicable for applications that remotely retrieve information from a query matching node.

1.7 Versioning and Capability Negotiation

Capability Negotiation: The Middleware protocol is connectionless, but the correct interface version is specified in every message that is transmitted using the Middleware protocol. See sections [3.1.3](#) and [3.2.3](#) for the specific version numbers.

1.8 Vendor-Extensible Fields

None.

1.9 Standards Assignments

None.

2 Messages

2.1 Transport

The messages in this protocol MUST be sent as HTTP POST messages, as specified in [\[MS-FSMW\]](#), the Middleware protocol.

2.2 Common Data Types

FSIDL data types are encoded as specified in [\[MS-FSMW\]](#) section 2. The full FSIDL for this protocol is specified in section [6](#).

3 Protocol Details

3.1 rtsearch::search_node Server Details

The protocol server, a query matching node, receives messages from a protocol client, which enables information gathering operations on the query matching node.

3.1.1 Abstract Data Model

None.

3.1.2 Timers

None.

3.1.3 Initialization

The protocol server MUST use the Middleware **bind** method to register an **rtsearch::search_node** server object in the name server, as specified in [\[MS-FSMW\]](#) section 3.4.4.2.

The parameters for the **bind** method are encapsulated in an **abstract object reference (AOR)**, as specified in [\[MS-FSMW\]](#) section 2.2.18.

name: This MUST be a string that contains the value "esp/clusters/webcluster/indexing/search/columnC/R", where C is the index column number and R is the **search row** number.

object_id: This MUST be an integer that is unique for each server object.

host: A string specifying the **host name** of the server hosting the server object.

port: This MUST be an integer that contains the port number of the server object on the protocol server. The value is **base port** + 390.

interface_type: This MUST be a string that contains the value "rtsearch::search_node".

interface_version: This MUST be a string that contains the value "5.4".

3.1.4 Message Processing Events and Sequencing Rules

This interface includes the following methods.

Method	Description
get_hostname	Returns a string that contains the FQDN of the query matching node.
get_transport_port	Returns the transport port used for query communication between the query and result service and the search service application.
get_column	Returns the index column number of the query matching node.
get_status	Returns a string that contains the status of the query matching node.
get_refcost	Returns the reference cost of a query matching node.
status	Returns a string that contains status information about the query matching node in

Method	Description
	XML format.

3.1.4.1 get_hostname

The **get_hostname** method returns a string that contains the FQDN of the query matching node.

```
string get_hostname()
```

Return Values: A string that MUST contain the FQDN of the query matching node.

Exceptions Thrown: No exceptions are thrown beyond those thrown by the underlying Middleware protocol as specified in [\[MS-FSMW\]](#).

3.1.4.2 get_transport_port

The **get_transport_port** method returns the port used for query communication between the query and result service and the search service application, as specified in [\[MS-FSDQE\]](#).

```
long get_transport_port()
```

Return Values: An integer that MUST be greater than or equal to zero and within the legal port range of the system.

Exceptions Thrown: No exceptions are thrown beyond those thrown by the underlying Middleware protocol as specified in [\[MS-FSMW\]](#).

3.1.4.3 get_column

The **get_column** method returns the index column number of the query matching node.

```
long get_column()
```

Return Values: An integer that MUST be greater than or equal to zero.

Exceptions Thrown: No exceptions are thrown beyond those thrown by the underlying Middleware protocol as specified in [\[MS-FSMW\]](#).

3.1.4.4 get_status

The **get_status** method returns the status of the query matching node.

```
string get_status()
```

Return Values: A string that MUST be specified in the following table.

Value	Description
down	The query matching node is unable to respond to search requests.

Value	Description
needs_exclusionlist	The exclusion list on the query matching node differs from the exclusion list in the indexing service.
initializing	The query matching node has started and is initializing.
ok	The query matching node is running normally..

Exceptions Thrown: No exceptions are thrown beyond those thrown by the underlying Middleware protocol as specified in [\[MS-FSMW\]](#).

3.1.4.5 get_refcost

The **get_refcost** method returns the reference cost of a query matching node. The reference cost is the relative cost of sending a search query to one specific query matching node compared to sending it to other query matching nodes in the search service application. It is used for load balancing between query matching nodes with different performance numbers.

```
long get_refcost()
```

Return Values: An integer that MUST be greater than or equal to zero.

Exceptions Thrown: No exceptions are thrown beyond those thrown by the underlying Middleware protocol as specified in [\[MS-FSMW\]](#).

3.1.4.6 status

The **status** method returns status information about the query matching nodes in the search service application in XML format.

```
string status()
```

Return Values: A string that MUST be in XML format, which uses the XML Schema specified in section [7](#) and whose content is implementation specific. Element specific attributes in this XML Schema are specified in the following subsections.

Exceptions Thrown: No exceptions are thrown beyond those thrown by the underlying Middleware protocol as specified in [\[MS-FSMW\]](#).

