



SESUG 2018

**St. Pete Beach, FL
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Paper 131

A Quick Bite on SAS® Studio Custom Tasks

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Presenter

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INTRODUCTION

SNAPSHOT of the Custom Task Built For this Presentation

The screenshot displays the SAS Studio 3.5 interface with a custom task configuration. The left pane shows the code editor with the following SAS code:

```
1 /*  
2 *  
3 * Task code generated by SAS Studio 3.5  
4 *  
5 * Generated on '3/1/18, 10:04 AM'  
6 * Generated on browser 'Mozilla/4.0 (compatible; MSIE 7.0; Windows NT 6.1;  
7 * Generated on web client 'https://awe-dbis-cl-53.cis1.cisr.uscis.dhs.gov:8  
8 *  
9 */  
10  
11  
12  
13  
14  
15 Proc Print data=SASHELP.CARS;  
16     var Origin Make Model Type DriveTrain MSRP Invoice;  
17     Where Origin='Asia' AND Make='Toyota';  
18 run;
```

The right pane shows the configuration for the task. The DATASOURCE is set to SASHELP.CARS. The PROC GROUP is set to Print. The FILTER 1 is set to Means. The Variable 1 is set to Origin. The Variable 2 is set to Make. The Value is set to Asia. The Value2 is set to Toyota.

The bottom status bar shows the file path: /home/mvkola/sasuser.v94/SASGF18/SASGF18.ctlk and the current line and column: Line 1, Column 1.

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Results Window of the Custom Task

The screenshot displays the SAS Results Window for a custom task. The window is divided into several sections:

- Top Bar:** Includes tabs for Settings, Code/Results, and Split. On the right, there are buttons for Log and Code.
- Navigation Bar:** Contains tabs for CODE, LOG, and RESULTS. Below these are icons for various actions like print, save, and zoom.
- Table of Contents:** A link to view the table of contents.
- Data Table:** A table with 8 columns: Obs, Origin, Make, Model, Type, DriveTrain, MSRP, and Invoice. It contains 400 rows of data.
- Filter Configuration Panel:** Located on the right, it includes sections for DATASOURCE (SASHELP.CARS), PROC GROUP (Print), and two filter sections (FILTER 1 and FILTER 2).

Data Table:

Obs	Origin	Make	Model	Type	DriveTrain	MSRP	Invoice
374	Asia	Toyota	Prius 4dr (gas/electric)	Hybrid	Front	\$20,510	\$18,926
375	Asia	Toyota	Sequoia SR5	SUV	All	\$35,695	\$31,827
376	Asia	Toyota	4Runner SR5 V6	SUV	Front	\$27,710	\$24,801
377	Asia	Toyota	Highlander V6	SUV	All	\$27,930	\$24,915
378	Asia	Toyota	Land Cruiser	SUV	All	\$54,765	\$47,986
379	Asia	Toyota	RAV4	SUV	All	\$20,290	\$18,553
380	Asia	Toyota	Corolla CE 4dr	Sedan	Front	\$14,085	\$13,055
381	Asia	Toyota	Corolla S 4dr	Sedan	Front	\$15,030	\$13,650
382	Asia	Toyota	Corolla LE 4dr	Sedan	Front	\$15,295	\$13,889
383	Asia	Toyota	Echo 2dr manual	Sedan	Front	\$10,750	\$10,144
384	Asia	Toyota	Echo 2dr auto	Sedan	Front	\$11,550	\$10,896
385	Asia	Toyota	Echo 4dr	Sedan	Front	\$11,290	\$10,642
386	Asia	Toyota	Camry LE 4dr	Sedan	Front	\$19,550	\$17,558
387	Asia	Toyota	Camry LE V6 4dr	Sedan	Front	\$22,775	\$20,325
388	Asia	Toyota	Camry Solara SE 2dr	Sedan	Front	\$19,635	\$17,722
389	Asia	Toyota	Camry Solara SE V6 2dr	Sedan	Front	\$21,955	\$19,819
390	Asia	Toyota	Avalon XL 4dr	Sedan	Front	\$26,550	\$23,693
391	Asia	Toyota	Camry XLE V6 4dr	Sedan	Front	\$25,920	\$23,125
392	Asia	Toyota	Camry Solara SLE V6 2dr	Sedan	Front	\$26,510	\$23,908
393	Asia	Toyota	Avalon XLS 4dr	Sedan	Front	\$30,920	\$27,271
394	Asia	Toyota	Sienna CE	Sedan	Front	\$23,495	\$21,198
395	Asia	Toyota	Sienna XLE Limited	Sedan	Front	\$28,800	\$25,690
396	Asia	Toyota	Celica GT-S 2dr	Sports	Front	\$22,570	\$20,363
397	Asia	Toyota	MR2 Spyder convertible 2dr	Sports	Rear	\$25,130	\$22,787
398	Asia	Toyota	Tacoma	Truck	Rear	\$12,800	\$11,879
399	Asia	Toyota	Tundra Regular Cab V6	Truck	Rear	\$16,495	\$14,978
400	Asia	Toyota	Tundra Access Cab V6 SR5	Truck	All	\$25,935	\$23,520

