GT 4.2.1 Index Service: System Administrator's Guide
Introduction

This guide contains advanced configuration information for system administrators working with the WS MDS Index Service. It provides references to information on procedures typically performed by system administrators, including installation, configuring, deploying, and testing the installation.

⚠️ Important

The Index Service is built and installed as part of a default GT 4.2.1 installation. For basic installation instructions, see Installing GT 4.2.1. For information about configuring WS MDS in general, see WS MDS System Administrator's Guide. No extra installation steps are required for this component.
**Table of Contents**

Index Service How-tos .......................................................................................................................... 5
1. Configuring the WS MDS Index Service ........................................................................................ 1
   1. Configuration overview ............................................................................................................. 1
   2. Defining the Aggregator Sources ............................................................................................. 1
2. Configuring the Aggregator Framework ..................................................................................... 3
   1. Configuration overview ............................................................................................................. 3
   2. Syntax of the interface ............................................................................................................... 3
3. Deploying ....................................................................................................................................... 5
   1. Deploying into Tomcat .............................................................................................................. 5
4. Testing ........................................................................................................................................... 6
5. Security Considerations ............................................................................................................... 7
   1. WS MDS Aggregator Services (Index Service and Trigger Service) Security Considerations ......... 7
6. Debugging ...................................................................................................................................... 8
   1. Logging in Java WS Core .......................................................................................................... 8
7. Troubleshooting ............................................................................................................................. 10
   1. Empty AggregatorData entry ..................................................................................................... 10
   2. Error Messages ........................................................................................................................ 10
Glossary ........................................................................................................................................... 11
Index ............................................................................................................................................... 12
List of Tables

7.1. WS MDS Index Service Error Messages ................................................................. 10
Index Service
How-tos

C
configuration interface,
   aggregator sinks,
   aggregator sources,
   disable publishing,
   overview,
configuring,
   aggregator sinks,
   aggregator sources,
   defining aggregator sources,
   disabling publishing,
   overview,

D
debugging
   logging,
deploying into Tomcat,

E
errors,

L
logging
   CEDPS-compliant,
   debugging,

S
security considerations,

T
testing,
testing your installation,
troubleshooting,
Chapter 1. Configuring the WS MDS Index Service

Note

The aggregation source used to collect data can be changed from default, as detailed in the Defining the Aggregator Sources section below.

1. Configuration overview

For a basic installation, the Index Service itself does not need any configuration changes from default; a default Index Service is available and automatically "registers" with the following GT web services based resources to allow monitoring and discovery: [CAS], [RFT], and [GRAM4] (click the links for information about what data is sent and how to change it).

Note

Auto-registration is turned on by default in GT 4.2.1. See the per service links above for information about configuring this capability.

In order for information to appear in the Index Service, the source of that information must be registered to the Index Service. Information sources are registered using tools like mds-servicegroup-add(1). Each registration has a limited lifetime; mds-servicegroup-add should be left running in the background so that it can continue to refresh registrations. Depending on administration preference, it may be run on the same host as the index, on the same host as a member resource, or on any other host(s).

The Index Service is built on Aggregator Framework and can use any Aggregator Sources Reference to collect information. In the most common case, the index service uses the QueryAggregatorSource to gather resource property values from the registered resource using one of the three WS-Resource Properties operations to poll for information; the polling method used depends on the configuration element supplied in the registration content.

Two other aggregator sources are supplied with the distribution: the SubscriptionAggregatorSource, which gathers resource property values through subscription/notification, and the ExecutionAggregatorSource, which executes an external program to gather information.

2. Defining the Aggregator Sources

The aggregation sources used to collect data can be changed from default by editing the aggregatorSources parameter in the JNDI service configuration. See $GLOBUS_LOCATION/etc/globus_wsrfs_mds_index/jndi-config.xml:

```xml
<resource name="configuration" type="org.globus.mds.aggregator.impl.AggregatorConfiguration">
    <resourceParams>
        <parameter>
            <name> factory</name>
            <value>org.globus.wsrf.jndi.BeanFactory</value>
        </parameter>
    </resourceParams>
</resource>
```
This parameter specifies one or more Java classes that may be used to collect data for the Index. By default it is set to use the QueryAggregatorSource, SubscriptionAggregatorSource, and ExecutionAggregatorSource. Details of these standard sources are in the Aggregator Sources Reference.
Chapter 2. Configuring the Aggregator Framework

WS MDS aggregator services (such as MDS Index, MDS Trigger and MDS Archive Tech Preview) inherit their configuration system from the Aggregator Framework module.

The Aggregator Framework does not have its own service-side configuration, although services which are based on the framework have their own service-side configuration options (such as MDS Index and MDS Trigger”) which are documented in the per-service documentation.

Registrations to a working Aggregator Framework are configured for the mds-servicegroup-add(1) tool. This tool takes an XML configuration file listing registrations, and causes those registrations to be made.

In general, configuration of aggregator services involves configuring the service to get information from one or more sources in a Grid. The mechanism for doing this is defined by (inherited from) the Aggregator Framework and described in this section.

1. Configuration overview

Configuring an Aggregating Service Group to perform a data aggregation is performed by specifying an Aggregator-Content object as the content parameter of a ServiceGroup add method invocation. An AggregatorContent object is composed of two xsd:any arrays: AggregatorConfig and AggregatorData:

- The AggregatorConfig xsd:any array is used to specify parameters that are to be passed to the underlying AggregatorSource when the ServiceGroup add method is invoked. These parameters are generally type-specific to the implementation of the AggregatorSource and/or AggregatorSink being used.

- The AggregatorData xsd:any array is used as the storage location for aggregated data that is the result of message deliveries to the AggregatorSink. Generally, the AggregatorData parameter of the AggregatorContent is not populated when the ServiceGroup add method is invoked, but rather is populated by message delivery from the AggregatorSource.

2. Syntax of the interface

2.1. Configuring the Aggregator Sources

For detailed information on configuring the three types of aggregator sources provided by the Globus Toolkit, see Aggregator Sources Reference.

- Chapter 6, Configuring Execution Aggregator Source
- Chapter 4, Configuration file: parameters for the query aggregator source
- Chapter 5, Configuration file: parameters for the subscription aggregator source

2.2. Configuring the Aggregator Sink

An aggregator sink may require sink-specific configuration (for example, the MDS Trigger Service requires sink-specific configuration; the MDS Index Service does not). See the documentation for the specific aggregator service being used for details on sink-specific documentation.
2.2.1. Disabling the publishing of the aggregator configuration on the server side

It is now possible to disable the publishing of the aggregator configuration along with the aggregated data. The following optional parameter can be added to the AggregatorConfiguration section of the service jndi-config.xml file:

```xml
<parameter>
    <name>publishAggregatorConfiguration</name>
    <value>false</value>
</parameter>
```

By default, this option is disabled and the aggregator configuration information is published.
Chapter 3. Deploying

The Index Service is deployed into the Globus container by default during the standard toolkit installation.

1. Deploying into Tomcat

The WS MDS Index Service has been tested to work without any additional setup when deployed into Tomcat. Please follow these Deploying into Tomcat to deploy GT4 services into Tomcat.

⚠️ Note

Note: please complete any prerequisite service configuration steps before you deploy into Tomcat.
Chapter 4. Testing

The entire content of the default index service in a deployment can be seen by executing the following command, which will dump the entire RP set of the service:

```
wsrf-query -a -z none -s https://127.0.0.1:8443/wsrf/services/DefaultIndexService/
```
Chapter 5. Security Considerations

The security considerations for the Aggregator Framework also apply to the Index Service:

1. WS MDS Aggregator Services (Index Service and Trigger Service) Security Considerations

By default, the aggregator sources do not use authentication credentials -- they retrieve information using anonymous SSL authentication or no authentication at all, and thus retrieve only publicly-available information. If a user or administrator changes that configuration so that a service's aggregator source uses credentials to acquire non-privileged data, then that user or administrator must configure the service's aggregator sink to limit access to authorized users.
Chapter 6. Debugging

Because WS MDS is built on Java WS Core, it uses the same sys admin logging, described below:

1. Logging in Java WS Core

The following information applies to Java WS Core and all services built on Java WS Core.

Java WS Core server side has two types of loggers. One logger is used for development logging and by default writes to standard out. The other logger includes system administration information and is CEDPs best practices compliant.

On client side, only developer logging is available and is configured using log4j.properties.

1.1. Development Logging in Java WS Core

The following information applies to Java WS Core and those services built on it.

Logging in the Java WS Core is based on the Jakarta Commons Logging API. Commons Logging provides a consistent interface for instrumenting source code while at the same time allowing the user to plug-in a different logging implementation. Currently we use Log4j as a logging implementation. Log4j uses a separate configuration file to configure itself. Please see Log4j documentation for details on the configuration file format.

1.1.1. Configuring server side developer logs

Server side logging can be configured in $GLOBUS_LOCATION/container-log4j.properties, when the container is stand alone container. For tomcat level logging, refer to Logging for Tomcat. The logger log4j.appender.A1 is used for developer logging and by default writes output to the system output. By default it is set for all warnings in the Globus Toolkit package to be displayed.

Additional logging can be enabled for a package by adding a new line to the configuration file. Example:

```
# for debug level logging from org.globus.package.FooClass
log4j.category.org.globus.package.name.FooClass=DEBUG
# for warnings from org.some.warn.package
log4j.category.org.some.warn.package=WARN
```

1.1.2. Configuring client side developer logs

Client side logging can be configured in $GLOBUS_LOCATION/log4j.properties. The logger log4j.appender.A1 is used for developer logging and by default writes output to the system output. By default it is set for all warnings in the Globus Toolkit package to be displayed.

---

1 http://cedps.net/index.php/LoggingBestPractices
2 http://jakarta.apache.org/commons/logging/
3 http://logging.apache.org/log4j/
5 http://tomcat.apache.org/tomcat-5.5-doc/logging.html
1.2. Configuring system administration logs

The specific logger to edit will be `log4j.logger.sysadmin` in `$GLOBUS_LOCATION/container-log4j.properties`. There you can configure the following properties:

```
log4j.appender.infoCategory=org.apache.log4j.RollingFileAppender
    log4j.appender.infoCategory.Threshold=INFO
    log4j.appender.infoCategory.File=var/containerLog
    log4j.appender.infoCategory.MaxFileSize=10MB
    log4j.appender.infoCategory.MaxBackupIndex=2
```

Above implies the logging file is rolling with each file size limited to 10MB and the logging information is stored in `$GLOBUS_LOCATION/var/containerLog`.

1.3. Sample log file

The `sample log file` contains many log entries for various scenarios in the Java WS container.

---

6 http://www.globus.org/toolkit/docs/4.2/4.2.1/common/javawscore/sample-container-log.txt
Chapter 7. Troubleshooting

You can find frequently asked questions here.

For a list of common errors in GT, see Error Codes.

1. Empty AggregatorData entry

**Problem:** An index service entry has AggregatorConfig data but an empty AggregatorData entry.

Solution: There is probably something wrong with the registration. For example, a registration that uses the QueryAggregatorSource `aggregator source` may have any of the following wrong with it:

- incorrect values for the resource's hostname or port number
- a misspelled resource property name
- the remote resource may impose security restrictions that prevent the queries from the index from working.

You can use the standard toolkit resource property query tools (such as `wsrf-get-properties`) to verify that the remote resource is responding.

2. Error Messages

Table 7.1. WS MDS Index Service Error Messages

<table>
<thead>
<tr>
<th>Error Code</th>
<th>Definition</th>
<th>Possible Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>error</td>
<td>what causes this</td>
<td>possible solutions</td>
</tr>
</tbody>
</table>

WS MDS is built on Java WS Core, please see Java WS Core Error Codes for more error code documentation.
## Glossary

### A

**Aggregator Framework**
A software framework used to build services that collect and aggregate data. WS MDS Services (such as the Index and Trigger services) are built on the Aggregator Framework, and are sometimes called Aggregator Services.

**aggregator services**
Services that are built on the Aggregator Framework, such as the WS MDS Index Service and Trigger Service.

**aggregator source**
A Java class that implements an interface (defined as part of the Aggregator Framework) to collect XML-formatted data. WS MDS contains three aggregator sources: the query aggregator source, the subscription aggregator source, and the execution aggregator source.

### I

**Index Service**
An aggregator service in WS MDS that serves as a registry similar to UDDI, but much more flexible. Indexes collect information and publish that information as WSRF resource properties.

### T

**Trigger Service**
An aggregator service (in WS MDS) that collects information and compares that data against a set of conditions defined in a configuration file. When a condition is met, or triggered, the specified action takes place (for example, an email is sent to a system administrator when the disk space on a server reaches a threshold).
Index

C
configuration interface, 1, 3
aggregator sinks, 3
aggregator sources, 3
disable publishing, 4
overview, 1, 3
configuring, 1, 3
aggregator sinks, 3
aggregator sources, 3
defining aggregator sources, 1
disabling publishing, 4
overview, 1, 3

D
debugging
logging, 8
deploying into Tomcat, 5

E
errors, 10

L
logging
CEDPS-compliant, 8
debugging, 8

S
security considerations, 7

T
testing, 6
testing your installation, 6
troubleshooting, 10
GT 4.2.1 Index Service: User's Guide
GT 4.2.1 Index Service: User's Guide

Introduction

This guide contains information for end-users of the WS MDS Index Service. The Index Service collects information about grid resources and publishes them as service group entries.
# Table of Contents

Index Service How-tos .......................................................................................................................... 5
1. Getting Information from the MDS Index Service ............................................................................... 1
   1. Simple usage .................................................................................................................................. 1
I. WS MDS Index User Commands ......................................................................................................... 3
   wsrft-query .......................................................................................................................................... 3
   wsrft-get-property ............................................................................................................................. 5
   wsrft-get-properties ............................................................................................................................ 7
   globus-wsrft-query ............................................................................................................................ 9
   globus-wsrft-get-property .................................................................................................................. 12
   globus-wsrft-get-properties ............................................................................................................... 14
2. Graphical User Interface .................................................................................................................... 16
3. Troubleshooting ................................................................................................................................... 17
   1. Error Messages .............................................................................................................................. 17
   2. General troubleshooting information ............................................................................................ 17
Glossary .................................................................................................................................................. 18
Index ...................................................................................................................................................... 19
# List of Tables

1. Common options .............................................................................................................................. 4  
2. Common options .............................................................................................................................. 6  
3. Common options .............................................................................................................................. 8  
4. Application-specific options ........................................................................................................ 9  
5. Common options ............................................................................................................................ 10  
6. Common options ............................................................................................................................ 12  
7. Common options ............................................................................................................................ 14  
3.1. WS MDS Index Service Error Messages ....................................................................................... 17
Index Service
How-tos

E
errors,

G
getting information from the Index Service (end users),

R
resource
  globus-wsrf-query,
  querying resource properties,
resource properties
  getting a single resource property from a resource,
  getting multiple resource properties from a resource,
  getting multiple values,
  getting value,
  globus-wsrf-get-properties,
  globus-wsrf-get-property,
  querying,
  querying the resource property document of a resource,
  wsrf-get-properties,
  wsrf-get-property,
  wsrf-query,

T
troubleshooting,

U
usage
  simple,
  using,
  basic,

W
wsrf-query,
Chapter 1. Getting Information from the MDS Index Service

To view the information contained in an Index Service, you can use either Java WS Core commands (outlined below) or WebMDS.

