



TIBCO Hawk®

Plug-in Reference Guide

Version 6.2.2

February 2023



Contents

Contents	2
Overview	5
TIBCO Hawk Plug-in	5
Writing a Custom Hawk Plug-in And Registering it With The Existing Hawk Agent	5
Enterprise Message Service™ Plug-in Microagent	7
Installation and Configuration	7
COM.TIBCO.hawk.tibjms.HawkListener	10
Purpose	11
Remarks	11
Methods	11
HawkListener:isRunning	14
HawkListener:getNumConnections	15
HawkListener:getServerinfo	16
HawkListener:getConnections	24
HawkListener:getUsers	26
HawkListener:getQueues	27
HawkListener:getRoutes	32
HawkListener:getTopics	34
HawkListener:getDurables	40
HawkListener:getConsumers	42
HawkListener:getProducers	44
HawkListener:getListenPorts	45
HawkListener:getCMLedgerInfo	46
HawkListener:getTransports	48
HawkListener:getTransport	49
HawkListener:getDbStores	51

HawkListener:getFileStores	53
HawkListener:getStores	55
HawkListener:getChannels	56
COM.TIBCO.hawk.tibjms.HawkController	58
Purpose	58
Remarks	59
Methods	59
HawkController:shutdown	60
HawkController:purgeDurable	61
HawkController:purgeQueue	62
HawkController:purgeTopic	63
HawkController:rotateLog	64
HawkController:compact	65
Java Virtual Machine Plug-in Microagent	67
Installation and Configuration	67
COM.TIBCO.hawk.jvm.JavaVirtualMachine	69
Purpose	69
Methods	69
getVirtualMachineInfo	71
getThreadInfo	73
getGarbageCollectorInfo	76
getMemoryPoolInfo	78
Universal Collector Plug-in Microagent	80
Installation and Configuration	80
COM.TIBCO.hawk.microagent.HawkUniversalCollector	81
Purpose	82
Methods	82
getCollectors	83
getForwarders	84
onEvent	86

removeForwarder	87
removeCollector	88
Inventory Plug-in Microagent	89
Installation and Configuration	89
COM.TIBCO.hawk.microagent.inventory.InventoryMicroAgent	90
Purpose	90
Methods	90
getAllEnvironments	92
getEnvironmentDetail	93
getProductsInAllEnvironments	94
getProductsInAnEnvironment	96
getSpecificProductDetail	97
getProductFeatureDetail	98
Heartbeat Plug-in Microagent	101
Installation and Configuration	101
COM.TIBCO.hawk.microagent.heartbeat.HeartbeatMicroAgent	102
Purpose	102
Methods	103
pingEMSServer	105
pingSecuredEMSServer	106
pingFTPServer	108
pingHTTPServer	110
pingJDBCDriver	111
pingSMTPServer	113
TIBCO Documentation and Support Services	115
Legal and Third-Party Notices	117

Overview

This chapter provides overview of the TIBCO Hawk Plug-in and how to create a custom Hawk plug-in.

- [TIBCO Hawk Plug-in](#)

TIBCO Hawk Plug-in

TIBCO Hawk plug-in is a type of Hawk micro agent that resides with the process space of a Hawk Agent. Such Hawk plug-ins are used to communicate with a host of third party applications using their specific protocols and allow them to be monitored and managed within the Hawk subsystem.

TIBCO Hawk installation provides the following fully functional ready-to-use plug-ins:

- Enterprise Message Service Plug-in, see [Enterprise Message Service™ Plug-in Microagent](#).
- Java Virtual Machine Plug-in, see [Java Virtual Machine Plug-in Microagent](#)
- Universal Collector Plug-in, see [Universal Collector Plug-in Microagent](#)
- Inventory Plug-in, see [Inventory Plug-in Microagent](#)
- Heartbeat Plug-in, see [Heartbeat Plug-in Microagent](#)

However, one can always write a custom Hawk plug-in to suit specific needs, using the set of available Hawk API methods.

Writing a Custom Hawk Plug-in And Registering it With The Existing Hawk Agent

Hawk is an extensible product and additional monitoring capabilities can be added by creating plug-ins to it. Every plug-in requires a .hma file, which is a HMA configuration file, and a .jar file, which is a Java implementation of various methods you want to expose via the Hawk subsystem. Follow the below steps to create a plug-in:

1. Create the .hma file.

Refer to the *HAWK_HOME/examples/ma_plugin/DM*.hma* file for guidance.

- Most important constituent of this .hma file is the main/startup class of the plug-in implementation. That is to be mentioned under the `<classname>` tag. For example:

```
<classname>com.A.B.myPluginControllerClass</classname>
```

- You can also specify some optional arguments that you would expect the users to configure externally without the need to change plug-in implementation. Such optional arguments should be mentioned under the `<arguments>` tag. For example:

```
<arguments><arg>-traceDir</arg><arg>C:/LogDir</arg></arguments>
```

- Absolute path of the implementation .jar files and all the required third party libraries should be mentioned under `<classpath>` tag. For example:

```
<classpath><path>C:/TPCL/libs/slf4j-api-1.6.4.jar</path></classpath>
```

2. Place the .hma file into the folder *CONFIG_FOLDER/plugin*.

If you have more than one Hawk plug-ins, please make sure that all .hma files are present in the *CONFIG_FOLDER/plugin* subfolder.

3. Edit the *CONFIG_FOLDER/bin/hawkagent.cfg* to set or uncomment the following parameter:

```
-hma_plugin_dir    ${CONFIG_FOLDER}/plugin.
```

4. Ensure that you have created the implementation .jar file in the same folder that is specified in the `<classpath>` tag within the .hma file.

Refer to the *HAWK_HOME/examples/ma_plugin/DM*.java* for guidance.

5. Restart the Hawk agent.

You should now be able to view your custom plug-in microagent and corresponding methods in Hawk Console.

Enterprise Message Service™ Plug-in Microagent

This chapter provides information about the Enterprise Message Service™ Plug-in microagent. It also gives details about the microagent methods that are used to administer and monitor the TIBCO Enterprise Message Service server.

- [Installation and Configuration](#)
- [COM.TIBCO.hawk.tibjms.HawkListener](#)
- [COM.TIBCO.hawk.tibjms.HawkController](#)

Installation and Configuration

TIBCO Hawk installer installs Enterprise Message Service Plug-in microagent in TIBCO_HOME/hawk/<version>/plugin/ems folder.

To configure the plug-in, follow these steps:

1. Make sure that TIBCO Enterprise Message Service is installed and running.
2. Ensure that the TIBCO Enterprise Message Service installation path is set in the `hawkemsadmin.hma` file (located in TIBCO_HOME/hawk/<version>/plugin/ems folder).
3. Copy the file `hawkemsadmin.hma` from TIBCO_HOME/hawk/<version>/plugin/ems to CONFIG_FOLDER/plugin.
4. Edit `hawkagent.cfg` in CONFIG_FOLDER/bin and set the following option:
`-hma_plugin_dir` CONFIG_FOLDER/plugin
5. Navigate to CONFIG_FOLDER/plugin directory and open the `hawkemsadmin.hma` file in a text editor.
6. Specify the TIBCO Hawk microagent class you wish to use in the `<classname>` element. You can use either the `HawkListener` class if you only want to monitor the server, or you can specify the `HawkController` class if you want to monitor and manage the server.

7. Specify the **username** and **password** and **server URL** to use to connect to the TIBCO Enterprise Message Service server in the appropriate `<arg>` elements. See [Parameters](#).

For example:

```
<arguments>
```

```
<arg>-user</arg>
```

```
<arg>admin</arg>
```

```
<arg>-password</arg>
```

```
<arg>MyPassword</arg>
```

```
<arg>-server</arg>
```

```
<arg>tcp://server1.yourcompany.com:7222</arg>
```

```
<arg>-timeout</arg>
```

```
<arg>5</arg>
```

```
</arguments>
```

**Note**

To use an SSL connection to the TIBCO Enterprise Message Service server, set the additional SSL arguments in the `hawkemsadmin.hma` file.

8. Restart the Hawk Agent.

Parameters

Parameters

Parameter	Description
-user -password	<p>The MicroAgent identifies itself with this user name and password when it connects to the EMS server.</p> <p>When absent, the default user name is admin. When absent, the default password is the empty string.</p>
-user -encryptedPassword	<p>To use an encrypted password, specify this pair. As the value for -encryptedPassword, supply the output you obtain by running the Hawk utility program <code>tibhawkpassword</code> located in your <code>CONFIG_FOLDER/bin</code> directory:</p> <pre>tibhawkpassword -encrypt</pre> <p>Enter your current password when prompted. See the <i>TIBCO Hawk Installation and Configuration Guide</i> for details.</p>
-server	<p>The MicroAgent connects to the EMS server at this URL (host computer and port). When absent, the default is <code>tcp://localhost:7222</code>.</p>
-timeout	<p>Limits the time (in seconds) that the MicroAgent waits for the EMS server to respond to queries.</p> <p>Acceptable values are in the range [5, 3600]. When absent, the default is 60.</p>
-version	EMS server version
-server_in_agent_name	<p>Includes the server url with the microagent name.</p> <p>To monitor multiple servers on one Hawk agent, you must include the <code>-server_in_agent_name</code> argument in the <code>hawkemsadmin.hma</code> file.</p>
-ssl_trace	<p>Prints the certificates loaded by the server and do more detailed tracing of SSL-related situation.</p>

Parameter	Description
-ssl_vendor	<p>The name of the vendor of the SSL implementation. The valid choices are:</p> <ul style="list-style-type: none"> • j2se-default—Use this option when you want to use the default JCE bundled with the • Java JRE • j2se • entrust61—Use this option when you want to use the Entrust libraries. • ibm—On non-IBM platforms, this option can be used only if the IBM version of JCE is installed.
-ssl_trusted	Specifies the file name of the server certificates. This option can be repeated if more than one certificate file is used.
-ssl_identity	Specifies the digital certificate of the TIBCO Hawk components.
-ssl_expected_hostname	The name that is expected in the name of the CN field of the server certificates is specified by this option. The value of this option is used when the -ssl_no_verify_hostname option is absent from the configuration file.
-ssl_password	The password to decrypt the identity file of the Hawk component.
-traceDir	Path of EMS plugin trace directory default is <CONFIG_FOLDER>/logs
-traceFilename	Name of the trace file. Default is emshma.log.
-traceLevel	Trace log level. The default value is 7, that is info.

