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A Peek at PROC DOCUMENT

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Abstract

A major enhancement to the SAS Output Delivery System (ODS) in SAS 9 Software is implementation of the DOCUMENT Destination, which allows SAS users to store ODS-generated objects in a re-useable file structure called a "document." ODS DOCMENTS can be accessed, re-played, and manipulated using the new DOCUMENT Window or PROC DOCUMENT, an interactive BASE SAS Procedure which is also new in SAS 9. Learning to use the DOCMENT Destination, DOCUMENT Window and DOCUMENT Procedure will give you enhanced control and flexibility when using ODS to generate output from SAS Procedures.

Core Concepts: ODS Tables, Objects and Destinations

In order to understand the new DOCUMENT capabilities added in SAS 9, it is important to first understand how the Output Delivery System works within the overall framework of the SAS System's creation of output by Procedures.

Prior to production implementation of Output Delivery System features in Version 8 of the SAS System, each Procedure generated its output as text. Users had very little control over the structure of the procedure-generated output, and sending the output to other file formats (e.g., a SAS data set or an HTML file) was a tedious exercise.

Starting in Version 8, SAS procedures that create "printed output" now send the results of their labors to the Output Delivery System. The formal term for what the procedure sends to ODS is the Data Component of the Output Object (described in more detail below) and contains the procedure's report, analysis, table, etc. Once the ODS receives the Data Component from the procedure, it binds it to the Style Component, which contains the "rules" for the appearance of the procedure-generated output. The combined Data and Style Components form the Output Object, which ODS then sends (or "delivers" to all of the ODS Destinations that are open at that point in your program.

[As we will discuss below, ODS' capability to simultaneously render the same Output Object to multiple open Destinations factors in to how we can use the new DOCUMENT Destination in conjunction with the other Destinations we are currently using to render our SAS-generated output.]

ODS Limitations in Version 8

While implementation of ODS has certainly revolutionized how we work with SAS-generated output, one major limitation is that the Output Objects cannot be stored in "raw" form. Instead, the objects are immediately sent to the open Output Destinations and cannot be re-used or manipulated in any way.

Because of this limitation, Procedures need to be re-run every time output is to be rendered to a different destination.

For example, suppose a risk analyst employed by a credit card issuer generates several hundred models every month, using PROC LOGISTIC, each predicting the probability of account "charge-off" (uncollectible account) for several million credit cards. Each model predicts probability of "charge-off" for a unique combination of credit card attributes (e.g., interest rate, credit limit, card type (gold, platinum, Visa™, MasterCard™), etc.) that form a unique "product" offered by the credit card issuer.

The analyst responsible for this monthly project normally delivers the PROC LOGISTIC-generated output as a SAS Data Set, using the ODS OUTPUT destination, which is then distributed to others in the organization for analysis. So far, so good.

But, what happens when the analyst receives a request to have the output of this month's models generated as, say, a Portable Document File (PDF) that some non-SAS users in another part of the organization want to review? In Version 8, the models would have to be re-run with the appropriate ODS statements to render the output to the PDF Destination.

This may not be a trivial exercise, especially if the analyses are performed on very large data sets. Extensive system resources and processing time may be required to "re-interrogate" the data, generate the models' output a second time, and then have the procedure-generated output rendered as a PDF.
Obviously, what's needed is a way to "capture" ODS objects in their "raw" form so they can be re-used (e.g., sent to other ODS Destinations) without having to re-run the Procedure which generated them.

The Solution: The DOCUMENT Destination

Starting with the release of SAS 9, the Output Delivery System includes the new DOCUMENT Destination. Sending our ODS-generated Output Objects to this new destination means they are stored in (either a temporary or permanent) "itemstore" called a SAS Document. The Document itemstore contains all of the Output Objects that were created while the DOCUMENT destination was open.

As with all other ODS Destinations, the new DOCUMENT Destination can be open at the same time other destinations are open. In fact, one of the key features of the SAS Output Delivery System is that you can render the same Output Object to multiple destinations at the same time. For example, the LISTING (Output Window) Destination is, by default, always open, which is why you see your Procedure-generated output in the Output Window unless you submit the ODS LISTING CLOSE command.

