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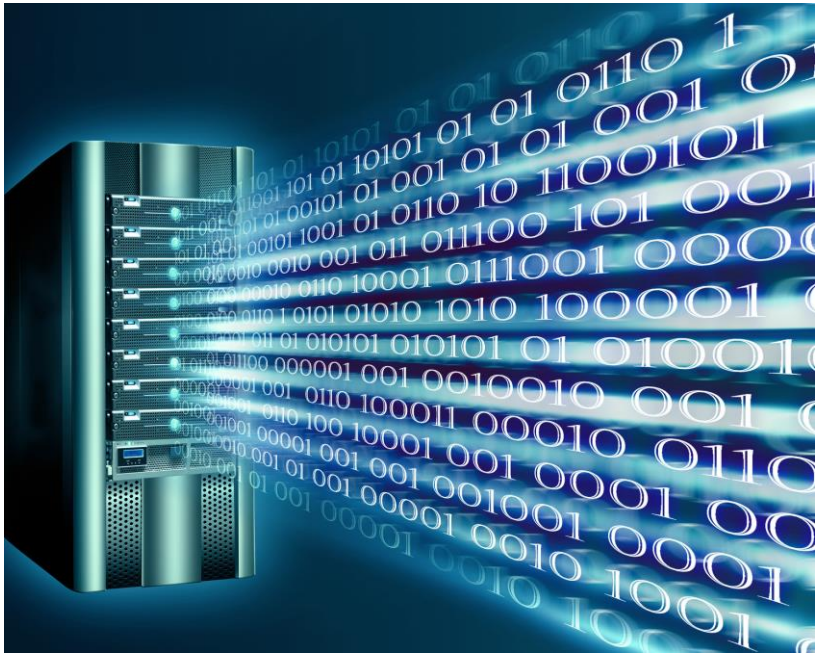
ZebraTester

Executing Load Tests with Google Protocol Buffer (protobuf) Messages



July 15, 2015

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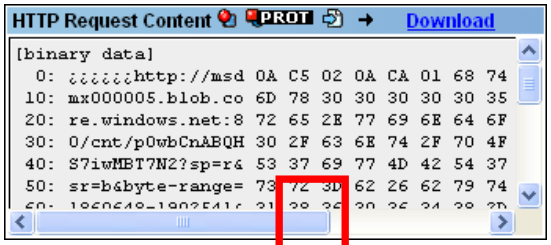
1 Introduction

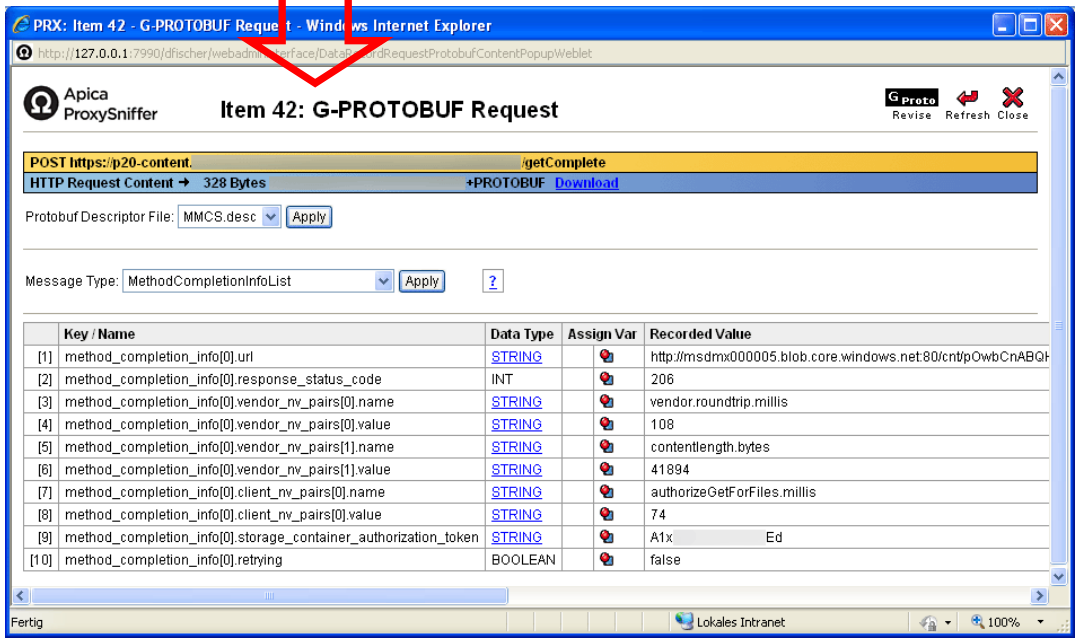
Wikipedia: *"**Protocol Buffers** are a method of serializing structured data, developed by Google Inc.*
The design goals for Protocol Buffers emphasized simplicity and performance. In particular, it was designed to be smaller and faster than XML. Protocol Buffers are widely used at Google for storing and interchanging all kinds of structured information. Protocol Buffers serve as a basis for a custom remote procedure call (RPC) system that is used for nearly all inter-machine communication at Google."

From a tester's view, Protocol Buffers (**protobuf**) is just another way of serializing data, like XML and JSON are. However, in opposite to XML, the "names" of the data fields and the name of the data record type (message type) are not included into the transmitted message, meaning that the (binary) bytes of the data field values are transmitted only – without any metadata information.



Therefore, when recording protobuf messages with ZebraTester you will see in the GUI at a first step unstructured binary data only.

Starting from ZebraTester version 5.1, you can load the metadata information for protobuf messages into ZebraTester, by loading one or more Google Protobuf FileDescriptorSets (*.desc files). After that you have to select the corresponding "protobuf message type" and, starting from this point, you can handle and post-process protobuf messages in an easy and convenient way in ZebraTester.