3.1.4.6.1 search-stats

The <search-stats> element is the root element. It has no attributes. The child elements are specified in the following subsections. The <search-stats> element MUST contain either one <error> element, or a mix of zero or more <dispatch> or <search> elements.

3.1.4.6.1.1 error

The <error> element contains a textual description of an error. This simple element contains no attributes.

3.1.4.6.1.2 fdispatch

The <fdispatch> element contains information about a search service application component configured to dispatch queries to other search service application components. It MUST contain either one <error> element, or a sequence of the other child elements as specified in the following subsections. This element contains the following attribute.

Attribute name	Description
name	The FQDN and port number of the specific search service application node. This will not be displayed if the node is the node generating the status message.

3.1.4.6.1.2.1 error

The <error> element contains a textual description of an error. This simple element contains no attributes.

3.1.4.6.1.2.2 version

The <version> element contains the version string of the search service application component. This simple element contains the following attribute.

Attribute name	Description
value	The version string of the search service application component.

3.1.4.6.1.2.3 hostname

The <hostname> element contains the name of the search service application node. This simple element contains the following attribute.

Attribute name	Description
name	The name of the search service application node. This MUST be either the FQDN, host name, or the string "localhost".

3.1.4.6.1.2.4 searchhandler

The <searchhandler> element contains information about search handlers, instances processing incoming search queries. This simple element contains the following attributes.

Attribute name	Description
instantiate-count	The total number of search handlers instantiated.
active-count	The number of active searches.

3.1.4.6.1.2.5 datasets

The <datasets> element contains <dataset> elements. It has one child element, specified in the following subsection, and has no attributes.

3.1.4.6.1.2.5.1 dataset

The <dataset> element contains information about the underlying hierarchy of the search service application components to which incoming search queries are distributed. This complex element contains one child element, specified in the following subsection, and the following attributes.

Attribute name	Description
active-nodes	The number of active indexing nodes .
total-search-time	The total time used to search with caching.
up-time	The amount of time elapsed between when the indexing node became functional and the current time.
avg-seconds-per-search	The average number of seconds per search.
partitions	The number of index partitions .
timed-out-percentage	The percentage of timed out queries.
max-active-partitions	The maximum number of active index partitions that were created. Duplicate indexer rows are not counted.
avg-searches-per-sec	The average number of searches per second.
first-partition	The first index partition number.
samples	The elapsed time used to search this indexing node, uncached.
id	The dataset identifier.
unit-selection-cost	The cost of the reference.
timed-out	The number of timeouts that have occurred.
total-searches	The total number of searches.
max-active-nodes	The maximum number of active indexing nodes that have occurred.
total-selection-cost	The number of references that point to this dataset.
active-partitions	The number of active index partitions. Duplicate indexer rows are not counted.
avg-uncached-search-time	The average number of seconds per search, uncached.

3.1.4.6.1.2.5.1.1 engine

The <engine> element contains information about one index partition. This simple element contains the following attributes.

Attribute name	Description
socket	An identifier in the format "h:p", where "h" is the FQDN and "p" is the port number.
samples	The number of times the index partition was searched.

Attribute name	Description
partition	The configured index partition number.
type	The type of the node. It MUST be either "dispatch" or "search".
state	The state of the node. It MUST be either "up" or "down".
docstamp	The timestamp that uniquely identifies an index.
row	The configured search row.
refcost	The relative cost of referencing the node.

3.1.4.6.1.2.6 httpd

The <httpd> element contains information about HTTP connections. This simple element contains the following attributes.

Attribute name	Description
connection-limit	The maximum number of connections allowed.
select-operations	The number of select operations performed.
open-connections	The number of open connections.
waiting-connections	The number of waiting connections.

3.1.4.6.1.2.7 filedesc-resource

The <filedesc-resource> element contains information about file descriptor resources. This simple element contains the following attributes.

Attribute name	Description
resource-usage	The number of resources used.
wait-queue-len	The number of resources for which the protocol client is waiting.
total-resource-count	The number of resources available.

3.1.4.6.1.3 fsearch

The <fsearch> element contains information about a search service application component configured to execute a query based search. The child elements are specified in the following subsections. This complex element contains the following attribute.

Attribute name	Description
name	The string "localhost:" followed by the port number of the search service application node.

3.1.4.6.1.3.1 version

The <version> element contains the version string of the search service application component. This simple element contains the following attribute.

Attribute name	Description
value	The version string of the search service application component.

3.1.4.6.1.3.2 search-statistics

The <search-statistics> element contains information about search statistics. This simple element contains the following attributes.

Attribute name	Description
up-time	The number of seconds between when this node started and the present.
total-search-time	The total number of seconds used for searching.
total-searches	The number of searches attempted.
avg-searches-per-second	The number of searches per second.
avg-search-time	The average number of seconds per search.