COM.TIBCO.hawk.tibjms.HawkListener

Microagent

Purpose

The HawkListener microagent monitors the EMS Server using the TIBCO Enterprise Message Service Administration API. The display name for this microagent in the Hawk Console is JMS_controller (server url).

**Note**

The server url is present in the microagent name when the option - server_in_agent_name is used.

Remarks

These HawkListener microagent method are supported on all platforms.

Methods

Method	Description	Page
HawkListener:isRunning	Checks if the server is running	HawkListener:isRunning
HawkListener:getNumConnections	Gets the number indicating current server connections	HawkListener:getNumConnections
HawkListener:getServerinfo	Gets the configuration parameters	HawkListener:getServerinfo

Method	Description	Page
HawkListener:getConnections	Gets information on all current connections	HawkListener:getConnections
HawkListener:getUsers	Gets information on users for this server	HawkListener:getUsers
HawkListener:getQueues	Gets information on queues on this server	HawkListener:getQueues
HawkListener:getRoutes	Gets information on routes on this server	HawkListener:getRoutes
HawkListener:getTopics	Gets information on topics on this server	HawkListener:getTopics
HawkListener:getDurables	Gets information on durables on this	HawkListener:getDurables

Method	Description	Page
	server	
HawkListener:getConsumers	Gets information on consumers on this server	HawkListener:getConsumers
HawkListener:getProducers	Gets information on producers on this server	HawkListener:getProducers
HawkListener:getListenPorts	Gets information on server listen ports	HawkListener:getListenPorts
HawkListener:getCMLedgerInfo	Gets statistics on RV CM ledgers on this server	HawkListener:getCMLedgerInfo
HawkListener:getTransports	Gets statistics on all transports on this server	HawkListener:getTransports
HawkListener:getTransport	Gets statistics	HawkListener:getTransport

Method	Description	Page
	rn a transport on this serve	
HawkListener:getDbStores	Gets database stores on this server	HawkListener:getDbStores
HawkListener:getFileStores	Gets information on file stores on this server	HawkListener:getFileStores
HawkListener:getStores	Gets information on stores on this server	HawkListener:getStores
HawkListener:getChannels	Gets information on multicast channels on this server	HawkListener:getChannels

HawkListener:isRunning

Method

Purpose

This method (on all platforms) checks if the server is running.

Remarks

Type

Synchronous, IMPACT_INFO

Arguments

None.

Returns

Name	Type	Description
running	Boolean	The flag passed to indicate whether the server is running

HawkListener:getNumConnections

Method

Purpose

This method (on all platforms) gets the number indicating current server connections.

Remarks

Type

Synchronous, IMPACT_INFO

Arguments

None.

Returns

Name	Type	Description
numConnects	Integer	The value indicating number of connections

HawkListener:getServerinfo

Method

Purpose

This method (on all platforms) gets the configuration parameters.

Remarks

Type

Synchronous, IMPACT_INFO

Arguments

None.

Returns

Name	Type	Description
asyncDBSize	Long	The value indicating total size of the asynchronous message store
authorizationEnabled	Boolean	The flag passed to indicate whether the authorization is turned on for this server
backupName	String	Returns the name of the fault tolerant backup for this store
connectionCount	Integer	Number of connections to the server.

Name	Type	Description
connectionCountUsage	Double	Number of connections to the server as a fraction of maxConnections
diskReadRate	Long	The value indicating the rate at which messages are being read from the disk
diskWriteRate	Long	The value indicating the rate at which messages are being written to the disk
durableCount	Integer	Number of durable subscribers on the server
faultTolerantActivation	Integer	The value indicating the time period for which a backup server will wait for a heartbeat message before concluding that the active server has failed
faultTolerantHeartBeat	Integer	The value indicating the time period in seconds of heartbeat messages sent by the server
faultTolerantReconnectTimeout	Integer	The time period for which a server that has just become the

Name	Type	Description
		active server following a failover will wait for clients, to reconnect before their state is removed from the shared state
faultTolerantURL	String	Returns fault tolerant URL for this server
flowControlEnabled	Boolean	The flag passed to indicate whether the flow control is enabled
fsyncEnabled	Boolean	The flag passed to indicate whether the fsync is enabled
inboundBytesRate	Long	The value indicating overall inbound bytes per second on this server
inboundMessageCount	Long	The value indicating number of inbound messages for the server
inboundMessageRate	Long	The value indicating rate at which messages are coming into the server
logFileMaxSize	Long	The value indicating maximum allowed size of the log file

Name	Type	Description
logFileName	String	Returns log file name, or null if not set
logFileSize	Long	The value indicating total size of log file
maxConnections	Integer	Maximum number of connections this server will allow
maxMsgMemory	Long	The value indicating maximum memory, in bytes, which server is allowed to use for storing messages in memory
maxStatisticsMemory	Long	The value indicating maximum statistics memory, in bytes
messagePoolBlockSize	Long	The value of msg_pool_block_size setting
messagePoolSize	Long	The value of msg_pool_size setting
messageSwappingEnabled	Boolean	The flag passed to indicate whether the message swapping is enabled
messageMemory	Long	The amount of memory in use to store messages

Name	Type	Description
messageMemoryUsage	Double	The amount of memory in use to store messages as a fraction of maxMsgMemory
messageMemoryPooled	Long	The amount of memory in use by the message pools
multicastEnabled	Boolean	The flag passed to indicate whether the multicast is turned on for this server
outboundBytesRate	Long	The overall outbound bytes per second on this server
outboundMessageCount	Long	The number of outbound messages for the server
outboundMessageRate	Long	The rate at which messages are flowing out of the server
pendingMessageCount	Long	Total number of pending messages for this server
pendingMessageSize	Long	Total size for all pending messages for this server
pid	Integer	The current process id of server

Name	Type	Description
queueCount	Integer	Number of queues on the server
rateInterval	Long	The value indicating the statistics rate interval in milliseconds
reserveMemory	Long	The amount of reserve memory in bytes
routingEnabled	Boolean	The flag passed to indicate whether the routing is enabled for this server
routeRecoverInterval	Long	The value indicating route recover interval in milliseconds
serverName	String	Returns name of this server
serverRateInterval	Long	The value indicating the server statistics rate interval in milliseconds
startTime	Long	The value indicating time in milliseconds that the server was started
state	String	Returns the current state of the server
statisticsCleanupInterval	Long	The value indicating

Name	Type	Description
		statistics cleanup interval in milliseconds
statisticsEnabled	Boolean	The flag passed to indicate whether the statistics are enabled
storeAsyncMinimum	Long	The minimum size of the server's asynchronous store file
storeCRCEnabled	Boolean	The flag passed to indicate whether the server uses CRC verification when reading store files
storeDirectory	String	Returns server store files directory
storeMinimum	Long	The minimum size in bytes of sever store files
storeSyncMinimum	Long	The minimum size of the server's synchronous store file
storeTruncateEnabled	Boolean	The flag passed to indicate whether the server attempts to truncate store files when possible
syncDBSize	Long	Total size of the

Name	Type	Description
		synchronous message store
topicCount	Integer	Number of topics on the server
trackCorrelationIds	Boolean	The flag passed to indicate whether the server tracks messages by correlation ID
trackMsgIds	Boolean	The flag passed to indicate whether the server tracks messages by message ID
upTime	Long	The value indicating time in milliseconds since this server was started
URL	String	URL for this server
userAuth	String	Returns locations this server uses for authenticating users
versionInfo	String	Returns version info for this server

HawkListener:getConnections

Method

Purpose

This method (on all platforms) gets information on all current connections.

Remarks

Type

Synchronous, IMPACT_INFO

Arguments

None.

Returns

Name	Type	Description
clientId	String	Returns client ID for this connection
consumerCount	Integer	Number of consumers for this connection
host	String	Returns host for this connection
ID	Long	The value indicating connection ID
producerCount	Integer	Number of producers for this connection
sessionCount	Integer	Number of sessions for this

Name	Type	Description
		connection
startTime	Long	The value indicating creation time, in milliseconds, for this connection
type	String	Returns destination type for this connection
upTime	Long	The value indicating time, in milliseconds, that this connection has been connected
URL	String	Returns URL for this connection
userName	String	Returns username for this connection

HawkListener:getUsers

Method

Purpose

This method (on all platforms) gets information on users for this server.

Remarks

Type

Synchronous, IMPACT_INFO

Arguments

None.

Returns

Name	Type	Description
name	String	Returns user name
description	String	Returns description of this user

HawkListener:getQueues

Method

Purpose

This method (on all platforms) gets information on queues on this server.

Remarks

The queueRegExp argument is a pattern match using regular expressions. Test any regular expressions you plan to use in rulebases by first using them interactively to ensure they return the desired results. The cursorInitialPosition and cursorSize arguments allows to return only a set number of queues instead of all queues.