1.1 Full Data Integration

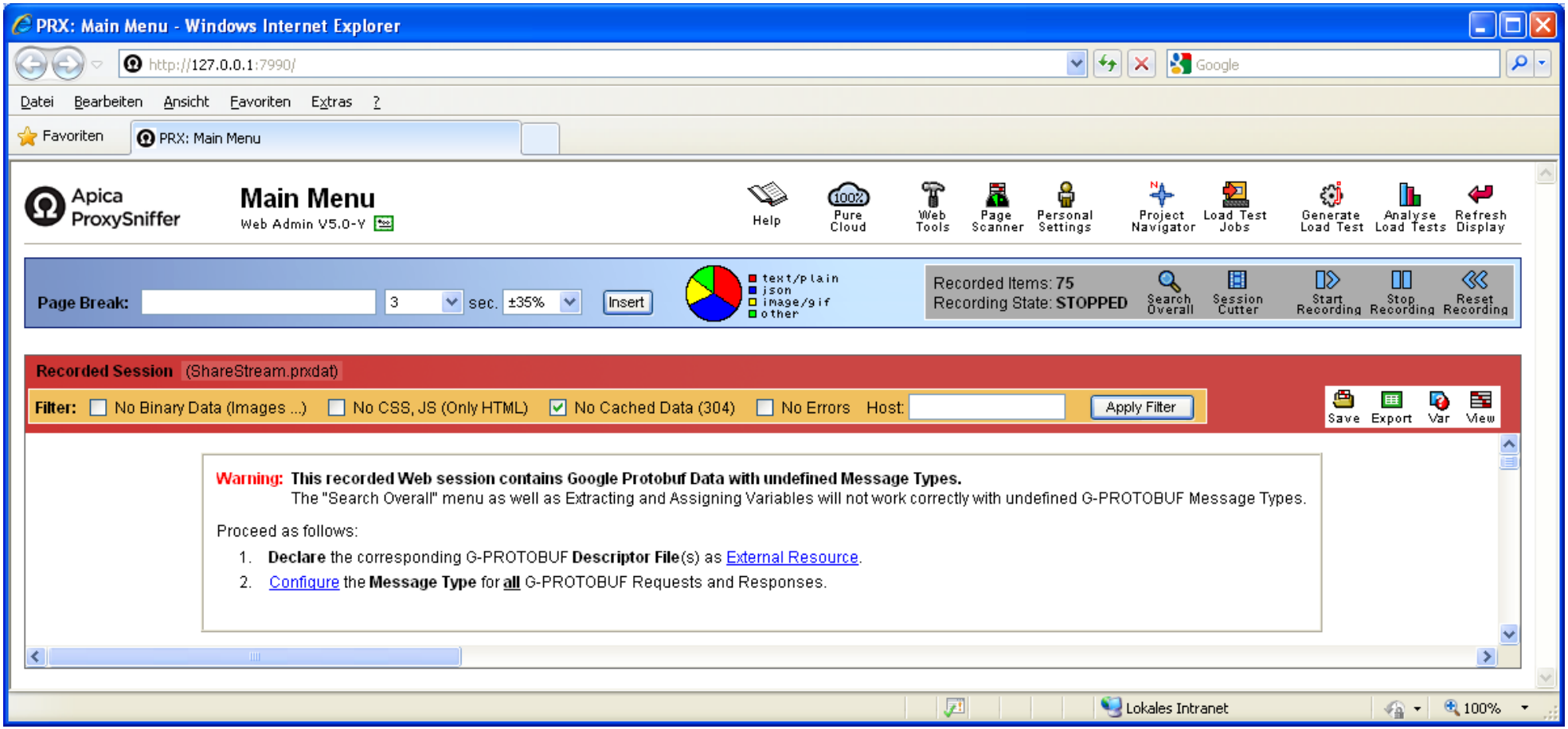
ZebraTester provides full data integration for Protocol Buffers, including:

- Parsing the binary protobuf data and showing them in a human-readable view.
- Extracting and Assigning session variables from/to protobuf data fields, by interpreting and with protecting the binary protbuf message format.
- Searching any ASCII text-fragments over the whole recorded session – and overall error snapshots in the load test result – by interpreting and (temporary) converting the binary protobuf data fields to their corresponding ASCII text presentation.
- Automated distribution of the Protobuf FileDescriptorSets (*.desc files) to the load generators.

2 Postprocessing the Recorded Session

2.1 Automatic Detection of Protobuf Messages

After recording a session with ZebraTester all recorded data are automatically checked if they contain protobuf data. This mechanism checks all recorded HTTP request and response and searches for a matching text fragment containing the string "protobuf" in all HTTP header fields named "Content-Type". If any match is found the following warning text is shown in the ZebraTester GUI:



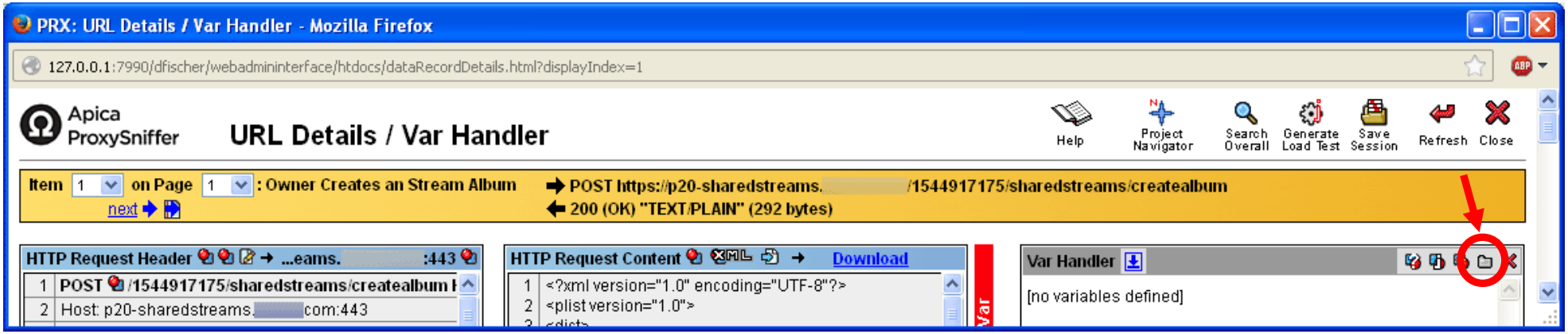
2.2 Loading the Protobuf FileDescriptorSet (*.desc file) into ZebraTester

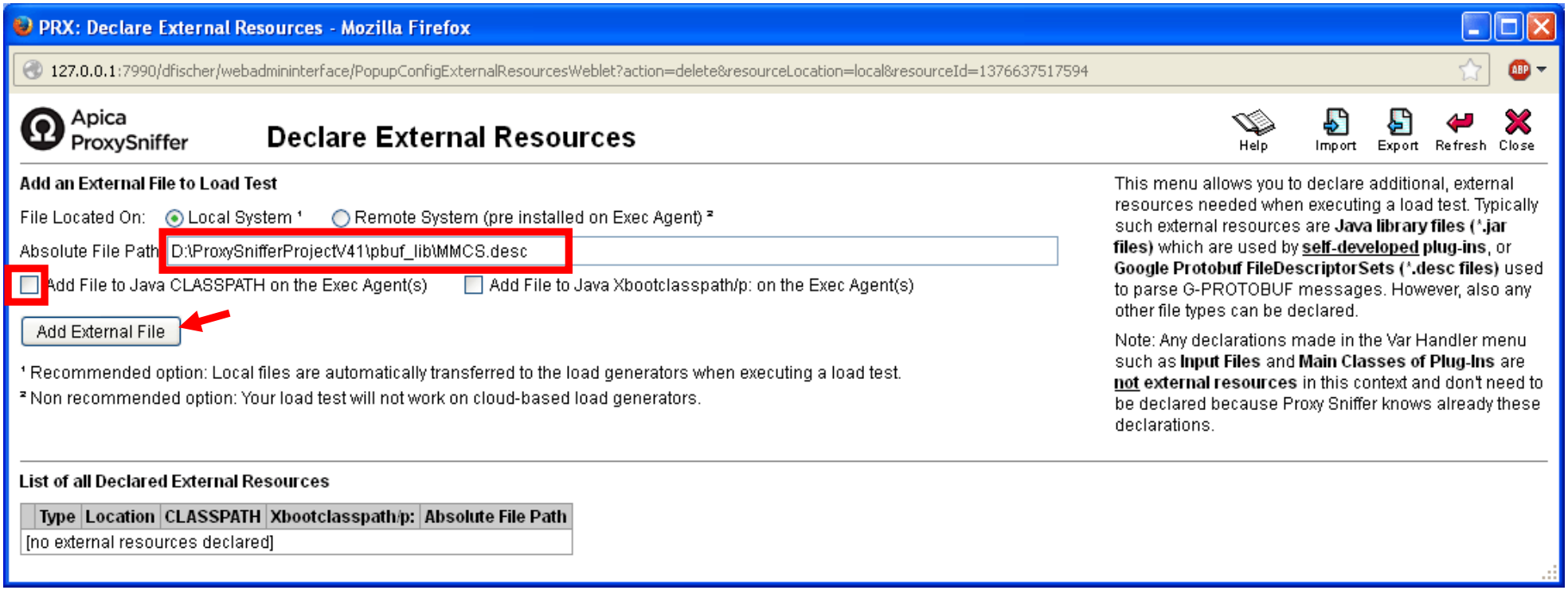
In order that ZebraTester can interpret the binary protobuf data you have to load the corresponding Protobuf FileDescriptorSet (*.desc file) into ZebraTester, which contains metadata information about the recorded protobuf messages. Such a protobuf *.desc file can be gained from a protobuf source file (*.proto) by using the **protoc** compiler. Example:

```
protoc --descriptor_set_out=addressbook.desc addressbook.proto
```