1. Simple usage

A typical example of using the default Index Service is with the `wsrf-query` Java WS Core command. For example:

```
$GLOBUS_LOCATION/bin/wsrfr-query -s https://localhost:8443/wsrfr/services/DefaultIndexService
```

displays all the resource properties collected by the default Index Service on your local host.

You can also use an XPath query to drill down your search as well as other Java WS Core commands such as `wsrf-get-property` and `wsrf-get-properties`. For more information, review the User's Guide.
WS MDS Index User Commands

The index service exposes information via service groups and is accessed using the same command-line tools used to query other WSRF services for information. These tools are part of Java WS Core.

- wsrf-query
- wsrf-get-property
- wsrf-get-properties

A set of functionally equivalent tools exist written using WS C core. They tend to be faster alternatives to the above java programs. These tools are part of C WS Core.

- globus-wsrf-query(1)
- globus-wsrf-get-property(1)
- globus-wsrf-get-properties(1)

The following commands are originally documented under their respective component guides, but are reproduced here for convenience.
Name

wsrf-query -- Performs query on a resource property document

wsrf-query

**Tool description**

Queries the resource property document of a resource. By default, a simple XPath query is assumed that returns the entire resource property document.

**Command syntax**

```
wsrf-query [options] [query expression] [dialect]
```
#### Table 1. Common options

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>-h</code>, <code>--help</code></td>
<td>Displays help information about the command.</td>
</tr>
<tr>
<td><code>-d</code>, <code>--debug</code></td>
<td>Enables debug mode. For example, full stack traces of errors will be dis-</td>
</tr>
<tr>
<td></td>
<td>played.</td>
</tr>
<tr>
<td><code>-e</code>, <code>--eprFile &lt;file&gt;</code></td>
<td>Specifies an XML file that contains the WS-Addressing endpoint reference.</td>
</tr>
<tr>
<td><code>-s</code>, <code>--service &lt;url&gt;</code></td>
<td>Specifies the service URL.</td>
</tr>
<tr>
<td><code>-k</code>, <code>--key &lt;name value&gt;</code></td>
<td>Specifies the resource key. The name is the QName of the resource key</td>
</tr>
<tr>
<td></td>
<td>in the string form: `namespaceURI</td>
</tr>
<tr>
<td></td>
<td>simple value of the key. For complex keys, use the <code>--eprFile</code> option. Ex-</td>
</tr>
<tr>
<td></td>
<td>ample: <code>--k &quot;(http://www.globus.org)MyKey&quot; 123</code></td>
</tr>
<tr>
<td><code>-f</code>, <code>--descriptor &lt;file&gt;</code></td>
<td>Specifies a client security descriptor. Overrides all other security settings.</td>
</tr>
<tr>
<td><code>-a</code>, <code>--anonymous</code></td>
<td>Enables anonymous authentication. Only supported with transport security</td>
</tr>
<tr>
<td></td>
<td>or the GSI Secure Conversation authentication mechanism.</td>
</tr>
<tr>
<td><code>-g</code>, <code>--delegation &lt;mode&gt;</code></td>
<td>Enables delegation. mode can be either 'limited' or 'full'. Only supported with the GSI Secure Conversation authentication mechanism.</td>
</tr>
<tr>
<td><code>-l</code>, <code>--contextLifetime &lt;value&gt;</code></td>
<td>Sets the lifetime of the client security context. value is in milliseconds. Only supported with the GSI Secure Conversation authentication mechanism.</td>
</tr>
<tr>
<td><code>-m</code>, <code>--securityMech &lt;type&gt;</code></td>
<td>Specifies the authentication mechanism. type can be 'msg' for GSI Secure Message, or 'conv' for GSI Secure Conversation.</td>
</tr>
<tr>
<td><code>-c</code>, <code>--serverCertificate &lt;file&gt;</code></td>
<td>Specifies the server’s certificate file used for encryption. Only needed for the GSI Secure Message authentication mechanism.</td>
</tr>
<tr>
<td><code>-p</code>, <code>--protection &lt;type&gt;</code></td>
<td>Specifies the protection level. type can be 'sig' for signature or 'enc' for encryption.</td>
</tr>
<tr>
<td><code>-x</code>, <code>--proxyFilename &lt;value&gt;</code></td>
<td>Sets the proxy file to use as client credential.</td>
</tr>
<tr>
<td><code>-z</code>, <code>--authorization &lt;type&gt;</code></td>
<td>Specifies authorization type. type can be 'self', 'host', 'none', or a string specifying the expected identity of the remote party.</td>
</tr>
<tr>
<td><code>-t</code>, <code>--timeout &lt;timeout&gt;</code></td>
<td>Specifies client timeout (in seconds). The client will wait maximum of the timeout value for a response from the server before returning an error. By default the timeout value is 10 minutes.</td>
</tr>
</tbody>
</table>

Examples:

```bash
$ wsrf-query -s https://127.0.0.1:8443/wsrf/services/DefaultIndexService "count((/*[local-name()='Entry'])")
```

```bash
$ wsrf-query -s https://127.0.0.1:8443/wsrf/services/DefaultIndexService "number((/*[local-name()='GLUECE']/glue:ComputingElement/glue:State/glue:FreeCPUs)=0"
```

```bash
$ wsrf-query -s http://localhost:8080/wsrf/services/ContainerRegistryService "/**/*/*/*/*/*[local-name()='Address']"
```
**Name**

wsrf-get-property -- Gets values of a single resource property

wsrf-get-property

**Tool description**

Gets a single resource property from a resource.

**Command syntax**

wsrf-get-property [options] <property>

The `<property>` is a QName of the resource property in the string form: `{namespaceURI}localPart`. 
Table 2. Common options

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
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<tbody>
<tr>
<td>-h, --help</td>
<td>Displays help information about the command.</td>
</tr>
<tr>
<td>-d, --debug</td>
<td>Enables debug mode. For example, full stack traces of errors will be displayed.</td>
</tr>
<tr>
<td>-e, --eprFile &lt;file&gt;</td>
<td>Specifies an XML file that contains the WS- Addressing endpoint reference.</td>
</tr>
<tr>
<td>-s, --service &lt;url&gt;</td>
<td>Specifies the service URL.</td>
</tr>
<tr>
<td>-k, --key &lt;name value&gt;</td>
<td>Specifies the resource key. The name is the QName of the resource key in the string form: {namespaceURI}localPart, while the value is the simple value of the key. For complex keys, use the --eprFile option. Example: -k &quot;(<a href="http://www.globus.org)MyKey">http://www.globus.org)MyKey</a>&quot; 123</td>
</tr>
<tr>
<td>-f, --descriptor &lt;file&gt;</td>
<td>Specifies a client security descriptor. Overrides all other security settings.</td>
</tr>
<tr>
<td>-a, --anonymous</td>
<td>Enables anonymous authentication. Only supported with transport security or the GSI Secure Conversation authentication mechanism.</td>
</tr>
<tr>
<td>-g, --delegation &lt;mode&gt;</td>
<td>Enables delegation. mode can be either 'limited' or 'full'. Only supported with the GSI Secure Conversation authentication mechanism.</td>
</tr>
<tr>
<td>-l, --contextLifetime &lt;value&gt;</td>
<td>Sets the lifetime of the client security context. value is in milliseconds. Only supported with the GSI Secure Conversation authentication mechanism.</td>
</tr>
<tr>
<td>-m, --securityMech &lt;type&gt;</td>
<td>Specifies the authentication mechanism. type can be 'msg' for GSI Secure Message, or 'conv' for GSI Secure Conversation.</td>
</tr>
<tr>
<td>-c, --serverCertificate &lt;file&gt;</td>
<td>Specifies the server's certificate file used for encryption. Only needed for the GSI Secure Message authentication mechanism.</td>
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<tr>
<td>-p, --protection &lt;type&gt;</td>
<td>Specifies the protection level. type can be 'sig' for signature or 'enc' for encryption.</td>
</tr>
<tr>
<td>-x, --proxyFilename &lt;value&gt;</td>
<td>Sets the proxy file to use as client credential.</td>
</tr>
<tr>
<td>-z, --authorization &lt;type&gt;</td>
<td>Specifies authorization type. type can be 'self', 'host', 'none', or a string specifying the expected identity of the remote party.</td>
</tr>
<tr>
<td>-t, --timeout &lt;timeout&gt;</td>
<td>Specifies client timeout (in seconds). The client will wait maximum of the timeout value for a response from the server before returning an error. By default the timeout value is 10 minutes.</td>
</tr>
</tbody>
</table>

Example:

```bash

Name

wsrf-get-properties -- Gets values of multiple resource properties

wsrf-get-properties

Tool description

Gets multiple resource properties from a resource.

Command syntax

wsrf-get-properties [options] <property1> [<property2>...<propertyN>]

Each <propertyN> is a QName of the resource property in the string form: {namespaceURI}localPart.
**Table 3. Common options**

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td><code>-h, --help</code></td>
<td>Displays help information about the command.</td>
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<td><code>-d, --debug</code></td>
<td>Enables debug mode. For example, full stack traces of errors will be displayed.</td>
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<tr>
<td><code>-e, --eprFile &lt;file&gt;</code></td>
<td>Specifies an XML file that contains the WS-Addressing endpoint reference.</td>
</tr>
<tr>
<td><code>-s, --service &lt;url&gt;</code></td>
<td>Specifies the service URL.</td>
</tr>
<tr>
<td><code>-k, --key &lt;name value&gt;</code></td>
<td>Specifies the resource key. The name is the QName of the resource key in the string form: [namespaceURI]localPart, while the value is the simple value of the key. For complex keys, use the --eprFile option. Example:</td>
</tr>
<tr>
<td><code>-f, --descriptor &lt;file&gt;</code></td>
<td>Specifies a client security descriptor. Overrides all other security settings.</td>
</tr>
<tr>
<td><code>-a, --anonymous</code></td>
<td>Enables anonymous authentication. Only supported with transport security or the GSI Secure Conversation authentication mechanism.</td>
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<tr>
<td><code>-g, --delegation &lt;mode&gt;</code></td>
<td>Enables delegation. mode can be either 'limited' or 'full'. Only supported with the GSI Secure Conversation authentication mechanism.</td>
</tr>
<tr>
<td><code>-l, --contextLifetime &lt;value&gt;</code></td>
<td>Sets the lifetime of the client security context. value is in milliseconds. Only supported with the GSI Secure Conversation authentication mechanism.</td>
</tr>
<tr>
<td><code>-m, --securityMech &lt;type&gt;</code></td>
<td>Specifies the authentication mechanism. type can be 'msg' for GSI Secure Message, or 'conv' for GSI Secure Conversation.</td>
</tr>
<tr>
<td><code>-c, --serverCertificate &lt;file&gt;</code></td>
<td>Specifies the server's certificate file used for encryption. Only needed for the GSI Secure Message authentication mechanism.</td>
</tr>
<tr>
<td><code>-p, --protection &lt;type&gt;</code></td>
<td>Specifies the protection level. type can be 'sig' for signature or 'enc' for encryption.</td>
</tr>
<tr>
<td><code>-x, --proxyFilename &lt;value&gt;</code></td>
<td>Sets the proxy file to use as client credential.</td>
</tr>
<tr>
<td><code>-z, --authorization &lt;type&gt;</code></td>
<td>Specifies authorization type. type can be 'self', 'host', 'none', or a string specifying the expected identity of the remote party.</td>
</tr>
<tr>
<td><code>-t, --timeout &lt;timeout&gt;</code></td>
<td>Specifies client timeout (in seconds). The client will wait maximum of the timeout value for a response from the server before returning an error. By default the timeout value is 10 minutes.</td>
</tr>
</tbody>
</table>

**Example:**

```
$ wsrf-get-properties -s http://localhost:8080/wsrfservices/CounterService \
  -k "(http://counter.com)CounterKey" 123 \
  "(http://docs.oasis-open.org/wsrfs/2004/06/wsrfs-WS-ResourceLifetime-1.2-draft-01.xsd)CurrentTime" \
  "(http://docs.oasis-open.org/wsrfs/2004/06/wsrfs-WS-ResourceLifetime-1.2-draft-01.xsd)TerminationTime"
```
Name

globus-wsrf-query -- Query a WSRF resource's Resource Property document

globus-wsrf-query [OPTIONS]... SERVICE-SPECIFIER QUERY-EXPRESSION

Tool description

Perform an XPATH query on a resource property document.

Command syntax

globus-wsrf-query [OPTIONS]... SERVICE-SPECIFIER QUERY-EXPRESSION

Table 4. Application-specific options

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-n</td>
<td>----nsMapFile FILENAME.</td>
</tr>
<tr>
<td>-N</td>
<td>--namespace PREFIX=NAMESPACE-URI</td>
</tr>
<tr>
<td>-D</td>
<td>--dialect DIALECT-URI</td>
</tr>
</tbody>
</table>
# Table 5. Common options

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>`-a</td>
<td>--anonymous`</td>
</tr>
<tr>
<td><code>-d, --debug</code></td>
<td>Enables debug mode. In debug mode, all SOAP messages will be displayed to stderr and full WSRF Fault messages will be displayed.</td>
</tr>
<tr>
<td>`-e</td>
<td>--eprFile FILENAME`</td>
</tr>
<tr>
<td>`-h</td>
<td>--help`</td>
</tr>
<tr>
<td>`-k</td>
<td>--key KEYNAME VALUE`</td>
</tr>
<tr>
<td><code>-m, --securityMech TYPE</code></td>
<td>Set authentication mechanism. TYPE is one of msg for WS-SecureMessage or conv for WS-SecureConversation.</td>
</tr>
<tr>
<td><code>-p, --protection LEVEL</code></td>
<td>Set message protection level. LEVEL is one of sig for digital signature or enc for encryption. The default is 'sig'.</td>
</tr>
<tr>
<td>`-s</td>
<td>--service ENDPOINT`</td>
</tr>
<tr>
<td>`-t</td>
<td>--timeout SECONDS`</td>
</tr>
<tr>
<td>`-u</td>
<td>--usage`</td>
</tr>
<tr>
<td>`-V</td>
<td>--version`</td>
</tr>
<tr>
<td><code>-v --certKeyFiles CERTIFICATE-FILENAME KEY-FILENAME</code></td>
<td>Use credentials located in CERTIFICATE-FILENAME and KEY-FILENAME. The key file must be unencrypted.</td>
</tr>
<tr>
<td>`-x</td>
<td>--proxyFilename FILENAME`</td>
</tr>
<tr>
<td>`-z</td>
<td>--authorization TYPE`</td>
</tr>
<tr>
<td><code>--versions</code></td>
<td>Show version information for all loaded modules and exit.</td>
</tr>
</tbody>
</table>

**SERVICE-SPECIFIER:** `-s URI [-k KEY VALUE] | -e FILENAME`

**QUERY-EXPRESSION:** XPath-Expression-String

### Examples:

```
% globus-wsrf-query -e widget.epr "//*[local-name() = 'CurrentTime']"
<ns02:CurrentTime
  xmlns:ns00="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:ns01="http://www.w3.org/2001/XMLSchema"
  xmlns:ns02="http://docs.oasis-open.org/wsrf/2004/06/wsrfs-WS-ResourceLifetime-1.2-draft"
ns00:time="ns01:dateTime">2006-05-30T13:53:15Z</ns02:CurrentTime>
```
% globus-wsrf-query -e widget.epr "//*[local-name() = 'CurrentTime']/text()"

% globus-wsrf-query -e widget.epr \
   -N wsrl=http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-ResourceLifetime-1.2-draft- 
     "//wsrl:CurrentTime/text()"
2006-05-30T13:54:36Z

Contents of widget.epr:

<ns01:EndpointReference xmlns:ns01="http://schemas.xmlsoap.org/ws/2004/03/addressing">
    <ns01:Address>http://globus.my.org:8080/wsrf/services/WidgetService</ns01:Address>
    <ns01:ReferenceProperties>
    </ns01:ReferenceProperties>
</ns01:EndpointReference>

Limitations

- The namespace mapping option and use of namespace prefixes in the XPath-Expression-String does not work when communicating with the Java container unless the http://wsrf.globus.org/core/query/targetedXPath dialect is used.

Output and Exit Code

If the query is successful, the program displays the output of the query to stdout and terminates with exit code 0. In the case of an error, the type of error will be displayed to stderr and the program will terminate with a non-0 exit code.
Name

globus-wsrf-get-property -- Get a resource property's value

globus-wsrf-get-property [OPTIONS]... SERVICE-SPECIFIER PROPERTY-NAME

Tool description

Get the value of a resource property from a WSRF resource.

Command syntax

globus-wsrf-get-property [OPTIONS]... SERVICE-SPECIFIER PROPERTY-NAME

Table 6. Common options

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-a</td>
<td>--anonymous</td>
</tr>
<tr>
<td>-d, --debug</td>
<td>Enables debug mode. In debug mode, all SOAP messages will be displayed to stderr and full WSRF Fault messages will be displayed.</td>
</tr>
<tr>
<td>-e</td>
<td>--eprFile FILENAME</td>
</tr>
<tr>
<td>-h</td>
<td>--help</td>
</tr>
<tr>
<td>-k</td>
<td>--key KEYNAME VALUE</td>
</tr>
<tr>
<td>-m, --securityMech TYPE</td>
<td>Set authentication mechanism. TYPE is one of msg for WS-SecureMessage or conv for WS-SecureConversation.</td>
</tr>
<tr>
<td>-p, --protection LEVEL</td>
<td>Set message protection level. LEVEL is one of sig for digital signature or enc for encryption. The default is 'sig'.</td>
</tr>
<tr>
<td>-s</td>
<td>--service ENDPOINT</td>
</tr>
<tr>
<td>-t</td>
<td>--timeout SECONDS</td>
</tr>
<tr>
<td>-u</td>
<td>--usage</td>
</tr>
<tr>
<td>-V</td>
<td>--version</td>
</tr>
<tr>
<td>-v</td>
<td>--certKeyFiles CERTIFICATE-FIILENAME KEY-FILENAME</td>
</tr>
<tr>
<td>-x</td>
<td>--proxyFilename FILENAME</td>
</tr>
<tr>
<td>-z</td>
<td>--authorization TYPE</td>
</tr>
<tr>
<td>--versions</td>
<td>Show version information for all loaded modules and exit.</td>
</tr>
</tbody>
</table>
SERVICE-SPECIFIER: [-s URI [-k KEY VALUE] | -e FILENAME]

PROPERTY-NAME: [{Namespace-URI}]Property-Name

Example:

% globus-wsrf-get-property -e widget.epr \\ 
'{{http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-ResourceLifetime-1.2-draft-01.xsd}CurrentTime}

<ns02:CurrentTime
        xmlns:ns00="http://www.w3.org/2001/XMLSchema-instance"
        xmlns:ns01="http://www.w3.org/2001/XMLSchema"
        xmlns:ns02="http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-ResourceLifetime-1.2-draft"
        ns00:type="ns01:dateTime">2006-05-30T14:26:35Z</ns02:CurrentTime>

Output and Exit Code

If the property exists, its values (if any) are displayed to stdout and the program terminates with exit code 0. In the case of an error, the type of error will be displayed to stderr and the program will terminate with a non-0 exit code.
Name
globus-wsrf-get-properties -- Get multiple resource property value

globus-wsrf-get-properties [OPTIONS]... SERVICE-SPECIFIER PROPERTY-NAME...

Tool description

Get the value of multiple resource properties from a WSRF resource.

Command syntax

globus-wsrf-get-properties [OPTIONS]... SERVICE-SPECIFIER PROPERTY-NAME...

Table 7. Common options

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-a</td>
<td>--anonymous</td>
</tr>
<tr>
<td>-d, --debug</td>
<td>Enables debug mode. In debug mode, all SOAP messages will be displayed to stderr and full WSRF Fault messages will be displayed.</td>
</tr>
<tr>
<td>-e</td>
<td>--eprFile FILENAME</td>
</tr>
<tr>
<td>-h</td>
<td>--help</td>
</tr>
<tr>
<td>-k</td>
<td>--key KEYNAME VALUE</td>
</tr>
<tr>
<td>-m, --securityMech TYPE</td>
<td>Set authentication mechanism. TYPE is one of msg for WS-SecureMessage or conv for WS-SecureConversation.</td>
</tr>
<tr>
<td>-p, --protection LEVEL</td>
<td>Set message protection level. LEVEL is one of sig for digital signature or enc for encryption. The default is 'sig'.</td>
</tr>
<tr>
<td>-s</td>
<td>--service ENDPOINT</td>
</tr>
<tr>
<td>-t</td>
<td>--timeout SECONDS</td>
</tr>
<tr>
<td>-u</td>
<td>--usage</td>
</tr>
<tr>
<td>-V</td>
<td>--version</td>
</tr>
<tr>
<td>-v</td>
<td>--certKeyFiles CERTIFICATE-FI-</td>
</tr>
<tr>
<td>-x</td>
<td>--proxyFilename FILENAME</td>
</tr>
<tr>
<td>-z</td>
<td>--authorization TYPE</td>
</tr>
<tr>
<td>--versions</td>
<td>Show version information for all loaded modules and exit.</td>
</tr>
</tbody>
</table>
SERVICE-SPECIFIER: [-s URI [-k KEY VALUE] | -e FILENAME]
PROPERTY-NAME: [{Namespace-URI}]Property-Name

Example:

% globus-wsrf-get-properties \
   -s http://grid.example.org:8080/wsrf/services/WidgetService \
   -k "{http://www.globus.org/namespaces/2004/06/core}WidgetKey" 123 \
   "{http://widgets.com}foo" \
   "{http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-ResourceLifetime-1.2-draft-01.xsd}CurrentTime"
<ns02:foo
   xmlns:ns00="http://www.w3.org/2001/XMLSchema-instance"
   xmlns:ns01="http://www.w3.org/2001/XMLSchema"
   xmlns:ns02="http://widgets.com"
   ns00:type="ns01:string">
 Foo Value String
</ns02:foo>
<ns03:CurrentTime
   xmlns:ns00="http://www.w3.org/2001/XMLSchema-instance"
   xmlns:ns01="http://www.w3.org/2001/XMLSchema"
   xmlns:ns03="http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-ResourceLifetime-1.2-draft-01.xsd"
   ns00:type="ns01:dateTime">2006-05-30T16:04:15Z</ns03:CurrentTime>

Output and Exit Code

If the properties exist, their values (if any) are displayed to stdout and the program terminates with exit code 0. In the case of an error, the type of error will be displayed to stderr and the program will terminate with a non-0 exit code.
Chapter 2. Graphical User Interface

There is no GUI specifically for the Index Service. The release contains WebMDS which can be used to display monitoring information collected in an Index Service in a normal web browser.
Chapter 3. Troubleshooting

General troubleshooting information is based on Java WS Core and is included below.

For a list of common errors in GT, see Error Codes.

1. Error Messages

Table 3.1. WS MDS Index Service Error Messages

<table>
<thead>
<tr>
<th>Error Code</th>
<th>Definition</th>
<th>Possible Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>error</td>
<td>what causes this</td>
<td>possible solutions</td>
</tr>
</tbody>
</table>

WS MDS is built on Java WS Core, please see Java WS Core Error Codes for more error code documentation.

2. General troubleshooting information

- In general, if you want to investigate a problem on your own please see Chapter 10, Debugging for details on how to turn on debugging.

- Most of the command line clients have a `-debug` option that will display more detailed error messages, including the error stack traces.

- Search the mailing lists¹ such as gt-user@globus.org² or jwscore-user@globus.org³ (before posting a message).

- If you think you have found a bug please report it in our Bugzilla⁴ system. Please include as much as detail about the problem as possible.

---

² [mailto:gt-user@globus.org](mailto:gt-user@globus.org)
³ [mailto:jwscore-user@globus.org](mailto:jwscore-user@globus.org)
⁴ [http://bugzilla.globus.org/bugzilla/](http://bugzilla.globus.org/bugzilla/)
Glossary

C

certificate
A public key plus information about the certificate owner bound together by the digital signature of a CA. In the case of a CA certificate, the certificate is self signed, i.e. it was signed using its own private key.

W

Web Services Addressing (WSA)
The WS-Addressing specification defines transport-neutral mechanisms to address web services and messages. Specifically, it defines XML elements to identify web service endpoints and to secure end-to-end endpoint identification in messages. See the W3C WS Addressing Working Group\footnote{http://www.w3.org/2002/ws/addr/} for details.

X

XML
Extensible Markup Language (XML) is standard, flexible, and extensible data format used for web services. See the W3C XML site\footnote{http://www.w3.org/XML/} for details.
Index

E
errors, 17

G
getting information from the Index Service (end users), 1

R
resource
  globus-wsrf-query, 9
  querying resource properties, 9
resource properties
  getting a single resource property from a resource, 5
  getting multiple resource properties from a resource, 7
  getting multiple values, 14
  getting value, 12
  globus-wsrf-get-properties, 14
  globus-wsrf-get-property, 12
  querying, 9
  querying the resource property document of a resource,
    3
  wsrf-get-properties, 7
  wsrf-get-property, 5
  wsrf-query, 3

T
troubleshooting, 17

U
usage
  simple, 1
  using, 1
    basic, 1

W
wsrf-query, 1
GT 4.2.1 Index Service: Developer's Guide
GT 4.2.1 Index Service: Developer's Guide

Introduction

The WS MDS Index Service collects information about grid resources and publishes that information as a service group. Client programs use resource property queries or subscription/notification to retrieve information from the index. Information can be added to the index via a number of different mechanisms: since the Index Service is implemented using the Aggregator Framework, any aggregator source can be used to provide information for the index.

This document describes the programmatic interfaces to the Index Service. See also general Globus Toolkit coding guidelines\(^1\) and GT 4.2.1 best practices.

\(^1\)http://www.globus.org/toolkit/docs/development/coding_guidelines.html
# Table of Contents

Index Service How-tos ............................................................................................................................ 7

1. Before you begin ................................................................................................................................. 1
   1. Feature summary .......................................................................................................................... 1
   2. Tested platforms ......................................................................................................................... 1
   3. Technology dependencies ........................................................................................................... 1
   4. WS MDS Aggregator Services (Index Service and Trigger Service) Security Considerations .......... 1

2. Usage scenarios .................................................................................................................................. 2
   1. Retrieving information from an index service ........................................................................... 2
   2. Adding information to an index .................................................................................................. 2

3. Writing a Execution Aggregator Information Provider .................................................................. 3
   1. Introduction ............................................................................................................................... 3
   2. Choosing (or conforming to) a Schema ..................................................................................... 3
   3. The Code ................................................................................................................................. 4
   4. Enabling The Provider .............................................................................................................. 4
   5. An Example Query .................................................................................................................... 7
   6. Contact the author .................................................................................................................... 8

4. Tutorials ........................................................................................................................................... 9

5. Architecture and design overview for the WS MDS Index Service ............................................... 10

6. Architecture and design overview for the WS MDS Aggregator Framework ..................................... 11
   1. Standard aggregator sinks ...................................................................................................... 12
   2. Standard aggregator sources .................................................................................................. 12

7. APIs ............................................................................................................................................. 14
   1. Programming Model Overview ............................................................................................. 14

8. WS and WSDL ................................................................................................................................. 15
   1. Protocol overview ................................................................................................................... 15
   2. Operations .............................................................................................................................. 15
   3. WS MDS Aggregator Framework Resource Properties ........................................................... 16
   4. Faults .................................................................................................................................... 16
   5. WSDL and Schema Definition .............................................................................................. 16

I. WS MDS Index User Commands .................................................................................................... ?
   - wsrf-query ............................................................................................................................. 18
   - wsrf-get-property ................................................................................................................ 20
   - wsrf-get-properties .............................................................................................................. 22
   - globus-wsrf-query ................................................................................................................ 24
   - globus-wsrf-get-property ................................................................................................. 27
   - globus-wsrf-get-properties .............................................................................................. 29

II. WS MDS Index Admin Commands ................................................................................................. ?
   - mds-servicegroup-add .......................................................................................................... 32
   - globus-index-add ................................................................................................................ 35

9. Graphical User Interface .................................................................................................................. 36

10. Configuring an executable to retrieve information ........................................................................ 37
    1. Interface introduction ............................................................................................................ 37
    2. Syntax of the interface .......................................................................................................... 37

11. Configuring the WS MDS Index Service ..................................................................................... 38
    1. Configuration overview ....................................................................................................... 38
    2. Defining the Aggregator Sources ......................................................................................... 38

12. Debugging .................................................................................................................................. 40
    1. Development Logging in Java WS Core ............................................................................... 40
    2. Enable Debug Logging for the Index Service ...................................................................... 40

13. Troubleshooting ......................................................................................................................... 42
    1. Java WS Core Errors ......................................................................................................... 43
2. General troubleshooting information ................................................................. 45
14. Related Documentation ................................................................................. 46
Glossary ........................................................................................................... 47
Index ................................................................................................................ 49
List of Figures

6.1. Graphic of Information Services Flow ................................................................. 11
List of Tables

6.1. Standard aggregator sinks .............................................................................................................. 12
6.2. Standard aggregator sources ........................................................................................................... 13
3. Common options ............................................................................................................................ 19
4. Common options ............................................................................................................................ 21
5. Common options ............................................................................................................................ 23
6. Application-specific options ............................................................................................................. 24
7. Common options ............................................................................................................................ 25
8. Common options ............................................................................................................................ 27
9. Common options ............................................................................................................................ 29
13.1. Java WS Core Errors ................................................................................................................... 44
Index Service
How-tos

A
aggregator sources,
execution,
query.
  GetMultipleResourcePropertiesPollType,
  GetResourcePropertyPollType,
  QueryResourcePropertiesPollType,
subscription,
AggregatorServiceGroup resource properties,
apis,
architecture,

C
configuration interface,
  overview,
configuring,
  defining aggregator sources,
  execution aggregator source,
  overview,

D
debugging,
  logging,
debugging (developer),
dependencies,

E
errors,
execution aggregator information provider,
execution aggregator source,

F
features,

G
globus-index-add,

I
information providers
  writing execution aggregator information provider,

L
logging
  debugging,

M
mds-servicegroup-add,

O
org.globus.mds.aggregator.impl,

P
platforms,

R
refresh existing entries in an index service,
register entries to an index service,
registering resources to MDS aggregator services,
related documents,
resource
globus-wsrf-query,
  querying resource properties,
resource properties
  getting a single resource property from a resource,
  getting multiple resource properties from a resource,
  getting multiple values,
  getting value,
globus-wsrf-get-properties,
globus-wsrf-get-property,
querying,
querying the resource property document of a resource,
wsrf-get-properties,
wsrf-get-property,
wsrf-query,
resource properties, AggregatorServiceGroup,

S
security considerations,
services,

T
troubleshooting
  for developers,
tutorial
    build a grid service,

U
usage scenarios,
usage scenarios (programming)
  adding information to an Index Service,
  retrieving information from an Index Service,

W
WSDL,
Chapter 1. Before you begin

1. Feature summary

Features new in release 4.2.1

• The Index Service now supports, in addition to queries made using the default XPath dialect, the new TargetedXPath dialect, which enables users to specify their own namespace mappings in queries.

2. Tested platforms

Tested Platforms for WS-MDS Index Service:

• Linux on i386
• Windows XP

Tested containers for WS-MDS Index Service:

• Java WS Core container
• Tomcat 5.0.28

3. Technology dependencies

The Index Service depends on the following GT components:

• Java WS Core
• Aggregator Framework

4. WS MDS Aggregator Services (Index Service and Trigger Service) Security Considerations

By default, the aggregator sources do not use authentication credentials -- they retrieve information using anonymous SSL authentication or no authentication at all, and thus retrieve only publicly-available information. If a user or administrator changes that configuration so that a service's aggregator source uses credentials to acquire non-privileged data, then that user or administrator must configure the service's aggregator sink to limit access to authorized users.
Chapter 2. Usage scenarios

1. Retrieving information from an index service

Information is retrieved from the index using the standard Java WS Core API calls for getting resource property information:

- `GetResourceProperty` to request a single resource property by name,
- `GetResourceProperties` to request several resource properties by name,
- `QueryResourceProperty` to perform an XPath query on a resource property document, and
- the notification/subscription mechanism.

See the Chapter 6, APIs for API details.

2. Adding information to an index

Information is added to an index by way of an aggregator source. The Globus Toolkit distribution includes several standard aggregator sources (see the Aggregator Sources Reference for more details). To create your own custom information source, see the Developer's Guide.
Chapter 3. GT 4.2.1 Index Service: How to Write a Simple Execution Aggregator Information Provider for WS MDS

1. Introduction

This document is intended to be a starting guide to writing non web-service based information providers for the WS MDS. It covers the concepts and walks through a simple example of how to get arbitrary information into the WS MDS using the Chapter 6, Configuring Execution Aggregator Source. This Aggregator Source is used for gathering arbitrary XML information about a registered resource by executing an external script. This is mostly useful for scenarios where you would like to publish information into the WS MDS from a non web-service based information source. For web-service based information sources that export known Resource Properties, it is much easier to use Chapter 4, Configuration file: parameters for the query aggregator source. However, that source is outside the scope of this document.

This document covers writing a simple information provider that publishes fortune information at a regular interval into the WS MDS's Index Service. This example was chosen because it is dynamic and simple, yet it illustrates all the fundamentals of this type of information provider.

2. Choosing (or conforming to) a Schema

The first step to getting information into the WS MDS is to decide which information you would like to have published. Since the data is in XML format, you should choose (or pick) the schema that you'd like the data to conform to. This generally means coming up with element names and types and creating some mapping of the data you're about to retrieve from your non web-service based application before putting it in to the WS MDS. For this example, I'm going to choose this very simple format for the data:

```xml
<fortuneInformation>
    <fortuneData>
        ... here is the fortune ...
    </fortuneData>
    <fortuneDateAndTime>
        ... date and time of retrieval ...
    </fortuneDateAndTime>
    <fortuneSourceURL>
        ... the URL of where the fortune was retrieved ...
    </fortuneSourceURL>
</fortuneInformation>
```

As you can see, that format is very simple. An example output will look like this:

```xml
<fortuneInformation>
    <fortuneData>
        186,282 miles per second: It isn't just a good idea, it's the law!
    </fortuneData>
    <fortuneDateAndTime>
```

3
Once you've chosen how to represent your data in XML format, you can start thinking about how you're going to retrieve and prepare that data for publication.

3. The Code

The second step to getting information into the WS MDS is to write a script (or program) that gathers and formats the appropriate data. This can be C code, shell script, perl code, etc, and it doesn't matter what kind of methods it uses behind the scenes, so long as it produces well formatted XML data.

For example, if we wanted to publish a fortune into the Index Service (using the free and charitable online service located at http://anduin.eldar.org/cgi-bin/fortune.pl), we could write a simple shell script to retrieve it and format it into our chosen XML schema.

You can sample the source code for this example implementation here. It is written as a bash shell script due to its simplicity. Tested platforms include GNU/Linux only. For this script to properly publish information, you must have one (or more) of the following programs installed on the system: `wget`, `lynx`, or `fortune`. All of these programs come standard with most GNU/Linux distributions, and it’s important to note that only one of them is required (i.e. not ALL are required). [ NOTE: Windows users must have something like the cygwin\(^1\) operating environment for this to work ]

Download the code: `fortune_script.sh`.

This file should be saved in your `$GLOBUS_LOCATION/libexec/aggrexec` directory, although the reason will be explained in the next section.

4. Enabling The Provider

Now that we have the information provider written, the next step is to enable it so that we can test it. To do this you will need to do three things. First, come up with a short name (i.e. a mapping) that can be used to reference your provider, second, copy your provider to the location where it is expected to be found, and finally, register it to the Index Service with the parameters you’d like.

4.1. Establish mapping of your information provider

To establish the mapping of your provider, you need to edit the `$GLOBUS_LOCATION/etc/globus_wsrf_mds_index/jndi-config.xml` file.

You should see an `executableMappings` section that looks something like this:

```xml
<parameter>
  <name>executableMappings</name>
  <value>
    aggr-test=aggregator-exec-test.sh,
  </value>
</parameter>
```

\(^1\) http://www.cygwin.com/
To add our `fortune_script.sh` file, let's decide that we're call it the `fortuneProvider` as the mapped name. Our entry would then look like this:

```
fortuneProvider=fortune_script.sh
```

With that line added, the entire entry should look like this (note that an extra comma had to be added before our new entry):

```
<parameter>
  <name>executableMappings</name>
  <value>
    aggr-test=aggregator-exec-test.sh,
    pingexec=example-ping-exec,
    fortuneProvider=fortune_script.sh
  </value>
</parameter>
```

**Note**

The reason we are required to establish this mapping in the first place is for security reasons. The execution aggregator source references this mapping when it's registered, rather than a full path name to a script to avoid allowing arbitrary registrations to be made that can execute arbitrary code. Requiring this mapping be configured before starting the globus container guarantees that the system administrator of the deployment has approved of the use of the new provider.

### 4.2. Copy information provider to correct location

To make sure your provider is in the expected place, it **MUST** be copied to the `$GLOBUS_LOCATION/libexec/aggrexec` directory. Notice how the full path of the script was not specified in the above example when making the mapping. That's because the path of `$GLOBUS_LOCATION/libexec/aggrexec` is simply assumed and it will be pre-pended at run-time for you. Make sure your file resides in this directory with proper executable permissions.

Check the listing to make sure:

```
neillm@glob ~ $ ls -al $GLOBUS_LOCATION/libexec/aggrexec/
total 12
drwxr-xr-x  2 neillm wheel 4096 Jul 16 14:01 .
drwxr-xr-x  6 neillm wheel 4096 Jul  8 14:52 ..
-rwxr-xr-x  1 neillm wheel  345 Jul  8 14:52 aggregator-exec-test.sh
-rwxr-xr-x  1 neillm wheel 1947 Jul 16 13:52 fortune_script.sh
```

### 4.3. Configure the registration file

So now that we've completed the first two steps of enabling the provider, we only have left to decide on the final details of how to make the registration to the Index Service.
To do this, you'll need a registration file. There are many types of registrations that can possibly occur, due to the flexibility of the Aggregator Framework. You can view several examples in the $GLOBUS_LOCATION/etc/globus_wsrf_mds_aggregator/example-aggregator-registration.xml file.

For this example, we'll simply use the custom fortune registration file provided², which is specific to the fortune provider we've made that uses the Execution Aggregator source. It's relatively simple, and the fields worth mentioning are shown here:

```xml
<defaultServiceGroupEPR>
  <wsa:Address>https://127.0.0.1:8443/wsrf/services/DefaultIndexService</wsa:Address>
</defaultServiceGroupEPR>

<defaultRegistrantEPR>
  <wsa:Address>https://127.0.0.1:8443/wsrf/services/fortuneProvider</wsa:Address>
</defaultRegistrantEPR>

These fields need to be updated to match how you'll be running your container. You'll need to properly address it, that is. For example, if you're running without security enabled on port 8080 and have an IP address of www.xxx.yyy.zzz, you should substitute the "https://127.0.0.1:8443" base part of the address with "http://www.xxx.yyy.zzz:8080".

Next, view or modify this section of the fortune-provider-registration.xml file:

```xml
<ServiceGroupRegistrationParameters
  xmlns="http://mds.globus.org/servicegroup/client" >

  <!-- Renew this registration every 600 seconds (10 minutes) -->
  <RefreshIntervalSecs>600</RefreshIntervalSecs>
  <Content xsi:type="agg:AggregatorContent"
    xmlns:agg="http://mds.globus.org/aggregator/types">
    <agg:AggregatorConfig xsi:type="agg:AggregatorConfig">
      <agg:ExecutionPollType>
        <!-- Run our script every 300,000 milliseconds (5 minutes) -->
        <agg:PollIntervalMillis>300000</agg:PollIntervalMillis>

        <!-- Specify our mapped ProbeName registered in the
            $GLOBUS_LOCATION/etc/globus_wsrf_mds_index/jndi-config.xml
            file -->
        <agg:ProbeName>fortuneProvider</agg:ProbeName>
      </agg:ExecutionPollType>
      </agg:AggregatorConfig>
    </agg:AggregatorData/>
  </Content>
</ServiceGroupRegistrationParameters>
```

The relevant fields here that you can configure are the following:

- **RefreshIntervalSeconds** - the amount of that time that should pass before the registration is renewed for you. 600 seconds (i.e. 10 minutes) is generally sufficient, and certainly is for this example. (Note: the mds-servicegroup-add utility will perform these registrations for you automatically at these time intervals). This parameter's unit is in seconds.

---

² fortune-provider-registration.xml
PollIntervalMillis - this is the time interval that we execute the specified provider. It's important to not set this value too low, as there's little value in having it execute extremely frequently given the overhead. For our example, we'll set it to 5 minutes (i.e. 300000 milliseconds). This means, the fortune information published in the Index Service will be updated once every 5 minutes. This parameter's unit is in milliseconds.

ProbeName - here is where the executable mapping is put to use. It must exactly match the (left-hand side) name you specified in the $GLOBUS_LOCATION/etc/globus_wsrf_mds_index/jndi-config.xml. For this example, we chose this name to be fortuneProvider, and you can see that's what we've specified.

Download the example registration file, fortune-provider-registration.xml.

4.4. Register with Index Service: run mds-servicegroup-add

Finally, to make the registration of our provider to the Index Service, you should run the mds-servicegroup-add program in a similar manner:

```
neillm@glob ~ $ $GLOBUS_LOCATION/bin/mds-servicegroup-add -s \
https://127.0.0.1:8443/wsrf/services/DefaultIndexService \
fortune-provider-registration.xml
```

Processing configuration file...
Processed 1 registration entries
Successfully registered
https://127.0.0.1:8443/wsrf/services/fortuneProvider to servicegroup at
https://127.0.0.1:8443/wsrf/services/DefaultIndexService

Note that you will have to specify the proper URI location of your Index Service on the command line and not the one specified above (unless it's the same, of course).

5. An Example Query

```
neillm@glob bin $ ./wsrf-query -s \
https://127.0.0.1:8443/wsrf/services/DefaultIndexService \
"//*[local-name()='fortuneInformation']"

<fortuneInformation xmlns="">
<fortuneData>
They told me you had proven it When they discovered our results About a month before. Their hair began to curl The proof was valid, more or less Instead of understanding it But rather less than more. We'd run the thing through PRL. He sent them word that we would try Don't tell a soul about all this To pass where they had failed For it must ever be And after we were done, to them A secret, kept from all the rest The new proof would be mailed. Between yourself and me. My notion was to start again Ignoring all they'd done We quickly turned it into code To see if it would run.
</fortuneData>
<fortuneDateAndTime>
Wed Jul 20 12:36:36 BST 2005
```
This segment of the query output represents the fortune data we've just written and configured for use. As you can see the `fortuneInformation` block was properly published into the Index Service since it's now been properly configured and registered!

6. Contact the author

Contact the author at neillm@mcs.anl.gov³.

³ mailto:neillm@mcs.anl.gov
Chapter 4. Tutorials

Use of the index service is covered in the Build a Grid Service Tutorial (GlobusWORLD 2005)\(^1\).

\(^1\) http://www.globus.org/toolkit/tutorials/BAS/
Chapter 5. Architecture and design overview for the WS MDS Index Service

There are essentially two interfaces to the Index Service -- one for getting information into the index, and one for retrieving information from the index.

Information is retrieved from the Index Service as service group entries using the standard WS MDS Core APIs for resource property queries or subscription/notification.

