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Using SAS[®] Software to Retrieve Thomson Reuters Tick-History Data

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Introduction

“Thomson Reuters Tick History provides millisecond-time-stamped tick data going back over eleven years, covering 45 million OTC and exchange-traded instruments worldwide.”¹

The current process for importing Thomson Reuters Tick History (TRTH) data into SAS® requires that you place a request using the TRTH Web interface. Then you wait for the query to finish before downloading the data onto a local drive. The data are then imported into a SAS interface by using a point-and-click wizard or by submitting SAS code. A SAS data set is created, which is then ready for analysis within the SAS system.

A program is available that uses the TRTH application programming interface to request and fetch tick-history data from within SAS. Several new dictionary macro definitions ([%ASSIGNMENTS](#), [%EXEC](#), [%EXECFTP](#), [%GET](#), [%GETRESULTS](#)) are also available, which provide supporting functionality to perform this task. This program removes a substantial amount of processing time that is required to request and fetch data using the TRTH Web interface. It does this by enabling you to request and fetch the data using SAS macro functions, which store the data locally in the form of a SAS data set. Furthermore, the code enables you to submit and monitor multiple FTP requests simultaneously for queries that fetch large amounts of data. This enables you to submit and track requests without having to wait for the query to finish processing on the server. User credentials are saved within the SAS session and are automatically resubmitted to avoid the issue of credentials timing out.

This paper shows you how to run the code and macros that enable you to request and fetch tick-history data from within SAS. This document is intended for programmers who understand the TRTH data source and the interface it provides. Information about each macro is provided in the [Appendix](#) of this paper. You can download the code and macros² from the [SASTRTHAPI_v1.2.zip](#) file.

Before you get started, read the important considerations that are explained in the next section. Then, follow the step-by-step instructions. Sample code is provided in the final section of this paper.

Important Considerations

In order to run the code and macros that enable you to request and fetch tick-history data from within SAS, the following software requirements apply:

Operating Systems: Windows 32-bit and 64-bit platforms

SAS System Software: SAS® 9.3

SAS Software: SAS Display Manager and SAS® Enterprise Guide® (No Profile Selected)

Third-Party Software: 7-Zip open-source file-compression software, which you can download from the [7Zip](#) Web site

Additional Requirements: A valid TRTH user account

¹ Thomson Reuters, “Thomson Reuters Tick History.” 2012. Available at thomsonreuters.com/products_services/financial/financial_products/a-z/tick_history/.

² The sample files and code examples are provided by SAS Institute Inc. “as is” without warranty of any kind, either express or implied, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. Recipients acknowledge and agree that SAS Institute shall not be liable for any damages whatsoever arising out of their use of this material. In addition, SAS Institute will provide limited support for the materials contained herein.

Note the following:

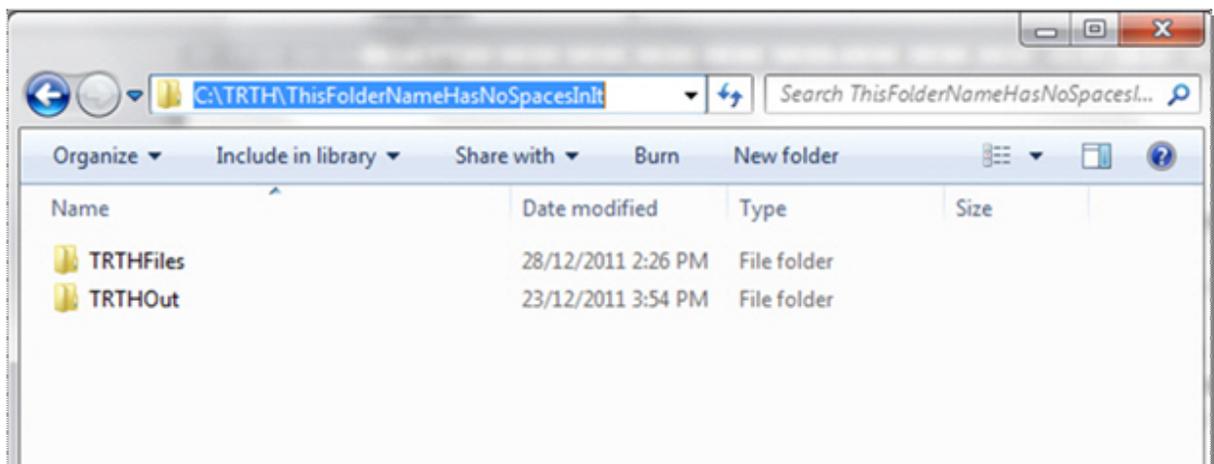
- The password that is associated with the TRTH account should not include special characters, such as single quotation marks ('), double quotation marks ("), ampersands (&), or percent signs (%).
- Most fields are case sensitive. Therefore, ensure that the exact values of the parameters are passed to the %GET, %EXEC, and %EXECFTP macros.
- Ensure that there are no spaces in the macro variable TRTHdir and that the variable ends with a backslash (\). Otherwise, the macros will not run correctly.
- All FTP requests that are made via the %EXECFTP macro are recorded in the data set TRTH.FTPRequests. Once recorded in the data set, the requests can be tracked and then accessed via the %GETRESULTS macro. The requests made via %EXEC are not recorded because they are purged as soon as %GETRESULTS is submitted for the relevant request ID.
- Supported values for the REQTYPE, MSGTYPE, and FIELDLIST parameters in %EXEC and %EXECFTP are provided in the data sets TRTH.gettypes and TRTH.reqtypes. These data sets are created when you run the macro %ASSIGNMENTS.