3.1.4.6.1.3.3 httpdconn

The <httpdconn> element contains information about HTTP connections. This simple element contains the following attributes.

Attribute name	Description
select-operations	The number of select operations on this connection.
calls-to-destructor	The number of times the <httpdconn> element was deallocated.
calls-to-constructor	The number of <httpdconn> elements that were created.

3.1.4.6.1.3.4 file-statistics

The <file-statistics> element contains information about file statistics. This simple element contains no attributes.

3.1.4.6.1.3.5 transportd

The <transportd> element contains information about the search query queue. This simple element contains the following attributes.

Attribute name	Description
transport-connection-cutoff-limit	The maximum number of waiting plus active connections.
waiting-transport-connections	The number of waiting connections.

Attribute name	Description
queued-transport-connections	The number of connections queued.
allocated-query-processors	The number of allocated query processors.
transport-connection-limit	The maximum number of active connections.
open-transport-connections	The number of connections in use.

3.1.4.6.1.3.6 result-cache

The <result-cache> element contains information about an implementation specific cache. This simple element contains the following attributes.

Attribute name	Description
total-element-reference-count	The number of references to the cache.
cache-hit-ratio	The number of cache hits divided by number of lookups.
cache-hits	The number of results retrieved from the cache.
lookups	The number of lookups attempted in the cache.
maximum-heap-size	The maximum number of bytes that can be stored in the cache.
cached-elements	The number of elements in the cache.
active-heap-size	The amount of data currently stored in the cache.

3.1.4.6.1.3.7 resultattr-cache

The <resultattro-cache> element contains information about an implementation specific cache. This simple element contains the same attributes as specified in section [3.1.4.6.1.3.6](#).

3.1.4.6.1.3.8 docinfo-cache

The <docinfo-cache> element contains information about an implementation specific cache. This simple element contains the following attributes.

Attribute name	Description
total-element-reference-count	The number of references to the cache.
cache-hit-ratio	The number of cache hits divided by the number of lookups.
cache-hits	The number of results retrieved from the cache.
lookups	The number of lookups attempted in the cache.
maximum-heap-size	The maximum number of bytes that can be stored in the cache.
docstamp	A timestamp that uniquely identifies an index.
total-doc-count	The total number of documents in the index.

Attribute name	Description
cached-elements	The number of elements in the cache.
active-heap-size	The amount of data currently stored in the cache.

3.1.4.6.1.3.9 boolean-occ-cache

The <boolean-occ-cache> element contains information about an implementation specific cache. This simple element contains the same attributes as specified in section [3.1.4.6.1.3.6](#).

3.1.4.6.1.3.10 pos-occ-cache

The <pos-occ-cache> element contains information about an implementation specific cache. This simple element contains the same attributes as specified in section [3.1.4.6.1.3.6](#).

3.1.4.6.1.3.11 phrase-occidx-cache

The <phrase-occidx-cache> element contains information about an implementation specific cache. This simple element contains the same attributes as specified in section [3.1.4.6.1.3.6](#).

3.1.4.6.1.3.12 phrase-occ-cache2

The <phrase-occ-cache2> element contains information about an implementation specific cache. This simple element contains the same attributes as specified in section [3.1.4.6.1.3.6](#).

3.1.4.6.1.3.13 bitvector-cache

The <bitvector-cache> element contains information about an implementation specific cache. This simple element contains the same attributes as specified in section [3.1.4.6.1.3.6](#).

3.1.4.6.1.3.14 int-range-bitvector-cache

The <int-range-bitvector-cache> element contains information about an implementation specific cache. This simple element contains, and the same attributes as specified in section [3.1.4.6.1.3.6](#).

3.1.4.6.1.3.15 int-occ-cache

The <int-occ-cache> element contains information about an implementation specific cache. This simple element contains the same attributes as specified in section [3.1.4.6.1.3.6](#).

3.1.4.6.1.3.16 filter-occ-cache

The <filter-occ-cache> element contains information about an implementation specific cache. This simple element contains the same attributes as specified in section [3.1.4.6.1.3.6](#).

3.1.4.6.1.3.17 dict-cache

The <dict-cache> element contains information about an implementation specific cache. This simple element contains the following attributes.

Attribute name	Description
total-element-	The number of references to the cache.

Attribute name	Description
reference-count	
cache-hit-ratio	The number of cache hits divided by the number of lookups.
cache-hits	The number of results retrieved from the cache.
cache-hit-rate	The ratio between the number of results retrieved from the cache and the number of lookups attempted in the cache.
lookups	The number of lookups attempted in the cache.
maximum-heap-size	The maximum number of bytes that can be stored in the cache.
cached-elements	The number of elements in the cache.
active-heap-size	The amount of data currently stored in the cache.

3.1.4.6.1.3.18 subquery-cache

The <subquery-cache> element contains information about an implementation specific cache. This simple element contains the same attributes as specified in section [3.1.4.6.1.3.6](#).