Because the Index is implemented as a WS MDS Aggregator Framework, the programmatic interface for getting information into the index is to create an aggregator source. The Aggregator Framework’s architecture is described in the next section.
Chapter 6. Architecture and design overview for the WS MDS Aggregator Framework

The WS MDS Aggregator Framework is the software framework on which WS MDS aggregator services are built. The Aggregator Framework collects data from an **aggregator source** and sends that data to an **aggregator sink** for processing.

Aggregator sources distributed with the Globus Toolkit include modules that query resource properties, acquire data through subscription/notification, and execute programs to generate data.

Another way of describing the Aggregator Framework is that it is designed to facilitate the collecting of information from or about WS-Resources via plugin aggregator sources and the feeding of that information to plugin aggregator sinks, which can then perform actions such as re-publishing, logging, or archiving the information.

**Figure 6.1. Graphic of Information Services Flow**

Information Flow in WS-MDS

[Diagram showing information flow]

Aggregators work on a type of service group called an **AggregatorServiceGroupRP**. Resources may be **registered** to an AggregatorServiceGroupRP using the service group **add** operation, which will cause an entry to be added to the service group. The entry will include configuration parameters for the aggregator source; when the registration is made, the appropriate aggregation source and sinks will be informed; the aggregator source will begin collecting data and
inserting it into the corresponding service group entry, and the aggregator sink will begin processing the information in the service group entries.

The method of collection by source and processing by the sink is dependent on the particular instantiation of the aggregator framework.

1. Standard aggregator sinks

The aggregator sinks distributed with the toolkit (org.globus.mds.aggregator.impl.ServiceGroupEntry-AggregatorSink and org.globus.mds.trigger.impl.TriggerResource) are described in the following table.

Table 6.1. Standard aggregator sinks

<table>
<thead>
<tr>
<th>Aggregator Sink</th>
<th>Service Implemented</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ServiceGroupEntry-AggregatorSink</td>
<td>Index Service</td>
<td>The servicegroup sink (used by the Index Service) publishes received data as content in the AggregatingServiceGroup entry used to manage the registration. This data can therefore be retrieved by querying the index for its 'entries' resource property.</td>
</tr>
<tr>
<td>TriggerResource</td>
<td>Trigger Service</td>
<td>The Trigger Service provides an aggregator sink which receives data, applies tests to that data, and if the tests match, runs a specified executable. See the Trigger Service documentation for more information.</td>
</tr>
</tbody>
</table>

2. Standard aggregator sources

The aggregator sources supplied with the toolkit collect information using resource property queries (query sources), subscription/notification (subscription sources), and execution of external programs (execution sources).

The aggregator sources supplied with the Globus Toolkit are listed in the following table.

Note

All aggregator sources listed in this table are in the org.globus.mds.aggregator.impl package, so for example the aggregator source listed as QueryAggregatorSource is actually org.globus.mds.aggregator.impl.QueryAggregatorSource
### Table 6.2. Standard aggregator sources

<table>
<thead>
<tr>
<th>Aggregator Source</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>QueryAggregatorSource</td>
<td>The query source collects information from a registered resource by using WS-Resource Properties polling mechanisms:</td>
</tr>
<tr>
<td></td>
<td>• GetResourcePropertyPollType; requests a single Resource Property from the remote resource.</td>
</tr>
<tr>
<td></td>
<td>• GetMultipleResourcePropertiesPollType; requests multiple Resource Properties from the remote resource.</td>
</tr>
<tr>
<td></td>
<td>• QueryResourcePropertiesPollType; requests a query be executed against the Resource Property Set of the remote resource.</td>
</tr>
<tr>
<td></td>
<td>Polls are made periodically, with both the period and target Resource Properties specified in the registration message.</td>
</tr>
<tr>
<td>SubscriptionAggregatorSource</td>
<td>The subscription source collects information from a registered resource using WS-Notification mechanisms. Data is delivered when property values change, rather than periodically.</td>
</tr>
<tr>
<td>ExecutionAggregatorSource</td>
<td>The execution source collects information about (not necessarily from) a registered resource by execution of a local executable, which is passed as input the identity of the registered resource. Details of the interface between the execution source and local executables are in Chapter 6, Configuring Execution Aggregator Source.</td>
</tr>
</tbody>
</table>
Chapter 7. APIs

1. Programming Model Overview

Index Service queries are performed using resource property requests; consult Java WS Core for details.

The contents of an index are maintained using the aggregator framework programming model, and can receive data from any aggregator source. Information about how to configure existing aggregator sources (such as the aggregator sources distributed with the Globus Toolkit, which include one that polls for resource property information, one that collects resource property information through subscription/notification, and one that collects information by executing an executable program) is found in the Aggregator Sources Reference; information about how to create new aggregator sources can be found in Developer's Guide.
Chapter 8. WS and WSDL

1. Protocol overview

The Aggregator Framework builds on the WS-ServiceGroup\(^1\) and WS-ResourceLifetime\(^2\) specifications. Those specifications should be consulted for details on the syntax of each operation.

Each Aggregator Framework is represented as a WS-ServiceGroup (specifically, an AggregatorServiceGroup).

Resources may be registered to an AggregatorServiceGroup using the AggregatorServiceGroup Add operation. Each registration will be represented as a ServiceGroupEntry resource. Resources may be registered to an AggregatorServiceGroup using the service group add operation, which will cause an entry to be added to the service group.

The entry will include configuration parameters for the *aggregator source*; when the registration is made, the following will happen:

1. The appropriate aggregation source and sinks will be informed,
2. the aggregator source will begin collecting data and inserting it into the corresponding service group entry,
3. and the aggregator sink will begin processing the information in the service group entries.

The method of collection by source and processing by the sink is dependent on the particular instantiation of the aggregator framework (see per-source documentation for source information and per-service documentation for sink information - for example the Index Service and the Trigger Service.)

2. Operations

2.1. AggregatorServiceGroup

- **add:** This operation is used to register a specified resource with the Aggregator Framework. In addition to the requirements made by the WS-ServiceGroup specification, the Content element of each registration must be an AggregatorContent type, with the AggregatorConfig element containing configuration information specific to each source and sink (documented in the System Administrator's Guide).

2.2. AggregatorServiceGroupEntry

- **setTerminationTime:** This operation can be used to set the termination time of the registration, as detailed in WS-ResourceLifetime.

---


3. WS MDS Aggregator Framework Resource Properties

3.1. AggregatorServiceGroup Resource Properties

- Entry: This resource property publishes details of each registered resource, including both an EPR to the resource, the Aggregator Framework configuration information, and data from the sink.

- RegistrationCount: This resource property publishes registration load information (the total number of registrations since service startup and decaying averages)

4. Faults


5. WSDL and Schema Definition

- AggregatorServiceGroup

- AggregatorServiceGroupEntry

- common types used by AggregatorServiceGroup and AggregatorServiceGroupEntry

Other relevant source files are the:

- WSRF service group schema

- WSRF resource lifetime schema

- MDS Usefulrp schema.

---

3 http://viewcvs.globus.org/viewcvs.cgi/ws-mds/aggregator/schema/mds/aggregator/aggregator_service_group_port_type.wsdl?revision=1.5&view=markup&pathrev=globus_4_2_branch

4 http://viewcvs.globus.org/viewcvs.cgi/ws-mds/aggregator/schema/mds/aggregator/aggregator_service_group_entry_port_type.wsdl?revision=1.6&view=markup&pathrev=globus_4_2_branch

5 http://viewcvs.globus.org/viewcvs.cgi/ws-mds/aggregator/schema/mds/aggregator/aggregator-types.xsd?revision=1.6&view=markup&pathrev=globus_4_2_branch

6 http://viewcvs.globus.org/viewcvs.cgi/wsrf/schema/wsrf/servicegroup/sgw-2.wsdl?revision=1.2&view=markup&pathrev=globus_4_2_branch

WS MDS Index User Commands

The index service exposes information via service groups and is accessed using the same command-line tools used to query other WSRF services for information. These tools are part of Java WS Core.

- wsrf-query
- wsrf-get-property
- wsrf-get-properties

A set of functionally equivalent tools exist written using WS C core. They tend to be faster alternatives to the above java programs. These tools are part of C WS Core.

- globus-wsrf-query(1)
- globus-wsrf-get-property(1)
- globus-wsrf-get-properties(1)

The following commands are originally documented under their respective component guides, but are reproduced here for convenience.
Name

wsrf-query -- Performs query on a resource property document

wsrf-query

Tool description

Queries the resource property document of a resource. By default, a simple XPath query is assumed that returns the entire resource property document.

Command syntax

wsrf-query [options] [query expression] [dialect]
Table 3. Common options

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-h, --help</td>
<td>Displays help information about the command.</td>
</tr>
<tr>
<td>-d, --debug</td>
<td>Enables debug mode. For example, full stack traces of errors will be displayed.</td>
</tr>
<tr>
<td>-e, --eprFile &lt;file&gt;</td>
<td>Specifies an XML file that contains the WS-Addressing endpoint reference.</td>
</tr>
<tr>
<td>-s, --service &lt;url&gt;</td>
<td>Specifies the service URL.</td>
</tr>
</tbody>
</table>
| -k, --key <name value> | Specifies the resource key. The name is the QName of the resource key in the string form: {namespaceURI}localPart, while the value is the simple value of the key. For complex keys, use the --eprFile option. Example: 
  -k "{(http://www.globus.org)MyKey"
  123 |
| -f, --descriptor <file> | Specifies a client security descriptor. Overrides all other security settings.                                                             |
| -a, --anonymous | Enables anonymous authentication. Only supported with transport security or the GSI Secure Conversation authentication mechanism.            |
| -g, --delegation <mode> | Enables delegation. mode can be either 'limited' or 'full'. Only supported with the GSI Secure Conversation authentication mechanism.    |
| -l, --contextLifetime <value> | Sets the lifetime of the client security context. value is in milliseconds. Only supported with the GSI Secure Conversation authentication mechanism. |
| -m, --securityMech <type> | Specifies the authentication mechanism. type can be 'msg' for GSI Secure Message, or 'conv' for GSI Secure Conversation.              |
| -c, --serverCertificate <file> | Specifies the server's certificate file used for encryption. Only needed for the GSI Secure Message authentication mechanism.           |
| -p, --protection <type> | Specifies the protection level. type can be 'sig' for signature or 'enc' for encryption.                                               |
| -x, --proxyFilename <value> | Sets the proxy file to use as client credential.                                                                                           |
| -z, --authorization <type> | Specifies authorization type. type can be 'self', 'host', 'none', or a string specifying the expected identity of the remote party.  |
| -t, --timeout <timeout> | Specifies client timeout (in seconds). The client will wait maximum of the timeout value for a response from the server before returning an error. By default the timeout value is 10 minutes. |

Examples:

```
$ wrsf-query -s https://127.0.0.1:8443/wrsf/services/DefaultIndexService "count(/*[local-name()='Entry'])"

$ wrsf-query -s https://127.0.0.1:8443/wrsf/services/DefaultIndexService "number(/*[local-name()='GLUECE']/glue:ComputingElement/glue:State/@glue:FreeCPUs)=0"

$ wrsf-query -s http://localhost:8080/wrsf/services/ContainerRegistryService "/**//*/*/*/*[local-name()='Address']"
```
Name

wsrf-get-property -- Gets values of a single resource property

wsrf-get-property

Tool description

Gets a single resource property from a resource.

Command syntax

wsrf-get-property [options] <property>

The <property> is a QName of the resource property in the string form: {namespaceURI}localPart.
Table 4. Common options

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-h, --help</td>
<td>Displays help information about the command.</td>
</tr>
<tr>
<td>-d, --debug</td>
<td>Enables debug mode. For example, full stack traces of errors will be displayed.</td>
</tr>
<tr>
<td>-e, --eprFile &lt;file&gt;</td>
<td>Specifies an XML file that contains the WS-Addressing endpoint reference.</td>
</tr>
<tr>
<td>-s, --service &lt;url&gt;</td>
<td>Specifies the service URL.</td>
</tr>
<tr>
<td>-k, --key &lt;name value&gt;</td>
<td>Specifies the resource key. The name is the QName of the resource key in the string form: {namespaceURI}localPart, while the value is the simple value of the key. For complex keys, use the --eprFile option. Example:</td>
</tr>
<tr>
<td></td>
<td>-k &quot;(<a href="http://www.globus.org)MyKey">http://www.globus.org)MyKey</a>&quot; 123</td>
</tr>
<tr>
<td>-f, --descriptor &lt;file&gt;</td>
<td>Specifies a client security descriptor. Overrides all other security settings.</td>
</tr>
<tr>
<td>-a, --anonymous</td>
<td>Enables anonymous authentication. Only supported with transport security or the GSI Secure Conversation authentication mechanism.</td>
</tr>
<tr>
<td>-g, --delegation &lt;mode&gt;</td>
<td>Enables delegation. mode can be either 'limited' or 'full'. Only supported with the GSI Secure Conversation authentication mechanism.</td>
</tr>
<tr>
<td>-l, --contextLifetime &lt;value&gt;</td>
<td>Sets the lifetime of the client security context. value is in milliseconds. Only supported with the GSI Secure Conversation authentication mechanism.</td>
</tr>
<tr>
<td>-m, --securityMech &lt;type&gt;</td>
<td>Specifies the authentication mechanism. type can be 'msg' for GSI Secure Message, or 'conv' for GSI Secure Conversation.</td>
</tr>
<tr>
<td>-c, --serverCertificate &lt;file&gt;</td>
<td>Specifies the server's certificate file used for encryption. Only needed for the GSI Secure Message authentication mechanism.</td>
</tr>
<tr>
<td>-p, --protection &lt;type&gt;</td>
<td>Specifies the protection level. type can be 'sig' for signature or 'enc' for encryption.</td>
</tr>
<tr>
<td>-x, --proxyFilename &lt;value&gt;</td>
<td>Sets the proxy file to use as client credential.</td>
</tr>
<tr>
<td>-z, --authorization &lt;type&gt;</td>
<td>Specifies authorization type. type can be 'self', 'host', 'none', or a string specifying the expected identity of the remote party.</td>
</tr>
<tr>
<td>-t, --timeout &lt;timeout&gt;</td>
<td>Specifies client timeout (in seconds). The client will wait maximum of the timeout value for a response from the server before returning an error. By default the timeout value is 10 minutes.</td>
</tr>
</tbody>
</table>

Example:

```
$ wsrf-get-property -s http://localhost:8080/wsrfservices/CounterService -k 
"(http://counter.com)CounterKey" 123 
"(http://docs.oasis-open.org/wsrfs/2004/06/wsrfs-WS-ResourceLifetime-1.2-draft-01.xsd)Cur
```
**Name**

wsrf-get-properties -- Gets values of multiple resource properties

wsrf-get-properties

**Tool description**

 Gets multiple resource properties from a resource.