Type

Synchronous, IMPACT_INFO

Arguments

Name	Type	Description
queueRegExp	String	Queue Name. Empty argument string provides information on all queues.
queueType	String	Queue type. Empty argument string provides information on all topics.
cursorInitialPosition	Integer	Initial position of the cursor.
cursorSize	Integer	Size of the cursor to determine the number of queues to return.

Returns

Name	Type	Description
name	String	Name of this queue
description	String	Description of this queue
pendingMessageSize	Long	The value indicating the total size for all pending messages for this queue
pendingMessageSizeUsage	Double	The value indicating the total size as a fraction of maxBytes for this queue

Name	Type	Description
pendingMessageCount	Long	The value indicating the total number of pending messages for this queue
pendingMessageCountUsage	Double	The value indicating the total number of pending messages as a fraction of maxMsgs for this queue
inTransitCount	Long	The value indicating the number of messages in transit to client
deliveredMessageCount	Long	The value indicating the number of messages delivered to client
consumerCount	Integer	Number of consumers for this queue
receiverCount	Integer	Number of active receivers on this queue
exclusive	Boolean	The flag passed to indicate whether the queue is exclusive
expiryOverride	Long	The value indicating the expiry override property
failsafe	Boolean	The flag passed to indicate whether the queue is failsafe
flowControl	Long	target max size of pending messages in

Name	Type	Description
		bytes before flow control starts
global	Boolean	The flag passed to indicate whether the queue is global
hasSenderName	Boolean	The flag passed to indicate whether the sender_name property is set
maxBytes	Long	The value indicating the maximum number of message bytes that the server stores for pending messages bound for this queue.
maxMsgs	Long	The value indicating the maximum number of messages that the server stores for pending messages bound for this queue.
maxRedelivery	Integer	Maximum number of redelivery attempts
overflowPolicy	String	Overflow policy for this queue
prefetch	Integer	Number of messages prefetched by the client
routeConnected	Boolean	The flag passed to indicate whether the

Name	Type	Description
		route for this queue is connected
routed	Boolean	The flag passed to indicate whether this is a routed queue
routeName	String	The name of the route for this routed queue
secure	Boolean	The flag passed to indicate whether the queue is secure
senderNameEnforced	Boolean	The flag passed to indicate whether sender_name_enforced property is set
static	Boolean	The flag passed to indicate whether the queue is static
temporary	Boolean	The flag passed to indicate whether the queue is temporary
outboundByteRate	Long	The value indicating the outbound bytes per second
outboundMessageRate	Long	The value indicating the outbound messages per second
outboundTotalBytes	Long	The value indicating the outbound total bytes

Name	Type	Description
outboundTotalMessages	Long	The value indicating the outbound total messages
inboundByteRate	Long	The value indicating the inbound bytes per second
inboundMessageRate	Long	The value indicating the inbound messages per second
inboundTotalBytes	Long	The value indicating the inbound total bytes
	Long	The value indicating the inbound total messages

HawkListener:getRoutes

Method

Purpose

This method (on all platforms) gets information on routes on this server.

Remarks

Type

Synchronous, IMPACT_INFO

Arguments

None

Returns

Name	Type	Description
name	String	Name of the remote server
URL	String	URL of the remote server on this route
connected	Boolean	The flag passed to indicate the state of this route
stalled	Boolean	The flag passed to indicate whether the is route stalled
connectionID	Long	The value indicating the connection ID of route
configured	Boolean	The flag passed to indicate whether the route is configured
zoneName	String	Name of the zone that route is in
zoneType	String	Type of zone the route is in

Name	Type	Description
outboundByteRate	Long	The value indicating the outbound bytes per second
outboundMessageRate	Long	The value indicating the outbound messages per second
	Long	The value indicating the outbound total bytes
outboundTotalMessages	Long	The value indicating the outbound total messages
inboundByteRate	Long	The value indicating the inbound bytes per second
inboundMessageRate	Long	The value indicating the inbound messages per second
inboundTotalBytes	Long	The value indicating the inbound total bytes
inboundTotalMessages	Long	The value indicating the inbound total messages

HawkListener:getTopics

Method

Purpose

This method (on all platforms) gets information on topics on this server.

Remarks

The topicRegExp argument is a pattern match using regular expressions. Test any regular expressions you plan to use in rulebases by first using them interactively to ensure they return the desired results. The cursorInitialPosition and cursorSize arguments allows to return only a set number of topics instead of all topics.

Type

Synchronous, IMPACT_INFO

Arguments

Name	Type	Description
topicRegExp	String	Topic Name. Empty argument string provides information on all topics.
topicType	String	Topic type. Empty argument string provides information on all topics.
cursorInitialPosition	Integer	Initial position of the cursor.
cursorSize	Integer	Size of the cursor to determine the number of topics to return.

Returns

Name	Type	Description
name	String	Name of this topic
description	String	Description of this topic
pendingMessageSize	Long	The value indicating the total size for all pending messages for this topic
pendingMessageSizeUsage	Double	The value indicating the total size as a fraction of maxBytes for this topic
pendingMessageCount	Long	The value indicating the total number of pending messages for this topic
pendingMessageCountUsage	Double	The value indicating the total number of pending messages as a fraction of maxMsgs for this topic
consumerCount	Integer	Number of consumers for this topic
subscriberCount	Integer	Number of subscribers for this topic
subscriptionCount	Integer	<p>Number of subscription for this topic.</p> <p>For EMS 8.0, due to the shared subscription feature (between subscribers) in the jms-2.0 specifications, the value of subscriptionCount could be different than the value</p>

Name	Type	Description
		<p>of subscriberCount.</p> <p>The field is visible only if you specify EMS version 8.0 in the hawkemsadmin.hma file.</p>
durableCount	Integer	Number of durable subscribers for this topic
durableSubscriptionCount	Integer	<p>Number of durable subscriptions for this topic.</p> <p>For EMS 8.0, due to the shared subscription feature (between subscribers) in the jms-2.0 specifications, the value of durableSubscriptionCount could be different than the value of durableCount.</p> <p>The field is visible only if you specify EMS version 8.0 in the hawkemsadmin.hma file.</p>
activeDurableCount	Integer	Number of active durable subscribers for this topic
expiryOverride	Long	The value indicating the expiry override property
	Boolean	The flag passed to indicate whether the topic is failsafe
flowControl	Long	The value indicating the target max size of pending

Name	Type	Description
		messages in bytes before flow control starts
global	Boolean	The flag passed to indicate whether the topic is global
hasSenderName	Boolean	The flag passed to indicate whether the sender_name property is set
maxBytes	Long	The value indicating the maximum number of message bytes that the server will store for pending messages bound for this topic
	Long	The value indicating the maximum number of messages that the server will store for pending messages bound for this topic
overflowPolicy	String	Overflow policy for this topic
secure	Boolean	The flag passed to indicate whether the topic is secure
senderNameEnforced	Boolean	The flag passed to indicate whether the sender_name_enforced property is set
static	Boolean	The flag passed to indicate whether the topic is static

Name	Type	Description
temporary	Boolean	The flag passed to indicate whether the topic is temporary
channel	String	Multicast channel for this topic
outboundByteRate	Long	The value indicating the outbound bytes per second
outboundMessageRate	Long	The value indicating the outbound messages per second
outboundTotalBytes	Long	The value indicating the outbound total bytes
outboundTotalMessages	Long	The value indicating the outbound total messages
inboundByteRate	Long	The value indicating the inbound bytes per second
inboundMessageRate	Long	The value indicating the inbound messages per second
	Long	The value indicating the inbound total bytes
inboundTotalMessages	Long	The value indicating the inbound total messages

HawkListener:getDurables

Method

Purpose

This method (on all platforms) gets information on durables on this server.



Note

As this method is deprecated, use the method `getConsumers` instead.

Remarks

The `durableRegExp` argument is a pattern match using regular expressions. Test any regular expressions you plan to use in rulebases by first using them interactively to ensure they return the desired results.

Type

Synchronous, IMPACT_INFO

Arguments

Name	Type	Description
<code>durableRegExp</code>	String	Durable Name. Empty argument string provides information on all durables.

Returns

Name	Type	Description
name	String	Name of this durable
topicName	String	Name of the topic that this durable subscribes to
active	Boolean	The flag passed to indicate whether the durable is connected
clientId	String	Client ID associated with this durable
consumerID	Long	The value indicating the ID of consumer
userName	String	Name of the user, if active, connected, and authenticated
pendingMessageSize	Long	The value indicating the total size, in bytes, of messages waiting to be delivered to this durable
pendingMessageCount	Long	The value indicating the number of messages waiting to be delivered to this durable
deliveredMessageCount	Long	The value indicating the number of delivered messages
noLocalEnabled	Boolean	The flag passed to indicate

Name	Type	Description
		whether the durable will not receive messages published on its own connection
static	Boolean	The flag passed to indicate whether the durable is statically defined

HawkListener:getConsumers

Method

Purpose

This method (on all platforms) gets information on consumers on this server.

Remarks

Type

Synchronous, IMPACT_INFO

Arguments

None

Returns

Name	Type	Description
connectionID	Long	The value indicating the connection ID
createTime	Long	The value indicating the creation time in milliseconds
destinationName	String	Destination name
destinationType	String	Destination type
ID	Long	The value indicating the unique ID
sessionID	Long	The value indicating the session ID
userName	String	User name
multicast	Boolean	The flag passed to indicate the multicast consumer
consumerByteRate	Long	The value indicating the consumer bytes per second
consumerMessageRate	Long	The value indicating the number of consumer messages per second
consumerTotalBytes	Long	The value indicating the consumer total bytes
consumerTotalMessages	Long	The value indicating the number of consumer total messages

HawkListener:getProducers

Method

Purpose

This method (on all platforms) gets information on producers on this server.