3.1.4.6.1.3.19 attributevectors

The <attributevectors> element contains <attributevector> elements. This complex element contains one child element, specified in the following subsection, and also contains the following attribute.

Attribute name	Description
total-memory-usage	The total amount of memory allocated by all the attribute vectors .

3.1.4.6.1.3.19.1 attributevector

The <attributevector> element contains information about an attribute vector. This simple element contains the following attributes.

Attribute name	Description
status	The status of the attribute vector. It MUST be set to the value "OK" or the value "INVALID".
name	The name of the attribute vector.
type	The type the attribute vector is configured to handle. It MUST be one of "string", "int8", "int16", "int32", "int64", "float", or "double".
multi-value	Specifies whether the attribute vector is multi-valued. It MUST be either "no" or "yes".
elements	The number of elements in the attribute vector.
custom	Specifies whether the attribute vector is enumerated. If the value is "format=enum", the attribute vector is enumerated; if the value is an empty string, the attribute vector is not enumerated.

Attribute name	Description
memory-bytes	The amount of memory allocated for this specific attribute vector.
basefile	The base file name of the attribute vector.

3.1.4.6.1.3.20 httpd

The <httpd> element contains information about HTTP connections. This simple element contains the following attributes.

Attribute name	Description
connection-limit	The maximum number of connections allowed.
select-operations	The number of select operations performed.
open-connections	The number of open connections.
waiting-connections	The number of waiting connections.

3.1.4.6.1.3.21 filedesc-resource

The <filedesc-resource> element contains information about file descriptor resources. This simple element contains the following attributes.

Attribute name	Description
resource-usage	The number of resources used.
wait-queue-len	The number of resources for which the protocol client is waiting.
total-resource-count	The number of resources available.

3.1.5 Timer Events

None.

3.1.6 Other Local Events

None.

3.2 rtsearch::search_node Client Details

The protocol clients requests status information from a query matching node.

3.2.1 Abstract Data Model

None.

3.2.2 Timers

None.

3.2.3 Initialization

The client side of this protocol MUST use the Middleware **resolve** method to find the **client proxy** to the server object bound in the name server, as specified in [\[MS-FSMW\]](#) section 3.4.4.1. The parameters for the **resolve** method are as follows:

name: This MUST be a string that contains the value "esp/clusters/webcluster/indexing/search/columnC/R", where C MUST be the index column number and R MUST be the search row number.

interface_type: This MUST be a string that contains the value "rtsearch::search_node".

version: This MUST be a string that contains the value "5.4".

3.2.4 Message Processing Events and Sequencing Rules

This is a stateless protocol. No sequence of method calls is imposed on this protocol. When a method completes, the values returned by the server MUST be returned unmodified to the upper layer. The protocol client MUST ignore errors returned from the server and notify the calling application about the error received in the higher layer. Otherwise, no special message processing is required on the protocol client other than the processing required in the underlying protocol.

3.2.5 Timer Events

None.

3.2.6 Other Local Events

None.

4 Protocol Examples

4.1 Get the Fully Qualified Domain Name of a Search Node

This example describes how to use the **get_hostname** method of the **search_node** interface, as specified in section [3.1.4.1](#), so the protocol client can retrieve the FQDN from a query matching node. In this example, the search row will be 0 and index column 1.

First the protocol server creates a server object that implements the **search_node** interface, and registers it in the name server. The protocol client can acquire a client proxy to that **search_node** interface by resolving the server object in the name server. This is possible because both the protocol client and protocol server have agreed a priori on both the location of the shared name server, and the symbolic name of the server object.

The protocol client can now call the **get_hostname** method on the **search_node** client proxy.

4.1.1 Example code

4.1.1.1 Protocol server initialization:

```
SET server_object_instance TO INSTANCE OF search_node SERVER OBJECT
SET server_object_host TO "myserver.mydomain.com"
SET server_object_port TO "1234"
SET server_object_interface_type TO "rtsearch::search_node"
SET server_object_interface_version TO "5.4"
SET server_object_name TO "esp/clusters/webcluster/indexing/search/column1/0"
SET server_object_aor TO server_object_host, server_object_port,
server_object_interface_type, server_object_interface_version AND server_object_name
CALL nameserver.bind WITH server_object_instance AND server_object_aor
```

4.1.1.2 Protocol client initialization:

```
SET server_object_name TO "esp/clusters/webcluster/indexing/search/column1/0"
SET server_object_type TO "rtsearch::search_node"
SET server_object_version TO "5.4"
CALL nameserver.resolve WITH server_object_name, server_object_type AND server_object_version
RETURNING search_node_client_proxy
```

4.1.1.3 Protocol client message:

```
CALL search_node_client_proxy.get_hostname RETURNING hostname
```

4.1.1.4 Protocol server response:

```
RETURN hostname
```

5 Security

5.1 Security Considerations for Implementers

Security is resolved in the Middleware protocol, as specified in [\[MS-FSMW\]](#).