Using Macros to Submit and Retrieve TRTH Requests

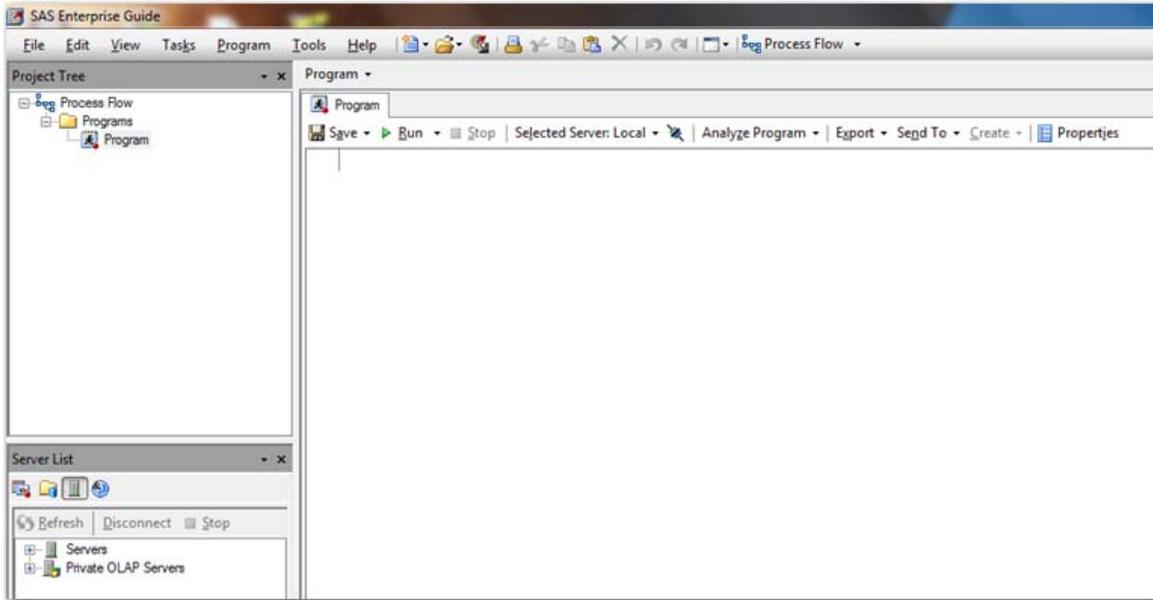
The following steps show you how to use the macros that you downloaded from the [SASTRTHAPI_v1.2.zip](#) file to submit and retrieve TRTH requests. The first section guides you through the initial setup. This setup only needs to be completed at the beginning of each SAS session. The next section guides you through submitting and retrieving requests. The last section provides an example.

Initial Setup

1. Extract the files from the [SASTRTHAPI_v1.2.zip](#) file to a directory of your choice. Ensure that there are no spaces in any of the folder names.

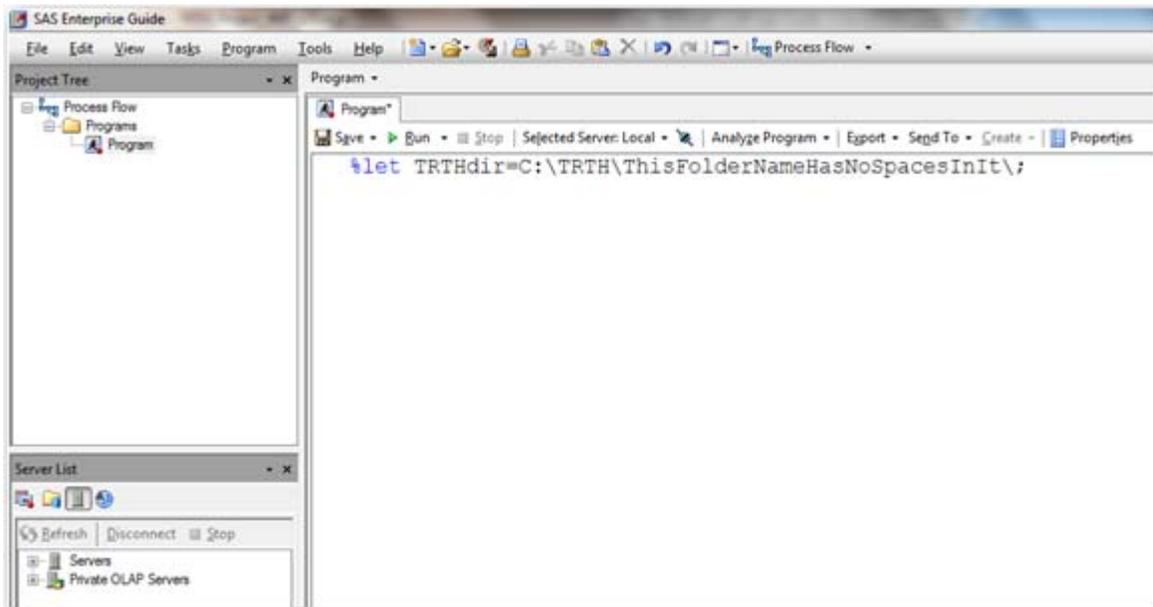


2. Start a SAS session in either SAS Enterprise Guide or SAS Display Manager.



3. Assign a global macro variable TRTHdir to the directory that you specified in Step 1. Make sure that there are no spaces in any of the folder names and that the path ends in a backslash (\). The directory path must also be recognized by the server from which the code is executed as a fully qualified path. An example is shown in the following displays.