Remarks

Type

Synchronous, IMPACT_INFO

Arguments

None

Returns

Name	Type	Description
connectionID	Long	The value indicating the connection ID
createTime	Long	The value indicating the

Name	Type	Description
		creation time in milliseconds
destinationName	String	Destination name
destinationType	String	Destination type
ID	Long	The value indicating the unique ID
sessionID	Long	The value indicating the session ID
userName	String	User name
producerByteRate	Long	The value indicating the producer bytes per second
producerMessageRate	Long	The value indicating the number of producer messages per second
producerTotalBytes	Long	The value indicating the producer total bytes
producerTotalMessages	Long	The value indicating the number of producer total messages

HawkListener:getListenPorts

Method

Purpose

This method (on all platforms) gets information on server listen ports.

Remarks

Type

Synchronous, IMPACT_INFO

Arguments

None

Returns

Name	Type	Description
port	String	Server listen port

HawkListener:getCMLedgerInfo

Method

Purpose

This method (on all platforms) gets statistics on RV CM ledgers on this server.

Remarks

The transport and subjPattern arguments are a pattern match using regular expressions. Test any regular expressions you plan to use in rulebases by first using them interactively to ensure they return the desired results.

Type

Synchronous, IMPACT_INFO

Arguments

Name	Type	Description
transport	String	Transport Name. It should be a valid transport name i.e. the name of the transport whose ledger file is to be summarized. It cannot be an empty string.
subjPattern	String	Subject Pattern Name. Empty argument string provides information on all topics.

Returns

Name	Type	Description
subject	String	Subject that this row summarizes
lastSent	Long	The value indicating the sequence

Name	Type	Description
		number of the most recent message sent on this subject
totalMsgs	Integer	Total number of messages stored on this subject
totalSize	Integer	Total storage size in bytes for this subject

HawkListener:getTransports

Method

Purpose

This method (on all platforms) gets statistics on all transports on this server.

Remarks

Type

Synchronous, IMPACT_INFO

Arguments

None

Returns

Name	Type	Description
name	String	Name of this transport
type	String	Transport type
topicImportDeliveryMode	String	Delivery mode for messages imported from this transport to a topic
queueImportDeliveryMode	String	Delivery mode for messages imported from this transport to a queue
exportHeaders	Boolean	The flag passed to indicate whether the JMS header information is included in message exported from this transport
exportProperties	Boolean	The flag passed to indicate whether the JMS property information is included in message exported from this transport

HawkListener:getTransport

Method

Purpose

This method (on all platforms) gets statistics on a particular transport on this server.

Remarks

The name argument is a pattern match using regular expressions. Test any regular expressions you plan to use in rulebases by first using them interactively to ensure they return the desired results.

Type

Synchronous, IMPACT_INFO

Arguments

Name	Type	Description
name	String	Name. The transport name should be the exact name of the transport. It cannot be null, empty string, or a pattern match regular expression.

Returns

Name	Type	Description
name	String	Name of this transport

Name	Type	Description
type	String	Transport type
topicImportDeliveryMode	String	Delivery mode for messages imported from this transport to a topic
queueImportDeliveryMode	String	Delivery mode for messages imported from this transport to a queue
exportHeaders	Boolean	The flag passed to indicate whether the JMS header information is included in message exported from this transport
exportProperties	Boolean	The flag passed to indicate whether the JMS property information is included in message exported from this transport

HawkListener:getDbStores

Method

Purpose

This method (on all platforms) gets database stores on this server.

Remarks

Type

Synchronous, IMPACT_INFO

Arguments

None.

Returns

Name	Type	Description
name	String	Name of this store
msgCount	Long	The value indicating the number of stored data messages
swappedCount	Long	The value indicating the number of swapped non-persistent data messages
driverName	String	JDBC driver class name
url	String	JDBC driver URL
userName	String	User name used to access database
driverDialect	String	SQL dialect

HawkListener:getFileStores

Method

Purpose

This method (on all platforms) gets information on file stores on this server.

Remarks

Type

Synchronous, IMPACT_INFO

Arguments

None.

Returns

Name	Type	Description
name	String	Name of this store
msgCount	Long	The value indicating the count of stored data messages
msgBytes	Long	The value indicating the number of bytes of stored data messages

Name	Type	Description
swappedCount	Long	The value indicating the number of swapped non-persistent data messages
swappedBytes	Long	The value indicating the number of bytes of swapped non-persistent data messages
freeSpace	Long	The value indicating the amount of free space in bytes
usedSpace	Long	The value indicating the amount of used space in bytes
fileSize	Long	The value indicating the total size of the file in bytes
fileName	String	Name of the store file.
fileMinimum	Long	The value indicating the minimum size in bytes
fileCRCEnabled	Boolean	The flag passed to indicate whether CRC verification is to be used
fileTruncateEnabled	Boolean	The flag passed to indicate whether truncation is to be done, if possible
fileSyncEnabled	Boolean	The flag passed to indicate synchronous write mode

HawkListener:getStores

Method

Purpose

This method (on all platforms) gets information on the stores of this server.

Remarks

Type

Synchronous, IMPACT_INFO

Arguments

None.

Returns

Name	Type	Description
name	String	Name of the store
msgCount	Long	The value indicating the count of stored data messages
msgBytes	Long	The value indicating the number of bytes of stored data messages

Name	Type	Description
swappedCount	Long	The value indicating the number of swapped non-persistent data messages
swappedBytes	Long	The value indicating the number of bytes of swapped non-persistent data messages
freeSpace	Long	The value indicating the amount of free space in bytes
usedSpace	Long	The value indicating the amount of used space in bytes
fileSize	Long	The value indicating the total size of the file in bytes

HawkListener:getChannels

Method

Purpose

This method (on all platforms) gets information on the multicast channels on this server.

Remarks

Type

Synchronous, IMPACT_INFO

Arguments

None.

Returns

Name	Type	Description
name	String	Name of the channel
address	String	Channel address
interface	String	Channel interface
ttl	Integer	Number of channel ttl
priority	Integer	Number of channel priority
maxrate	Long	The value indicating channel maximum rate
maxtime	Long	The value indicating channel maximum time
active	Boolean	The flag passed to indicate whether the channel is active
backlogCount	Long	The value indicating the number of messages waiting to be transmitted
backlogSize	Long	The value indicating the number of bytes waiting to be transmitted
transmittedBytes	Long	The value indicating the

Name	Type	Description
		number of bytes transmitted
retransmittedBytes	Long	The value indicating the number of bytes retransmitted
bufferedBytes	Long	The value indicating the number of bytes buffered for retransmission
channelByteRate	Long	The value indicating the channel bytes per second
channelMessageRate	Long	The value indicating the channel messages per second
channelTotalBytes	Long	The value indicating the channel total message bytes
channelTotalMessages	Long	The value indicating the channel total messages

COM.TIBCO.hawk.tibjms.HawkController

Microagent

Purpose

The HawkController microagent manages and monitors the EMS Server using the TIBCO Enterprise Message Service Administration API. The display name for this microagent in the Hawk Console is `JMS_controller (server url)`. The HawkController microagent contains entire methods of the HawkListener microagent for monitoring purposes. In addition, the HawkController microagent has following methods for managing EMS server.

**Note**

The `server_url` is present in the microagent name when the option `-server_in_agent_name` is used.

Remarks

These HawkController microagent methods are supported on all platforms.

Methods

Method	Description	Page
HawkController:shutdown	Shuts down this server.	HawkController:shutdown
HawkController:purgeDurable	Purges pending messages for the durable with the given name and client ID on this server.	HawkController:purgeDurable
HawkController:purgeQueue	Purges pending messages for the given queue on this server.	HawkController:purgeQueue

Method	Description	Page
HawkController:purgeTopic	Purges pending messages for the given topic on this server.	HawkController:purgeTopic
HawkController:rotateLog	Rotates servers log file on this server.	HawkController:rotateLog
HawkController:compact	Compacts the given file store on this server.	HawkController:compact

HawkController:shutdown

Method

Purpose

This method shuts down the server.

Remarks

Type

Synchronous, IMPACT_ACTION

Arguments

None.

Returns

None.

HawkController:purgeDurable

Method

Purpose

This method purges pending messages for the durable with the given name and client ID on this server.

Remarks

Type

Synchronous, IMPACT_ACTION

Arguments

Name	Type	Description
durableName	String	Get name of the durable to be purged

Returns

None.

HawkController:purgeQueue

Method

Purpose

This method purges pending messages for the given queue on this server.

Remarks

Type

Synchronous, IMPACT_ACTION

Arguments

Name	Type	Description
queueName	String	Queue Name. Get name of the queue to be purged.

Returns

None.

HawkController:purgeTopic

Method

Purpose

This method purges pending messages for the given topic on this server.

Remarks

Type

Synchronous, IMPACT_ACTION

Arguments

Name	Type	Description
topicName	String	Topic Name. Get name of the durable to be purged.

Returns

None.

HawkController:rotateLog

Method

Purpose

This method (on all platforms) rotates the server's log files.

Remarks

Type

Synchronous, IMPACT_ACTION

Arguments

None.

Returns

None.

HawkController:compact

Method

Purpose

This method (on all platforms) compacts the given file store on this server.