5.2 Index of Security Parameters

None.

6 Appendix A: Full FSIDL

For ease of implementation, the following is the full FSIDL that is used by this protocol.

```
module interfaces {
    module rtsearch {
        interface search_node {
            #pragma version search_node 5.4

            string get_hostname();
            long get_transport_port();
            long get_column();
            string get_status();
            long get_refcost();
            string status();
        };
    };
};
```

7 Appendix B: XML Schema for status method

For ease of implementation, the following is the full XML schema that is used by this protocol.

```
<?xml version="1.0" encoding="UTF-8" ?>

<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema">

  <xs:element name="search-stats">
    <xs:complexType>
      <xs:choice>
        <xs:element ref="error" />
        <xs:sequence minOccurs="0" maxOccurs="unbounded">
          <xs:element ref="fdispatch" minOccurs="0" />
          <xs:element ref="fsearch" minOccurs="0" />
        </xs:sequence>
      </xs:choice>
    </xs:complexType>
  </xs:element>

  <xs:element name="error">
    <xs:complexType mixed="true" />
  </xs:element>

  <xs:element name="fdispatch">
    <xs:complexType>
      <xs:choice>
        <xs:element ref="error" />
        <xs:sequence>
          <xs:element ref="version" />
          <xs:element ref="hostname" />
          <xs:element ref="searchhandler" />
          <xs:element ref="datasets" />
          <xs:element ref="httpd" minOccurs="0" />
          <xs:element ref="filedesc-resource" />
        </xs:sequence>
      </xs:choice>
      <xs:attribute name="name" type="xs:string" use="optional" />
    </xs:complexType>
  </xs:element>

  <xs:element name="fsearch">
    <xs:complexType>
      <xs:sequence>
        <xs:element ref="version" />
        <xs:element ref="search-statistics" />
        <xs:element ref="httpdconn" />
        <xs:element ref="file-statistics" />
        <xs:element ref="transportd" />
        <xs:element ref="result-cache" />
        <xs:element ref="resultattr-cache" />
        <xs:element ref="docinfo-cache" />
        <xs:element ref="boolean-occ-cache" />
        <xs:element ref="pos-occ-cache" />
        <xs:element ref="phrase-occidx-cache" />
        <xs:element ref="phrase-occ-cache2" />
        <xs:element ref="bitvector-cache" />
      </xs:sequence>
    </xs:complexType>
  </xs:element>

</xs:schema>
```

```

        <xs:element ref="int-range-bitvector-cache" />
        <xs:element ref="int-occ-cache" />
        <xs:element ref="filter-occ-cache" />
        <xs:element ref="dict-cache" />
        <xs:element ref="subquery-cache" />
        <xs:element ref="attributevectors" />
        <xs:element ref="httpd" minOccurs="0" />
        <xs:element ref="filedesc-resource" />
    </xs:sequence>
    <xs:attribute name="name" type="xs:string" use="optional" />
</xs:complexType>
</xs:element>

<xs:element name="version">
    <xs:complexType>
        <xs:attribute name="value" type="xs:string" use="required" />
    </xs:complexType>
</xs:element>

<xs:element name="hostname">
    <xs:complexType>
        <xs:attribute name="name" type="xs:string" use="required" />
    </xs:complexType>
</xs:element>

<xs:element name="searchhandler">
    <xs:complexType>
        <xs:attribute name="instantiate-count" type="xs:string" use="required" />
        <xs:attribute name="active-count" type="xs:string" use="required" />
    </xs:complexType>
</xs:element>

<xs:element name="datasets">
    <xs:complexType>
        <xs:sequence>
            <xs:element ref="dataset" />
        </xs:sequence>
    </xs:complexType>
</xs:element>

<xs:element name="dataset">
    <xs:complexType>
        <xs:sequence>
            <xs:element ref="engine" minOccurs="0" />
        </xs:sequence>
        <xs:attribute name="active-nodes" type="xs:string" use="required" />
        <xs:attribute name="total-search-time" type="xs:string" use="required" />
        <xs:attribute name="up-time" type="xs:string" use="required" />
        <xs:attribute name="avg-seconds-per-search" type="xs:string" use="optional" />
        <xs:attribute name="partitions" type="xs:string" use="required" />
        <xs:attribute name="timed-out-percentage" type="xs:string" use="optional" />
        <xs:attribute name="max-active-partitions" type="xs:string" use="required" />
        <xs:attribute name="avg-searches-per-sec" type="xs:string" use="optional" />
        <xs:attribute name="first-partition" type="xs:string" use="required" />
        <xs:attribute name="samples" type="xs:string" use="required" />
        <xs:attribute name="id" type="xs:string" use="required" />
        <xs:attribute name="unit-selection-cost" type="xs:string" use="required" />
        <xs:attribute name="timed-out" type="xs:string" use="required" />
        <xs:attribute name="total-searches" type="xs:string" use="required" />
    </xs:complexType>
</xs:element>

