REST Acceptor Transport Adaptor

Overview

This document contains a description of the main features of FIXEdge's REST Transport Adaptor (REST TA), as well as common steps required for installation.

Concept

FIXEdge REST adaptor is a REST server that handles REST requests with incoming messages in JSON form, converts them to FIX format and sends them to a given target. The adapter is designed for the generic processing of messages, without lock-in to specific message types.

Depending on the configuration settings, the adaptor can transform incoming message to either a FIX XML message of 'n' type, or map JSON fields into FIX tags. The type of the resulting message should be defined in tag 35.

The JSON message format might look as follows:

```
'{"35":"D", "1":"12345", "56":"CITIGROUP", .........}'
```

The adaptor supports repeating groups and nested repeating groups.

Requests are sent as HTTP POST requests to the following URL: http://<Address>:<ListenPort>/messages

Example of REST request using curl for localhost and listen port 8001:

```
curl -H "Content-Type: application/json" -X POST -d "{\"35\":\"D\",\"1\":\"USD\",\"386\":[{\"336\":\"ABCD\"}]}"
http://localhost:8001/messages
```

Resulting FIX messages can be optionally validated against FIX dictionaries defined in the *engine.properties* configuration file.

As a result of a REST request, the adapter should return one of the following HTTP status codes:

- 200 - Success
- 202 - Accepted, returned when a message is successfully received and parsed, but couldn't be delivered to the client in FE
- 400 - HTTP error Bad Request (with JSON content including error message), in case of wrong input message or validation errors
- 404 - HTTP error Not found for requests with the wrong URL

Logging for received and send messages

FIXEdge REST adaptor can be configured to write the following data into separate log file:

- Content of input request
- Resulting FIX messages
- HTTP status returned to the caller

Integration with FIXICC

The adaptor supports the monitoring of its current state with FIXICC. It provides the following monitorable properties:

- number of received messages
- number of sent messages
- number of rejected messages

Description of JSON format for input messages:

- Fields in input JSON message are listed as pairs of "FIXID":"FIXValue".
- a JSON message can contain repeating groups represented as follows:

```
{ "NoRecordsID": [      { "FIXID":"FIXValue", "FIXID":"FIXValue"... },      { "FIXID":"FIXValue",
"FIXID":"FIXValue"... }     ...    ] }
```

Message Conversion Methods

REST Acceptor TA supports two conversion methods:

1. Raw (available since FIXEdge 6.9.0)
    a. Adapter accepts any FIX message
    b. Adapter routes FIX message to BL
2. WrapInXmlMessage
    a. Adapter accepts any JSON
    b. Adapter creates FIX message 35=n (XML Message)
    c. Adapter stores received JSON as-is in tag 213 (XmlData)
    d. Adapter routes FIX message to BL
3. NumericTagValueMapping
    a. Adapter accepts JSON, structured as described in **JSON format for input messages** section
    b. Adapter seeks tag-value pair "35":"*XYZ*" in incoming JSON
    c. If tag-value pair "35":"*XYZ*" is not found, or *XYZ* is not a valid FIX message type, adapter returns an error.
    d. The adapter creates empty FIX message with MsgType 35=*XYZ*
    e. For every tag-value pair in JSON corresponding tags/values are filled in FIX message by Adapter
    f. Adapter routes FIX message to BL

Examples of input/output messages (pipe symbol stands for SOH symbol):

	input (from external system)	**output (to BL)**
WrapInXmlMessage	FIX: 8=FIX.4.4| 9=168| 35=E| 49=0| 56=RESTAdapter| 34=1| 50=30737| 66=List1| 116=OMS1| 52=20191101-11:11:01.080| 394=3| 68=2| 73=2| 11=0003| 67=1| 100=DSMD| 55=11| 54=1| 38=100| 11=0004| 67=2| 100=DSMD| 55=12|54=2| 38=200| 10=235	FIX (input message is marked orange): 8=FIX.4.4| 9=259| 35=n| 49=0| 56=0| 34=1| 52=20200317-10:23:55.068| 212=201| 213=8=FIX.4.4| 9=168| 35=E| 49=0| 56=RESTAdapter| 34=1| 50=30737| 66=List1| 116=OMS1| 52=20191101-11:11:01.080| 394=3| 68=2| 73=2| 11=0003| 67=1| 100=DSMD| 55=11| 54=1| 38=100| 11=0004| 67=2| 100=DSMD| 55=12| 54=2| 38=200| 10=235| 10=219

NumericTagValueMapping	JSON (the example contains repeating groups):
	
	`{"66":"List1",`
	`"56":"RESTAdapter",`
	`"34":"3",`
	`"35":"E",`
	`"68":"2",`
	`"49":"JAVA",`
	`"394":"3",`
	`"116":"OMS1",`
	`"50":"30737",`
	`"52":"20150101-01:01:01.080",`
	`"73":[{"11":"0003",`
	`"55":"MSFT",`
	`"67":"1",`
	`"54":"1",`
	`"100":"DSMD",`
	`"38":"100"},`
	`{"11":"0004",`
	`"55":"IBM",`
	`"67":"2",`
	`"54":"2",`
	`"100":"DSMD",`
	`"38":"200"}]}`
		FIX:
		
		8=FIX.4.4| 9=184| 35=E| 49=JAVA| 56=RESTAdapter| 34=3| 50=30737| 116=OMS1| 52=20150101-01:01:01.080| 66=List1| 394=3| 68=2| 73=2| 11=0003| 67=1| 100=DSMD| 55=MSFT| 54=1| 38=100| 11=0004| 67=2| 100=DSMD| 55=IBM| 54=2| 38=200| 10=249

FIX Message validation

REST Acceptor TA can be configured to validate converted FIX messages. FIX Message validation uses the following default validation options:

- prohibitTagsWithoutValue = true
- verifyDataTagsSequence = true
- verifyTagsValues = true
- prohibitUnknownTags = true
- prohibitDuplicatedTags = true
- verifyReperatingGroupBounds = true
- checkRequiredGroupFields = true
- allowZeroNumInGroup = false
- ignoreUnknownFields = false

Installation steps

In order to set up REST TA for FIX Edge you need to:

1. Copy the FIXEdge distribution package to the FIX Edge home:

Unpack the content of the distribution package to the FIXEdge root directory, e.g. to *C:\FIXEdge*.

2. Enable TA to be used by FIXEdge.

In the *'Transport Layer Section'* of the *FIXEdge.properties*, add REST TA to the list of supported adapters:

```
TransportLayer.TransportAdapters = TransportLayer.RestTA
```

Note: If you use other transport adapters, just add TransportLayer.RestTA to the end of the list:

```
TransportLayer.TransportAdapters = TransportLayer.SmtpTA, TransportLayer.RestTA
```

3. Configure the TA.

3.1. Add the REST TA section to the *FIXEdge.properties*.

A sample set of properties is given below:

```
TransportLayer.TransportAdapters = TransportLayer.RestTA

TransportLayer.RestTA.Description = REST Acceptor TA
TransportLayer.RestTA.DllName = bin/rest_acceptor_ta-vc10-MD-x64.dll
TransportLayer.RestTA.Type = DLL

TransportLayer.RestTA.ClientID = RestAcceptorClient
TransportLayer.RestTA.LogCategory = RestAcceptorClient
TransportLayer.RestTA.ListenPort = 8001
TransportLayer.RestTA.FIXVersion = FIX50
TransportLayer.RestTA.ConversionMethod = NumericTagValueMapping
TransportLayer.RestTA.ValidateFIXMessage = ValidateAndWarn
```

Note: Sample settings could be copied from the *RESTAcceptorTA.properties* file (in the *doc* folder of FIXEdge distribution package) to the *FIXEdge.properties* file.

3.2. Optionally, configure logging for the received and sent messages in a separate log category:

```
Log.RESTTA.Device = File
Log.RESTTA.DebugIsOn = true
Log.RESTTA.TraceIsOn = true
Log.RESTTA.NoteIsOn = true
Log.RESTTA.File.Name = FIXEdge1/log/RESTTA.log
```

4. Restart FIXEdge to apply the changes.

Routing Messages from REST TA

The REST TA Client can be referred to the business layer (BL) by the ClientID name specified in the *FIXEdge.properties* file. Below is an example of BL_Config.xml.

BL_Config.xml

```
<?xml version="1.0" encoding="UTF-8" ?>
<!--
    FIXEdge - the XML Configuration file
    $Revision: 1.17.2.7 $
<!DOCTYPE FIXEdge SYSTEM "BusinessLayer.dtd">
-->
<FIXEdge>
    <BusinessLayer>
        <Rule>
            <Source>
                <Client Name="RestAcceptorClient"/>
            </Source>
            <Condition>
                <MatchField Field="35" Value=" D|G|F|n " />
            </Condition>
            <Action>
                <Send>
                    <FixSession SenderCompID="FIXEDGE" TargetCompID="FIXCLIENT"/>
                </Send>
            </Action>
        </Rule>

        <DefaultRule>
            <Action>
                <DoNothing/>
            </Action>
        </DefaultRule>
    </BusinessLayer>
</FIXEdge>
```

REST TA Configuration Parameters

Configuration of the REST Adaptor contains a list of adaptor properties, HTTP server properties, and log settings:

Property Name	Description	Required	Default Value
Transport adapter parameters			
TransportLayer.RestTA. Description	User-defined description of the Transport Adapter	Y	REST Acceptor TA
TransportLayer.RestTA. DllName	TA library file name	Y	
TransportLayer.RestTA.Type	TA library type	Y	DLL
TransportLayer.RestTA. ClientID	Transport adaptor Client ID which identifies the source of messages in BL config	Y	
TransportLayer.RestTA. ListenPort	TCP port number for incoming HTTP connections. Allowed range is 1 - 65535	N	8001
TransportLayer.RestTA. FIXVersion	FIX version of generated messages: • **FIX40** - FIX 4.0 • **FIX41** - FIX 4.1 • **FIX42** - FIX 4.2 • **FIX43** - FIX 4.3 • **FIX44** - FIX 4.4 • **FIX50** - FIX 5.0 • **FIX50SP1** - FIX 5.0 SP1 • **FIX50SP2** - FIX 5.0 SP2	N	FIX44
TransportLayer.RestTA. ConversionMethod	The method used to convert input messages into FIX format: • **WrapInXmlMessage** - put the input data into FIX XML message of 'n' type • **NumericTagValueMapping** - parse the input JSON file format to corresponding FIX message • **Raw**- raw FIX message (FIX message is sent to BL as is) Introduced in FIXEdge 6.9.0	N	NumericTagValueMapping
TransportLayer.RestTA. ValidateFIXMessage	Enables/disables validation of resulting FIX message: • **No** – validation disabled • **ValidateAndWarn** – validation enabled, a warning message is added to the log when validation fails • **ValidateAndReject** – validation enabled, service returns HHTP error 400 (bad request) and rejects the message if validation fails	N	No
HTTP(S) Server Parameters			
TransportLayer.RestTA. Protocol	Security type of connection. Allows user to setup secure or non-secure HTTP connection. Introduced in FIXEdge 6.9.0 • **HTTP** - non-secure connections • **HTTPS** - secure connections	Yes	
TransportLayer.RestTA. HTTP.timeout	Connection timeout for HTTP connections in seconds.	N	60

TransportLayer.RestTA.HTTP.keepAlive	Enables/disables persistent HTTP connections: • **false** – persistent HTTP connections are disabled • **true** – persistent HTTP connections are enabled	N	true
TransportLayer.RestTA.HTTP.maxKeepAliveRequests	Specifies the maximum number of requests allowed during a persistent connection. 0 means unlimited connections.	N	0
TransportLayer.RestTA.HTTP.keepAliveTimeout	Connection timeout for persistent HTTP connections in seconds.	N	10
TransportLayer.RestTA.HTTP.maxThreads	A maximum number of threads processing HTTP requests. The allowed range is 1 – 16.	N	1
TransportLayer.RestTA.HTTPS.PrivateKey	Path to a private key Introduced in FIXEdge 6.9.0	Conditional. Required with secure connections: TransportLayer.RestTA.Protocol = HTTPS	FIXEdge1/conf/AdminRESTAPI.key
TransportLayer.RestTA.HTTPS.Certificate	Path to certificate Introduced in FIXEdge 6.9.0	Conditional. Required with secure connections: TransportLayer.RestTA.Protocol = HTTPS	FIXEdge1/conf/AdminRESTAPI.key
TransportLayer.RestTA.HTTPS.PrivateKeyPassword	Private key password	Conditional Used when the private key is password-encrypted.	
TransportLayer.RestTA.AuthHeader	Authentication header (may be used in HTTP mode also) Introduced in FIXEdge 6.9.0	No	
TransportLayer.RestTA.AuthValue	Authentication value (may be used in HTTP mode also) Introduced in FIXEdge 6.9.0	No	
Logging Parameters			
TransportLayer.RestTA.LogCategory	Transport adaptor log category	Y	
Log.RESTTA.Device	The target device for logging the received and sent messages: • **File** – writes a log to a separate file • **Console** – sends a log to console window	N	
Log.RESTTA.File.Name	Filename used to log the received and sent messages	N	

Configuration example

An example of REST Acceptor configuration with the security mode turned on:

```
TransportLayer.RestTA.Description = RESTAcceptorTA
TransportLayer.RestTA.DllName = bin/REST_Acceptor_TA-vc10-MDD-x64.dll
TransportLayer.RestTA.Type = DLL
TransportLayer.RestTA.ClientID = RestAcceptorClient
TransportLayer.RestTA.LogCategory = RestAcceptorClient
TransportLayer.RestTA.Protocol = HTTPS
TransportLayer.RestTA.HTTPS.PrivateKey = FIXEdge1/conf/AdminRESTAPI.key
TransportLayer.RestTA.HTTPS.Certificate = FIXEdge1/conf/AdminRESTAPI.crt
TransportLayer.RestTA.ListenPort = 8001
TransportLayer.RestTA.FIXVersion = FIX44
TransportLayer.RestTA.ConversionMethod = NumericTagValueMapping
TransportLayer.RestTA.ValidateFIXMessage = ValidateAndWarn
TransportLayer.RestTA.AuthHeader = apikey
TransportLayer.RestTA.AuthValue = QWERTY0123456789
TransportLayer.RestTA.PrivateKeyPassword = PKEYPASS123
```