Remarks

Type

Synchronous, IMPACT_ACTION_INFO

Arguments

Name	Type	Description
storeName	String	Store Name. Get name of the store file to compact.
maxTime	Long	The value indicating upper limit in seconds on compact time

Returns

Name	Type	Description
completed	Boolean	The flag passed to indicate whether the compact completed before timeout expired

Java Virtual Machine Plug-in Microagent

This chapter provides information about the Java Virtual Machine Plug-in microagent. It also gives details about the microagent methods.

- [Installation and Configuration](#)
- [COM.TIBCO.hawk.jvm.JavaVirtualMachine](#)

Installation and Configuration

TIBCO Hawk Java Virtual Machine Plug-in microagent enables TIBCO Hawk to monitor Java virtual machine processes started by the same user on the local machine.

To configure this plug-in into your TIBCO Hawk installation:

1. Copy the hawkvm.hma file from HAWK_HOME/plugin/jvm to CONFIG_FOLDER/plugin.
2. Edit and verify hawkvm.hma in CONFIG_FOLDER/plugin to correct version and path of jars and Trace Log Configuration.

```
<!--Trace Configuration -->
```

```
<arg>--traceDir</arg> <arg>%TIBCO_HAWK_HOME_ESC%/plugin/jvm/log</arg>
```

```
<arg>--traceFilename</arg>
```

```
<arg>jvmhma.log</arg>
```

```
<!-- Trace Level -->
```

```
<!-- ALL = -1, ALWAYS=0, INFO=1, WARNING=2, ERROR=4 DEBUG=8 -->
```

```
<!-- Default is INFO + WARNING + ERROR -->
```

```
<arg>--traceLevel</arg>
```

```
<arg>7</arg>
```

3. Edit CONFIG_FOLDER/bin/tibhawkagent.tra to add <JAVA_HOME_ESC>/lib/tools.jar in tibco.class.path.extended, if using external JRE and not already added.
4. Edit hawkvm.hma to ensure correct path for tools.jar - most preferably from HAWK_HOME/tibcojre{64}/1.8.0/lib in the classpath section.
5. Make sure the -hma_plugin_dir property is uncommented and have a value "HAWK_HOME/plugin" in CONFIG_FOLDER/bin/hawkagent.cfg.
6. Make sure the "application.args -file hawkagent.cfg" is not commented in the CONFIG_FOLDER/bin/tibhawkagent.tra file.
7. Restart the Hawk Agent.



Note

Note that if invoking the JVM->getVirtualMachineInfo method on an agent does not return any data, then ensure the following:

- On Windows Platform: Ensure that attach.dll is present in the jre\bin folder. The JRE could be the one supplied by TIBCO installer (v1.8 if chosen during the installation), or any of the JRE v1.8.x you may have previously installed. This library is not part of pure JRE v1.8.x distribution bundle from ORACLE, although it was part of JRE v1.6.x distribution bundle from ORACLE/Sun. This library however is required for HAWK JVM plugin operation. It is present as part of jdk\jre distribution. You may also get it from ORACLE download site.
- On UNIX Platform(s): Ensure that libattach.so is present in jre\lib folder. It is present in JDK distribution under jdk\jre. The JRE could be the one supplied by TIBCO installer (v1.8 if chosen during the installation), or any of the JRE v1.8.x you may have previously installed. This library is not part of pure JRE v1.8.x distribution bundle from ORACLE, although it was part of JRE v1.6.x distribution bundle from ORACLE/Sun. This library however is required for HAWK JVM plugin operation. It is present as part of jdk\jre distribution. You may also get it from ORACLE download site.

COM.TIBCO.hawk.jvm.JavaVirtualMachine

Microagent

Purpose

Monitoring of the Java Virtual Machine(s) processes started by the same user on the local machine using Java Attach API through Hawk.

Methods

Method	Description	Page
getVirtualMachineInfo	Discovers and provides detailed information of all Java Virtual Machine(s) started by the same user on the local machine	getVirtualMachineInfo
getThreadInfo	Returns general thread information, execution information, and synchronization	getThreadInfo

Method	Description	Page
	statistics of a specific thread or all threads of a particular Java Virtual Machine. The Process Name field is mandatory and cannot be left blank.	
getGarbageCollectorInfo	Returns details of Garbage Collector of Java Virtual Machine processes started by the same user on the local machine. The Process Name field is mandatory and cannot be left blank.	getGarbageCollectorInfo
getMemoryPoolInfo	Returns details of memory pools of Java Virtual Machine processes started by the same user on the local machine. The Process Name field is	getMemoryPoolInfo

Method	Description	Page
	mandatory and cannot be left blank.	

getVirtualMachineInfo

Method

Purpose

This method returns details of the Java virtual machine processes started by the same user on the local machine by the Java virtual machine process name. If the process name argument is blank then the method discovers all Java virtual machine(s) and returns the details of each Java virtual machine. If provided, the Process name argument serves as a regular expression used to filter the Java virtual machines returned.

Type

Open, Synchronous, IMPACT_INFO

Arguments

Name	Type	Description
Process Name	String	The name. Empty argument string provides information on all Java Virtual Machine processes.

Returns

Name	Type	Description
Process Id	String	JAVA Process Id
Name	String	The name representing the running Java Virtual Machine
Up Time	Long	The uptime of the Java Virtual Machine in milliseconds
Start Time	Long	The start time of the Java Virtual Machine in milliseconds
Process CPU Time	Integer	The CPU time used by the process on which the Java Virtual Machine is running
Current Heap Size	Long	The size of used memory in bytes
Committed Memory	Long	The size of memory in bytes that is committed for the Java Virtual Machine to use
Maximum Heap Size	Long	The maximum size of memory in bytes that can be used for memory management
Free Heap Size	Long	The amount of free memory in bytes
Non Heap Memory Used	Long	The amount of used non heap memory in bytes
Live Threads	Integer	The current number of live threads including both daemon and non-daemon threads

Name	Type	Description
Peak Threads	Integer	The peak live thread count since the Java Virtual Machine was started or peak was reset
Daemon Threads	Integer	The current number of live daemon threads
Total Threads Started	Long	The total number of threads created and started since the start of Java Virtual Machine
Current classes loaded	Integer	The number of classes currently loaded into Java Virtual Machine
Total classes loaded	Long	The total number of classes loaded since the start of Java Virtual Machine execution
Total classes unloaded	Long	The total number of classes unloaded since the start of Java Virtual Machine execution
Virtual Machine Name	String	The Java Virtual Machine implementation name
Virtual Machine Vendor	String	The Java Virtual Machine implementation vendor
Virtual Machine Version	String	The Java Virtual Machine implementation version
Command Line	String	The command used to launch Java Virtual Machine process

getThreadInfo

Method

Purpose

Returns general, execution information and synchronization statistics of Thread by Thread Name, Java Virtual Machine process name and/or Thread State. It returns general, execution information and synchronization statistics of all thread(s) of particular Java virtual machine, if the Thread Name argument is blank. The Process Name field is mandatory and cannot be left blank.

Type

Synchronous, IMPACT_INFO

Arguments

Name	Type	Description
Thread Name	String	The thread name. Empty argument string provides information on all running Java Virtual Machine threads.
Java Virtual Machine Process Name	String	The Java Virtual Machine process name.
Thread State Thread State Possible Values: <ul style="list-style-type: none">• Blank• NEW• RUNNABLE• BLOCKED• WAITING	String	The Thread State. Empty argument string provides information on all threads irrespective of the state.

Name	Type	Description
		<ul style="list-style-type: none"> • TIME_WAITING • TERMINATED

Returns

Name	Type	Description
Virtual Machine Process Id	String	Process Id of Java Virtual Machine process
Virtual Machine Process Name	String	The name of representing the running Java Virtual Machine
Thread Id	String	The ID of the thread
Thread Name	String	The name of the thread
Thread State	String	The state of the thread
Suspended	String	Denotes whether the thread is suspended
isInNative	String	Denotes whether it is executing native code via the Java Native Interface (JNI)
Blocked Count	String	The total number of attempts that the thread is blocked to enter or re-enter a monitor
Blocked Time	String	The approximate accumulated elapsed time (in milliseconds) that the thread has blocked to enter or

Name	Type	Description
		re-enter a monitor since the enabling of thread contention monitoring
Waited Count	String	The total count of the number of times the thread waited for notification
Waited Time	String	The approximate accumulated elapsed time (in milliseconds) that the thread has waited for notification since the enabling of thread contention monitoring
Thread User Time	String	CPU time executed by the thread in user mode in nanoseconds
Lock Name	String	The string representation of the monitor lock that the thread is blocked to enter or waiting to be notified through the <code>Object.wait</code> method
Lock Owner Id	String	The thread ID which holds the monitor lock of an object on which the thread is blocked
Lock Owner Name	String	The thread name which holds the monitor lock of an object on which the thread is blocked

getGarbageCollectorInfo

Method

Purpose

This method returns details of Garbage Collector of the Java virtual machine processes started by the same user on the local machine by the Java virtual machine process name. The Process Name field is mandatory and cannot be left blank.

Type

Open, Synchronous, IMPACT_INFO

Arguments

Name	Type	Description
Process Name	String	The Java virtual machine process name. The Process Name field is mandatory and cannot be left blank.

Returns

Name	Type	Description
Process Id	String	JAVA Process Id
Process Name	String	The Java virtual machine process name
Garbage collector	String	The Garbage Collector name
GC Count	Long	The Garbage Collector count since

Name	Type	Description
		Java Virtual Machine started
GC Time	Long	Garbage Collector time since Java Virtual Machine started

getMemoryPoolInfo

Method

Purpose

This method returns details of memory pools of the Java virtual machine processes started by the same user on the local machine by the Java virtual machine process name. The Process Name field is mandatory and cannot be left blank.