```



```

    <xs:attribute name="max-active-nodes" type="xs:string" use="required" />
    <xs:attribute name="total-selection-cost" type="xs:string" use="required" />
    <xs:attribute name="active-partitions" type="xs:string" use="required" />
    <xs:attribute name="avg-uncached-search-time" type="xs:string" use="optional" />
  </xs:complexType>
</xs:element>

<xs:element name="engine">
  <xs:complexType>
    <xs:attribute name="socket" type="xs:string" use="required" />
    <xs:attribute name="samples" type="xs:string" use="required" />
    <xs:attribute name="partition" type="xs:string" use="required" />
    <xs:attribute name="type" use="required">
      <xs:simpleType>
        <xs:restriction base="xs:NMTOKEN">
          <xs:enumeration value="dispatch" />
          <xs:enumeration value="search" />
        </xs:restriction>
      </xs:simpleType>
    </xs:attribute>
    <xs:attribute name="state" use="required">
      <xs:simpleType>
        <xs:restriction base="xs:NMTOKEN">
          <xs:enumeration value="up" />
          <xs:enumeration value="down" />
        </xs:restriction>
      </xs:simpleType>
    </xs:attribute>
    <xs:attribute name="docstamp" type="xs:string" use="required" />
    <xs:attribute name="row" type="xs:string" use="required" />
    <xs:attribute name="refcost" type="xs:string" use="required" />
  </xs:complexType>
</xs:element>

<xs:element name="httpd">
  <xs:complexType>
    <xs:attribute name="connection-limit" type="xs:string" use="required" />
    <xs:attribute name="select-operations" type="xs:string" use="required" />
    <xs:attribute name="open-connections" type="xs:string" use="required" />
    <xs:attribute name="waiting-connections" type="xs:string" use="required" />
  </xs:complexType>
</xs:element>

<xs:element name="filedesc-resource">
  <xs:complexType>
    <xs:attribute name="resource-usage" type="xs:string" use="required" />
    <xs:attribute name="wait-queue-len" type="xs:string" use="required" />
    <xs:attribute name="total-resource-count" type="xs:string" use="required" />
  </xs:complexType>
</xs:element>

<xs:element name="search-statistics">
  <xs:complexType>
    <xs:attribute name="up-time" type="xs:string" use="required" />
    <xs:attribute name="total-search-time" type="xs:string" use="required" />
    <xs:attribute name="total-searches" type="xs:string" use="required" />
    <xs:attribute name="avg-searches-per-second" type="xs:string" use="optional" />
    <xs:attribute name="avg-search-time" type="xs:string" use="optional" />
  </xs:complexType>

```

```

</xs:element>

<xs:element name="httpdconn">
  <xs:complexType>
    <xs:attribute name="select-operations" type="xs:string" use="required" />
    <xs:attribute name="calls-to-destructor" type="xs:string" use="required" />
    <xs:attribute name="calls-to-constructor" type="xs:string" use="required" />
  </xs:complexType>
</xs:element>

<xs:element name="file-statistics" type="xs:string" />

<xs:element name="transportd">
  <xs:complexType>
    <xs:attribute name="transport-connection-cutoff-limit" type="xs:string" use="required" />
  </xs:complexType>
</xs:element>

<xs:element name="result-cache">
  <xs:complexType>
    <xs:attribute name="total-element-reference-count" type="xs:string" use="required" />
    <xs:attribute name="cache-hit-ratio" type="xs:string" use="optional" />
    <xs:attribute name="cache-hits" type="xs:string" use="required" />
    <xs:attribute name="lookups" type="xs:string" use="required" />
    <xs:attribute name="maximum-heap-size" type="xs:string" use="required" />
    <xs:attribute name="cached-elements" type="xs:string" use="required" />
    <xs:attribute name="active-heap-size" type="xs:string" use="required" />
  </xs:complexType>
</xs:element>

<xs:element name="resultattr-cache">
  <xs:complexType>
    <xs:attribute name="total-element-reference-count" type="xs:string" use="required" />
    <xs:attribute name="cache-hit-ratio" type="xs:string" use="optional" />
    <xs:attribute name="cache-hits" type="xs:string" use="required" />
    <xs:attribute name="lookups" type="xs:string" use="required" />
    <xs:attribute name="maximum-heap-size" type="xs:string" use="required" />
    <xs:attribute name="cached-elements" type="xs:string" use="required" />
    <xs:attribute name="active-heap-size" type="xs:string" use="required" />
  </xs:complexType>
</xs:element>

<xs:element name="docinfo-cache">
  <xs:complexType>
    <xs:attribute name="maximum-heap-size" type="xs:string" use="required" />
    <xs:attribute name="total-doc-count" type="xs:string" use="required" />
    <xs:attribute name="cached-elements" type="xs:string" use="required" />
    <xs:attribute name="cache-hits" type="xs:string" use="required" />
    <xs:attribute name="active-heap-size" type="xs:string" use="required" />
    <xs:attribute name="lookups" type="xs:string" use="required" />
    <xs:attribute name="docstamp" type="xs:string" use="required" />
    <xs:attribute name="cache-hit-ratio" type="xs:string" use="optional" />
  </xs:complexType>
</xs:element>