Returning to our hypothetical example of the credit risk analyst and her monthly "charge-off" models, with SAS 9 Software is installed at her workplace she could continue to create SAS data sets containing the model results, just as she did in SAS Version 8. But, by also opening the DOCUMENT Destination before the models are generated (and, of course, closing it afterwards), she could save all the output in a re-useable itemstore called a "document," She could then re-use, or "re-play" the objects to any ODS Destination *without having to re-run the PROC LOGISTIC tasks used to create the models.* So, when an ad-hoc request for the model results to be portrayed as a PDF document, the risk analyst can just "re-play" the Document to the PDF Destination using either the DOCUMENT Window or PROC DOCUMENT commands (see below).

Both permanent and temporary itemstores can be created by the ODS DOCUMENT Destination. Creating a permanent DOCUMENT itemstore allows you to use it repeatedly, across SAS sessions, just like you can use the variables and observations in a permanent SAS data set from one SAS session to the next. An, just like your temporary SAS data sets, temporary DOCUMENT itemstores are not available for use after you terminate the SAS Session in which they were created.

DOCUMENT itemstores can be transferred from one user to another, but they **cannot** be transported across operating systems/platforms.

The ability to transfer a DOCUMENT itemstore from one user to another makes it possible for, say, our risk analyst to generate the desired "charge-off" models, save the PROC LOGISTIC-generated results to a DOCUMENT itemstore, and then send the itemstore to someone else who, by using either the DOCUMENT Window or PROC DOCUMENT Syntax, creates web pages for the company intranet by re-playing the output the HTML (Hyper Text Markup Language) Destination.
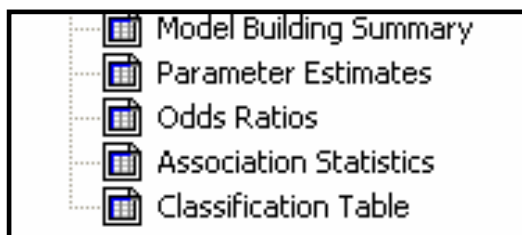
The DOCUMENT Window

SAS 9 includes two methods by which to work with the contents of your DOCUMENT itemstores, the DOCUMENT Window and the DOCUMENT Procedure. Let's first take a look at the DOCUMENT Window.

This new window on the SAS Desktop is opened when you submit the ODSDOCUMENT command from the command line or the as a Display Manager command via the Program Editor. The DOCUMENT Window then appears on the left-hand side of your SAS workspace, along with the RESULTS and EXPLORER Windows. Here is an example of what the DOCUMENTS Window looks like after I had used PROC LOGISTIC to create a predictive model.
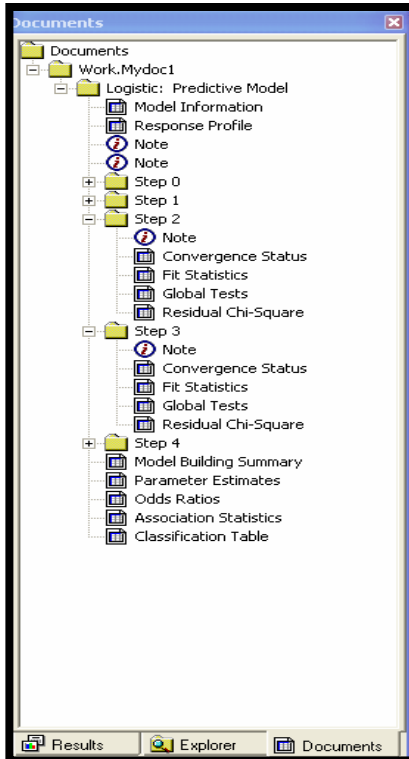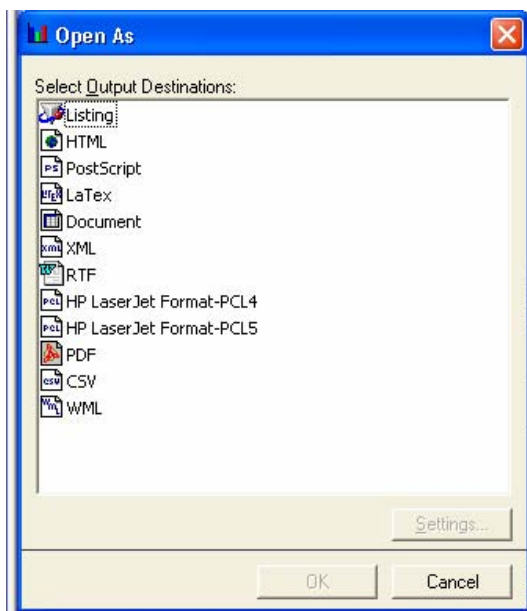