Type

Open, Synchronous, IMPACT_INFO

Arguments

Name	Type	Description
Process Name	String	The Java virtual machine process name. The Process Name field is mandatory and cannot be left blank.

Returns

Name	Type	Description
Process Id	String	JAVA Process Id
Process Name	String	The Java virtual machine process name
Memory Pool Name	String	The name of the memory pool
Peak Usage Committed	Long	Peak Usage Committed
Peak Usage Used	Long	Peak Usage Used
Peak Usage Init	Long	Initial Peak Usage
Peak Usage Max	Long	Maximum Peak Usage
Current Usage Committed	Long	Current Usage Committed
Current Usage Used	Long	Current Usage Used
Current Usage Init	Long	Current Usage Init
Current Usage Max	Long	Current Usage Max

Universal Collector Plug-in Microagent

This chapter provides information about the Universal Collector Plug-in microagent. It also gives details about the microagent methods.

- [Installation and Configuration](#)
- [COM.TIBCO.hawk.microagent.HawkUniversalCollector](#)

Installation and Configuration

The Universal Collector microagent enables you to monitor the log files and Hawk rulebases and forward the logs and rulebase data to TIBCO LogLogic® Log Management Intelligence (LMI) or any Syslog consumer.

To configure this plug-in into your TIBCO Hawk installation:

1. Copy the hawkuc.hma file from HAWK_HOME/plugin/hawkuc to CONFIG_FOLDER/plugin.
2. Edit and verify hawkuc.hma in CONFIG_FOLDER/plugin to have the correct version and path of JAR files; and correct trace log configurations.

```
<microagent>
```

```
<!-- The classname of the microagent -->
```

```
<classname>com.tibco.hawk.microagent.uc.HawkUniversalCollectorMA</classname>
```

```
<!-- The arguments to be passed to the  
MicroAgent.initializeMicroAgent() method -->
```

```
<arguments>
```



```
<arg>--pluginDir</arg>
```

```
<arg>HAWK_HOME/hawk/6.2/plugin/hawkuc/</arg>
```

```
</arguments>
```

```
<classpath>
```

```
<path>HAWK_HOME/hawk/6.2/plugin/hawkuc/lib/hawkuc.jar</path>
```

```
<pathdir>HAWK_HOME/hawk/6.2/plugin/hawkuc/lib/ext</pathdir>
```

```
</classpath>
```

```
</microagent>
```

3. In CONFIG_FOLDER/bin/hawkagent.cfg file, ensure that the -hma_plugin_dir property is uncommented and have a value CONFIG_FOLDER/plugin .
4. In the CONFIG_FOLDER/bin/tibhawkagent.tra file, ensure that the "application.args -file hawkagent.cfg" is not commented .

Restart the Hawk Agent.

COM.TIBCO.hawk.microagent.HawkUniversalCollector

Microagent

Purpose

The Universal Collector microagent enables you to monitor the log files and forward the logs to TIBCO LogLogic® Log Management Intelligence (LMI) or another Syslog. It also enables you to collect the metrics data from Hawk rulebases and Hawk microagents and forward the data to TIBCO LogLogic® Log Management Intelligence (LMI) or another Syslog.

The microagent uses collectors and forwarders to distribute the data from different sources to the specified destinations. To forward the data, the microagent uses ULDP for LogLogic LMI and TCP or UDP syslog for other Syslog consumers.

For more information on configuring collectors and forwarders, see *TIBCO Hawk Console Users Guide*.

Methods

Method	Description	Page
getCollectors	Returns the details of the configured collector	getCollectors
getForwarders	Returns the details of the configured forwarder	getForwarders
onEvent	Asynchronous method that listens to Universal Collector events and returns the event details to subscribers.	onEvent
removeForwarder	Removes the configured forwarder	removeForwarder
removeCollector	Removes the configured collector	removeCollector

[getCollectors](#)[getCollectors](#)[getCollectors](#)

getCollectors

Method

Purpose

This method returns the list of collectors.

Type

Synchronous, IMPACT_INFO

Arguments

Name	Type	Description
	String	If this argument is empty, information about all the configured collectors is returned.

Returns

Name	Type	Description
Key	String	The collector key
Name	String	Name of the collector

Name	Type	Description
Type	String	Type of the collector
Collection	String	Connection parameters <ul style="list-style-type: none">• Syslog: protocol/bound port• RT File: File name (no path)• Remote File: File path• Hawk Rulebase (Rulebase name)• Hawk Metrics
Forwarder IDs	String	List of forwarder keys to which the collector is forwarding the data.
isActive	Boolean	Specifies whether Log Source is active (true) or not (false)
Tags	String	Tags are useful to store, sort, and search for Log Sources in a list.

getForwarders

Method

Purpose

The method returns the list of forwarders.

Type

Synchronous, IMPACT_INFO

Arguments

Name	Type	Description
	String	If this argument is empty, information about all the configured forwarders is returned.

Returns

Name	Type	Description
Key	String	The forwarder key
Name	String	Name of the forwarder
Host	String	The host name of forwarder destination
Port	String	The port of forwarder destination
Use Compression	Boolean	If the connection is slow, you can configure the logs to be compressed for a more rapid flow of data. Define whether the logs are compressed (true) or not (false: default value)
Use Authentication	Boolean	Define whether the communication is authenticated (true) or not (false - default value)
Use Encryption	Boolean	Define whether the communication is encrypted (true) or not (false - default value)

Name	Type	Description
Use Schedule	Boolean	Define whether the scheduled forwarding (logs are sent over a period of time) is enabled (true) or not (false - default value)
Forward UC Logs	Boolean	Specifies whether Universal Collector internal logs are forwarded or not
Buffer Size	Integer	Buffer size in megabytes

onEvent

Method

Purpose

The method listens to Universal Collector events and returns the event details to subscribers.

Type

Asynchronous, IMPACT_INFO

Arguments

None

Returns

Name	Type	Description
Key	String	The key of collector or forwarder for which the event occurred.
Configuration type	String	Specifies whether the event is for collector (Log Source) or forwarder.
Event type	String	The event that occurred. The event can be added, removed or updated.

removeForwarder

Method

Purpose

This method removes the configured forwarder.

Type

Synchronous, IMPACT_ACTION

Arguments

Name	Type	Description
	String	The forwarder key. Use the <code>getForwarders</code> method with no argument to retrieve keys for all configured forwarders.

Returns

None

removeCollector

Method

Purpose

The purpose of this method is to remove the configured collector.

Type

Synchronous, IMPACT_ACTION

Arguments

Name	Type	Description
	String	The collector key. Use <code>getCollectors</code> method with no argument to retrieve keys for all configured collectors.

Returns

None

Inventory Plug-in Microagent

This chapter provides information about the Inventory Plug-in microagent. It also gives details about the microagent methods.

- [Installation and Configuration](#)
- [COM.TIBCO.hawk.microagent.inventory.InventoryMicroAgent](#)

Installation and Configuration

TIBCO Hawk Inventory Plug-in microagent enables TIBCO Hawk to check the inventory of various installed products.

To configure this plug-in into your TIBCO Hawk installation:

1. Copy the `inventory.hma` file from `HAWK_HOME/plugin/inventory` to `CONFIG_FOLDER/plugin`.
2. Edit and verify `inventory.hma` in `CONFIG_FOLDER/plugin` to correct version and path of jars and Trace Log Configuration.

```
<!--Trace Configuration -->
```

```
<arg>--traceDir</arg>
```

```
<arg>CONFIG_FOLDER/hawk/logs</arg>
```

```
<arg>--traceFilename</arg>
```

```
<arg>inventoryhma.log</arg>
```

```
<!-- Trace Level -->
```

```
<!-- ALL = -1, ALWAYS=0, INFO=1, WARNING=2, ERROR=4 DEBUG=8 -->
```

```
<!-- Default is INFO + WARNING + ERROR -->
```

```
<arg>--traceLevel</arg>
```

```
<arg>7</arg>
```

3. Edit CONFIG_FOLDER/bin/tibhawkagent.tra to add <JAVA_HOME_ESC>/lib/tools.jar in tibco.class.path.extended, if using external JRE and not already added.
4. Make sure the -hma_plugin_dir property is uncommented and have a value CONFIG_FOLDER/plugin in CONFIG_FOLDER/bin/hawkagent.cfg.
5. Make sure the "application.args -file hawkagent.cfg" is not commented in the CONFIG_FOLDER/bin/tibhawkagent.tra file.
6. Restart the Hawk Agent.

COM.TIBCO.hawk.microagent.inventory.InventoryMicroAgent

Microagent

Purpose

The Inventory plugin allows you to check the inventory of the various installed products.

Methods

Method	Description	Page
getAllEnvironments	Returns the details of installed TIBCO Homes.	getAllEnvironments
getEnvironmentDetail	Returns the details of a specific environment.	getEnvironmentDetail
getProductsInAllEnvironments	Returns the details of installed TIBCO products.	getProductsInAllEnvironments
getProductsInAnEnvironment	Returns product details from a specific environment.	getProductsInAnEnvironment
getSpecificProductDetail	Returns specific product details from a specific environment.	getSpecificProductDetail
getProductFeatureDetail	Returns feature details from a specific product.	getProductFeatureDetail

getAllEnvironments

Method

Purpose

This method returns a list of all installed TIBCO products across all TIBCO HOMES installed and configured on the machine..

Type

Open, Synchronous, IMPACT_INFO

Arguments

None.

Returns

Name	Type	Description
Index	String	TIBCO Home index
Environment	String	The name of an installed environment
Location	String	The installation location of an installed environment

Name	Type	Description
Configuration Folder	String	The configuration location of an installed environment
Created On	String	The install timestamp of an installed environment
Total Installed Products	String	Number of installed products

getEnvironmentDetail

Method

Purpose

This method returns the details of a specific environment.