For example, submit the following: `%let TRTHdir=C:\TRTH\ThisFolderNameHasNoSpacesInIt\;`



```

1 ;*;*;*;/quit;run;
2 OPTIONS PAGENO=MIN;
3 %LET _CLIENTTASKLABEL='Program';
4 %LET _CLIENTPROJECTPATH='';
5 %LET _CLIENTPROJECTNAME='';
6 %LET _SASPROGRAMFILE='';
7
8 ODS ALL_CLOSE;
9 OPTIONS DEV=ACTIVEX;
10 GOPTIONS XPIXELS=0 YPIXELS=0;
11 FILENAME EGSR TEMP;
12 ODS tagsets.sasreport12(ID=EGSR) FILE=EGSR STYLE=Analysis
12 ! STYLESHEET=(URL="file:///C:/Program%20Files/SASHome/x86/SASEnterpriseGuide/4.3/Styl
12 ! GPATH=%sasworklocation ENCODING=UTF8 options(rolap="on");
NOTE: Writing TAGSETS.SASREPORT12(EGSR) Body file: EGSR
13
14 GOPTIONS ACCESSIBLE;
15 %let TRTHdir=C:\TRTH\ThisFolderNameHasNoSpacesInIt\;
16
17 GOPTIONS NOACCESSIBLE;
18 %LET _CLIENTTASKLABEL='';
19 %LET _CLIENTPROJECTPATH='';
20 %LET _CLIENTPROJECTNAME='';
21 %LET _SASPROGRAMFILE='';
22
23 ;*;*;*;/quit;run;
    
```

- Submit the code: `%include "&TRTHdir.TRTHfiles\TRTHMacros.sas";`

```