**Command syntax**

```bash
wsrf-get-properties [options] <property1> [<property2>... <propertyN>]
```

Each `<propertyN>` is a QName of the resource property in the string form: `{namespaceURI}localPart`
### Table 5. Common options

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>-h, --help</code></td>
<td>Displays help information about the command.</td>
</tr>
<tr>
<td><code>-d, --debug</code></td>
<td>Enables debug mode. For example, full stack traces of errors will be displayed.</td>
</tr>
<tr>
<td><code>-e, --eprFile &lt;file&gt;</code></td>
<td>Specifies an <strong>XML</strong> file that contains the <strong>WS-Addressing</strong> endpoint reference.</td>
</tr>
<tr>
<td><code>-s, --service &lt;url&gt;</code></td>
<td>Specifies the service URL.</td>
</tr>
<tr>
<td><code>-k, --key &lt;name value&gt;</code></td>
<td>Specifies the resource key. The <strong>name</strong> is the QName of the resource key in the string form: <code>{namespaceURI}localPart</code>, while the <strong>value</strong> is the simple value of the key. For complex keys, use the <strong>--eprFile</strong> option. Example:</td>
</tr>
<tr>
<td><code>-f, --descriptor &lt;file&gt;</code></td>
<td>Specifies a client security descriptor. Overrides all other security settings.</td>
</tr>
<tr>
<td><code>-a, --anonymous</code></td>
<td>Enables anonymous authentication. Only supported with transport security or the GSI Secure Conversation authentication mechanism.</td>
</tr>
<tr>
<td><code>-g, --delegation &lt;mode&gt;</code></td>
<td>Enables delegation. <strong>mode</strong> can be either 'limited' or 'full'. Only supported with the GSI Secure Conversation authentication mechanism.</td>
</tr>
<tr>
<td><code>-l, --contextLifetime &lt;value&gt;</code></td>
<td>Sets the lifetime of the client security context. <strong>value</strong> is in milliseconds. Only supported with the GSI Secure Conversation authentication mechanism.</td>
</tr>
<tr>
<td><code>-m, --securityMech &lt;type&gt;</code></td>
<td>Specifies the authentication mechanism. <strong>type</strong> can be 'msg' for GSI Secure Message, or 'conv' for GSI Secure Conversation.</td>
</tr>
<tr>
<td><code>-c, --serverCertificate &lt;file&gt;</code></td>
<td>Specifies the server's <strong>certificate</strong> file used for encryption. Only needed for the GSI Secure Message authentication mechanism.</td>
</tr>
<tr>
<td><code>-p, --protection &lt;type&gt;</code></td>
<td>Specifies the protection level. <strong>type</strong> can be 'sig' for signature or 'enc' for encryption.</td>
</tr>
<tr>
<td><code>-x, --proxyFilename &lt;value&gt;</code></td>
<td>Sets the proxy file to use as client credential.</td>
</tr>
<tr>
<td><code>-z, --authorization &lt;type&gt;</code></td>
<td>Specifies authorization type. <strong>type</strong> can be 'self', 'host', 'none', or a string specifying the expected identity of the remote party.</td>
</tr>
<tr>
<td><code>-t, --timeout &lt;timeout&gt;</code></td>
<td>Specifies client timeout (in seconds). The client will wait maximum of the timeout value for a response from the server before returning an error. By default the timeout value is 10 minutes.</td>
</tr>
</tbody>
</table>

Example:

```
```
Name

globus-wsrf-query -- Query a WSRF resource's Resource Property document

globus-wsrf-query [OPTIONS]... SERVICE-SPECIFIER QUERY-EXPRESSION

Tool description

Perform an XPATH query on a resource property document.

Command syntax

globus-wsrf-query [OPTIONS]... SERVICE-SPECIFIER QUERY-EXPRESSION

Table 6. Application-specific options

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-n</td>
<td>----nsMapFile FILENAME.</td>
</tr>
<tr>
<td>-N</td>
<td>--namespace PREFIX=NAMESPACE-URI</td>
</tr>
<tr>
<td>-D</td>
<td>--dialect DIALECT-URI</td>
</tr>
</tbody>
</table>
Table 7. Common options

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-a</td>
<td>--anonymous</td>
</tr>
<tr>
<td>-d, --debug</td>
<td>Enables debug mode. In debug mode, all SOAP messages will be displayed to stderr and full WSRF Fault messages will be displayed.</td>
</tr>
<tr>
<td>-e</td>
<td>--eprFile FILENAME</td>
</tr>
<tr>
<td>-h</td>
<td>--help</td>
</tr>
<tr>
<td>-k</td>
<td>--key KEYNAME VALUE</td>
</tr>
<tr>
<td>-m, --securityMech TYPE</td>
<td>Set authentication mechanism. TYPE is one of msg for WS-SecureMessage or conv for WS-SecureConversation.</td>
</tr>
<tr>
<td>-p, --protection LEVEL</td>
<td>Set message protection level. LEVEL is one of sig for digital signature or enc for encryption. The default is 'sig'.</td>
</tr>
<tr>
<td>-s</td>
<td>--service ENDPOINT</td>
</tr>
<tr>
<td>-t</td>
<td>--timeout SECONDS</td>
</tr>
<tr>
<td>-u</td>
<td>--usage</td>
</tr>
<tr>
<td>-V</td>
<td>--version</td>
</tr>
<tr>
<td>-v</td>
<td>--certKeyFiles CERTIFICATE-FILENAME KEY-FILENAME</td>
</tr>
<tr>
<td>-x</td>
<td>--proxyFilename FILENAME</td>
</tr>
<tr>
<td>-z</td>
<td>--authorization TYPE</td>
</tr>
</tbody>
</table>

SERVICE-SPECIFIER: [-s URI [-k KEY VALUE]] | -e FILENAME]

QUERY-EXPRESSION: XPath-Expression-String

Examples:

% globus-wsrf-query -e widget.epr "//*[local-name() = 'CurrentTime']"
<ns02:CurrentTime
  xmlns:ns00="http://www.w3.org/2001/XMLSchema-instance"
  xmlns:ns01="http://www.w3.org/2001/XMLSchema"
  xmlns:ns02="http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-ResourceLifetime-1.2-draft"
  ns00:type="ns01:dateTime">2006-05-30T13:53:15Z</ns02:CurrentTime>
globus-wsrf-query

% globus-wsrf-query -e widget.epr "//*[local-name() = 'CurrentTime']/text()"

% globus-wsrf-query -e widget.epr \  
-N wsrl=http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-ResourceLifetime-1.2-draft- 
"//wsrl:CurrentTime/text()"
2006-05-30T13:54:36Z

Contents of widget.epr:

<ns01:EndpointReference xmlns:ns01="http://schemas.xmlsoap.org/ws/2004/03/addressing">
  <ns01:Address>http://globus.my.org:8080/wsrf/services/WidgetService</ns01:Address>
</ns01:EndpointReference>

Limitations

- The namespace mapping option and use of namespace prefixes in the XPath-Expression-String does not work when communicating with the Java container unless the http://wsrf.globus.org/core/query/targetedXPath dialect is used.

Output and Exit Code

If the query is successful, the program displays the output of the query to stdout and terminates with exit code 0. In the case of an error, the type of error will be displayed to stderr and the program will terminate with a non-0 exit code.
Name

globus-wsrf-get-property -- Get a resource property's value

globus-wsrf-get-property [OPTIONS]... SERVICE-SPECIFIER PROPERTY-NAME

Tool description

Get the value of a resource property from a WSRF resource.

Command syntax

globus-wsrf-get-property [OPTIONS]... SERVICE-SPECIFIER PROPERTY-NAME

Table 8. Common options

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-a</td>
<td>--anonymous</td>
</tr>
<tr>
<td>-d, --debug</td>
<td>Enables debug mode. In debug mode, all SOAP messages will be displayed to stderr and full WSRF Fault messages will be displayed.</td>
</tr>
<tr>
<td>-e</td>
<td>--eprFile FILENAME</td>
</tr>
<tr>
<td>-h</td>
<td>--help</td>
</tr>
<tr>
<td>-k</td>
<td>--key KEYNAME VALUE</td>
</tr>
<tr>
<td>-m, --securityMech TYPE</td>
<td>Set authentication mechanism. TYPE is one of msg for WS-SecureMessage or conv for WS-SecureConversation.</td>
</tr>
<tr>
<td>-p, --protection LEVEL</td>
<td>Set message protection level. LEVEL is one of sig for digital signature or enc for encryption. The default is 'sig'.</td>
</tr>
<tr>
<td>-s</td>
<td>--service ENDPOINT</td>
</tr>
<tr>
<td>-t</td>
<td>--timeout SECONDS</td>
</tr>
<tr>
<td>-u</td>
<td>--usage</td>
</tr>
<tr>
<td>-V</td>
<td>--version</td>
</tr>
<tr>
<td>-v</td>
<td>--certKeyFiles CERTIFICATE-FILENAME KEY-FILENAME</td>
</tr>
<tr>
<td>-x</td>
<td>--proxyFilename FILENAME</td>
</tr>
<tr>
<td>-z</td>
<td>--authorization TYPE</td>
</tr>
<tr>
<td>--versions</td>
<td>Show version information for all loaded modules and exit.</td>
</tr>
</tbody>
</table>
SERVICE-SPECIFIER: [-s URI [-k KEY VALUE]] | -e FILENAME

PROPERTY-NAME: [[Namespace-URI]]Property-Name

Example:

```bash
% globus-wsrf-get-property -e widget.epr \
   '{http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-ResourceLifetime-1.2-draft-01.xsd}CurrentTime

<ns02:CurrentTime
   xmlns:ns00="http://www.w3.org/2001/XMLSchema-instance"
   xmlns:ns01="http://www.w3.org/2001/XMLSchema"
   xmlns:ns02="http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-ResourceLifetime-1.2-draft-01.xsd"
   ns00:type="ns01:dateTime">2006-05-30T14:26:35Z</ns02:CurrentTime>
```

**Output and Exit Code**

If the property exists, its values (if any) are displayed to *stdout* and the program terminates with exit code 0. In the case of an error, the type of error will be displayed to *stderr* and the program will terminate with a non-0 exit code.
Name

globus-wsrf-get-properties -- Get multiple resource property value

globus-wsrf-get-properties [OPTIONS]... SERVICE-SPECIFIER PROPERTY-NAME...

Tool description

Get the value of multiple resource properties from a WSRF resource.

Command syntax

globus-wsrf-get-properties [OPTIONS]... SERVICE-SPECIFIER PROPERTY-NAME...

Table 9. Common options

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-a</td>
<td>--anonymous</td>
</tr>
<tr>
<td>-d</td>
<td>--debug</td>
</tr>
<tr>
<td>-e</td>
<td>--eprFile FILENAME</td>
</tr>
<tr>
<td>-h</td>
<td>--help</td>
</tr>
<tr>
<td>-k</td>
<td>--key KEYNAME VALUE</td>
</tr>
<tr>
<td>-m</td>
<td>--securityMech TYPE</td>
</tr>
<tr>
<td>-p</td>
<td>--protection LEVEL</td>
</tr>
<tr>
<td>-s</td>
<td>--service ENDPOINT</td>
</tr>
<tr>
<td>-t</td>
<td>--timeout SECONDS</td>
</tr>
<tr>
<td>-u</td>
<td>--usage</td>
</tr>
<tr>
<td>-V</td>
<td>--version</td>
</tr>
<tr>
<td>-v</td>
<td>--certKeyFiles CERTIFICATE-FILENAME KEY-FILENAME</td>
</tr>
<tr>
<td>-x</td>
<td>--proxyFilename FILENAME</td>
</tr>
<tr>
<td>-z</td>
<td>--authorization TYPE</td>
</tr>
<tr>
<td>--versions</td>
<td>Show version information for all loaded modules and exit.</td>
</tr>
</tbody>
</table>
SERVICE-SPECIFIER: [-s URI [-k KEY VALUE] | -e FILENAME]

PROPERTY-NAME: [{Namespace-URI}]Property-Name

Example:

% globus-wsrf-get-properties \
   -s http://grid.example.org:8080/wsrf/services/WidgetService \
   -k "{http://www.globus.org/namespaces/2004/06/core}WidgetKey" 123 \ 
   "{http://widgets.com}foo" \ 
   "{http://docs.oasis-open.org/wsrf/2004/06/wsrf-WS-ResourceLifetime-1.2-draft-01.xsd}CurrentTime" \
<ns02:foo \
   xmlns:ns00="http://www.w3.org/2001/XMLSchema-instance" \
   xmlns:ns01="http://www.w3.org/2001/XMLSchema" \
   xmlns:ns02="http://widgets.com" \
   ns00:type="ns01:string"> 
Foo Value String 
</ns02:foo> 
</ns03:CurrentTime>

Output and Exit Code

If the properties exist, their values (if any) are displayed to stdout and the program terminates with exit code 0. In the case of an error, the type of error will be displayed to stderr and the program will terminate with a non-0 exit code.
The `mds-servicegroup-add(1)` command in the Aggregator Framework is used to configure the Index Service to query information from various sources.

The `globus-index-add(1)` command line tool is written using WS C and offers similar functionality to `mds-servicegroup-add(1)` with a few new options.
# Name

mds-servicegroup-add -- Registering grid resources to aggregating MDS services such as the Index, Archive and Trigger services

# Tool description

**mds-servicegroup-add** creates a set of registrations to a WS-ServiceGroup and periodically renews those registrations. It is intended primarily for registering grid resources to aggregating MDS services such as the Index and Trigger services.

The tool can be deployed at the aggregating service, at resource services, or at any other location.

This allows registrations to be configured by the administrator of the aggregating service, or by the administrator of resources, by a third party, or by some combination of those.

Registrations are defined in an XML configuration file, which is documented here: Chapter 3, Registering Aggregator Sources.

For an example using an Index Service, see Simple usage for the Index Service.

And remember to note the section on Limitations.

## Command syntax

The basic syntax for **mds-servicegroup-add** is:

```
mds-servicegroup-add [options] config.xml
```

where:

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>-s</code></td>
<td>A URL to the service group against which the mds-servicegroup-add request will be executed. This command line argument is an optional argument, it is only necessary that this URL argument be specified in the case that there are no suitable target service group EPRs present in the configuration file. Any end point references found in the configuration file will automatically override the EPR specified by this argument on the command-line. If this argument is not specified and no suitable service group EPR is present in the configuration file, the target EPR defaults to the DefaultIndexService on the local host using the default TLS port of 8443.</td>
</tr>
<tr>
<td><code>-o</code> outputFile</td>
<td>If this argument is specified, <strong>mds-servicegroup-add</strong> will write the EPRs of all successfully created service group entries from the target resource to this file. This file can then be used as input to the <strong>mds-set-multiple-termination-time</strong> command.</td>
</tr>
<tr>
<td><code>-q</code> seconds</td>
<td>By default, <strong>mds-servicegroup-add</strong> will continue to run, refreshing the lifetimes for the service group entry resources it creates. Use this option to cause <strong>mds-servicegroup-add</strong> to terminate itself after the specified number of seconds has elapsed. This can be helpful when using long-lifetime registrations or when updating entry lifetimes via a different mechanism.</td>
</tr>
<tr>
<td><code>-a</code></td>
<td>By default, <strong>mds-servicegroup-add</strong> will attempt to make an authenticated connection to each service group. This option is used to specify anonymous connections (and to prevent <strong>mds-servicegroup-add</strong> from failing if you don't have a valid Grid credential).</td>
</tr>
<tr>
<td><code>-z</code> auth_type</td>
<td>Specify an authorization type:</td>
</tr>
</tbody>
</table>
The common Java client options are also supported.