Type

Open, Synchronous, IMPACT_INFO

Arguments

Name	Type	Description
Environment	String	The name of an installed environment

Returns

Name	Type	Description
Index	String	<TIBCO_HOME> index
Environment	String	The name of an installed environment
Location	String	The installation location of an installed environment
Configuration Folder	String	The configuration location of an installed environment
Created On	String	The install timestamp of an installed environment
Total Installed Products	String	Number of installed products

getProductsInAllEnvironments

Method

Purpose

This method returns the details of installed TIBCO products.

Type

Open, Synchronous, IMPACT_INFO

Arguments

None.

Returns

Name	Type	Description
Product ID	String	The product serial number
Environment	String	The name of an installed environment
Location	String	The installation location of an installed environment
No	String	Product number
Product Name	String	The name of an installed product
Product Version	String	The version of an installed product
Product Timestamp	String	The install timestamp of an installed product
Configuration Folder	String	The configuration location of an installed environment

**Note**

For methods such as `getEnvironmentDetail` and `getProductsInAllEnvironments` we have difference of one installed product/component on invocation and subscription result. This is because in the detail product listing in an environment, "tpcl" as a product gets ignored.

getProductsInAnEnvironment

Method

Purpose

This method returns product details from a specific environment.

Type

Open, Synchronous, `IMPACT_INFO`

Arguments

Name	Type	Description
Environment	String	The name of an installed environment

Returns

Name	Type	Description
Product Id	String	The product serial number
Environment	String	The name of an installed environment
Location	String	The installation location of an installed environment

Name	Type	Description
No	String	Product number
Product Name	String	The name of an installed product
Product Version	String	The version of an installed product
Product Timestamp	String	The install timestamp of an installed product
Configuration Folder	String	The configuration location of an installed environment

getSpecificProductDetail

Method

Purpose

This method returns specific product details from a specific environment.

Type

Open, Synchronous, `IMPACT_INFO`

Arguments

Name	Type	Description
Environment	String	The name of an installed environment.

Name	Type	Description
Product Id	String	The product serial number

Returns

Name	Type	Description
Product Id	String	The product serial number
Environment	String	The name of an installed environment
Location	String	The installation location of an installed environment
No	String	Product number
Product Name	String	The name of an installed product
Product Version	String	The version of an installed product
Product Timestamp	String	The installed timestamp of an installed product
Configuration Folder	String	The configuration location of an installed environment

getProductFeatureDetail

Method

Purpose

This method returns feature details from a specific product.

Type

Open, Synchronous, `IMPACT_INFO`

Arguments

Name	Type	Description
Environment	String	The name of an installed environment.
Product Id	String	The product serial number

Returns

Name	Type	Description
Product Id	String	The product serial number
Environment	String	The name of an installed environment
Location	String	The installation location of an installed environment
Product Name	String	The name of an installed product

Name	Type	Description
Product Version	String	The version of an installed product
Feature	String	The feature name of an installed product
Feature Version	String	The feature version of an installed product
Visible? (Y/N)	String	The product feature visibility during product installation

Heartbeat Plug-in Microagent

This chapter provides information about the Heartbeat Plug-in microagent. It also gives details about the microagent methods.

- [Installation and Configuration](#)
- [COM.TIBCO.hawk.microagent.heartbeat.HeartbeatMicroAgent](#)

Installation and Configuration

TIBCO Hawk Heartbeat Plug-in microagent enables you to check the status of various servers.

To configure this plug-in into your TIBCO Hawk installation:

1. Copy the heartbeat.hma file from HAWK_HOME/plugin/heartbeat to CONFIG_FOLDER/plugin.
2. Read the heartbeat.hma file located in the <CONFIG_FOLDER>/plugin directory carefully before modifying the default configuration. This file contains comments that are self-explanatory and will guide you on how to set the health check status monitoring configurations as per your needs. There are 7 sections in this file that are explained later in this document. Each one caters to different a need. Follow the instructions given in the comments verbatim, especially when commenting and uncommenting the sections. Every section has the following Trace Log configuration. Edit this file per your requirements.

```
<!--Trace Configuration -->
```

```
<arg>--traceDir</arg>
```

```
<arg>CONFIG_FOLDER/hawk/logs</arg>
```

```
<arg>--traceFilename</arg>
```

```
<arg>heartbeathma.log</arg>
```

```
<!-- Trace Level -->
```

```
<!-- ALL = -1, ALWAYS=0, INFO=1, WARNING=2, ERROR=4 DEBUG=8 -->
```

```
<!-- Default is INFO + WARNING + ERROR -->
```

```
<arg>--traceLevel</arg>
```

```
<arg>7</arg>
```

3. Edit CONFIG_FOLDER/bin/tibhawkagent.tra to add <JAVA_HOME_ESC>/lib/tools.jar in tibco.class.path.extended, if using external JRE and not already added.
4. Make sure the -hma_plugin_dir property is uncommented and have a value "CONFIG_FOLDER/plugin" in CONFIG_FOLDER/bin/hawkagent.cfg.
5. Make sure the "application.args -file hawkagent.cfg" is not commented in the CONFIG_FOLDER/bin/tibhawkagent.tra file.
6. Restart the Hawk Agent.

COM.TIBCO.hawk.microagent.heartbeat.HeartbeatMicroAgent

Microagent

Purpose

This Plugin allows you to check the health status of the various servers.

- Default out-of-the-box Configuration
- EMS Server
- EMS Server in Secured (SSL) Configuration
- FTP Server
- HTTP Server
- Database Server (using various JDBC Drivers)
- SMTP Mail Server

For each of the above, certain configuration and supporting libraries are required. Each of the following sections describe minimum & necessary artifacts to be configured.

Make sure you uncomment the required XML section, keeping the remaining sections commented. When you uncomment, remove the "#" from ">#-" in the uncommented block, and vice versa in the commented block to ensure a valid XML document.

Methods

Method	Description
pingEMSServer	<p>Pings TIBCO EMS server using the connection parameters specified. The connection URL formats for available drivers are as follows:</p> <pre>scheme://<host>:<port></pre> <p>scheme could be <code>tcp</code> or <code>ssl</code> (for secured connectivity). The default port is 7222.</p>
pingSecuredEMS Server	<p>Pings SSL secured TIBCO EMS server using the connection parameters specified. The connection URL formats for available drivers are as follows:</p> <pre>scheme://<host>:<port></pre>

Method	Description
	scheme could be <code>ssl</code> for secured connectivity. The default port is 7243.
<code>pingFTPServer</code>	<p>Pings an FTP server using the connection parameters specified. The connection URL formats for available drivers are as follows:</p> <pre>scheme://<host>:<port></pre> <p>scheme could be <code>ftp</code> or <code>sftp</code> (for secured connectivity). The default port for <code>ftp</code> is 21 and for <code>sftp</code> is 22.</p>
<code>pingHTTPServer</code>	<p>Pings a web server using the HTTP connection parameters specified. The connection URL formats for available drivers are as follows:</p> <pre>scheme://<host>:<port></pre> <p>scheme could be <code>http</code> or <code>https</code> (for secured connectivity). The default port for <code>http</code> is 80 and for <code>https</code> it is 443. Only the server URL is mandatory. The rest are optional.</p>
<code>pingJDBCDriver</code>	<p>Connect to a database server using the JDBC driver connection parameters specified. The connection URL formats for available drivers are as follows:</p> <pre>jdbc:oracle:thin:@<host>:<port>:<database> Default Port:1521</pre> <pre>jdbc:sqlserver://<host>:<port>;databaseName=<database> Default Port:1433</pre> <pre>jdbc:sybase:Tds:<host>:<port>/<database></pre>

Method	Description
	<pre>e> Default Port:5000</pre>
	<pre>jdbc:db2://<host>:<port>/<database>:currentSchema; Default Port:5000</pre>
	<pre>jdbc:mysql://<host>:<port>/<database>. Default Port:3306</pre>
pingSMTPServer	Pings a SMTP server using the connection parameters specified.

pingEMSServer

Method

Purpose

Pings TIBCO EMS server using the connection parameters specified. The connection URL formats for available drivers are as follows:

```
scheme://<host>:<port>
```

scheme could be tcp or ssl (for secured connectivity). The default port is 7222.

Type

Open, Synchronous, IMPACT_INFO

Arguments

Name	Type	Description
EMS Server URL	String	EMS host URL in the form (tcp)://<host>:<port>
EMS User	String	EMS user name
Password	String	EMS password
Is Password Encrypted?	String	Is the password encrypted? Yes or No
Connection Timeout	String	Connection timeout in seconds. By default it is empty.

Returns

Name	Type	Description
isServerAccessible	String	Is server accessible? True or False
Status Code	String	Status code
Status Details	String	Status details

pingSecuredEMSServer

Method

Purpose

Pings SSL secured TIBCO EMS server using the connection parameters specified. The connection URL formats for available drivers are as follows:

```
scheme://<host>:<port>
```

scheme could be `ssl` for secured connectivity. The default port is 7243.