%let TRTHdir=C:\TRTH\ThisFolderNameHasNoSpacesInIt\;

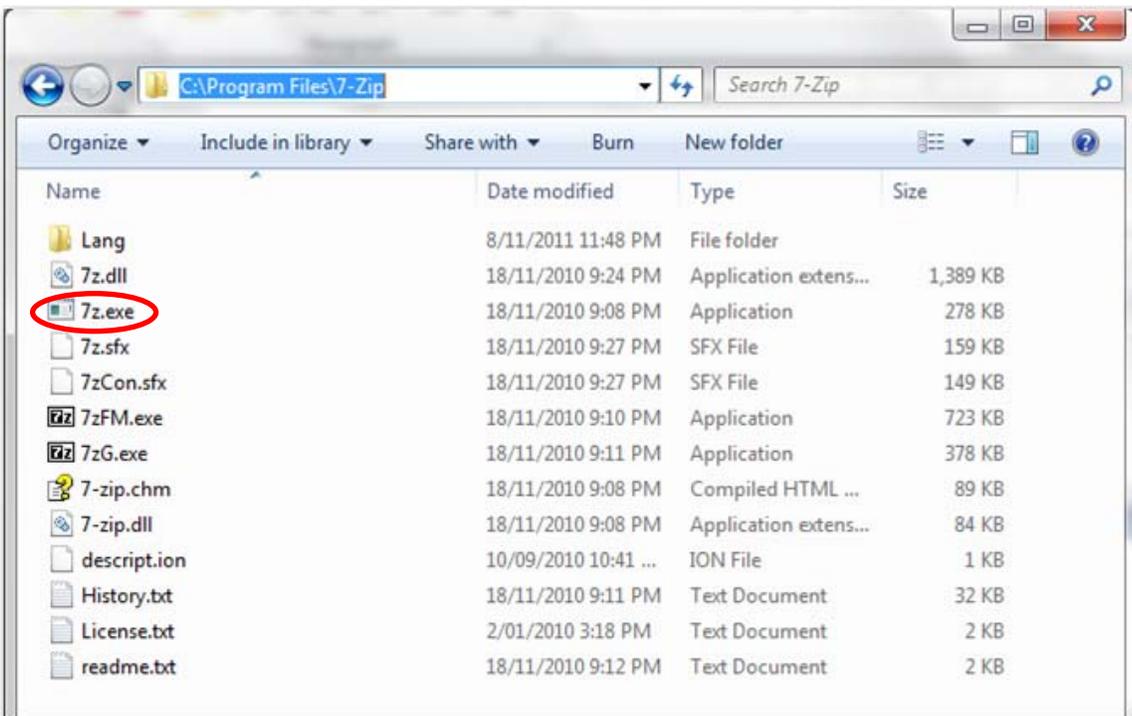
%include "&TRTHdir.TRTHfiles\TRTHMacros.sas";
    
```

```

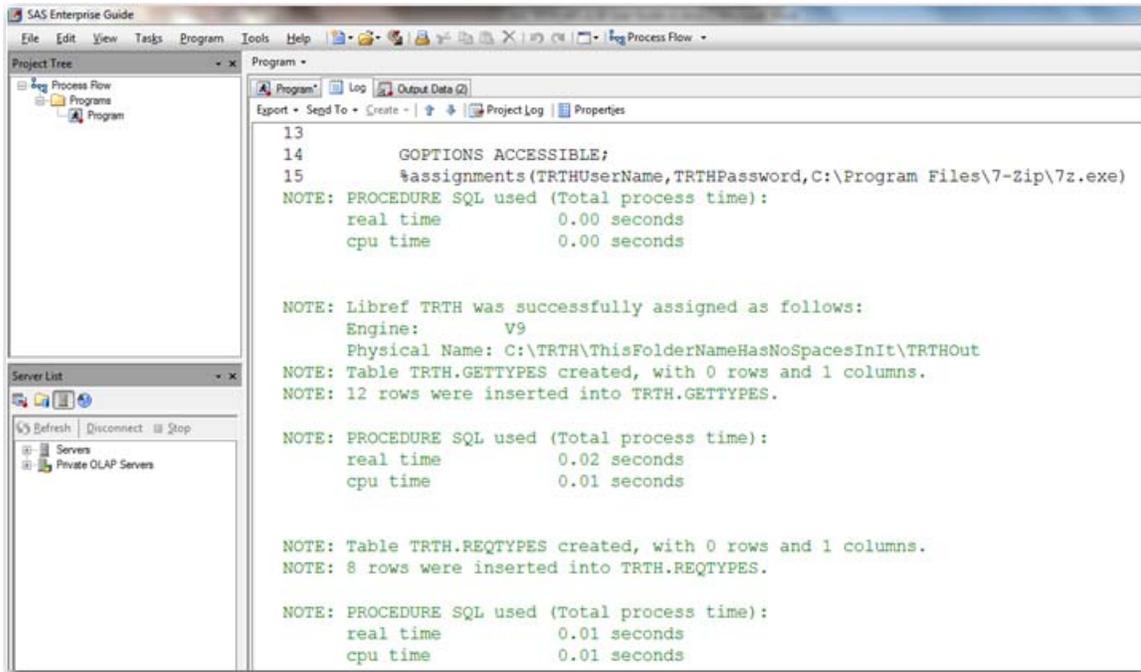
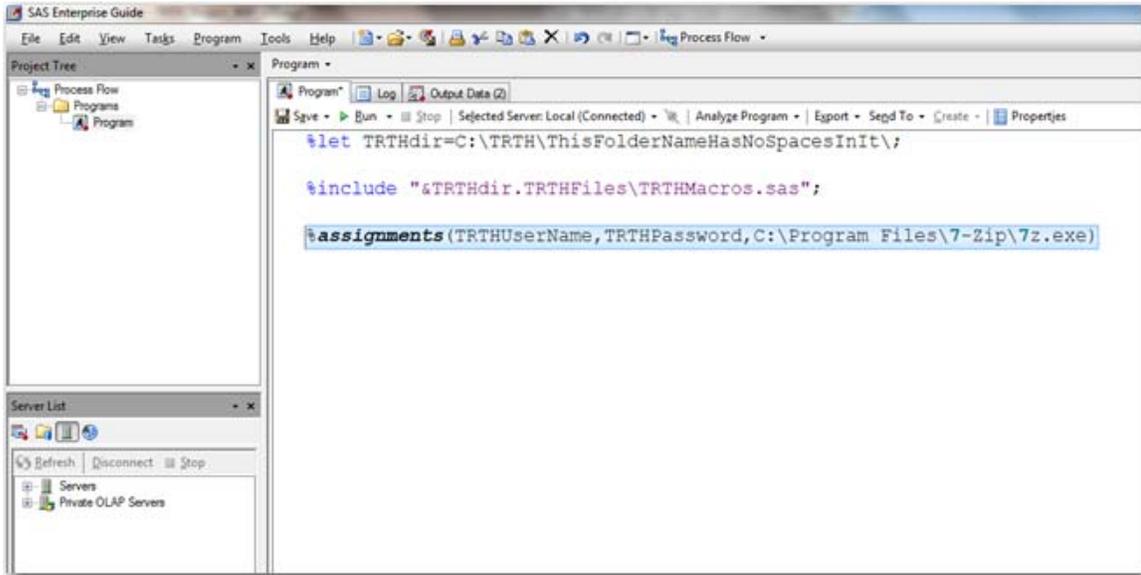
7
8   ODS_ALL_CLOSE;
9   OPTIONS DEV=ACTIVEX;
10  GOPTIONS XPIXELS=0 YPIXELS=0;
11  FILENAME EGSR TEMP;
12  ODS tagsets.sasreport12(ID=EGSR) FILE=EGSR STYLE=Seaside
12  ! STYLESHEET=(URL="file:///C:/Program%20Files/SASHome/x86/SASEnterpriseGuide/4.3/Styles
12  ! /Seaside.css") NOGTITLE NOGFOOTNOTE GPATH=%sasworklocation ENCODING=UTF8
12  ! options(rolap="on");
NOTE: Writing TAGSETS.SASREPORT12(EGSR) Body file: EGSR
13
14  GOPTIONS ACCESSIBLE;
15  %include "&TRTHdir.TRTHFiles\TRTHMacros.sas";
NOTE: SAS TRTH API v1.00
761
762  GOPTIONS NOACCESSIBLE;
763  %LET _CLIENTTASKLABEL=;
764  %LET _CLIENTPROJECTPATH=;
765  %LET _CLIENTPROJECTNAME=;
766  %LET _SASPROGRAMFILE=;
767
768  ;*:*:*:*:quit;run;
769  ODS_ALL_CLOSE;
770
771
772  QUIT; RUN;
773