Registering a resource manually

Prerequisites

You need the following before you register a resource with an Index Service:

- Have a working Index Service, as documented in the Index Service System Administrator's Guide.
- Know the EPR to the resource.
- Know the EPR to the Index Service. This can be seen in the container output at startup of the container on the index host, and will look something like this: https://myhost:8443/wsrf/services/DefaultIndexService

Simple usage for the Index Service

The simplest way to register resources to an index is to:

1. Edit the example configuration file ($GLOBUS_LOCATION/etc/globus_wsrf_mds_aggregator/example-aggregator-registration.xml), replacing the EPRs in that file with the EPRs for your resources
2. Run mds-servicegroup-add to perform the registrations specified in that file.

For example, to register to the DefaultIndexService with a modified example-aggregator-registration.xml file, you could run a command similar to the following:

```
$GLOBUS_LOCATION/bin/mds-servicegroup-add -s "https://127.0.0.1:8443/wsrf/services/DefaultIndexService " $GLOBUS_LOCATION/etc/globus_wsrf_mds_aggregator/example-aggregator-registration.xml
```
Limitations

It may be necessary for the tool to continue to run in order for the registrations that it maintains to be kept alive, as registrations will otherwise time out.
Name
globus-index-add -- Registering grid resources to MDS index services
globus-index-add

Tool description

globus-index-add Allows a user to register entries to an Index service and to refresh existing entries. The tool can be run in daemon mode where it is much like mds-servicegroup-add(1). In daemon mode it runs until canceled, periodically refreshing the entry. Unlike mds-servicegroup-add(1) the add and refresh step can be seperated. When adding the user can save the EPR of the entry they just added. Then at a later time they can use that EPR to update the entry. This feature makes it possible to script around updates and adds. Further it allows for entry information to be permisted in the event that the add client dies.

Registrations are defined in an XML configuration file, which is documented here: Section 1. “Registering resources (general)”.

For an example using an Index Service, see Simple usage for the Index Service.

Command syntax

The basic syntax for globus-index-add is:

globus-index-add [options]

where:

<table>
<thead>
<tr>
<th>Option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>-h</td>
<td>Print a usage message.</td>
</tr>
<tr>
<td>-q</td>
<td>Write no output messages</td>
</tr>
<tr>
<td>-d</td>
<td>Run in daemon mode, refreshing the entry every updates cycle.</td>
</tr>
<tr>
<td>-u</td>
<td>Update the entry given in the epr.</td>
</tr>
<tr>
<td>-vb</td>
<td>Verbose output</td>
</tr>
<tr>
<td>-e &lt;endpoint string&gt;</td>
<td>The endpoint string. Ex: http(s)://host:port/service-group-address. This is used with -a</td>
</tr>
<tr>
<td>-a &lt;file&gt;</td>
<td>Add to the index service the entry describe in this ServiceGroupRegistrations file.</td>
</tr>
<tr>
<td>-E &lt;file&gt;</td>
<td>&lt;file&gt; contains the EPR of the entry to update with -u</td>
</tr>
<tr>
<td>-t &lt;minutes&gt;</td>
<td>Set the number of minutes for the entry to live. Used for both -a and -u.</td>
</tr>
<tr>
<td>-me &lt;integer&gt;</td>
<td>Set the maximum amount of retries to update before failing. The program will continue to retry to attempt the refresh &lt;integer&gt; number of times</td>
</tr>
<tr>
<td>-z [self]</td>
<td>[host]</td>
</tr>
<tr>
<td>-ms [sig]</td>
<td>[conv]</td>
</tr>
</tbody>
</table>
Chapter 9. Graphical User Interface

There is no GUI specifically for the Index Service. The release contains WebMDS which can be used to display monitoring information collected in an Index Service in a normal web browser.
Chapter 10. Configuring an executable to retrieve information

1. Interface introduction

The ExecutionAggregatorSource, which may be used by the Index Service, has a domain-specific interface (specifically, the inputs provided to and outputs expected from the executable program).

2. Syntax of the interface

The syntax of the execution source's domain-specific interface is described in Chapter 6, Configuring Execution Aggregator Source.
Chapter 11. Configuring the WS MDS Index Service

Note

The aggregation source used to collect data can be changed from default, as detailed in the Defining the Aggregator Sources section below.

1. Configuration overview

For a basic installation, the Index Service itself does not need any configuration changes from default; a default Index Service is available and automatically "registers" with the following GT web services based resources to allow monitoring and discovery: [CAS], [RFT], and [GRAM4] (click the links for information about what data is sent and how to change it).

Note

Auto-registration is turned on by default in GT 4.2.1. See the per service links above for information about configuring this capability.

In order for information to appear in the Index Service, the source of that information must be registered to the Index Service. Information sources are registered using tools like mds-servicegroup-add. Each registration has a limited lifetime; mds-servicegroup-add should be left running in the background so that it can continue to refresh registrations. Depending on administration preference, it may be run on the same host as the index, on the same host as a member resource, or on any other host(s).

The Index Service is built on Aggregator Framework and can use any Aggregator Sources Reference to collect information. In the most common case, the index service uses the QueryAggregatorSource to gather resource property values from the registered resource using one of the three WS-Resource Properties operations to poll for information; the polling method used depends on the configuration element supplied in the registration content.

Two other aggregator sources are supplied with the distribution: the SubscriptionAggregatorSource, which gathers resource property values through subscription/notification, and the ExecutionAggregatorSource, which executes an external program to gather information.

2. Defining the Aggregator Sources

The aggregation sources used to collect data can be changed from default by editing the aggregatorSources parameter in the JNDI service configuration. See $GLOBUS_LOCATION/etc/globus_wsrf_mds_index/jndi-config.xml:

```xml
<resource name="configuration" type="org.globus.mds.aggregator.impl.AggregatorConfiguration">
  <resourceParams>
    <parameter>
      <name> factory</name>
      <value>org.globus.wsrf.jndi.BeanFactory</value>
    </parameter>
    <parameter>
```

38
This parameter specifies one or more Java classes that may be used to collect data for the Index. By default it is set to use the QueryAggregatorSource, SubscriptionAggregatorSource, and ExecutionAggregatorSource. Details of these standard sources are in the Aggregator Sources Reference.
Chapter 12. Debugging

Log output from WS MDS is a useful tool for debugging issues. Because WS MDS is built on top of Java WS Core, developer debugging is the same as described in Chapter 10, Debugging. For information on sys admin logs, see Chapter 6, Debugging.

1. Development Logging in Java WS Core

The following information applies to Java WS Core and those services built on it.

Logging in the Java WS Core is based on the Jakarta Commons Logging\(^1\) API. Commons Logging provides a consistent interface for instrumenting source code while at the same time allowing the user to plug-in a different logging implementation. Currently we use Log4j\(^2\) as a logging implementation. Log4j uses a separate configuration file to configure itself. Please see Log4j documentation for details on the configuration file format\(^3\).

1.1. Configuring server side developer logs

Server side logging can be configured in $GLOBUS_LOCATION/container-log4j.properties, when the container is stand alone container. For tomcat level logging, refer to Logging for Tomcat\(^4\). The logger log4j.appender.A1 is used for developer logging and by default writes output to the system output. By default it is set for all warnings in the Globus Toolkit package to be displayed.

Additional logging can be enabled for a package by adding a new line to the configuration file. Example:

```properties
# for debug level logging from org.globus.package.FooClass
log4j.category.org.globus.package.name.FooClass=DEBUG
# for warnings from org.some.warn.package
log4j.category.org.some.warn.package=WARN
```

1.2. Configuring client side developer logs

Client side logging can be configured in $GLOBUS_LOCATION/log4j.properties. The logger log4j.appender.A1 is used for developer logging and by default writes output to the system output. By default it is set for all warnings in the Globus Toolkit package to be displayed.

2. Enable Debug Logging for the Index Service

To turn on debug logging for the Index Service, add the line:

```properties
log4j.category.org.globus.mds.index=DEBUG
```

to the appropriate properties file. Since the Index Service is implemented using the Aggregator Framework, you may also want to turn on aggregator debugging by adding this line:

```
log4j.category.org.globus.mds.index=DEBUG
```

---

\(^1\) [http://jakarta.apache.org/commons/logging/](http://jakarta.apache.org/commons/logging/)


\(^4\) [http://tomcat.apache.org/tomcat-5.5-doc/logging.html](http://tomcat.apache.org/tomcat-5.5-doc/logging.html)
log4j.category.org.globus.mds.aggregator=DEBUG
Chapter 13. Troubleshooting

For a list of common errors in GT, see Error Codes.
1. Java WS Core Errors
### Table 13.1. Java WS Core Errors

<table>
<thead>
<tr>
<th>Error Code</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Failed to acquire notification consumer home instance from registry</td>
<td>Caused by <code>javax.naming.NameNotFoundException</code>: Name services is not bound in this Context. This warning is logged by the container if the request did not contain the necessary WS-Addressing headers. Those headers at all or is somehow misconfigured.</td>
</tr>
<tr>
<td>The WS-Addressing 'To' request header is missing</td>
<td>If you see this error in the container log, it usually means you are trying to connect to HTTPS server using HTTPS that specifies 8443 as a port number and http as the protocol name.</td>
</tr>
<tr>
<td>java.io.IOException: Token length X &gt; 33554432</td>
<td>This error usually indicates a mismatch between the version of Apache Axis that the code was compiled with and the version of Apache Axis that the code is currently running with.</td>
</tr>
<tr>
<td>java.lang.NoSuchFieldError: DOCUMENT</td>
<td>These errors usually indicate that a resource key was not passed with the request or that an invalid resource key was passed with the request (the element QName of the resource key did not match what the service expected).</td>
</tr>
<tr>
<td>org.globus.wsrf.InvalidResourceKeyException: Argument key is null / Re- source key is missing</td>
<td>Cannot resolve localhost. The machine's <code>/etc/hosts</code> isn't set up correctly and/or you do not have DNS for these machines.</td>
</tr>
<tr>
<td>Unable to connect to localhost:xxx</td>
<td>Cannot resolve localhost. The machine's <code>/etc/hosts</code> isn't set up correctly and/or you do not have DNS for these machines.</td>
</tr>
<tr>
<td>org.globus.common.ChainedIOException: Failed to initialize security context</td>
<td>This may indicate that the user's proxy is invalid.</td>
</tr>
<tr>
<td>Error: org.xml.sax.SAXException: Unregistered type: class xxx</td>
<td>This may indicate that an Axis generated XML type, defined by the WS RLS XSD, was not properly registered upon deployment without intervention by the user, sometimes they do not.</td>
</tr>
<tr>
<td>No socket factory for 'https' protocol</td>
<td>When a client fails with the following exception:</td>
</tr>
<tr>
<td></td>
<td><code>java.io.IOException: No socket factory for 'https' protocol at org.apache.axis.transport.http.HTTPSender.getSocket(HTTPSender.java) org.apache.axis.transport.http.HTTPSender.writeToSocket(HTTPSender.java)</code></td>
</tr>
<tr>
<td></td>
<td>FIXME - it may have happened because...</td>
</tr>
</tbody>
</table>
### Error Code

**No client transport named 'https' found**

When a client fails with the following exception:

No client transport named 'https' found at

org.apache.axis.client.AxisClient.invoke(AxisClient.java:170) at
org.apache.axis.client.Call.invokeEngine(Call.java:2726)

The client is most likely loading an incorrect `client-config.wsdd` configuration file.

**ConcurrentModificationException in Tomcat 5.0.x**

If the following exception is visible in the Tomcat logs at startup, it might cause the HTTPSValve to fail:

java.util.ConcurrentModificationException at

java.util.HashMap$HashIterator.nextEntry(HashMap.java:782) at
java.util.HashMap$EntryIterator.next(HashMap.java:824) at
java.util.HashMap.putAllForCreate(HashMap.java:424) at
java.util.HashMap.clone(HashMap.java:656) at
mx4j.server.DefaultMBeanRepository.clone(DefaultMBeanRepository.java:56)

The HTTPSValve might fail with the following exception:

java.lang.NullPointerException at

org.apache.coyote.tomcat5.CoyoteRequest.setAttribute(CoyoteRequest.java:1472) at
org.apache.coyote.tomcat5.CoyoteRequestFacade.setAttribute(CoyoteRequestFacade.java:351) at
org.globus.tomcat.coyote.valves.HTTPSValve.expose(HTTPSValve.java:99)

These exceptions will prevent the transport security from working properly in Tomcat.

**java.net.SocketException: Invalid argument or cannot assign requested address**

FIXME - what causes this?

**GAR deploy/undeploy fails with container is running error**

A GAR file can only be deployed or undeployed locally while the container is off. However, GAR deployment/undeployment might fail with this error even if the container is off. This usually happens if the container has crashed or was stopped improperly, preventing the container from cleaning up its state files.

---

### 2. General troubleshooting information

- In general, if you want to investigate a problem on your own please see Chapter 10, Debugging for details on how to turn on debugging.

- Most of the command line clients have a `-debug` option that will display more detailed error messages, including the error stack traces.

- Search the mailing lists\(^1\) such as `gt-user@globus.org`\(^2\) or `jwscore-user@globus.org`\(^3\) (before posting a message).

- If you think you have found a bug please report it in our Bugzilla\(^4\) system. Please include as much detail about the problem as possible.

---


\(^2\) [mailto:gt-user@globus.org](mailto:gt-user@globus.org)

\(^3\) [mailto:jwscore-user@globus.org](mailto:jwscore-user@globus.org)

\(^4\) [http://bugzilla.globus.org/bugzilla/](http://bugzilla.globus.org/bugzilla/)
Chapter 14. Related Documentation

Specifications for resource properties, service groups, and subscription/notification are available at http://www.globus.org/wsrf/.
# Glossary

## A

**Aggregator Framework**

A software framework used to build services that collect and aggregate data. WS MDS Services (such as the Index and Trigger services) are built on the Aggregator Framework, and are sometimes called Aggregator Services.