Filter Configuration Panel:

- DATASOURCE:** SASHELP.CARS
- PROC GROUP:** Select from the List: Print
- FILTER 1:**
 - Variable 1: Origin, Make, Model
 - Variable 2: (1 item) Origin
 - Value: Asia
- FILTER 2:**
 - Variable 3: (1 item) Make
 - Value2: Toyota

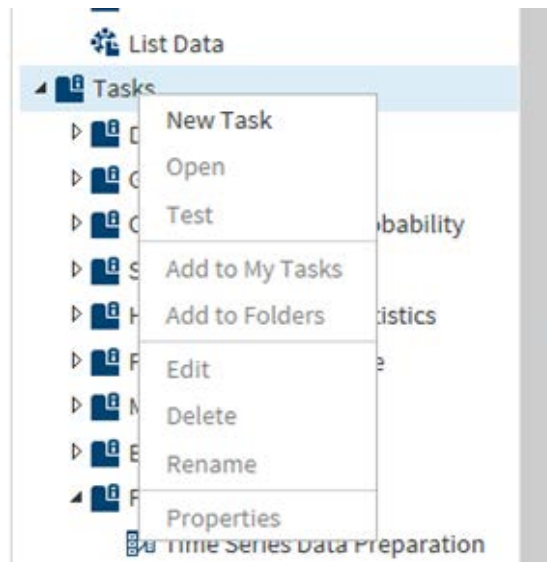
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Messages: 2 User: mvkola

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Two Ways to Create Custom Tasks

There are two ways to create custom tasks. One way to create is by expanding the “Tasks and Utilities” and right clicking on the Tasks and selecting “New Task”

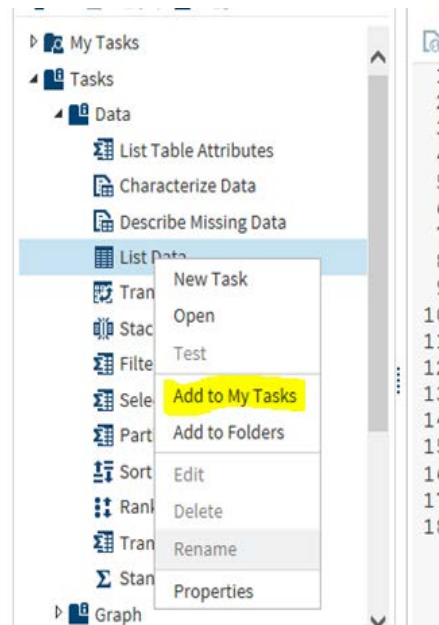


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Another way to create is selecting the existing SAS task and adding to My Tasks. This can be done by right clicking the existing SAS task for example “List Data” and selecting “Add to My Task” This will add the existing task to My Task and now the user will have the ability to edit this task.