```

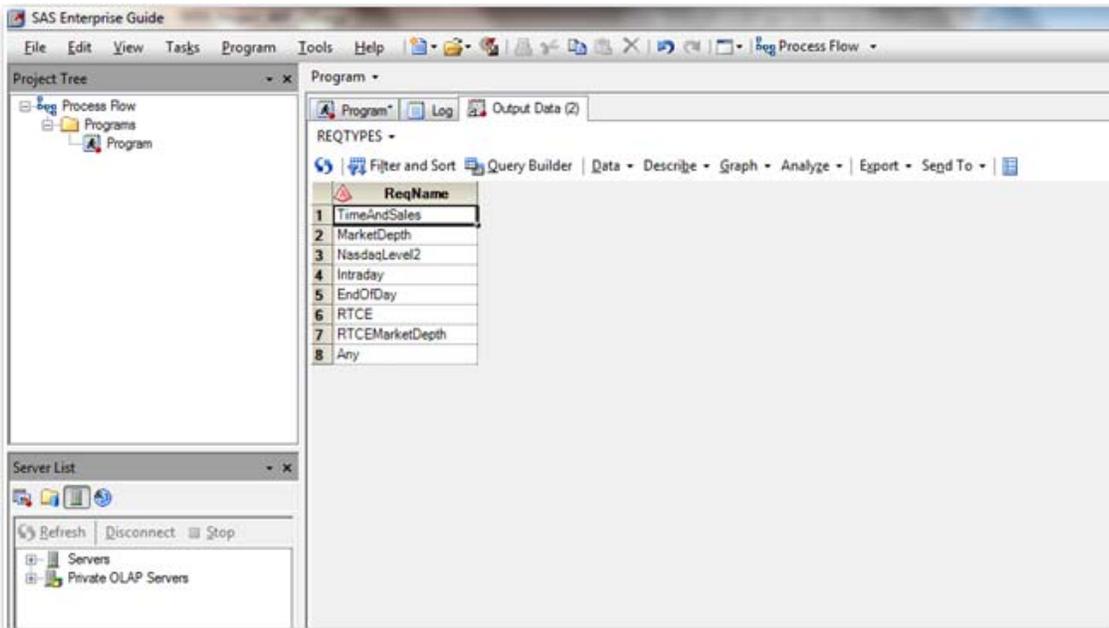
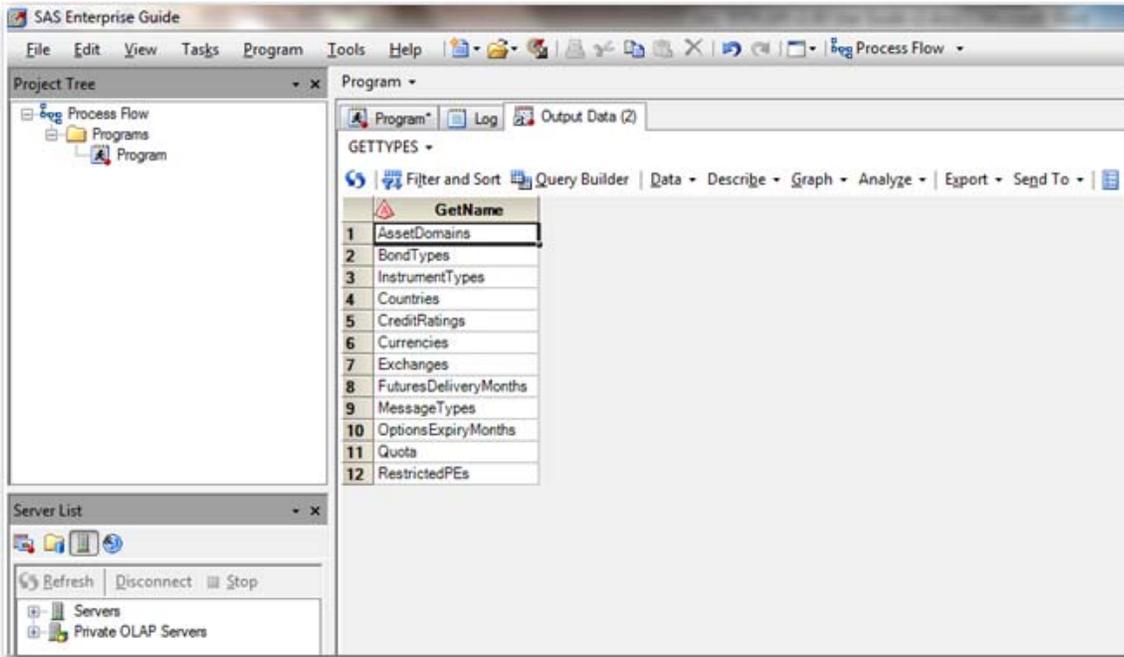
5. Navigate to the directory and executable 7z.exe. Note that the .exe extension might not appear depending on your folder settings. In this case, select the file called 7z for 7-Zip.



- Submit the macro `%ASSIGNMENTS` with the appropriate parameters.



Two tables are created: TRTH.gettypes and TRTH.reqtypes



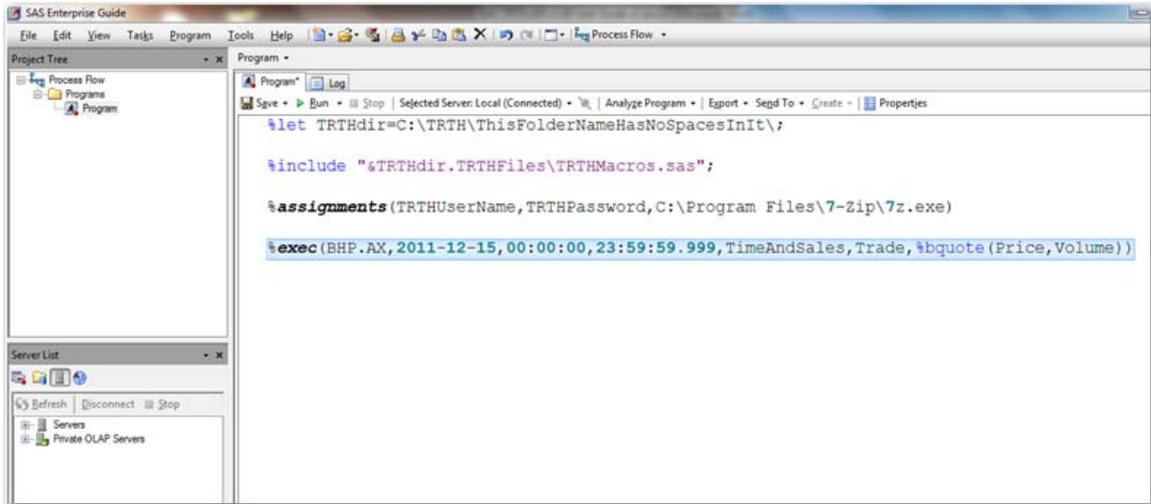
Submission Request and Retrieval

1. To send a request for a single security for a single day, submit the macro %EXEC with the appropriate parameters. To send a request for a single security for more than one day, submit the macro %EXECFTP with the appropriate parameters. The parameters REQTYPE (request type), MSGTYPE (message type), and FIELDLIST (list of fields to display), which are used in both macros, are discussed in Step 2.