**aggregator source**

A Java class that implements an interface (defined as part of the Aggregator Framework) to collect XML-formatted data. WS MDS contains three aggregator sources: the query aggregator source, the subscription aggregator source, and the execution aggregator source.

## C

**certificate**

A public key plus information about the certificate owner bound together by the digital signature of a CA. In the case of a CA certificate, the certificate is self signed, i.e. it was signed using its own private key.

## I

**Index Service**

An aggregator service in WS MDS that serves as a registry similar to UDDI, but much more flexible. Indexes collect information and publish that information as WSRF resource properties.

**information provider**

A "helper" software component that collects or formats resource information, for use in WS MDS by an aggregator source or by a WSRF service when creating resource properties.

## T

**Trigger Service**

An aggregator service (in WS MDS) that collects information and compares that data against a set of conditions defined in a configuration file. When a condition is met, or triggered, the specified action takes place (for example, an email is sent to a system administrator when the disk space on a server reaches a threshold).

## W

**Web Services Addressing (WSA)**

The WS-Addressing specification defines transport-neutral mechanisms to address web services and messages. Specifically, it defines XML elements to identify web service endpoints and to secure end-to-end endpoint identification in messages. See the [W3C WS Addressing Working Group](http://www.w3.org/2002/ws/addr/) for details.

---

14 http://www.w3.org/2002/ws/addr/
XML

Extensible Markup Language (XML) is standard, flexible, and extensible data format used for web services. See the W3C XML site²⁰ for details.

²⁰http://www.w3.org/XML/
Index

A
aggregator sources, 13
  execution, 13
  query, 13
    GetMultipleResourcePropertiesPollType, 13
    GetResourcePropertyPollType, 13
    QueryResourcePropertiesPollType, 13
subscription, 13
AggregatorServiceGroup resource properties, 16
apis, 14
architecture, 10–11

C
configuration interface, 38
  overview, 38
configuring, 38
  defining aggregator sources, 38
  execution aggregator source, 37
overview, 38

D
debugging, 40
  logging, 40
debugging (developer), 40
dependencies, 1

E
errors, 43
execution aggregator information provider, 3
execution aggregator source, 37

F
features, 1

G
globus-index-add, 35

I
information providers
  writing execution aggregator information provider, 3

L
logging
  debugging, 40

M
mds-servicegroup-add, 32

O
org.globus.mds.aggregator.impl, 12

P
platforms, 1

R
refresh existing entries in an index service, 35
register entries to an index service, 35
registering resources to MDS aggregator services, 32
related documents, 46
resource
  globus-wsrf-query, 24
  querying resource properties, 24
resource properties
  getting a single resource property from a resource, 20
  getting multiple resource properties from a resource, 22
  getting multiple values, 29
  getting value, 27
  globus-wsrf-get-properties, 29
  globus-wsrf-get-property, 27
querying, 24
querying the resource property document of a resource, 18
  wsrf-get-properties, 22
  wsrf-get-property, 20
  wsrf-query, 18
resource properties, AggregatorServiceGroup, 16

S
security considerations, 1
services, 15

T
troubleshooting
  for developers, 42
tutorial
    build a grid service, 9

U
usage scenarios, 2
usage scenarios (programming)
  adding information to an Index Service, 2
  retrieving information from an Index Service, 2

W
WSDL, 15
GT 4.2.1 WS MDS Migration Guide
GT 4.2.1 WS MDS Migration Guide

Introduction

The following provides available information about migrating from previous versions of the Globus Toolkit.
# Table of Contents

1. Migrating MDS from GT4 ................................................................. 1  
2. Migrating MDS from GT3 ................................................................. 2  
3. Migrating MDS from GT2 ................................................................. 3  
Glossary ....................................................................................... 4
List of Tables

1.1. Comparison of MDS in GT3 and GT4 ................................................................. 1
2.1. Comparison of MDS in GT3 and GT4 ................................................................. 2
3.1. Comparison of MDS in GT2 and GT4 ................................................................. 3
Chapter 1. Migrating MDS from GT4

Although the basic functionality remains the same for MDS in GT4, the architecture has changed from OGSI in GT3 to WSRF in GT4. In OGSI, services advertise service data; in WSRF, services advertise resource properties. Resource Properties and service data are very similar -- both provide a mechanism for expressing arbitrary data about grid resources in XML format, as well as query and notification/subscription interfaces to that data.

The GT4 Index Service provides the same functionality as the GT3 Index Service; however, the GT4 Index Service supports WSRF service group registration and resource property query and subscription/notification mechanisms, while the GT3 Index Service supported OGSI service group registration and service data query and subscription/notification mechanisms.

The following table shows a mapping of some GT3 concepts/tools to GT4.

Table 1.1. Comparison of MDS in GT3 and GT4

<table>
<thead>
<tr>
<th>Description</th>
<th>GT2 Version</th>
<th>GT4 Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>Query Operations</td>
<td>FindServiceData (to retrieve a single service data element by name or to perform an XPath query against a service's service data elements)</td>
<td>GetResourceProperty (to retrieve a single resource property by name), GetMultipleResourceProperties (to retrieve multiple resource properties by name), and QueryResourceProperties (to perform an XPath query against a service's resource properties).</td>
</tr>
<tr>
<td>APIs used for queries</td>
<td>OGSI (GT3) Core APIs</td>
<td>WS Core APIs</td>
</tr>
<tr>
<td>Command-line clients used for queries</td>
<td>ogsi-find-service-data</td>
<td>wsrfs-get-property, wsrfs-get-properties, wsrfs-query</td>
</tr>
<tr>
<td>Available GUIs</td>
<td>globus-sdb (standalone client) and WebSDB (web interface)</td>
<td>WebMDS (web interface)</td>
</tr>
<tr>
<td>Operations for subscription/notification</td>
<td>OGSI NotificationSource / NotificationSink</td>
<td>WS-Notification</td>
</tr>
<tr>
<td>APIs used for subscription/notification</td>
<td>OGSI (GT3) Core APIs</td>
<td>WS Core APIs</td>
</tr>
<tr>
<td>Index registration mechanism</td>
<td>GT3 services can be configured to publish their service data to index services.</td>
<td>Index Servers maintain aggregating service groups that include registration information (timeout values, the mechanism to use to acquire information, and additional mechanism-specific parameters) The registration is accomplished by adding an entry to an aggregating service group via the mds-servicegroup-add command. In addition, services may be configured to register themselves to the default index server running in the same container.</td>
</tr>
</tbody>
</table>

A more detailed mapping of OGSI concepts to WSRF concepts can be found here.¹

Chapter 2. Migrating MDS from GT3

Although the basic functionality remains the same for MDS in GT4, the architecture has changed from OGSI in GT3 to WSRF in GT4. In OGSI, services advertise service data; in WSRF, services advertise resource properties. Resource Properties and service data are very similar -- both provide a mechanism for expressing arbitrary data about grid resources in XML format, as well as query and notification/subscription interfaces to that data.

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</table>

A more detailed mapping of OGSI concepts to WSRF concepts can be found [here](http://www-106.ibm.com/developerworks/library/ws-resource/ogsi_to_wsrf_1.0.pdf).
Chapter 3. Migrating MDS from GT2

Although the basic functionality remains the same for MDS in GT4, the architecture, standards used, and implementation have changed significantly in GT2. The following table shows a mapping of some GT2 concepts to GT4 concepts.

### Table 3.1. Comparison of MDS in GT2 and GT4

<table>
<thead>
<tr>
<th>Description</th>
<th>GT2 Version</th>
<th>GT4 Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>Format of data describing a resource</td>
<td>LDAP data hierarchy</td>
<td>XML data document</td>
</tr>
<tr>
<td>Query language</td>
<td>LDAP queries</td>
<td>XPath queries</td>
</tr>
<tr>
<td>Wire protocol for queries</td>
<td>LDAP</td>
<td>WS-ResourceProperties</td>
</tr>
<tr>
<td>APIs used for queries</td>
<td>LDAP APIs</td>
<td>WS Core APIs</td>
</tr>
<tr>
<td>Command-line clients used for queries</td>
<td>grid-info-search</td>
<td>wsrf-get-property, wsrf-get-properties, wsrf-query</td>
</tr>
<tr>
<td>Available GUIs</td>
<td>Various LDAP browsers</td>
<td>WebMDS</td>
</tr>
<tr>
<td>Wire protocol for subscription/notification</td>
<td>Not supported</td>
<td>WS-Notification</td>
</tr>
<tr>
<td>APIs used for subscription/notification</td>
<td>Not supported</td>
<td>WS Core APIs</td>
</tr>
<tr>
<td>Security support</td>
<td>SAML-based security using X.509 user, proxy and host certificates</td>
<td>HTTPS-based security using X.509 user, proxy and host certificates</td>
</tr>
<tr>
<td>Queryable index of aggregated information</td>
<td>GIIS, which publishes data using the LDAP-related standards listed above</td>
<td>WS MDS Index Server, which publishes data using the WSRF-related standards listed above</td>
</tr>
<tr>
<td>Queryable source of non-aggregated information</td>
<td>GRIS, which uses information providers to gather data from services and then publishes that data the LDAP-related standards listed above</td>
<td>Individual web services, which publish data about their own resources using WSRF-related standards listed above</td>
</tr>
<tr>
<td>Index registration mechanism</td>
<td>MDS servers (GRIS's and, in some cases, GIIS's) register themselves with a GIIS. An MDS server is configured to register itself to a remote index by editing the local MDS server's grid-info-resource-register.conf file, providing information about the location of the remote index to register to and timeout values for the registration</td>
<td>WS MDS Index servers maintain aggregating service groups that include registration information (timeout values, the mechanism to use to acquire information, and additional mechanism-specific parameters) The registration is accomplished by adding an entry to an aggregating service group via the mds-servicegroup-add command. In addition, services may be configured to register themselves to the default index server running in the same container.</td>
</tr>
<tr>
<td>Mechanism used by an index to collect information</td>
<td>GIIS's send LDAP queries to remote services.</td>
<td>WS MDS Index servers use a plugin-based architecture to support several mechanisms to collect information. The Globus Toolkit supplies plugins that support collecting information via polling (resource property queries), subscription/notification, and by program execution.</td>
</tr>
</tbody>
</table>
## Glossary

### I

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Index Service</td>
<td>An aggregator service in WS MDS that serves as a registry similar to UDDI, but much more flexible. Indexes collect information and publish that information as WSRF resource properties.</td>
</tr>
<tr>
<td>information provider</td>
<td>A &quot;helper&quot; software component that collects or formats resource information, for use in WS MDS by an aggregator source or by a WSRF service when creating resource properties.</td>
</tr>
</tbody>
</table>
GT 4.2.1 Index Service: Quality Profile

Table of Contents

1. Test coverage reports ................................................................. 1
2. Code analysis reports ................................................................. 1
3. Outstanding bugs ...................................................................... 1
4. Bug Fixes .................................................................................. 1
5. Performance reports ................................................................. 1

1 http://bugzilla.globus.org/globus/buglist.cgi?short_desc_type=allwordssubstr&short_desc=&product=MDS&component=wsrf_index&long_desc_type=allwordssubstr&long_desc=&bug_file_loc_type=allwordssubstr&bug_file_loc=&bug_status=NEW&bug_status=ASSIGNED&bug_status=REOPENED&emailtype1=substring&email1=&emailtype2=substring&email2=&bugidtype=include&bug_id=&votes=&changedin=&chfieldfrom=&chfielddate=Now&chfieldvalue=&cmdtype=doit&newqueryname=&order=Reuse+same+sort+as+last+time&field0-0-noop&type0-0-noop&value0-0=

2 http://bugzilla.globus.org/globus/buglist.cgi?short_desc_type=allwordssubstr&short_desc=&product=MDS&component=wsrf_index&long_desc_type=allwordssubstr&long_desc=&bug_file_loc_type=allwordssubstr&bug_file_loc=&bug_status=RESOLVED&bug_status=VERIFIED&bug_status=CLOSED&emailtype1=substring&email1=&emailtype2=substring&email2=&bugidtype=include&bug_id=&votes=&changedin=&chfieldfrom=&chfielddate=Now&chfieldvalue=&cmdtype=doit&newqueryname=&order=Reuse+same+sort+as+last+time&field0-0-noop&type0-0-noop&value0-0=

1. Test coverage reports

• None available at this time.

2. Code analysis reports

• None available at this time.

3. Outstanding bugs

• All open Index Service bugs and enhancement requests

4. Bug Fixes

• All fixed Index Service bugs and enhancement requests.

5. Performance reports

• None available at this time.
1. Component Overview

The Index Service collects monitoring and discovery information from Grid resources, and publishes it in a single
location; generally, it is expected that a virtual organization will deploy one or more index services which will collect
data on all of the Grid resources available within that virtual organization.

2. Feature summary

Features new in release 4.2.1

- The Index Service now supports, in addition to queries made using the default XPath dialect, the new TargetedXPath
dialect, which enables users to specify their own namespace mappings in queries.

3. Summary of Changes in WS MDS Index Service

No new changes in this release

4. Bug Fixes

- All fixed Index Service bugs and enhancement requests.¹

5. Known Problems

The following problems and limitations are known to exist for WS MDS Index Service at the time of the 4.2.1 release:

¹ http://bugzilla.globus.org/globus/buglist.cgi?short_desc_type=allwordssubstr&short_desc=&product=MDS&component=wsrf_index&long_desc_type=allwordssubstr&long_desc=&bug_file_loc_type=allwordssubstr&bug_file_loc=&bug_status=RESOLVED&bug_status=VERIFIED&bug_status=CLOSED&emailtype1=substring&email1=&emailtype2=substring&email2=&bugidtype=include&bug_id=&votes=&changed-in=&chfieldfrom=&chfieldto=Now&chfieldtype=&cmdtype=doit&newqueryname=&order=Reuse+same+sort+as+last+time&field0-d-0=noop&type0-d-0=noop&value0-0-0=
5.1. Limitations

- The WS-MDS Index Service currently keeps the entire set of index data in memory; the size of the index is thus limited by the amount of memory available to the Globus container.

5.2. Outstanding bugs

- All open Index Service bugs and enhancement requests

6. Technology dependencies

The Index Service depends on the following GT components:

- Java WS Core
- Aggregator Framework

7. Tested platforms

Tested Platforms for WS-MDS Index Service:

- Linux on i386
- Windows XP

Tested containers for WS-MDS Index Service:

- Java WS Core container
- Tomcat 5.0.28

8. Associated Standards

Associated standards for WS MDS Index:

- WS-ResourceProperties (WSRF-RP)
- WS-ResourceLifetime (WSRF-RL)
- WS-ServiceGroup (WSRF-SG)
- WS-BaseFaults (WSRF-BF)
- WS-BaseNotification
- WS-Topics

---

9. For More Information

See Index Service for more information about this component.

Glossary