```

```

        <xs:attribute name="total-element-reference-count" type="xs:string" use="required" />
    </xs:complexType>
</xs:element>

<xs:element name="boolean-occ-cache">
    <xs:complexType>
        <xs:attribute name="total-element-reference-count" type="xs:string" use="required" />
        <xs:attribute name="cache-hit-ratio" type="xs:string" use="optional" />
        <xs:attribute name="cache-hits" type="xs:string" use="required" />
        <xs:attribute name="lookups" type="xs:string" use="required" />
        <xs:attribute name="maximum-heap-size" type="xs:string" use="required" />
        <xs:attribute name="cached-elements" type="xs:string" use="required" />
        <xs:attribute name="active-heap-size" type="xs:string" use="required" />
    </xs:complexType>
</xs:element>

<xs:element name="pos-occ-cache">
    <xs:complexType>
        <xs:attribute name="total-element-reference-count" type="xs:string" use="required" />
        <xs:attribute name="cache-hit-ratio" type="xs:string" use="optional" />
        <xs:attribute name="cache-hits" type="xs:string" use="required" />
        <xs:attribute name="lookups" type="xs:string" use="required" />
        <xs:attribute name="maximum-heap-size" type="xs:string" use="required" />
        <xs:attribute name="cached-elements" type="xs:string" use="required" />
        <xs:attribute name="active-heap-size" type="xs:string" use="required" />
    </xs:complexType>
</xs:element>

<xs:element name="phrase-occidx-cache">
    <xs:complexType>
        <xs:attribute name="total-element-reference-count" type="xs:string" use="required" />
        <xs:attribute name="cache-hit-ratio" type="xs:string" use="optional" />
        <xs:attribute name="cache-hits" type="xs:string" use="required" />
        <xs:attribute name="lookups" type="xs:string" use="required" />
        <xs:attribute name="maximum-heap-size" type="xs:string" use="required" />
        <xs:attribute name="cached-elements" type="xs:string" use="required" />
        <xs:attribute name="active-heap-size" type="xs:string" use="required" />
    </xs:complexType>
</xs:element>

<xs:element name="phrase-occ-cache2">
    <xs:complexType>
        <xs:attribute name="total-element-reference-count" type="xs:string" use="required" />
        <xs:attribute name="cache-hit-ratio" type="xs:string" use="optional" />
        <xs:attribute name="cache-hits" type="xs:string" use="required" />
        <xs:attribute name="lookups" type="xs:string" use="required" />
        <xs:attribute name="maximum-heap-size" type="xs:string" use="required" />
        <xs:attribute name="cached-elements" type="xs:string" use="required" />
        <xs:attribute name="active-heap-size" type="xs:string" use="required" />
    </xs:complexType>
</xs:element>

<xs:element name="bitvector-cache">
    <xs:complexType>
        <xs:attribute name="total-element-reference-count" type="xs:string" use="required" />
        <xs:attribute name="cache-hit-ratio" type="xs:string" use="optional" />
        <xs:attribute name="cache-hits" type="xs:string" use="required" />
        <xs:attribute name="lookups" type="xs:string" use="required" />
        <xs:attribute name="maximum-heap-size" type="xs:string" use="required" />
    </xs:complexType>
</xs:element>