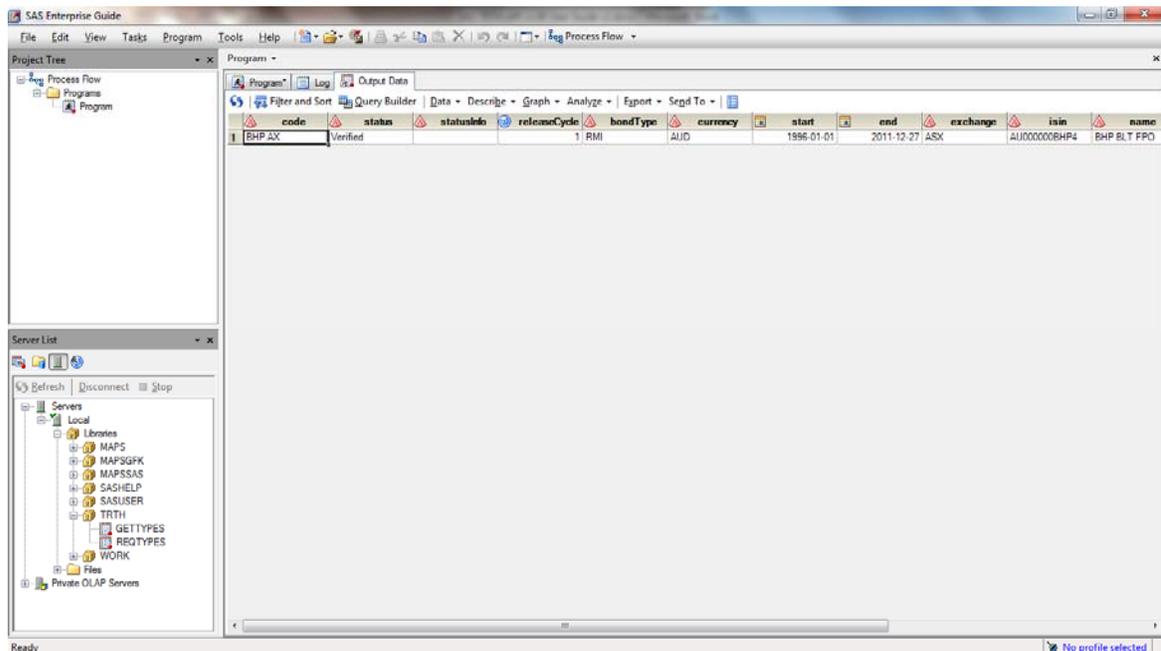
Example for Requesting Tick-History Data for a Single Security for a Single Day

The following code requests “Price” and “Volume” data for “Trades” of type “Time and Sales” for security BHP.AX on the date 2011-12-15 between the hours of 00:00:00 and 23:59:59.999.

```
%exec(BHP.AX,2011-12-15,00:00:00,23:59:59.999,TimeAndSales,Trade,%bquote(Price,Volume))
```



If the security exists, a data set TRTH.VerifyRIC is included in the output that shows details of the security.



- If you are unsure of the combination of supported values that are available for the REQTYPE, MSGTYPE, and FIELDLIST parameters, submit the macro %GET. Give the first parameter the value MessageTypes and give the second parameter a value of RequestType from the list of supported request types. This list was created in [Step 6](#) in the “Initial Setup” section and stored in the data set TRTH.reqtypes.

For example, you want to request “TimeAndSales” data but do not know which values are supported for the parameters MSGTYPE and FIELDLIST. Submitting the following code provides the list of supported values for REQTYPE “TimeAndSales”:

```
%get (MessageTypes, TimeAndSales)
```

The screenshot shows the SAS Enterprise Guide interface. The main window displays the following SAS code:

```

%let TRTHdir=C:\TRTH\ThisFolderNameHasNoSpacesInIt\;

%include "&TRTHdir.TRTHFiles\TRTHMacros.sas";

%assignments (TRTHUserName, TRTHPassword, C:\Program Files\7-Zip\7z.exe)

%exec (BHP.AX, 2011-12-15, 00:00:00, 23:59:59.999, TimeAndSales, Trade, %bquote (Price, Volume))

%get (MessageTypes, TimeAndSales)

```

The left pane shows the Project Tree with a 'Program' folder. The bottom status bar indicates 'Ready' and 'No profile selected'.

The TRTH.MessageTypes data set is created, which includes the list of supported values.

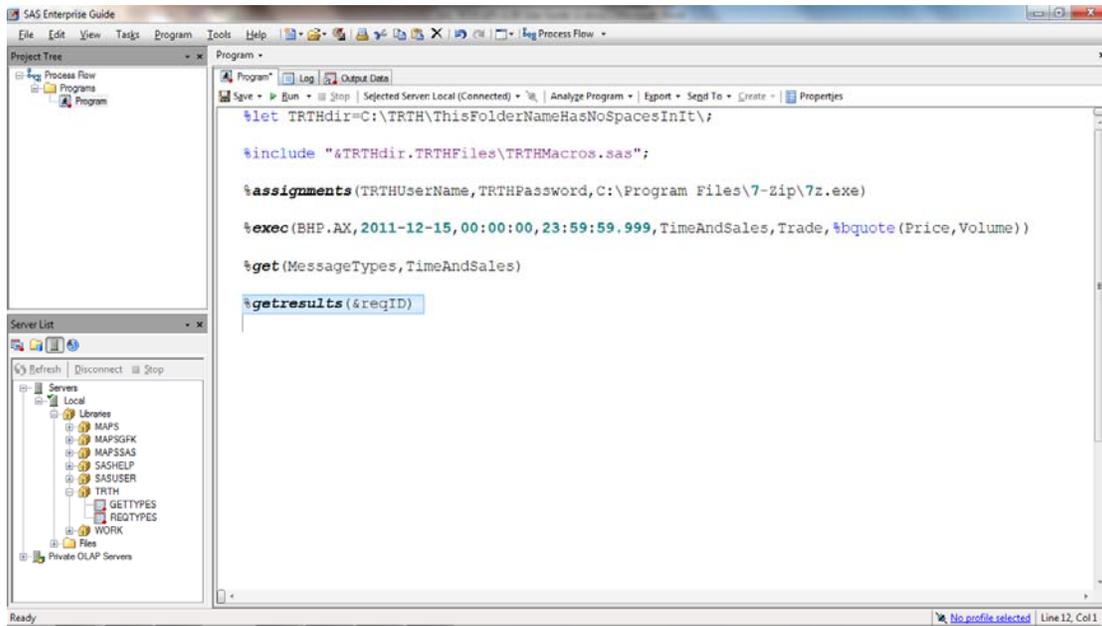
The screenshot shows the SAS Enterprise Guide interface with the output of the macro displayed in a table. The table has three columns: Obs, MsgType, and Fields. The data is as follows:

Obs	reqtype	MsgType	Fields
1	TimeAndSales	C&E Quote	Contributor ID
2	TimeAndSales	C&E Quote	Bench Price
3	TimeAndSales	C&E Quote	Mid Price
4	TimeAndSales	C&E Quote	Bid Price
5	TimeAndSales	C&E Quote	Ask Price
6	TimeAndSales	C&E Quote	Qualifiers
7	TimeAndSales	C&E Quote	Contrib. Time
8	TimeAndSales	C&E Quote	Primary Activity Price
9	TimeAndSales	C&E Quote	Secondary Activity Price
10	TimeAndSales	C&E Quote	General Value1
11	TimeAndSales	C&E Quote	General Value2
12	TimeAndSales	C&E Quote	General Value3
13	TimeAndSales	C&E Quote	General Value4
14	TimeAndSales	C&E Quote	General Value9
15	TimeAndSales	C&E Quote	Crack
16	TimeAndSales	C&E Quote	Top
17	TimeAndSales	C&E Quote	Freight
18	TimeAndSales	Short Sale	Short Price
19	TimeAndSales	Short Sale	Short Volume
20	TimeAndSales	Short Sale	Short Traded Volume
21	TimeAndSales	Short Sale	Short Turnover
22	TimeAndSales	Short Sale	Short Weighting
23	TimeAndSales	Short Sale	Short Limit
24	TimeAndSales	Short Sale	Loan Ask Volume
25	TimeAndSales	Short Sale	Loan Ask Amount Trading Price
26	TimeAndSales	Short Sale	Percentage Short Volume vs Traded Volume
27	TimeAndSales	Short Sale	Percentage Short Price vs Traded Price
28	TimeAndSales	Short Sale	Qualifiers
29	TimeAndSales	Indices and Market Statistics	Exchange Identification
30	TimeAndSales	Indices and Market Statistics	Description
31	TimeAndSales	Indices and Market Statistics	Currency Code
32	TimeAndSales	Indices and Market Statistics	Trading Status
33	TimeAndSales	Indices and Market Statistics	Ticker Symbol
34	TimeAndSales	Indices and Market Statistics	Issue Long Name

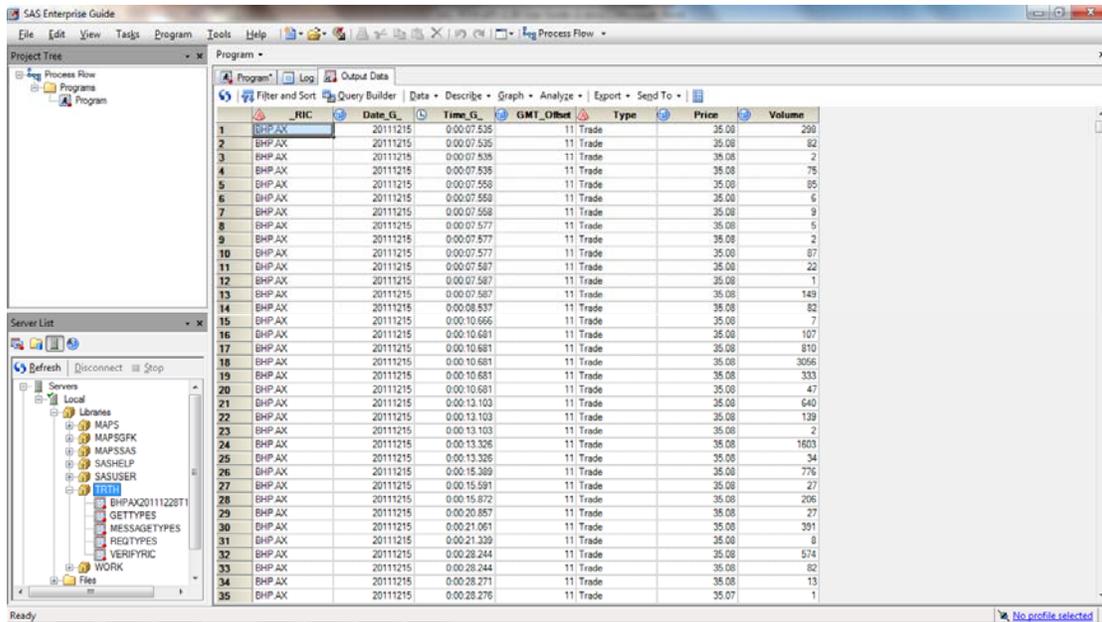
The left pane shows the Project Tree with a 'Program' folder. The bottom status bar indicates 'Ready' and 'No profile selected'.

- Fetch the results from the preceding request by submitting the macro `%GETRESULTS`. For example, submit the following:

```
%getresults(&reqID)
```



The results are stored in the TRTH library with a data set name of the security and submission date.



Example

This example summarizes the preceding step-by-step instructions and provides some additional examples.