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TASK ELEMENTS

REGISTRATION

The REGISTRATION element represents a collection of metadata for the task. This element is required in order to know the type of task.

In the below code the registration element contains child elements

NAME, DESCRIPTION, GUID, PROCEDURE, VERSION and the hyper LINK the values of these elements are self-explanatory. Since this task is built for the sole purpose of this paper the child elements describe the current task type in the REGISTRATION.



TASK ELEMENTS

REGISTRATION

<Registration>

<Name>A Quick Bite on SAS Studio Custom Tasks</Name>

<Description>Custom Built Task</Description>

<GUID>726B2B12-4542-4200-96F4-960C645D767F</GUID>

<Procedures>MEAN FREQ PRINT</Procedures>

<Version>3.5</Version>

<Links>

<Link href="http://support.sas.com/software/products/sasstudio/index.html#s1=2">SAS Studio Documentation</Link>

</Links>

</Registration>

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When the above code is executed following User Interface is displayed under INFORMATION tab:

DATA	OPTIONS	STATISTICS	INFORMATION
------	---------	------------	-------------

▲ PROPERTIES

Name: A Quick Bite on SAS Studio Custom Tasks
Description: Custom Built Task
Category: None
Procedures: MEAN FREQ PRINT
Version: 3.5

▲ RESOURCES

[SAS Studio Documentation](#)



TASK ELEMENTS

METADATA

The following code is for the METADATA element. This element contains child elements which are DATASOURCES and OPTIONS. The DATASOURCES contains one child element which is DATASOURCE. This element specifies the information about the dataset for the task.

THE DATASOURCE also contains a child element which is Roles which identifies the variables that must be assigned in order to run the task and groups the individual role assignments that are needed for a task.

The Role tag, which is the only child of the roles element, describes one type of role assignment for the task.



```
<Metadata>
```

```
<DataSources>
```

```
  <DataSource name="dataset">
```

```
    <Roles>
```

```
      <Role maxVars="0" minVars="0" name="var1"  
order="true" type="A">Variable 1:</Role>
```

```
      <Role maxVars="1" minVars="0" name="var2"  
order="true" type="A">Variable 2:</Role>
```

```
      <Role maxVars="1" minVars="0" name="var3"  
order="true" type="A">Variable 3:</Role>
```

```
    </Roles>
```

```
  </DataSource>
```

```
</DataSources>
```

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When you run this code, you get the data and roles section as follows
The DATASOURCE element helps display the DATASET and the Roles are Variable1,
Variable2 and Variable3:

DATA	OPTIONS	STATISTICS	INFORMATION
▲ DATASOURCE			
<div>SASHELP.CARS</div>			
▶ PROC GROUP			
▲ FILTER 1			
Variable 1:			
<div>Column</div>			
Variable 2: (1 item)			
<div>Column</div>			
Value:			
<div>Select a value</div>			
▲ FILTER 2			
Variable 3: (1 item)			
<div>Column</div>			
Value2:			
<div>Select a value</div>			

When you run this code, you get the data and roles section as follows
The DATASOURCE element helps display the DATASET and the Roles are Variable1,
Variable2 and Variable3:

DATA	OPTIONS	STATISTICS	INFORMATION
▲ DATASOURCE			
<div>SASHELP.CARS</div>			
▶ PROC GROUP			
▲ FILTER 1			
Variable 1:			
<div>Column</div>			
Variable 2: (1 item)			
<div>Column</div>			
Value:			
<div>Select a value</div>			
▲ FILTER 2			
Variable 3: (1 item)			
<div>Column</div>			
Value2:			
<div>Select a value</div>			

OPTIONS

The OPTIONS element identifies the options that are required in order to run the task. The option tag, which is the only child of the options element, describes the assigned option.

```
<Options>
  <Option inputType="string" name="datatab">DATA</Option>
  <Option inputType="string" name="datagrpf">DATASOURCE</Option>
  <Option name="PROCS" inputType="string">PROC GROUP</Option>
  <Option defaultValue="Print" inputType="combobox"
    name="List" width="264px">Select from the List:</Option>
  <Option inputType="string" name="Print">Print</Option>
  <Option inputType="string" name="Freq">Freq</Option>
  <Option inputType="string" name="Means">Means</Option>
  <Option inputType="string" name="filter1">FILTER 1</Option>
  <Option indent="1" inputType="distinct" name="values1" source="var2" max="200">Value:</Option>
  <Option inputType="string" name="filter2">FILTER 2</Option>
  <Option indent="1" inputType="distinct" name="values2" source="var3">Value2:</Option>
```

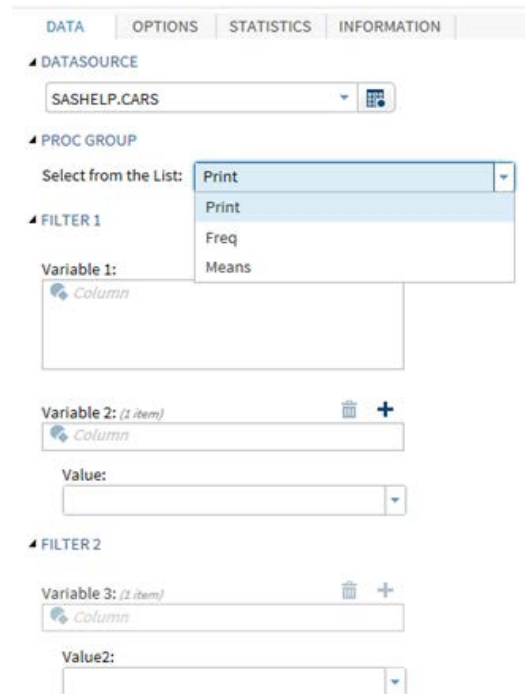
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OPTIONS

The output for the above options will display the following screen:



The screenshot shows the SAS Options dialog box with the following settings:

- DATA** tab selected.
- DATASOURCE:** SASHELP.CARS
- PROC GROUP:** Select from the List: Print (dropdown menu is open showing Print, Print, Freq, Means)
- FILTER 1:** Variable 1: Column
- Variable 2:** (1 item) Column, Value: (dropdown menu)
- FILTER 2:** Variable 3: (1 item) Column, Value2: (dropdown menu)

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OPTIONS

```
<Option inputType="string" name="optionstab">OPTIONS</Option>
<Option inputType="string" name="outputgrp">OUTPUT DATA SET</Option>
<Option defaultValue="filter" indent="1"
inputType="outputdata" name="outputDS" required="true">Data set name (Please name your output data set):</Option>

<Option name="BASICOPTIONS" inputType="string">BASIC OPTIONS</Option>
<Option defaultValue="Print" inputType="combobox" name="ROWS2LIST" width="264px">Rows to list:</Option>
<Option inputType="string" name="all">All rows</Option>
<Option inputType="string" name="firstnrows">First n rows</Option>
<Option decimalPlaces="0" defaultValue="10" indent="1" inputType="numstepper" maxValue="999999" minValue="1"
name="NVALUE" required="true">Rows (n):</Option>
```

DATA	OPTIONS	STATISTICS	INFORMATION
OUTPUT DATA SET			
* Data set name (Please name your output data set):			
<input type="text" value="SASGF18"/>			
BASIC OPTIONS			
Rows to list: <input type="text" value="All rows"/>			
* Rows (n): <input type="text" value="10"/>			

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OPTIONS

```
<Option inputType="string" name="statistics">STATISTICS</Option>
<Option inputType="string" name="GROUPCHECK">Means STATISTICS</Option>
<Option inputType="string" indent="1" name="labelCHECK">Select the statistics you would like included in the output dataset.</Option>
<Option defaultValue="0" indent="1" inputType="checkbox" name="chkMEAN">Mean</Option>
<Option defaultValue="0" indent="1" inputType="checkbox" name="chkMIN">Minimum</Option>
<Option defaultValue="0" indent="1" inputType="checkbox" name="chkMAX">Maximum</Option>
<Option defaultValue="0" indent="1" inputType="checkbox" name="chkSTD">Standard Deviation</Option>
<Option defaultValue="0" indent="1" inputType="checkbox" name="chkLCLM">LCLM</Option>
<Option defaultValue="0" indent="1" inputType="checkbox" name="chkUCLM">UCLM</Option>
<Option defaultValue="0" indent="1" inputType="checkbox" name="chkP25">25th Percentile</Option>
<Option defaultValue="0" indent="1" inputType="checkbox" name="chkP75">75th Percentile</Option>
</Options>
```

DATA	OPTIONS	STATISTICS	INFORMATION
------	---------	------------	-------------

▲ Means STATISTICS

Select the statistics you would like included in the output dataset.

- ☐ Mean
- ☐ Minimum
- ☐ Maximum
- ☐ Standard Deviation
- ☐ LCLM
- ☐ UCLM
- ☐ 25th Percentile
- ☐ 75th Percentile

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TASK ELEMENTS

USER INTERFACE (UI)

The UI Element contains CONTAINER child element and the CONTAINER contains GROUP Element as child and the GROUP contains the DATAITEM, OPTIONCHOICE and ROLEITEM as child elements. The OPTIONCHOICE contains OPTIONITEM as child.

```
<UI>
  <Container option="datatab">
    <Group open="true" option="datagr">
      <DataItem data="dataset"/>
    </Group>
    <Group open="true" option="PROCS">
      <OptionChoice option="List">
        <OptionItem option="Print"/>
        <OptionItem option="Freq"/>
        <OptionItem option="Means"/>
      </OptionChoice>
    </Group>
    <Group open="true" option="filter1">
      <RoleItem role="var1"/>
      <RoleItem role="var2"/>
      <OptionItem option="values1"/>
    </Group>
    <Group open="true" option="filter2">
      <RoleItem role="var3"/>
      <OptionItem option="values2"/>
    </Group>
  </Container>
```

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TASK ELEMENTS

USER INTERFACE (UI)

The following is the UI for the DATA container:

The screenshot displays the SAS DATA container interface. At the top, there are four tabs: DATA, OPTIONS, STATISTICS, and INFORMATION. The DATA tab is selected. Below the tabs, the DATASOURCE is set to SASHELP.CARS. The PROC GROUP dropdown menu is open, showing a list of options: Print, Print, Freq, and Means. The FILTER 1 section shows Variable 1 set to Column. Below this, Variable 2 is also set to Column, and a Value dropdown menu is visible. The FILTER 2 section shows Variable 3 set to Column, and a Value2 dropdown menu is visible.

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TASK ELEMENTS

DEPENDENCIES

```
<Dependencies>
<Dependency condition="$List.equalsIgnoreCase('Freq') ">
  <Target action="disable" conditionResult="true" option="var2"/>
  <Target action="disable" conditionResult="true" option="var3"/>
</Dependency>
<Dependency condition="$List.equalsIgnoreCase('Print') ">
  <Target action="enable" conditionResult="true" option="var2"/>
  <Target action="enable" conditionResult="true" option="var3"/>
</Dependency>
<Dependency condition="$List.equalsIgnoreCase('Means') ">
  <Target action="disable" conditionResult="true" option="var2"/>
  <Target action="disable" conditionResult="true" option="var3"/>
  <Target action="enable" conditionResult="true" option="chkMEAN"/>
  <Target action="disable" conditionResult="false" option="chkMEAN"/>
  <Target action="enable" conditionResult="true" option="chkMIN"/>
  <Target action="disable" conditionResult="false" option="chkMIN"/>
  <Target action="enable" conditionResult="true" option="chkMAX"/>
  <Target action="disable" conditionResult="false" option="chkMAX"/>
  <Target action="enable" conditionResult="true" option="chkSTD"/>
  <Target action="disable" conditionResult="false" option="chkSTD"/>
  <Target action="enable" conditionResult="true" option="chkLCLM"/>
  <Target action="disable" conditionResult="false" option="chkLCLM"/>
  <Target action="enable" conditionResult="true" option="chkUCLM"/>
  <Target action="disable" conditionResult="false" option="chkUCLM"/>
  <Target action="enable" conditionResult="true" option="chkP25"/>
  <Target action="disable" conditionResult="false" option="chkP25"/>
  <Target action="enable" conditionResult="true" option="chkP75"/>
  <Target action="disable" conditionResult="false" option="chkP75"/>
  <Target action="enable" conditionResult="true" option="BASICOPTIONS"/>
  <Target action="disable" conditionResult="true" option="BASICOPTIONS"/>
</Dependency>
<Dependency condition="$var2.size() > 0">
  <Target action="enable" conditionResult="true" option="var3"/>
  <Target action="disable" conditionResult="false" option="var3"/>
</Dependency>
<Dependency condition="$ROWS2LIST.equalsIgnoreCase('firstnrows') ">
  <Target action="enable" conditionResult="true" option="NVALUE"/>
  <Target action="disable" conditionResult="false" option="NVALUE"/>
</Dependency>
<Dependency condition="$ROWS2LIST.equalsIgnoreCase('all') ">
  <Target action="enable" conditionResult="false" option="NVALUE"/>
  <Target action="disable" conditionResult="true" option="NVALUE"/>
</Dependency>
</Dependencies>
```

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When the above code is executed, all the dependency conditions are applied. The variables Variable1 and Variable2 are disabled when Freq is selected.

The screenshot shows the SAS Studio interface with the following configuration:

- DATA** | **OPTIONS** | **STATISTICS** | **INFORMATION**
- DATA SOURCE**: SASHELP.CARS
- PROC GROUP**: Select from the List: **Freq**
- FILTER 1**:
 - Variable 1**: *Column* (disabled)
- Variable 2**: *Column* (disabled)
Value: *Select a value* (disabled)
- FILTER 2**:
 - Variable 3**: *Column* (disabled)
 - Value2**: *Select a value* (disabled)

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TASK ELEMENTS

REQUIREMENTS

This element acts like the DEPENDENCY element. This element specifies a list of condition that must be met in order for the task to run. If the condition is true, SAS code can be generated. If the condition is false, no code is generated. When defining a requirement, you can specify the message to display when the requirement is not met.

In the below code the condition is (`$var1.size () > 0`) this means if the value of the var1 is great than 0 then the condition is met and if the value is not great then 0 i.e.; no value is entered the condition is not met and the message will be displayed.

```
<Requirements>
  <Requirement condition="$var1.size() > 0">
    <Message>At least one variable must be assigned to the Variable1.</Message>
  </Requirement>
</Requirements>
```

Once the above code is executed the following screen is displayed. If you notice the highlighted areas the message is displayed “At least one variable must be assigned to the Variable1” Because the Variable1 does not have any columns selected.



TASK ELEMENTS

REQUIREMENTS

The screenshot displays the SAS Studio web interface. The left pane shows a code editor with the following text:

```
1 /*  
2 *  
3 * Code cannot be generated because the following  
4 * requirements are not met:  
5 *  
6 * At least one variable must be assigned to the Variable1.  
7 *  
8 *  
9 */  
10
```

The right pane shows the configuration panel with the following sections:

- DATASOURCE:** SASHELP.CARS
- PROC GROUP:** Select from the List: Print
- FILTER 1:**
 - Variable 1: Column
- FILTER 2:**
 - Variable 3: (1 item) Column
 - Value: Select a value

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TASK ELEMENTS

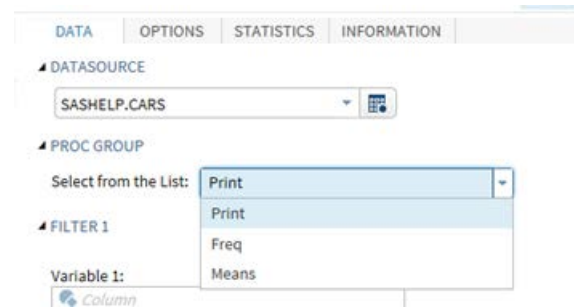
CODE TEMPLATE

The code template creates the string output of the task. For most tasks, this output is SAS code. The code Template element contains a CDATA block of the Apache Velocity scripting language. The string output is produced using this scripting language.

Here is the code that I'm using for PROC PRINT and PROC FREQ. I am using the IF statement in the velocity code to choose the PRINT/FREQ/MEANS. The \$List is the velocity variable which is created in the options element which is the combo box. Following is the code.

```
<Option defaultValue="Print" inputType="combobox"
  name="$List" width="264px">Select from the List:</Option>
```

And the UI has the option to choose from PRINT, FREQ and MEANS as it is shown in the below screen.



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TASK ELEMENTS

CODE TEMPLATE

In the following Velocity code if the “IF STATEMENT” has PRINT. It will execute PROC PRINT part of the Velocity Code

<CodeTemplate>

<![CDATA[

```
#if($List.equals("Print"))
  Proc Print data=$dataset #if($ROWS2LIST.equals("firstnrows"))(obs=$NVALUE) #end
    #if($ROWS2LIST.equals("all"))
      #end;
      #if( $var1.size() > 0 )
        var #foreach( $item in $var1 ) $item#end;
      #end
      #if( $var2.size() > 0 )
        Where #foreach( $item in $var2 ) $item#end = '$values1'
      #end
      #if( $var3.size() > 0 )
        AND #foreach( $item in $var3 ) $item#end = '$values2'
      #end;
    run;
#end
```

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TASK ELEMENTS

CODE TEMPLATE

The following screen shows the SAS code on the left which is displayed when the Print is selected in the PROC Group and code for FREQ is displayed when the FREQ is selected and same for the Means.

The screenshot displays the SAS Studio interface. On the left, the CODE window shows SAS code with a red circle highlighting the following lines:

```
14  
15 Proc Print data=SASHELP.CARS;  
16     var Origin Make Model Type MSRP;  
17     Where Origin='Asia' AND Make='Toyota';  
18 run;
```

On the right, the TASK ELEMENTS panel shows the following configuration:

- DATASOURCE:** SASHELP.CARS
- PROC GROUP:** Select from the List: Print (highlighted with a red circle)
- FILTER 1:**
 - Variable 1: Origin, Make, Model
- Variable 2:** Origin
- Value:** Asia
- FILTER 2:**
 - Variable 3: Make
- Value2:** Toyota

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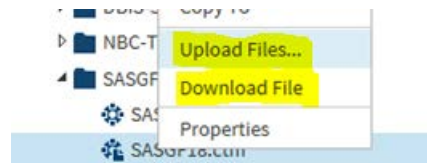
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TASK ELEMENTS

Saving and Sharing the Task

The Custom Task is created and now the task can be saved as CTM or CTK files and be shared with the users by downloading from SAS Studio and could be emailed or place in a share drive. The user will have to upload the files to SAS Studio in order to execute and produce the results.

The upload and download could be done by right clicking on the file and selecting upload/download and follow the directions to select the path where the file need to be saved.



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CONCLUSION

All the elements which are used in the custom task building must be put together in order for the Task to generate the application/UI Screen. Executing the task elements individually may not produce the desired results. The REGISTRATION is used for identity and the DATASOURCES and ROLES are used for SAS Data Set and variable selection. UI is used to display User Interface part of the task. CODE Template is used for writing the Velocity Code.

The entire CTM code is run to produce the CTK output which is the User Interface. Once the UI is displayed, the Data Set, variables etc. are selected. After the data selection the SAS code is generated on the code window. Then the SAS code is submitted by hitting this button and the result is generated in the Results window.



CONTACT INFORMATION

Your comments and questions are valued and encouraged.
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