```

```

        <xs:attribute name="cached-elements" type="xs:string" use="required" />
        <xs:attribute name="active-heap-size" type="xs:string" use="required" />
    </xs:complexType>
</xs:element>

<xs:element name="int-range-bitvector-cache">
    <xs:complexType>
        <xs:attribute name="total-element-reference-count" type="xs:string" use="required" />
        <xs:attribute name="cache-hit-ratio" type="xs:string" use="optional" />
        <xs:attribute name="cache-hits" type="xs:string" use="required" />
        <xs:attribute name="lookups" type="xs:string" use="required" />
        <xs:attribute name="maximum-heap-size" type="xs:string" use="required" />
        <xs:attribute name="cached-elements" type="xs:string" use="required" />
        <xs:attribute name="active-heap-size" type="xs:string" use="required" />
    </xs:complexType>
</xs:element>

<xs:element name="int-occ-cache">
    <xs:complexType>
        <xs:attribute name="total-element-reference-count" type="xs:string" use="required" />
        <xs:attribute name="cache-hit-ratio" type="xs:string" use="optional" />
        <xs:attribute name="cache-hits" type="xs:string" use="required" />
        <xs:attribute name="lookups" type="xs:string" use="required" />
        <xs:attribute name="maximum-heap-size" type="xs:string" use="required" />
        <xs:attribute name="cached-elements" type="xs:string" use="required" />
        <xs:attribute name="active-heap-size" type="xs:string" use="required" />
    </xs:complexType>
</xs:element>

<xs:element name="filter-occ-cache">
    <xs:complexType>
        <xs:attribute name="total-element-reference-count" type="xs:string" use="required" />
        <xs:attribute name="cache-hit-ratio" type="xs:string" use="optional" />
        <xs:attribute name="cache-hits" type="xs:string" use="required" />
        <xs:attribute name="lookups" type="xs:string" use="required" />
        <xs:attribute name="maximum-heap-size" type="xs:string" use="required" />
        <xs:attribute name="cached-elements" type="xs:string" use="required" />
        <xs:attribute name="active-heap-size" type="xs:string" use="required" />
    </xs:complexType>
</xs:element>

<xs:element name="dict-cache">
    <xs:complexType>
        <xs:attribute name="total-element-reference-count" type="xs:string" use="required" />
        <xs:attribute name="cache-hit-ratio" type="xs:string" use="optional" />
        <xs:attribute name="cache-hits" type="xs:string" use="required" />
        <xs:attribute name="cache-hit-rate" type="xs:string" use="required" />
        <xs:attribute name="lookups" type="xs:string" use="required" />
        <xs:attribute name="maximum-heap-size" type="xs:string" use="required" />
        <xs:attribute name="cached-elements" type="xs:string" use="required" />
        <xs:attribute name="active-heap-size" type="xs:string" use="required" />
    </xs:complexType>
</xs:element>

<xs:element name="subquery-cache">
    <xs:complexType>
        <xs:attribute name="total-element-reference-count" type="xs:string" use="required" />
        <xs:attribute name="cache-hit-ratio" type="xs:string" use="optional" />
        <xs:attribute name="cache-hits" type="xs:string" use="required" />

```

```

    <xs:attribute name="lookups" type="xs:string" use="required" />
    <xs:attribute name="maximum-heap-size" type="xs:string" use="required" />
    <xs:attribute name="cached-elements" type="xs:string" use="required" />
    <xs:attribute name="active-heap-size" type="xs:string" use="required" />
  </xs:complexType>
</xs:element>

<xs:element name="attributevectors">
  <xs:complexType>
    <xs:sequence>
      <xs:element ref="attributevector" maxOccurs="unbounded" />
    </xs:sequence>
    <xs:attribute name="total-memory-usage" type="xs:string" use="required" />
  </xs:complexType>
</xs:element>

<xs:element name="attributevector">
  <xs:complexType>
    <xs:attribute name="status" use="required">
      <xs:simpleType>
        <xs:restriction base="xs:NMTOKEN">
          <xs:enumeration value="OK" />
          <xs:enumeration value="INVALID" />
        </xs:restriction>
      </xs:simpleType>
    </xs:attribute>
    <xs:attribute name="name" type="xs:string" use="required" />
    <xs:attribute name="type" use="required">
      <xs:simpleType>
        <xs:restriction base="xs:NMTOKEN">
          <xs:enumeration value="string" />
          <xs:enumeration value="int8" />
          <xs:enumeration value="int16" />
          <xs:enumeration value="int32" />
          <xs:enumeration value="int64" />
          <xs:enumeration value="float" />
          <xs:enumeration value="double" />
        </xs:restriction>
      </xs:simpleType>
    </xs:attribute>
    <xs:attribute name="multi-value" use="required">
      <xs:simpleType>
        <xs:restriction base="xs:NMTOKEN">
          <xs:enumeration value="no" />
          <xs:enumeration value="yes" />
        </xs:restriction>
      </xs:simpleType>
    </xs:attribute>
    <xs:attribute name="elements" type="xs:string" use="required" />
    <xs:attribute name="custom" type="xs:string" use="required" />
    <xs:attribute name="memory-bytes" type="xs:string" use="required" />
    <xs:attribute name="basefile" type="xs:string" use="required" />
  </xs:complexType>
</xs:element>

</xs:schema>

```

8 Appendix C: Product Behavior

The information in this specification is applicable to the following Microsoft products or supplemental software. References to product versions include released service packs:

- Microsoft® FAST™ Search Server 2010

Exceptions, if any, are noted below. If a service pack or Quick Fix Engineering (QFE) number appears with the product version, behavior changed in that service pack or QFE. The new behavior also applies to subsequent service packs of the product unless otherwise specified. If a product edition appears with the product version, behavior is different in that product edition.

Unless otherwise specified, any statement of optional behavior in this specification that is prescribed using the terms SHOULD or SHOULD NOT implies product behavior in accordance with the SHOULD or SHOULD NOT prescription. Unless otherwise specified, the term MAY implies that the product does not follow the prescription.

9 Change Tracking

No table of changes is available. The document is either new or has had no changes since its last release.

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