The DOCUMENT Window

Here is a close-up view of some to the elements of this DOCUMENT Itemstore. You can see that a distinctive new icon for Output Objects rendered to the DOCUMENT Destination has been added to the Output Delivery System in SAS 9.

DOCUMENT Destination Icons:
Close Up View

The DOCUMENT Window provides a GUI (Graphical User Interface) to the elements of the DOCUMENT itemstore. You can use point-and-click commands within the DOCUMENT Window to re-play, delete, copy and move the elements in the itemstore.

For example, a left-mouse-click on any of these elements opens the "Open As" Window, which permits you to replay the element to any of the listed ODS Destinations.

There are some limitations to the use of this aspect of the DOCUMENT Window which are slated to be addressed in a future release of the SAS System. At present the ability to send the output to a specified path/file location is very limited, and it may be a bit frustrating to work with this window until SAS Research and Development and implement some enhancements to it.

You can also submit commands within the DOCUMENT Window to rename, delete, copy and paste objects. New Documents can be created within this window, and you can also re-organize the layout of your output by cutting and pasting objects from one object to another.

The new DOCUMENT Window and the RESULTS Window, which has been a key element of SAS Software in Windows-based operating systems for many years, have functionalities in common. But, there are some tasks which can only be performed in one of the two windows. The following table, abstracted from the documentation chapter for PROC DOCUMENT (see below), shows the similarities and differences between them.

Task	Document Window	Results Window
View SAS documents, including those stored in SAS Libraries	YES	YES
View output objects, such as PDF. HTML, etc	YES	YES
View results after creating a new output object	YES	YES
Customize layout/ordering of OBJECTS	YES	NO
View document properties	YES	YES
View OBJECT properties	NO	YES
Delete/rename entries	YES	YES
Copy/move DOCUMENTS	YES	NO

PROC DOCUMENT

The second tool with which to work with your ODS Documents is the DOCUMENT Procedure, which has been added to BASE SAS Software in SAS 9. This interactive procedure has a number of tools to create, modify, delete, rename and re-play objects stored in your Documents. Several examples of PROC DOCUMENT syntax are available on the SAS web site (see below) or in the PDF Version of my PowerPoint™-based presentation available for download at www.**SierraInformation**.com

While mastering PROC DOCUMENT's syntax has something of a learning curve, it is well worth the time invested to do so, especially if you are generating complex reports with output from multiple SAS procedures which you want to store in a DOCUMENT itemstore.

Learning More

You can learn more about the DOCUMENT ODS Destination, Itemstores, Window and Procedure by downloading the documentation and other resources available at the BASE SAS Research and Development section of SAS Institute's web site. The URL is:
support.sas.com/rnd/base/topics/odsdocument/

A PDF version of the PROC DOCUMENT documentation and other information is available for download from the web site.

Summary and Conclusions

The new DOCUMENT Destination, Procedure and Window expands ODS capabilities to a new level of power and flexibility. While there is something of a learning curve with PROC DOCUMENT syntax, taking the time to master its capabilities will be worth the effort.

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