Type

Open, Synchronous, `IMPACT_INFO`

Arguments

Name	Type	Description
EMS Server URL	String	EMS host URL in the form (tcp)://<host>:<port>
EMS User	String	EMS user name
Password	String	EMS password
Is Password Encrypted?	String	Is the password encrypted? Yes or No
Connection Timeout	String	Connection timeout in seconds. By default it is empty.
SSL Vendor	String	SSL vendor
SSL Trace	String	SSL trace

Name	Type	Description
SSL Debug Trace	String	SSL debug trace
SSL Trusted	String	SSL Trusted
SSL Hostname	String	SSL Hostname
SSL Identity	String	SSL identity
SSL Key	String	SSL Key
SSL Password	String	SSL password
SSL Ciphers	String	SSL ciphers

Returns

Name	Type	Description
isServerAccessible	String	Is server accessible? True or False
Status Code	String	Status code
Status Details	String	Status details

pingFTPServer

Method

Purpose

Pings an FTP server using the connection parameters specified. The connection URL formats for available drivers are as follows:

```
scheme://<host>:<port>
```

scheme could be ftp, ftps (ftp with SSL), or sftp (for secured connectivity). The default port for ftp is 21 and for sftp is 22.

Type

Open, Synchronous, IMPACT_INFO

Arguments

Name	Type	Description
FTP Server URL	String	FTP host URL in the form {ftp/sftp}://<host>:<port>
FTP User	String	FTP user name
Password	String	FTP password
Connection Timeout	String	Connection timeout in seconds. By default left empty.

Returns

Name	Type	Description
isServerAccessible	String	Is server accessible? True or False
Status Code	String	Status code

Name	Type	Description
Status Details	String	Status details

pingHTTPServer

Method

Purpose

Pings a web server using the HTTP connection parameters specified. The connection URL formats for available drivers are as follows:

```
scheme://<host>:<port>
```

scheme could be http or https (for secured connectivity). The default port for http is 80 and for https it is 443. Only the server URL is mandatory. The rest are optional.

Type

Open, Synchronous, IMPACT_INFO

Arguments

Name	Type	Description
HTTP Server URL	String	HTTP host URL in the form {http/https}://<host>:<port>
HTTP User	String	HTTP user name

Name	Type	Description
Password	String	HTTP password
Connection Timeout	String	Connection timeout in seconds. By default left empty.

Returns

Name	Type	Description
isServerAccessible	String	Is server accessible? True or False
Status Code	String	Status code
Status Details	String	Status details

pingJDBCDriver

Method

Purpose

Connect to a database server using the JDBC driver connection parameters specified. The connection URL formats for available drivers are as follows:

```
jdbc:oracle:thin:@<host>:<port>:<database> Default Port:1521
```

```
jdbc:sqlserver://<host>:<port>;databaseName=<database> Default Port:1433
```

```
jdbc:sybase:Tds:<host>:<port>/<database> Default Port:5000
```

```
jdbc:db2://<host>:<port>/<database>:currentSchema; Default Port:5000
```

```
jdbc:mysql://<host>:<port>/<database>. Default Port:3306
```

Type

Open, Synchronous, IMPACT_INFO

Arguments

Name	Type	Description
JDBC Driver	String	JDBC Driver
JDBC Driver URL	String	JDBC Connection URL
JDBC User	String	JDBC user name
Password	String	JDBC Password
Connection Timeout	String	Connection timeout in seconds. By default left empty.

Returns

Name	Type	Description
isServerAccessible	String	Is server accessible? True or False

Name	Type	Description
Status Code	String	Status code
Status Details	String	Status details

pingSMTPServer

Method

Purpose

Pings a SMTP server using the connection parameters specified.

Type

Open, Synchronous, `IMPACT_INFO`

Arguments

Name	Type	Description
SMTP Server URL	String	SMTP Host URL
Connection Timeout	String	Connection timeout in seconds. By default left empty.

Returns

Name	Type	Description
isServerAccessible	String	Is server accessible? True or False
Status Code	String	Status code
Status Details	String	Status details

TIBCO Documentation and Support Services

For information about this product, you can read the documentation, contact TIBCO Support, and join TIBCO Community.

How to Access TIBCO Documentation

Documentation for TIBCO products is available on the [TIBCO Product Documentation](#) website, mainly in HTML and PDF formats.

The [TIBCO Product Documentation](#) website is updated frequently and is more current than any other documentation included with the product.

Product-Specific Documentation

Documentation for TIBCO Hawk® is available on the [TIBCO Hawk® Product Documentation](#) page.

The following documents for this product can be found in the TIBCO Documentation site:

- *TIBCO Hawk® Release Notes*
- *TIBCO Hawk® Concepts*
- *TIBCO Hawk® Installation, Configuration, and Administration*
- *TIBCO Hawk® Console User Guide*
- *TIBCO Hawk® Programmer's Guide*
- *TIBCO Hawk® Admin Agent*
- *TIBCO Hawk® Plug-in Reference for TIBCO Administrator*
- *TIBCO Hawk® Microagent Reference*
- *TIBCO Hawk® Plug-in Reference*
- *TIBCO Hawk® Security Guidelines*

How to Contact TIBCO Support

Get an overview of [TIBCO Support](#). You can contact TIBCO Support in the following ways:

- For accessing the Support Knowledge Base and getting personalized content about products you are interested in, visit the [TIBCO Support](#) website.
- For creating a Support case, you must have a valid maintenance or support contract with TIBCO. You also need a user name and password to log in to [TIBCO Support](#) website. If you do not have a user name, you can request one by clicking **Register** on the website.

How to Join TIBCO Community

TIBCO Community is the official channel for TIBCO customers, partners, and employee subject matter experts to share and access their collective experience. TIBCO Community offers access to Q&A forums, product wikis, and best practices. It also offers access to extensions, adapters, solution accelerators, and tools that extend and enable customers to gain full value from TIBCO products. In addition, users can submit and vote on feature requests from within the [TIBCO Ideas Portal](#). For a free registration, go to [TIBCO Community](#).

Legal and Third-Party Notices

SOME TIBCO SOFTWARE EMBEDS OR BUNDLES OTHER TIBCO SOFTWARE. USE OF SUCH EMBEDDED OR BUNDLED TIBCO SOFTWARE IS SOLELY TO ENABLE THE FUNCTIONALITY (OR PROVIDE LIMITED ADD-ON FUNCTIONALITY) OF THE LICENSED TIBCO SOFTWARE. THE EMBEDDED OR BUNDLED SOFTWARE IS NOT LICENSED TO BE USED OR ACCESSED BY ANY OTHER TIBCO SOFTWARE OR FOR ANY OTHER PURPOSE.

USE OF TIBCO SOFTWARE AND THIS DOCUMENT IS SUBJECT TO THE TERMS AND CONDITIONS OF A LICENSE AGREEMENT FOUND IN EITHER A SEPARATELY EXECUTED SOFTWARE LICENSE AGREEMENT, OR, IF THERE IS NO SUCH SEPARATE AGREEMENT, THE CLICKWRAP END USER LICENSE AGREEMENT WHICH IS DISPLAYED DURING DOWNLOAD OR INSTALLATION OF THE SOFTWARE (AND WHICH IS DUPLICATED IN THE LICENSE FILE) OR IF THERE IS NO SUCH SOFTWARE LICENSE AGREEMENT OR CLICKWRAP END USER LICENSE AGREEMENT, THE LICENSE(S) LOCATED IN THE “LICENSE” FILE(S) OF THE SOFTWARE. USE OF THIS DOCUMENT IS SUBJECT TO THOSE TERMS AND CONDITIONS, AND YOUR USE HEREOF SHALL CONSTITUTE ACCEPTANCE OF AND AN AGREEMENT TO BE BOUND BY THE SAME.

This document is subject to U.S. and international copyright laws and treaties. No part of this document may be reproduced in any form without the written authorization of Cloud Software Group, Inc.

TIBCO, the TIBCO logo, the TIBCO O logo, Hawk, LogLogic, Rendezvous, TIBCO Administrator, and TIBCO BusinessWorks are either registered trademarks or trademarks of Cloud Software Group, Inc. in the United States and/or other countries.

Java and all Java based trademarks and logos are trademarks or registered trademarks of Oracle Corporation and/or its affiliates.

This document includes fonts that are licensed under the SIL Open Font License, Version 1.1, which is available at: <https://scripts.sil.org/OFL>

Copyright (c) Paul D. Hunt, with Reserved Font Name Source Sans Pro and Source Code Pro.

All other product and company names and marks mentioned in this document are the property of their respective owners and are mentioned for identification purposes only.

This software may be available on multiple operating systems. However, not all operating system platforms for a specific software version are released at the same time. See the readme file for the availability of this software version on a specific operating system platform.

THIS DOCUMENT IS PROVIDED “AS IS” WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR NON-INFRINGEMENT.

THIS DOCUMENT COULD INCLUDE TECHNICAL INACCURACIES OR TYPOGRAPHICAL ERRORS. CHANGES ARE PERIODICALLY ADDED TO THE INFORMATION HEREIN; THESE CHANGES WILL BE INCORPORATED IN NEW EDITIONS OF THIS DOCUMENT. CLOUD SOFTWARE GROUP, INC. MAY MAKE IMPROVEMENTS AND/OR CHANGES IN THE PRODUCT(S) AND/OR THE PROGRAM(S) DESCRIBED IN THIS DOCUMENT AT ANY TIME.

THE CONTENTS OF THIS DOCUMENT MAY BE MODIFIED AND/OR QUALIFIED, DIRECTLY OR INDIRECTLY, BY OTHER DOCUMENTATION WHICH ACCOMPANIES THIS SOFTWARE, INCLUDING BUT NOT LIMITED TO ANY RELEASE NOTES AND "READ ME" FILES.

This and other products of Cloud Software Group, Inc. may be covered by registered patents. Please refer to TIBCO's Virtual Patent Marking document (<https://www.tibco.com/patents>) for details.

Copyright © 1996-2023. Cloud Software Group, Inc. All Rights Reserved.