The following code provides the required initial setup:

```
%let TRTHdir=C:\TRTH\ThisFolderNameHasNoSpacesInIt\;
%include "&TRTHdir.TRTHFiles\TRTHMacros.sas";
%assignments(TRTHUserName,TRTHPassword,C:\Program Files\7-Zip\7z.exe)
```

You might be interested in data of type "Time and Sales" but might not be aware of the parameter values that are supported for message type and field list returned, which are the fifth and sixth parameters in the macro %EXEC. The following code retrieves a list of supported values for these fields.

```
%get(MessageTypes,TimeAndSales)
```

The following code requests "Price" and "Volume" data for "Trades" of type "Time and Sales" for security BHP.AX on the date 2011-12-15 between the hours of 00:00:00 and 23:59:59.999.

```
%exec(BHP.AX,2011-12-15,00:00:00,23:59:59.999,TimeAndSales,Trade,%bquote(Price,Volume))
%getresults(&reqID)
```

The additional %EXECFTP macro requests "Price" data for "Trades" of type "Time and Sales" for security BHP.AX for the period 2011-12-15 00:00:00 to 2011-12-31 23:59:59.999.

```
%execftp(BHP.AX,2011-12-15,00:00:00,2011-12-31,23:59:59.999,TimeAndSales,Trade,Price)
```

Because the amount of data requested is much larger than the %EXEC request, additional parameters can be specified to indicate how many attempts should be made to request the result from the server and how long to wait between each attempt. In the following example, 10 attempts will be made, with a wait time of 60 seconds between each attempt.

```
%getresults(&reqID,10,6)
```

Appendix: Macro Definitions

%ASSIGNMENTS

Description

The %ASSIGNMENTS macro creates most of the global macro variables that are used by the other macro definitions. It also sets some global options and creates up to three SAS data sets—TRTH.Gettypes, TRTH.Reqtypes, and TRTH.FTPRequests. The data set TRTH.Gettypes provides a list of valid values that can be passed to the parameter GETTYPE in the macro %GET. The data set TRTH.Reqtypes provides a list of valid values that can be passed to the parameter REQTYPE in the macros %GET, %EXEC, and %EXECFTP. The data set TRTH.FTPRequests is also created if it does not already exist. This data set records all of the FTP requests that are submitted.

Syntax

```
%assignments(_uid,_pw,_compexe)
```

Parameters

_uid	The TRTH user name.
_pw	The TRTH password.
_compexe	The complete file path including the executable to 7z.exe.

%EXEC

Description

The %EXEC macro definition submits a tick-history request to the Thomson Reuters server using the credentials that are supplied in %ASSIGNMENT for a single security for a single day and time range. A successful submission assigns a request ID into the macro variable reqID that is associated with this request. This request ID can then be used to fetch the underlying data by submitting %getresults(&reqID).

Syntax

```
%exec(sec,date,starttime,endtime,reqtype,msgtype,%bquote(fieldlist))
```

Parameters

SEC	The name of the security.
DATE	The date of inquiry in the format 'yyyy-mm-dd'.
STARTTIME	The start time for the above date in the format 'hh:mm:ss.sss'.
ENDTIME	The end time for the above date in the format 'hh:mm:ss.sss'.
REQTYPE	The request type. See TRTH.Reqtypes for a list of acceptable values.
MSGTYPE	Message type—For a list of acceptable values, submit %get(MessageTypes,reqtype), where reqtype is the request type specified above.
FIELDLIST	The list of fields to be returned—Ensure that the fields are separated by commas and contained within %bquote(). The valid values can be ascertained by submitting %get(MessageTypes,reqtype), where reqtype is the request type specified above.

%EXECFTP

Description

The %EXECFTP macro definition submits a tick history request to the Thomson Reuters server for a single security for a user-specified date-time period. A successful submission assigns a request ID into the macro variable reqID, which is associated to this request. This request ID can then be used to fetch the underlying data by calling the macro %getresults(&reqID). Because FTP requests can take time to process on the Thomson Reuters server, all FTP requests, including the request ID are recorded in TRTH.FTPRequests. This enables the user to refer back to a particular request in order to retrieve the results by submitting %getresults(&reqID).

Syntax

```
%execftp(sec, startdate, starttime, enddate, endtime, reqtype, msgtype, fieldlist)
```

Parameters

SEC	The name of the security.
STARTDATE	The start date of inquiry in the format 'yyyy-mm-dd'.
STARTTIME	The start time for the start date in the format 'hh:mm:ss.sss'.
ENDDATE	The end date of inquiry in the format 'yyyy-mm-dd'.
ENDTIME	The end time for the end date in the format 'hh:mm:ss.sss'.
REQTYPE	The request type. See TRTH.Reqtypes for a list of acceptable values.
MSGTYPE	Message type—For a list of acceptable values, submit %get(MessageTypes, reqtype), where reqtype is the request type specified above.
FIELDLIST	The list of fields to be returned—Ensure that the fields are separated by commas and contained within %bquote(). The valid values can be ascertained by submitting %get(MessageTypes, reqtype), where reqtype is the request type specified above.

%GET

Description

The %GET macro fetches the list of possible values for the value of GETTYPE. The parameter REQTYPE is required only when GETTYPE equals "MessageTypes." It can be left as blank or not included for all other cases, for example, `%get(Currencies)`.

This macro is useful in finding the supported values of REQTYPE, GETTYPE, and FIELDLIST parameters used in %EXEC and %EXECFTP.

Syntax

```
%get(gettype, reqtype)
```

Parameters

GETTYPE	The supported values for GETTYPE are provided in the data set TRTH.Gettypes which is created when the macro %ASSIGNMENTS is submitted.
REQTYPE	The supported values for REQTYPE are provided in the data set TRTH.Reqtypes, which is created when the macro %ASSIGNMENTS is submitted and needs to be provided only when GETTYPE is equal to "MessageTypes".

%GETRESULTS

Description

The %GETRESULTS macro fetches the results from the server that is associated with REQID. These results are saved locally as a file with the extension `csv.gz` and stored in the file location specified by TRTHdir in the directory TRTHOut. If the compressed file is successfully extracted, then the delimited file is also stored in the same location. A successful import stores a data set in the library TRTH that contains the name of the security (with special characters stripped out) for the specified date-time period.

Syntax

```
%getresults(reqID, attempts, wait)
```

Parameters

REQID	The request ID generated from %EXEC or %EXECFTP.
ATTEMPTS	The number of times to resubmit the retrieval of results.
WAIT	The amount of time, in seconds, to wait between resubmissions.

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