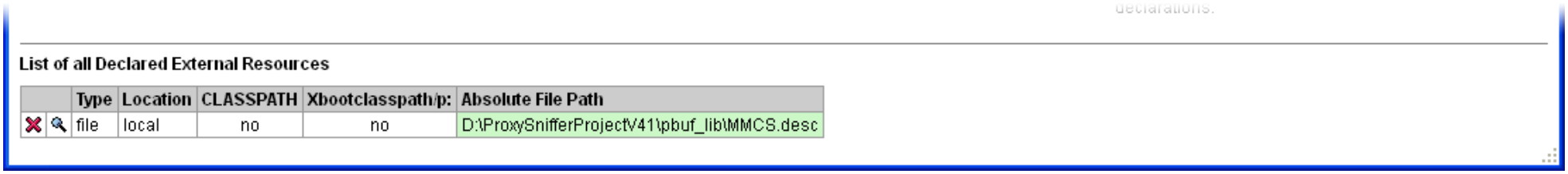
You have to use the proper *.proto file that matches to the corresponding recorded data. You may ask the development team of the Web application to get the proper *.proto file.

Once you have the protobuf *.desc file you can place it to any directory on your local machine and then register it as an "External Resource" of your recorded session by calling the "Declare External Resources" menu:



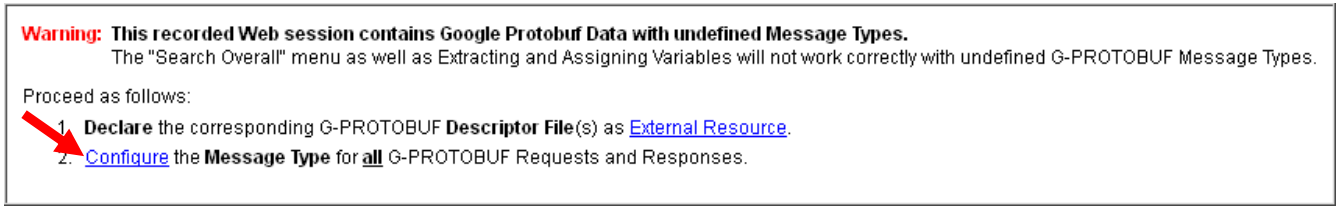


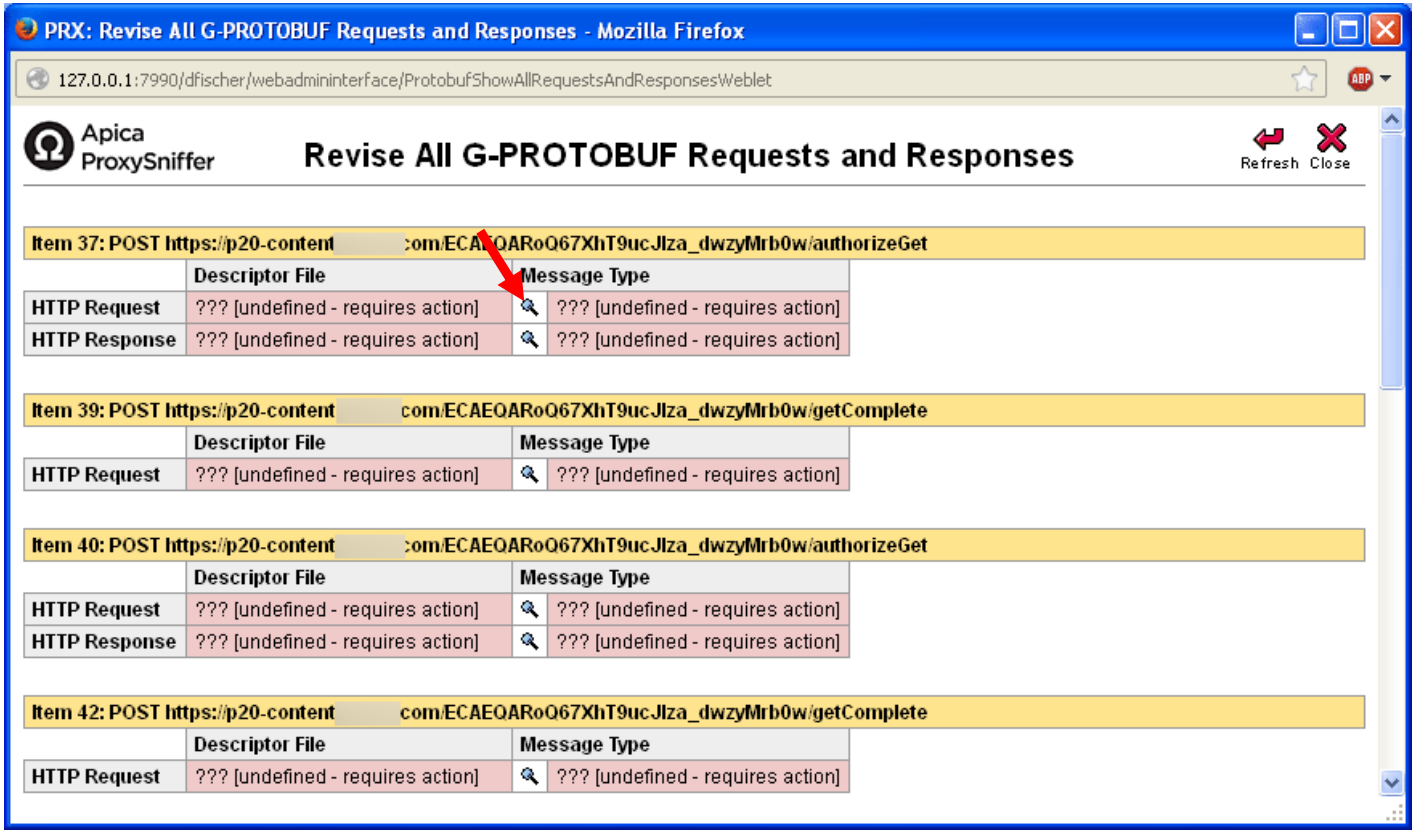
Note: you should also uncheck the checkbox "Add File to Java CLASSPATH on the Exec Agent(s)"



2.3 Configuring the Message Type for all Protobuf Requests and Responses

In order that the protobuf data can be shown in a human-readable view, and that you can extract and assign variables from/to protobuf messages you have to configure the proper "Message Type" for **all** Protobuf requests and responses. Return to the ZebraTester main menu and click on the second link in the warning text:

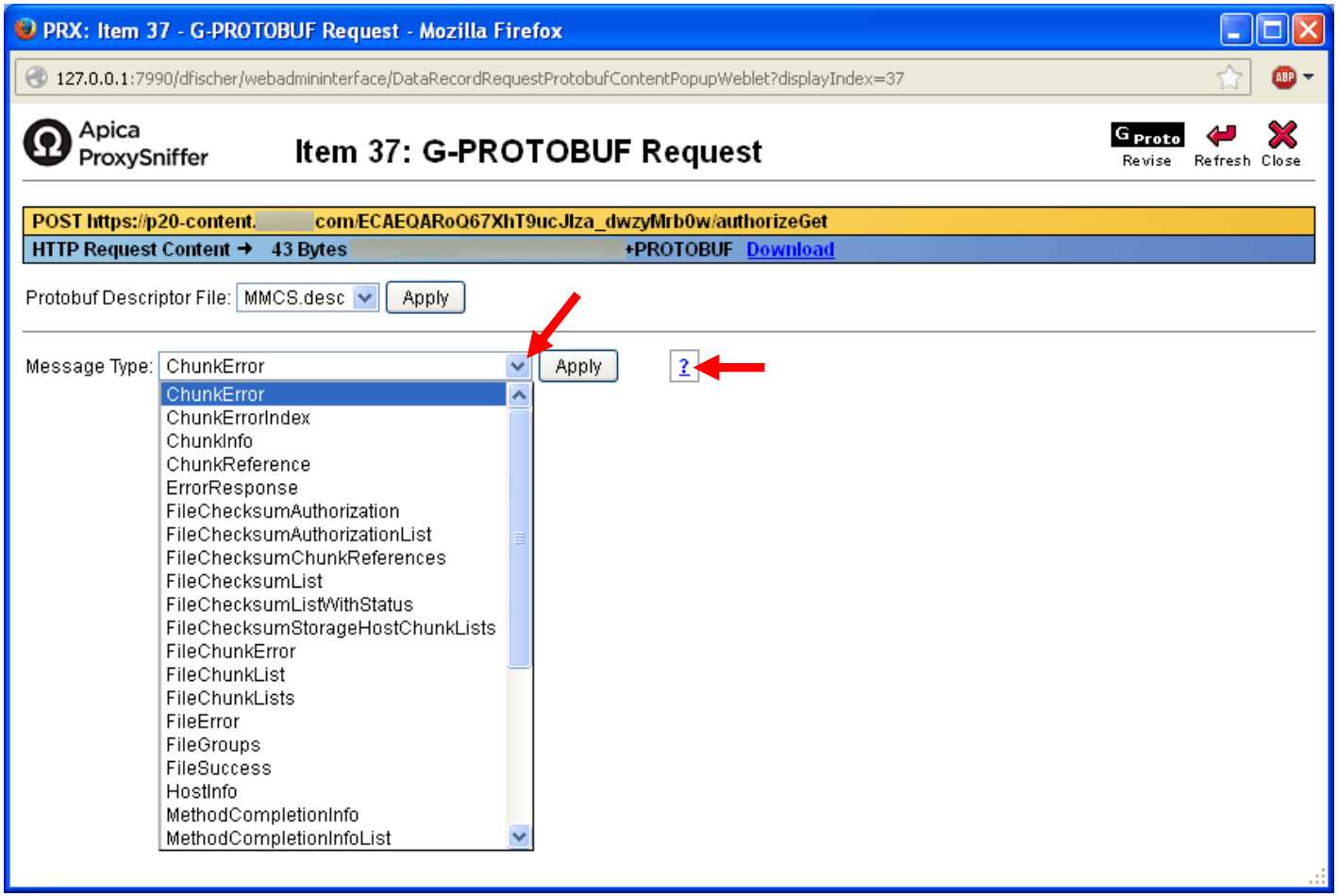




You will see a compilation of all protobuf messages over the whole recoded session.

Click on the magnifier icon of each message to define the "message type".

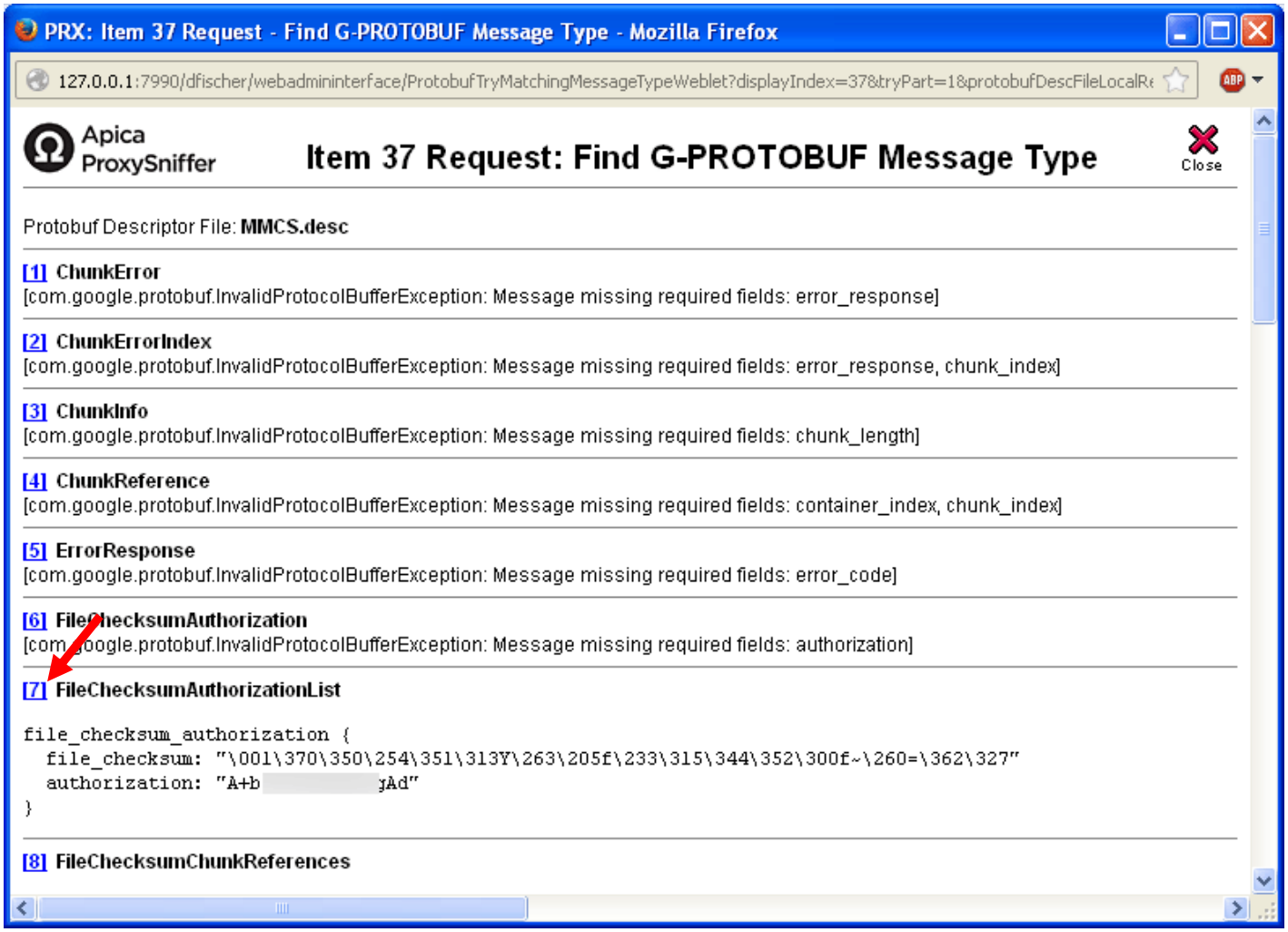
Then you can select the corresponding protobuf "message type" for this HTTP request or response:



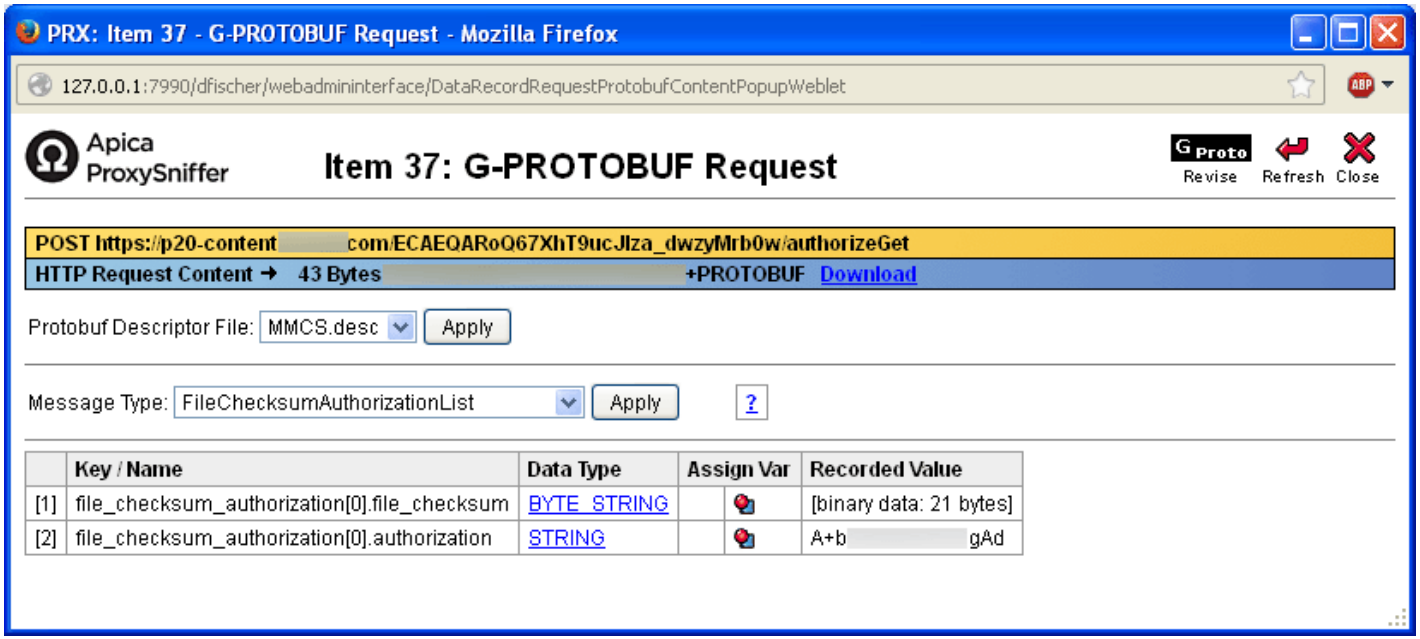
If you don't know which "message type" matches to the binary data you can try to guess it by clicking on the **?** icon.

However, instead of guessing, best practice is to ask the development team of the Web application for that information – for each HTTP request and response that contains protobuf data.

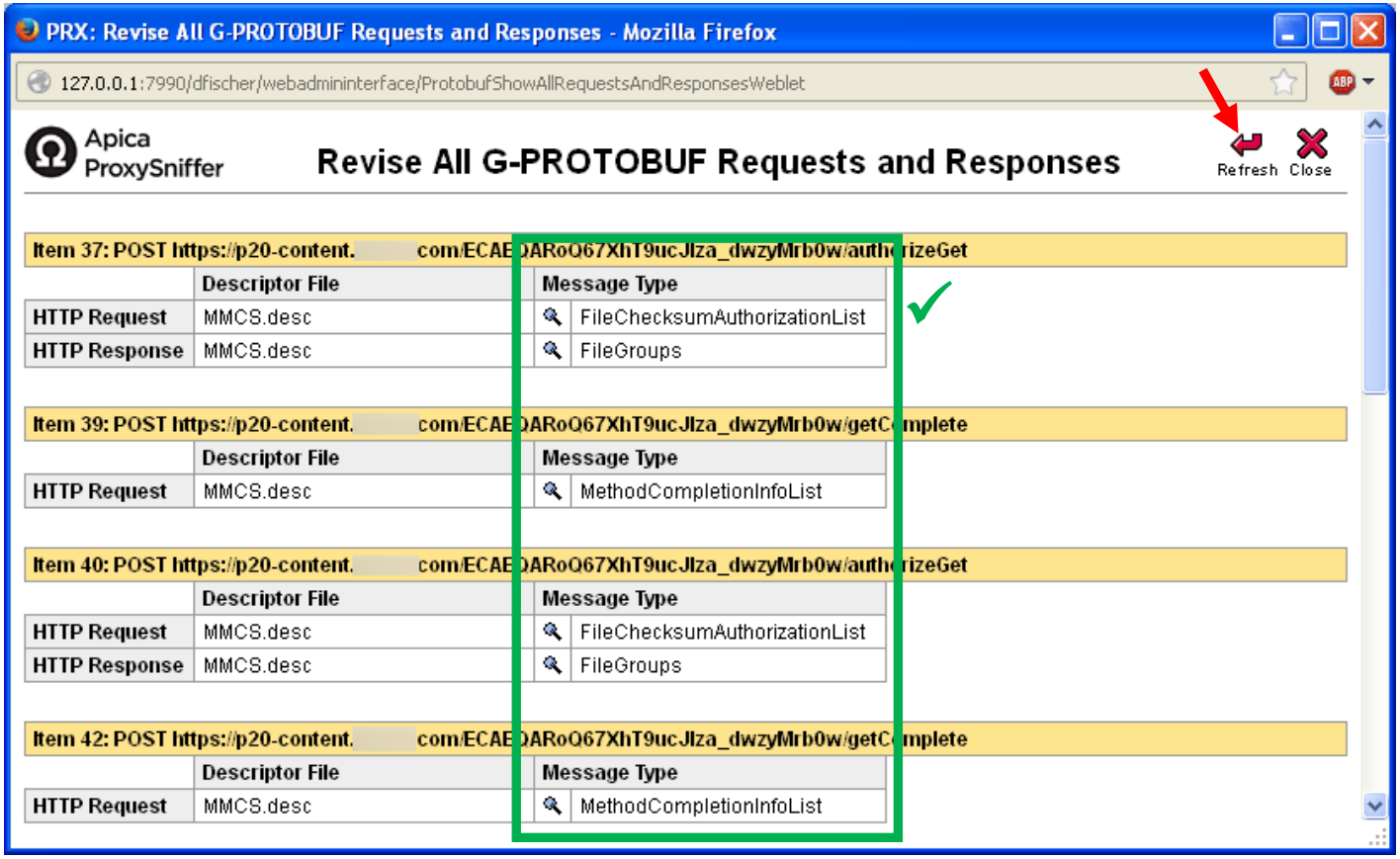
If you have to guess the "message type" then select the "parsed message-result" that makes the most sense:



After you have selected the "message type" you will see the parsed protobuf data:



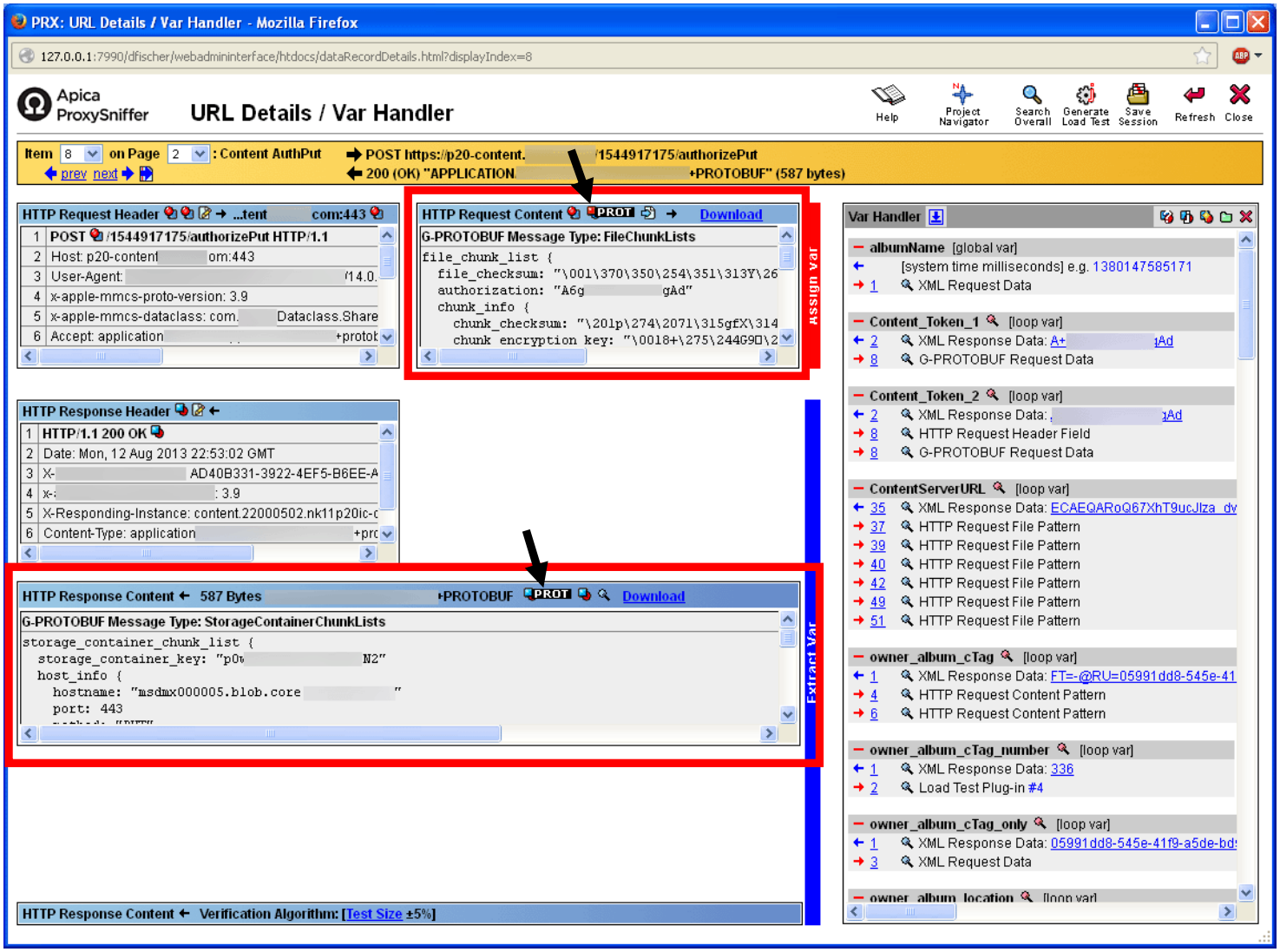
Return to the "Revise All G-PROTOBUF Requests and Responses" menu and then click on the "Refresh" icon. After that continue to complete the "message types" **for all other** HTTP requests and responses. Finally all "message types" should be defined:

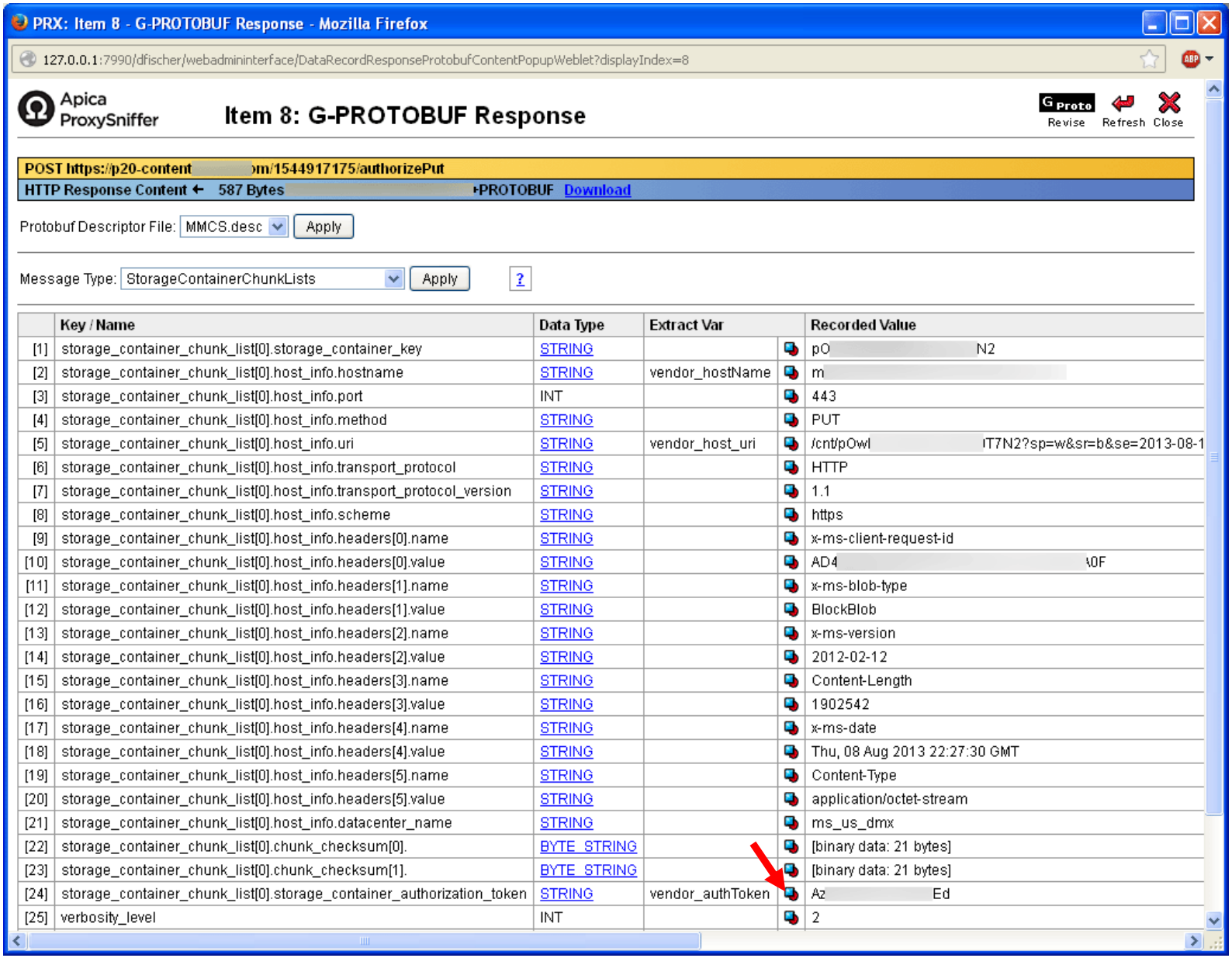


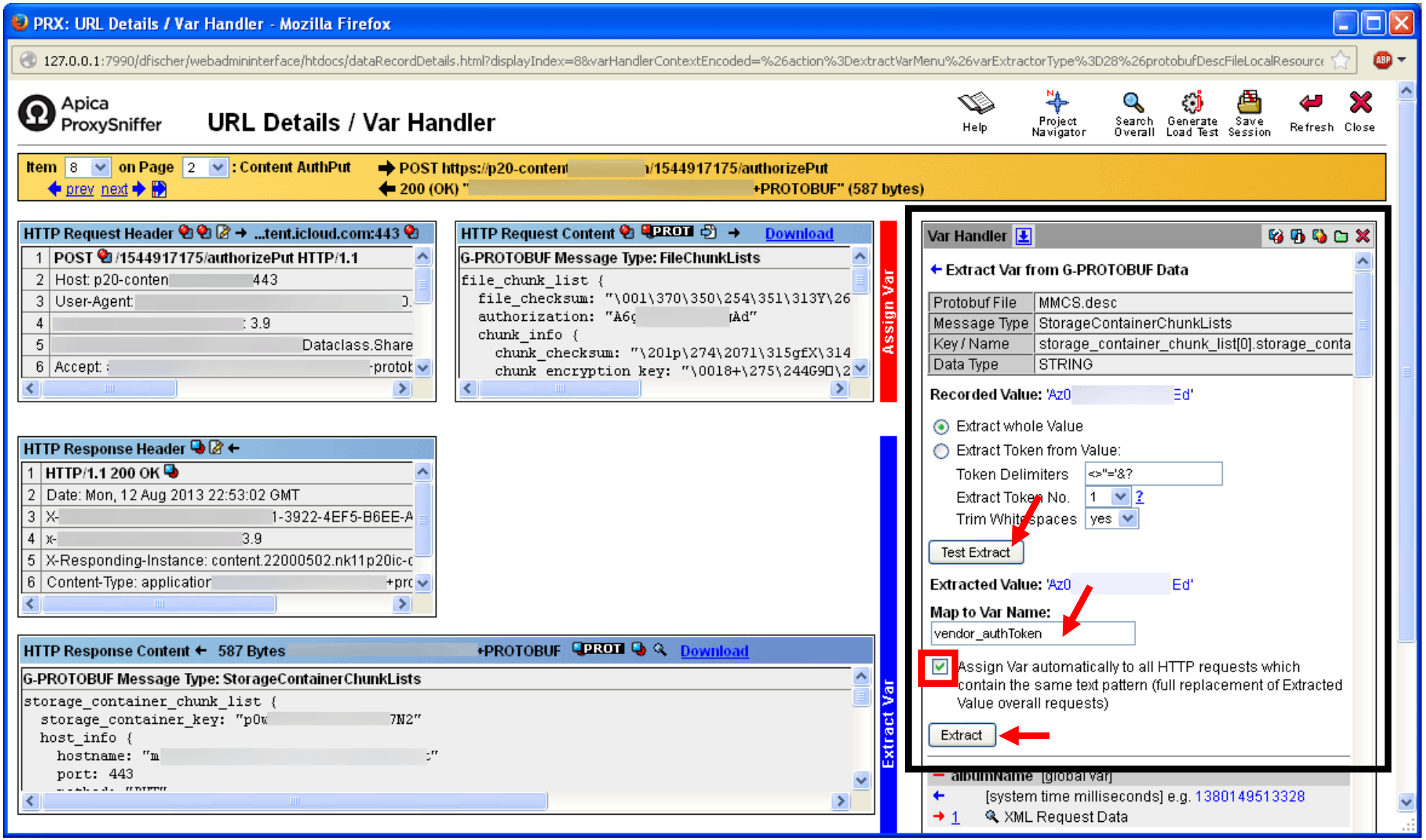
Now you are ready to search any ASCII text fragments overall recorded data and you are ready to extract and assign variables from/to protobuf data fields. At this step it's recommended that you save your recorded session once again.

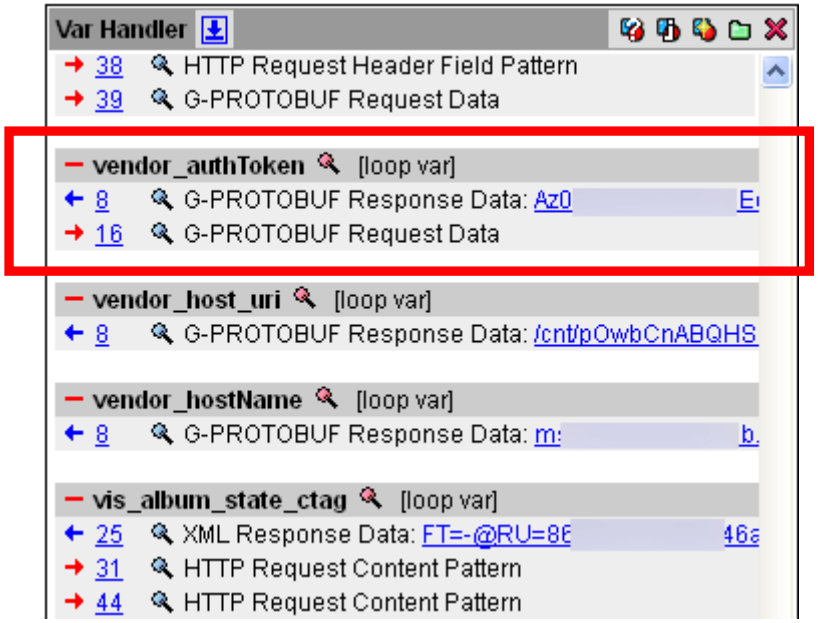
2.4 Extracting and Assigning Variables from/to Protobuf Message Fields

After you have defined the "message type" for all protobuf messages you can extract and assign variables from/to protobuf message fields – in a standard and convenient way as provided for all other supported data formats:



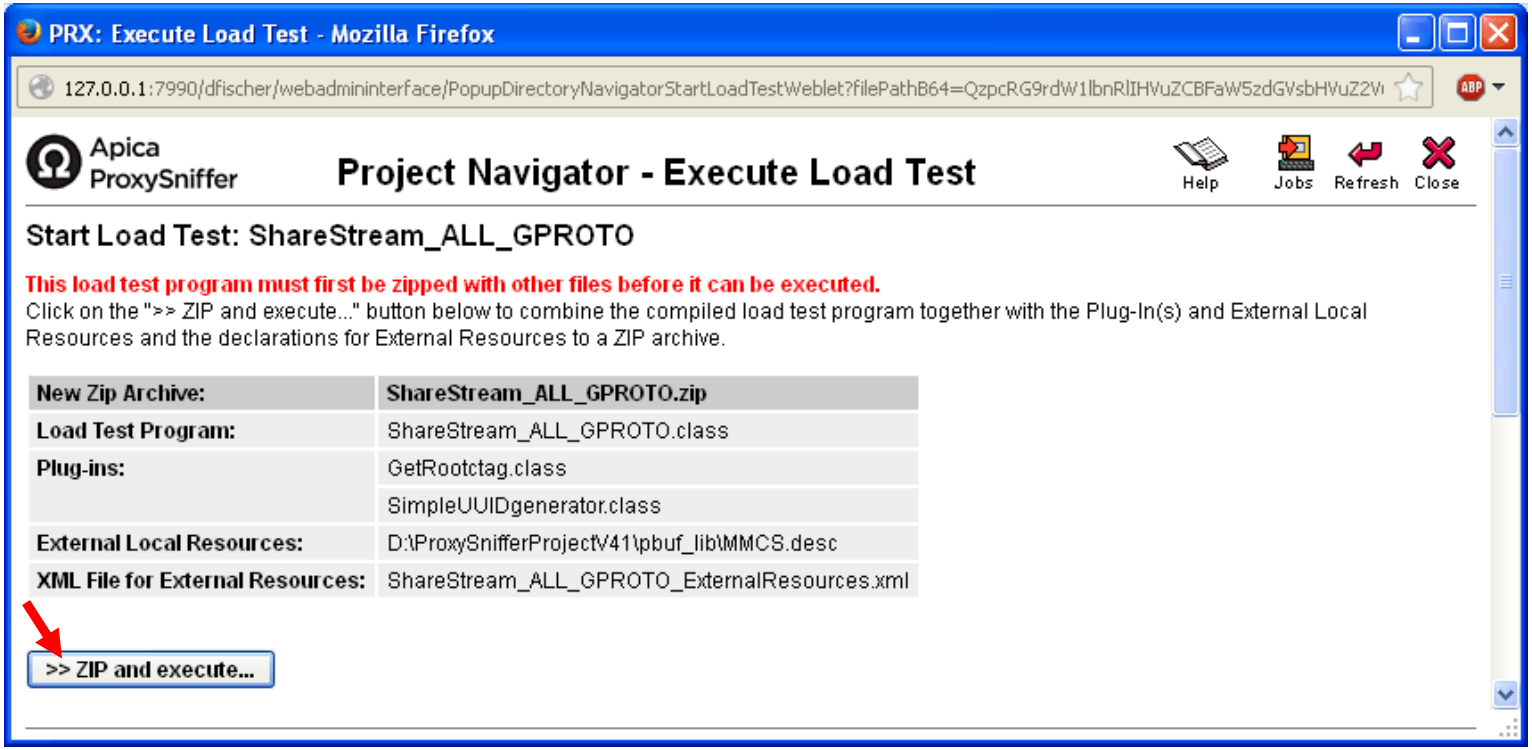

PRX: Item 8 - G-PROTOBUF Response - Mozilla Firefox
127.0.0.1:7990/dfischer/webadmininterface/DataRecordResponseProtobufContentPopupWeblet?displayIndex=8
Apica ProxySniffer
Item 8: G-PROTOBUF Response
G Proto Revise
Refresh
Close
POST https://p20-content om/1544917175/authorizePut
HTTP Response Content ← 587 Bytes PROTOBUF Download
Protobuf Descriptor File: MMCS.desc Apply
Message Type: StorageContainerChunkLists Apply ?
Key / Name
Data Type
Extract Var
Recorded Value
[1] storage_container_chunk_list[0].storage_container_key STRING pO N2
[2] storage_container_chunk_list[0].host_info.hostname STRING vendor_hostName m
[3] storage_container_chunk_list[0].host_info.port INT 443
[4] storage_container_chunk_list[0].host_info.method STRING PUT
[5] storage_container_chunk_list[0].host_info.uri STRING vendor_host_uri /cnt/pOwl IT7N2?sp=w&sr=b&se=2013-08-1
[6] storage_container_chunk_list[0].host_info.transport_protocol STRING HTTP
[7] storage_container_chunk_list[0].host_info.transport_protocol_version STRING 1.1
[8] storage_container_chunk_list[0].host_info.scheme STRING https
[9] storage_container_chunk_list[0].host_info.headers[0].name STRING x-ms-client-request-id
[10] storage_container_chunk_list[0].host_info.headers[0].value STRING AD4 \0F
[11] storage_container_chunk_list[0].host_info.headers[1].name STRING x-ms-blob-type
[12] storage_container_chunk_list[0].host_info.headers[1].value STRING BlockBlob
[13] storage_container_chunk_list[0].host_info.headers[2].name STRING x-ms-version
[14] storage_container_chunk_list[0].host_info.headers[2].value STRING 2012-02-12
[15] storage_container_chunk_list[0].host_info.headers[3].name STRING Content-Length
[16] storage_container_chunk_list[0].host_info.headers[3].value STRING 1902542
[17] storage_container_chunk_list[0].host_info.headers[4].name STRING x-ms-date
[18] storage_container_chunk_list[0].host_info.headers[4].value STRING Thu, 08 Aug 2013 22:27:30 GMT
[19] storage_container_chunk_list[0].host_info.headers[5].name STRING Content-Type
[20] storage_container_chunk_list[0].host_info.headers[5].value STRING application/octet-stream
[21] storage_container_chunk_list[0].host_info.datacenter_name STRING ms_us_dmx
[22] storage_container_chunk_list[0].chunk_checksum[0]. BYTE_STRING [binary data: 21 bytes]
[23] storage_container_chunk_list[0].chunk_checksum[1]. BYTE_STRING [binary data: 21 bytes]
[24] storage_container_chunk_list[0].storage_container_authorization_token STRING vendor_authToken Az Ed
[25] verbosity_level INT 2


PRX: URL Details / Var Handler - Mozilla Firefox
Apica ProxySniffer
URL Details / Var Handler
Help
Project Navigator
Search Overall
Generate Load Test
Save Session
Refresh
Close
Item 8 on Page 2 : Content AuthPut
prev next
POST https://p20-content /1544917175/authorizePut
200 (OK) " +PROTOBUF" (587 bytes)
HTTP Request Header
HTTP Request Content
Download
G-PROTOBUF Message Type: FileChunkLists
Assign Var
HTTP Response Header
HTTP Response Content
587 Bytes
+PROTOBUF
Download
G-PROTOBUF Message Type: StorageContainerChunkLists
Extract Var
Var Handler
Extract Var from G-PROTOBUF Data
Protobuf File
MMCS.desc
Message Type
StorageContainerChunkLists
Key / Name
storage_container_chunk_list[0].storage_conta
Data Type
STRING
Recorded Value:
Extract whole Value
Extract Token from Value:
Token Delimiters
Extract Token No.
Trim White Spaces
Test Extract
Extracted Value:
Map to Var Name:
vendor_authToken
Assign Var automatically to all HTTP requests which contain the same text pattern (full replacement of Extracted Value overall requests)
Extract
albumName [global var]
[system time milliseconds] e.g. 1380149513328
XML Request Data



3 Generating the Load Test Program and Executing the Load Test

Generating the load test program and executing the load test can be done as usual – without any special additional configuration. All required resources are automatically combined to a ZIP archive and are automatically distributed to the load generators.



4 Manufacturer, Sales and Support

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Apica Support: support@apicasystem.com

Apica Sales: sales@apicasystem.com

Note: All menus provide *context specific help text*, available using the Help Icon: