Paper 135-30

# Creating and Using SAS<sup>®</sup> Stored Processes with SAS<sup>®</sup> Enterprise Guide<sup>®</sup>

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## ABSTRACT

This hands-on workshop shows how to use SAS Enterprise Guide to create and use SAS stored processes. In particular, you will learn how to

- · create a new project, run an existing stored process, and stream the results back to SAS Enterprise Guide
- add an existing SAS program to the project and use it to create, register, and test a new stored process
- add a data source to the project, run a task against it, and create, register, and test a new stored process based on that task.

#### INTRODUCTION

A SAS stored process is a SAS program that is hosted on a server and described by metadata. A stored process can be invoked by many of the new clients in the SAS<sup>®</sup>9 Intelligence Platform. A stored process is similar in concept to programs that are run by SAS/IntrNet software but is more versatile because of the underlying metadata and security support. Although there are several ways to create and register a stored process, this hands-on workshop focuses on how to use SAS Enterprise Guide for these tasks. SAS Enterprise Guide is an easy-to-use Windows application that provides an intuitive visual interface to the power of SAS, including transparent access to data, ready-to-use tasks for analysis and reporting, and the ability to easily export data to other applications.

#### **OVERVIEW OF SAS STORED PROCESSES**

Because a stored process is basically a SAS program, it can access any SAS data source or external file as input and can create multiple types of output, such as new data sets, files, and report output in a variety of formats. There are some advantages to using a stored process over using a traditional SAS program. For example, code is not embedded in client applications; it is stored on a server. This enables you to centrally maintain, manage, and secure the code. Another advantage is that stored processes can be invoked from multiple types of clients such as Web browsers and desktop applications. Because there is only one copy of the code, every client application that invokes a stored process always gets the latest version of the stored process program.

There are three basic steps to creating a stored process:

- 1. Write the stored process program either from scratch (using a program editor) or by taking the output of a SAS task.
- 2. Choose the server to execute the stored process.
- 3. Register the stored process metadata.

After a stored process has been created and registered, it can be invoked from several of the SAS<sup>®</sup>9 Intelligence Platform applications, such as SAS Enterprise Guide, SAS Add-In for Microsoft Office, SAS Information Map Studio, SAS Web Report Studio, and the SAS Information Delivery Portal.

SAS stored processes can be hosted by either the SAS Stored Process Server or the SAS Workspace Server. These two servers are similar but have different capabilities. The SAS Stored Process Server is a multi-user server that runs under a single shared user identity. This single process is shared by many clients, is dedicated to executing stored processes, and implements several features that are not available on the workspace server, such as streaming output, sessions, multiple-value input parameters, and support for stored process Web services. The SAS Workspace Server is a single-user server that runs under the client identity and starts a new server process each time a stored process is executed.

When a SAS stored process is registered, there are many metadata attributes that contain information about the stored process, such as the name, description, and keywords; input parameters to allow the stored process to be dynamic; output options to control how results are delivered; the server on which the stored process will execute; and security options.

# PART 1

Create a new SAS Enterprise Guide project and run an existing stored process.

1. Launch SAS Enterprise Guide by selecting <u>Start</u> ⇒ <u>All Program</u> ⇒ <u>SAS</u> ⇒ <u>Enterprise Guide 3.0</u>. In the Welcome window select <u>New Project</u>.

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Open a proje	ect			
🚰 More pro	jects			
New				
波 New Pro	iect			-
New SA				
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Assistance				
2 Tutorial:	Getting Started v	with SAS Enterpri	se Guide	

- 2. View the available stored processes by selecting <u>View</u> ⇒ <u>Stored Process List</u> (or by selecting <u>Wiew</u> on the toolbar).
- 3. Expand the <u>AMO Stored Processes</u> folder and double-click the <u>AMO Sales Forecast</u> stored process to add it to the project.

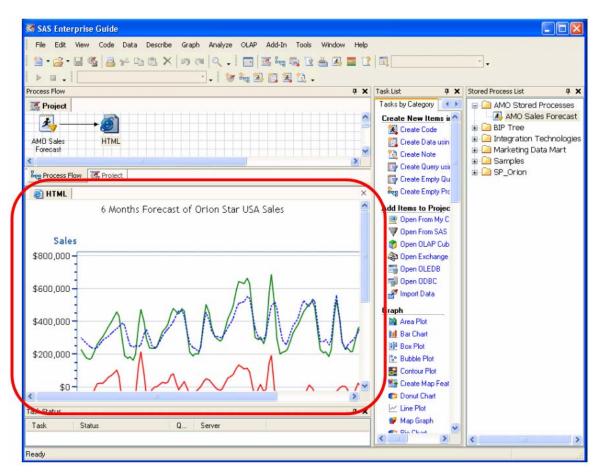
SAS Enterprise Guide	
File Edit View Code Data Describe Graph Analyze OLAP Add-In Tools Window Help         Image: Comparison of the second se	Task List       # X       Stored Process List       #         Tasks by Category       Image: Create Code       Image: Create Code       Image: Create Code         Image: Create Data usin       Image: Create Code       Image: Create Code       Image: Create Code         Image: Create Data usin       Image: Create Code       Image: Create Code       Image: Create Code         Image: Create Data usin       Image: Create Code       Image: Create Code       Image: Create Code         Image: Create Code       Image: Create Code       Image: Create Code       Image: Create Code         Image: Create Code       Image: Create Code       Image: Create Code       Image: Create Code         Image: Create Code       Image: Create Code       Image: Create Code       Image: Create Code         Image: Create Code       Image: Create Code       Image: Create Code       Image: Create Code         Image: Create Code       Image: Create Code       Image: Create Code       Image: Create Code         Image: Create Code       Image: Create Code       Image: Create Code       Image: Create Code         Image: Create Code       Image: Create Code       Image: Create Code       Image: Create Code         Image: Open DLEDB       Image: Create Create       Image: Create Code       Image: Create Code         Imac: Create Create
Task Status 4 X Task Status Q Server	Image: Society       Image: S
Ready	

4. Run the stored process by selecting **<u>Run This Stored Process</u>** from the pop-up menu (or by selecting the stored process and selecting **)** on the toolbar).

5. Because this stored process has several parameters to make it dynamic, a parameter window is displayed. Click the down arrow next to Significance level, select <u>10%</u>, and click Run. The stored process program is run using the selected parameters.

AMO Sales Forecast		X
General Significance level:		
Forecast method: Number of Lead Months:	STEPAR V	
Forecast method: (* denotes m	equired parameter)	< >
Sas.	2 🔶 Run	Cancel

6. The results are displayed in the work area.



## PART 2

Add an existing SAS program to the project and create a new stored process from it.

- 1. Add an existing SAS program to the project (this program is located on the local computer) by selecting <u>File</u> ⇒ <u>Open</u> ⇒ <u>From My Computer...</u>.
- Using the drop-down list in the Look in box, navigate to C:\Workshop\winsas\sbiovr, select <u>customerlist.sas</u>, and click Open

Open From My	Computer			? 🛛
Look in	: 🗁 sbiovr	1 📥	🖌 🧿 🗊 🗁 🛄 -	
D Recent	Customerlist.sa			
Desktop				
My Documents				
My Computer				
<b>S</b>	File name:	customerlist.sas	~	Open +
My Network	Files of type:	All Files (*.*)	~	Cancel

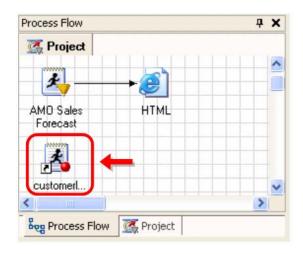
The customerlist.sas program uses the PRINT procedure and OBS system option to print only a specific number of Orion Star Gold customers. Currently the OBS system option is specified using a %LET statement. We will remove that statement so that the number of observations can be specified using a stored process parameter.

```
%let num=20;
options obs=#
libname orgold "C:\Workshop\winsas\sbip\Orion_Star_15AUG03\orgold";
title "Listing of Orion Gold Customers";
proc print data=orgold.customer_dim label;
  var customer_name customer_id;
run;
```

3. In the code editing area, highlight the first line (%let num=20;) and select Delete.



- 4. Select <u>File</u> ⇒ <u>Save customerlist.sas</u> to save the changes.
- 5. Select the program that was just added to the process flow, and select <u>Create Stored Process...</u> from the popup menu.



6. The Create New Stored Process Wizard opens. The first step enables you to specify descriptive information about the stored process. Type **SUGI Stored Process #1** as the Name and click Next > .

🕼 Create New Stored Process Wizard
General Information (Step 1 of 6) Specify a name for your stored process. You can also provide a description and keywords for the stored process.
Name:
SUGI Stored Process #1 🛑 1
Description:
Keywords (comma separated):
Provide a name for your stored process. This name is used to identify your stored process on the SAS Metadata Server. More (F1)
Preview code < Back Next > F2 Run Cancel

Create New Stored Process Wizard Ietadata Location (Step 2 of 6) Specify the location on the metadata server		
information about this stored process. Location of the stored process on the metad	ata cerver	
//Foundation/AMD Stored Processes		
	Refresh	Choose location

8. In step 3, verify that the Execution server is set to <u>SASMain – Logical Stored Process Server</u>, accept the default Source file path and Source filename, and click Next > .

🧟 Create New Stored Process Wizard
Execution Environment (Step 3 of 6) Specify the server that will execute the SAS code at run time. You must also specify a storage location and name for your code.
Execution server: 1
SASMain - Logical Stored Process Server - SAS Stored Process Server - 9.1
Source file path:
C:\Workshop\winsas\sbiamo\storedprocesses
Existing SAS code files:
AMO_Sales_Forecast.sas AMO_Sales_Forecast~1.sas
Source filename (*.sas):
SUGI_Stored_Process_#1.sas
Select the location where you want to store your SAS code. Stored processes can be stored only in locations that are defined on the SAS Metadata Server. More (F1)
Preview code < Back  Next > Fi(2) Run Cancel

- Because this stored process does have a parameter (number of observations to print), we will have the wizard automatically scan the code for macro variable references. Click Add, then select Parameters From SAS Code....
- 10. Type Number of Customers to Print as the value for User prompt, select Integer as the Data type, select <u>Required</u>, and then select the <u>Constraints</u> tab.

🜀 Automatically Add Pa	arameters from SAS Code	×
General Constraints	<u> </u>	
User prompt:	Number of Customers to Print	
SAS variable name:	num	
Description:		
Data type:	Integer 2	
Default Value:		
Location:	General 🗸	
Options:		
	Expert     ✓ Required       ✓ Modifiable     ✓ Visible	
Skip this parameter	Rescan code Add Close Cancel	

11. Select <u>Integer range</u> as the type of constraint, select <u>Minimum</u> and type 1, select <u>Maximum</u> and type 10000, select <u>Increment</u> and type 5, and then click <u>Add</u>.

		arameters from SAS Code	$\mathbf{X}$
			T
	Integer range		
	Integer Range		
2	Minimum	1 🛑 3	
4	Maximum	10000 🛑 (5)	
6	Increment	5 (7)	
• I	Increment		
	Skip this parameter	Rescan code Add Cancel	

		variables c	ould be found in th	ie program.	Click
Enterprise Guide					
Enterprise Guide could not loo	cate any addi		Variables in the SAS	code.	
Verify that the parameter has	been addeo	d and click	Next >		
Specify the parameters to include	de in your sourd	ce code. You	can also		
organize these parameters in gr	20LIDS				
		Options	Description		
Group or parameter name	Data type n/a	Options V	Description		Add
Group or parameter name	Data type n/a		Description		Add Edit
Group or parameter name	Data type n/a	V	Description		
Group or parameter name	Data type n/a	V	Description		Edit
Group or parameter name	Data type n/a	V	Description		Edit
Group or parameter name	Data type n/a	V	Description		Edit
Group or parameter name	Data type n/a	V	Description		Edit
Group or parameter name	Data type n/a	V	Description		Edit

14. Verify that Streaming output is selected and click

Next >

Output Options (Step 5 of 6) Select the type of output package for the	stored process.
None	Streaming Options Input streams:
Create HTML user interface Transient package of files Permanent File system	Name     Multi     Description       Add     Edit     Delete
Enables you to view the output immediately a	Output stream: An output stream named _WEBOUT is automatically defined. fter it is generated. No output package is stored on the server. More (F1)

15. Review the summary of the steps and click Finish to create and register the stored process.

Create New Stored Process Wizard	
Summary (Step 6 of 6) Verify that the information about your stored process is correct.	*
Summary Generated by Enterprise Guide Stored Process Manager	^
Stored Process	
Name: SUGI Stored Process #1	
Stored process execution server: Name: SASMain - Logical Stored Process Server Type: SAS Server Version: 9.1	
SAS source code storage: Location: C:\Workshop\winsas\sbiamo\storedprocesses Location description: SAS code filename: SUGI_Stored_Process_#1.sas	×
Сору to	o clipboard
	More (F1)
Preview code < Back   Next > Finish	Bun Cancel

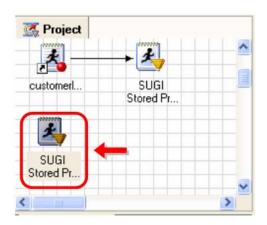
16. When you are notified that the stored process has been saved, click OK
Enterprise Guide Stored process saved successfully OK
17. When you are prompted to update the code task, click Yes
SAS Enterprise Guide SAS Enterprise

Do you want to updat	e the code task	with the code from the stored proc	:ess?
	Yes	No	

18. The Stored Process List should now show the new stored process.



- 19. Add the new stored process to the project by double-clicking it in the Stored Process List.
- 20. Run the stored process by selecting **Run This Stored Process** from the pop-up menu (or by selecting the stored process and selecting **>** on the toolbar).



21. When the parameter window is displayed, change the Number of Customers to Print to 8 and click Run

General			
Number of Customers to Print	8	<mark>1</mark>	
(" denotes required parameter)			 

22. View the output and verify that only eight customer names and IDs were printed.

<b>S</b>	AS Enter	prise Guide				
		View Code Data Describe Grap				
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Proce	ss Flow		👱 🗸 🛛 🦅 🗞 🌆		• Task List 🛛 📮 🗙	Stored Process List 🛛 📮 🗙
Stor	Project	W C Project ATML w customerfist sas Att ML mg of Orion Gold	Customers		Tasks by Cate	AMO Stored Process     AMO Sales Fore     AMO Sales Fore     SUGI Stored Pri     BIP Tree     Integration Techno     Marketing Data Ma     Samples     SP_Orion
	Obs	Customer Name	Customer ID		V Open Fron Open OLA	
	1	Albert Collet	1		Dpen OLE	
	2	Markus Sepke	13		Import Dat	
	3	Oliver S. Füßling	19		Graph M Area Plot	
	4	José Fernández de Mesa	21		🚺 Bar Chart 🏥 Box Plot	
	5	Dianne Patchin	45		😒 Bubble Plc 🛃 Contour Pl	
	6	Annmarie Leveille	49		🚮 Create Ma 🌍 Donut Cha	
	7	Gert-Gunter Mendler	50		🗠 Line Plot 💕 Map Grapi	
	8	Carsten Maestrini	61		🕼 Pie Chart 🔽	
Read	U			1	< >	< >>
				/		-

# PART 3

Add a data source to the project, run a task against it, and create a new stored process based on that task.

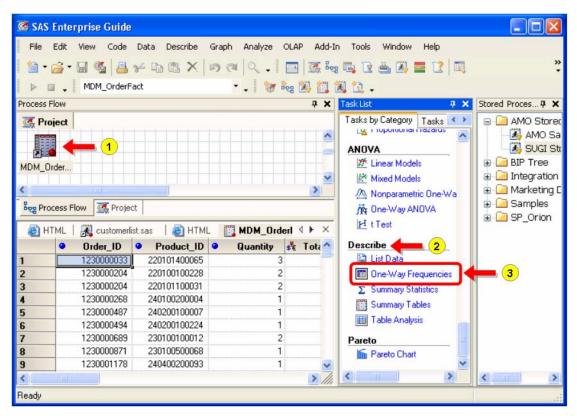
Add a data source to the project by selecting <u>File</u> ⇒ <u>Open</u> ⇒ <u>From SAS Server/Binder...</u>. When you are prompted to connect to the SASMain server, type edusolutions\sasdemo as the User, type student1 (case sensitive) as the Password, clear <u>Remember these credentials</u>, and click OK.

	Credentials	Required 🛛
	Server SASMain	
	User:	edusolutions\sasdemo
	Password:	жижижия <b>(2</b> )
3 🛁		r these credentials

2. Select MDM Target Tables Library as the library, select MDM\_OrderFact, and click

🗁 Open From SA	S Server/Binder				
Look in:	🇊 MDM Target Tabl	es Library 🚺 📥 🔽	🗢 🗈 🗙	🎬 📰 🔹	
	Name		Туре	Indexed	
-	MDM_OrderFact	2	Data		
Servers	MDM_ProductDi	m	Data		
		r			
	File name:			3	Open
	Files of type:	All Files (*,*)			Cancel
	Open as:	Auto		~	1

3. With the MDM\_OrderFact table selected, scroll to find the Describe section in the Task List and select One-Way Frequencies.



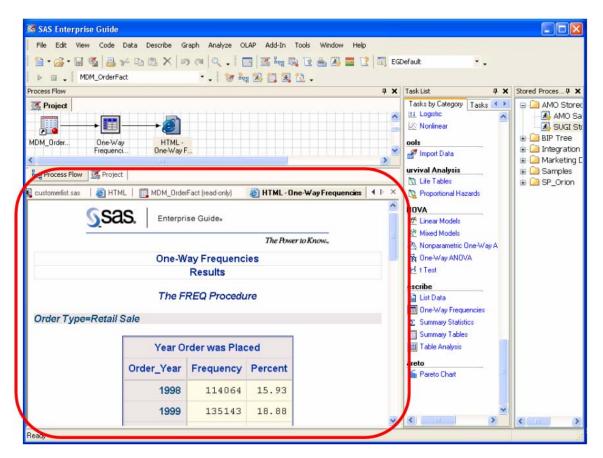
4. In the task dialog, drag and drop Order\_Year onto the Analysis variables role, and drag and drop Order\_Type onto the Group analysis by role. Select <u>Statistics</u> in the navigation pane on the left.

Task Roles Statistics					
Plots Besults	Variables:	_	Roles:	Order_Type sort order:	
Titles	Name ● Order_ID ● Product_ID ● Quantity St Tota_Retail_Price St CostPrice_Per_Unit ● Order_Type ■ Order_Type ■ Order_Date ■ Delivery_Date ● Order_Year ● Order_Qtr ● Order_Month ● Delivery_Time	•	Analysis variables  Order_Year  Frequency count (Limit: 1)  Order_Type  Order_Type	2	

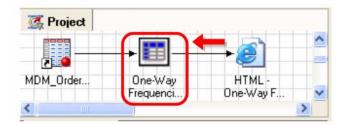
5. Select Frequencies and percentages from the Frequency table options and click Run

sk Roles	Statistics		
tistics ts	Frequency table options	Binomial proportions	Exact computations
sults	Include:	Asymptotic test	Computational time may be
es	<ul> <li>Frequencies and percentages with cumulatives</li> </ul>	Exact p-values	excessive for certain data.
	<ul> <li>Frequencies and cumulative frequencies</li> </ul>	Test proportion: 0.5	Limit computation time
1 =	<ul> <li>Frequencies and percentages</li> </ul>	Confidence level: 95%	Seconds: 900
	Frequencies only		Use Monte Carlo estimation
	Missing values	Chi-square goodness of fit	- <u> </u> ]
	Show frequencies	Asymptotic test	
	Include in calculations	Exact p-values	
	The selection pane enables you t	o choose different sets of options for the ta	sk.
	•		~
ew code	2	Run Save C	ancel Help

6. View the task output.



7. Create a stored process based on the one-way frequencies task. Select the task that you just created, and select <u>Create Stored Process...</u> from the pop-up menu.



8. The Create New Stored Process Wizard opens. Type **SUGI Stored Process #2** as the Name and click Next > .

🧟 Create New Stored Process Wizar	d		
General Information (Step 1 of 7)			
Specify a name for your stored process. description and keywords for the stored pr	'ou can also provide a ocess.		<b>A</b>
Name:			
SUGI Stored Process #2 🔶 1			
Description:			
Keywords (comma separated):			
			More (F1)
Preview code	k Next >	Run	Cancel

information about this	tep 2 of 7) on the metadata server where you want to store the stored process.	×
Location of the stored	process on the metadata server	
//Foundation/AM0 S	tored Processes	
	Refresh	Choose location

10. In step 3, verify that the Execution server is set to **SASMain – Logical Stored Process Server**, accept the default Source file path and Source filename, and click Next > .

Create New Stored Proces	ss Wizard	
Execution Environment (Step 3 Specify the server that will execu- also specify a storage location a	ute the SAS code at run time. You must	*
Execution server:		
SASMain - Logical Stored Process	Server - AS Stored Process Server - 9.1	~
Source file path:		
C:\Workshop\winsas\sbiamo\store	edprocesses	~
Existing SAS code files:		
AMO_Sales_Forecast.sas AMO_Sales_Forecast~1.sas	SUGI_Stored_Process_#1.sas	
Source filename (*.sas):		
SUGI_Stored_Process_#2.sas		
		More (F1)
Preview code	< Back   Next >   F(2)  Run	Cancel

Next >

11. In step 4, accept the default library assignment information and click

MDM Target Lib		='eduBI05' port=8561 protocol=bridge userid='edusolutions\sas
Include LIBNAME st	atement in SAS code	
Type: IN	DM Target Tables Libra PUT	Use custom LIBNAME statement Libname MDMT Meta ipaddr='eduBI05' port=8561 protocol=bridge userid='edusolutions\sasdemo'
Hostname: ed Username: Password:	luB105	pw='{sas001}U3R12GVudDE=' repid=A0000001.A5M8DL2U libid=A5M8DL2U.BF0000R

12. Because there are no parameters for this stored process, click Next >

Group or parameter name	Data type	Options	Description	Add
🗁 General	n/a	V		
				Edit
				Delete

13. Verify that <u>Streaming output</u> is selected and click Next >

🥳 Create New Stored Process Wizard	
Output Options (Step 6 of 7) Select the type of output package for the sto	ored process.
None	Streaming Options Input streams:
Create HTML user interface Transient package of files Permanent File system	Name Multi Description
Lists the input streams that are currently defined. process at run time.	Output stream: An output stream named _WEBOUT is automatically defined. An input stream is an alternative way of providing data to a stored More (F1)
Preview code < Back	Next > Herefi 2 Run Cancel

14. Review the summary of the steps and click Finish to create and register the stored process.

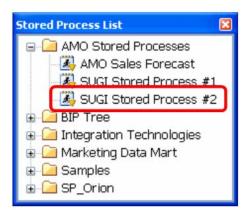
🧟 Create New Stored Process Wizard	
Summary (Step 7 of 7) Verify that the information about your stored process is correct.	*
Summary Generated by Enterprise Guide Stored Process Manager	^
Stored Process	
Name: SUGI Stored Process #2	
Stored process execution server: Name: SASMain - Logical Stored Process Server Type: SAS Server Version: 9.1	
SAS source code storage: Location: C:\Workshop\winsas\sbiamo\storedprocesses Location description: SAS code filename: SUGI_Stored_Process_#2.sas	~
Copy to clipboard	
Mc	ore (F1)
Preview code < Back  Next > Finish  Finish	Cancel

15. When you are notified that the stored process has been saved, click

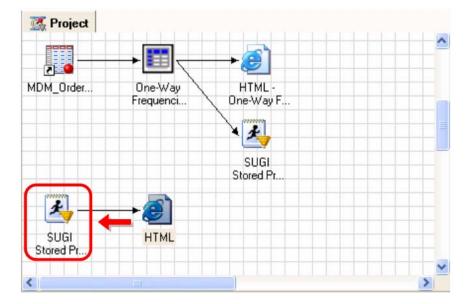




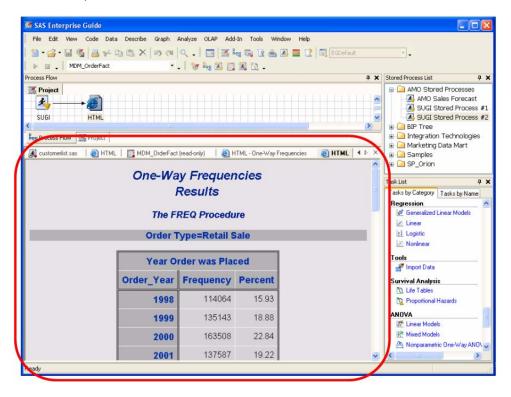
16. The Stored Process List should now include the new stored process.



- 17. Add the new stored process to the project by double-clicking it in the Stored Process List.
- Run the stored process by selecting <u>Run This Stored Process</u> from the pop-up menu (or by selecting the stored process and selecting on the toolbar).



19. View the output.



### CONCLUSION

This hands-on workshop provided an overview of SAS stored processes and how SAS Enterprise Guide can be used to create and use stored processes.

#### REFERENCES

You can learn more about SAS stored processes by attending the following SAS Education course: *Creating, Distributing, and Using SAS<sup>®</sup> Stored Processes.* 

#### **CONTACT INFORMATION**

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