Customize your WEB output using SAS/IntrNet™ Software and WEB publishing tools

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ABSTRACT

Customizing dynamic Web output can often be a tedious task because of the preferences of each end user. This paper will focus on how you use the functionality of the Web Publishing Tools provided by The SAS® Institute to create a flexible application that can conform to end-users different output specifications.

This paper uses concept of Application Dispatcher and Application Server of SAS/IntrNet software, SAS/Graph® software, SAS macro language and SAS Web Publishing Tools in Windows NT™ environment.

Drill down capabilities of the demo programs and examples of Solutions@Work™ of SAS/IntrNet software are used throughout this paper.

INTRODUCTION

Data Set Formatter is used to create HTML table from a SAS data set. With the help of GIF and GIF Animator Device Driver, SAS/Graph® procedure produces images for the Web browser dynamically. PROC GGRAF procedure is used to create VRML(Virtual Reality Modeling Language) Images for the Web browser.

A brief overview of setting up SAS/IntrNet software and the process to get HTML table and Graph images are focused in this paper.

COMPONENTS

Application Server
When application server starts, it submits the content of Permdata.sas and Servauto.sas. Application server can be always turned on or Application Broker can turned it on when you submit a query through Web browser. SAS/IntrNet software is installed in the C:\IntrNet directory. Permdata.sas and Servauto.sas reside in this directory.

PERMDATA.SAS: This program allocates library reference of all the data library to be used to derive HTML output, Device Driver for GIF or GIFANIM, compiled macros to send queries quickly to the Web browser and to store permanent data and graphs. Figure 1, shows part of the contents of this program.

```
libname ris9803 'g:\ris9803'  access=readonly;
libname ris9806 'g:\ris9806'  access=readonly;
libname gdevice0 'w:\ahsan\qbp\graphs' access=readonly;
libname save 'c:\qbp612\data';
libname data 'c:\qbp612\redata';
libname sod  'c:\qbp612\soddata';
libname hdata 'w:\ahsan\qbp\graphs\hdata' access=readonly;
libname qbpmcro 'c:\qbp612\qbpmcro' access=readonly;
libname realmcro 'c:\qbp612\realmcro' access=readonly;
```
Figure 1: Permdata.sas

SERVAUTO.SAS: This program allocates all the application program references. SAS catalog entries of SCL and SOURCE are used to submit request to the application server. Figure 2, shows part of the contents of this program.

```
%let _TMPDIR=C:\temp\;
libname sample  'c:\intrnet\sample'  access=readonly;
libname ris 'w:\ahsan\qbp\graphs' access=readonly;
```
Figure 2: Servauto.sas

Application Broker
Broker.exe and Broker.cfg are the two components of the application broker. They are residing in the Web Server directory called 'SCRIPTS'.

BROKER.EXE: Web server invokes broker.exe and sends information to application server after you submit a request in the Web browser. The request is sent along with Name/Value pair provided by HTML form and they are available as macro variables.

BROKER.CFG: It contains information about TCP/IP address and port address of the application server. The default service name is changed from 'DEFAULT' to 'DESHI', so the request is sent to specific application server.

IIS WEB SERVER
Microsoft Personal Web Server is used to communicate with Web browser and application server. An HTML file resides in the root directory('WWWROOT) which waits for your selection for dynamic drill down. As soon as you select an HTTP link, it submits a compiled macro. The syntax of these programs is discussed in the later part of this document. These programs can be a SAS program, compiled SCL program, macros and compiled stored macros.
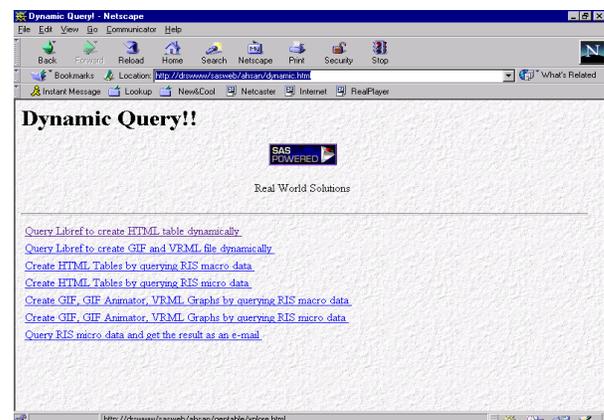

Figure 3: A Sample HTML File

An NT workstation is connected by TCP/IP protocol to other workstation. Personal WEB server is smart enough to automatically configure the IP address and TCP port number assigned to installed workstation. Netconfig.exe will also list the TCP/IP address in NT environment.
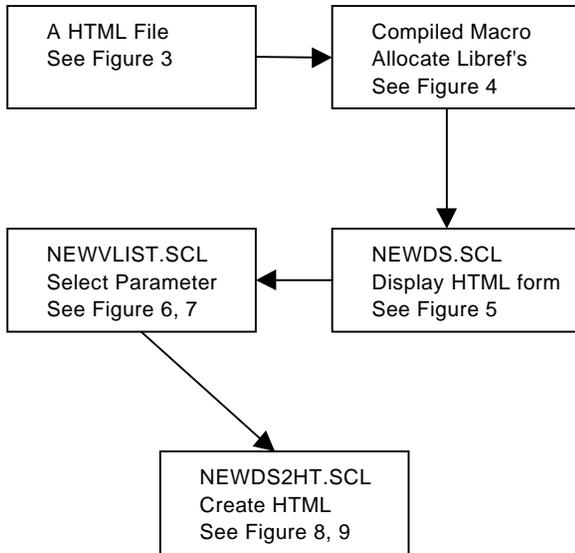
WEB Browser
Some of the JAVA™ and VRML related application did not run under Netscape™ 4.04 and MS Explorer™ 4.0. The problem is avoided by using Netscape 4.06 and MS Explorer

4.01. These two browsers would be used all through out this document

HTML TABLE

Setup
You need to have a clickble HTML link to communicate with SAS programs. This link will use Websamp.sc2 catalog and its entries. This paper uses the concept of XPLORE.MACRO which is available in the institute Web site and Solutions@Work™ documentation. A flow chart is provided to show the sequence of programs needed to create customized HTML table.

```
┌─────────────────────┐        ┌─────────────────────┐
│  A HTML File        │───────▶│  Compiled Macro     │
│  See Figure 3       │        │  Allocate Libref's  │
│                     │        │  See Figure 4       │
└─────────────────────┘        └─────────────────────┘

┌─────────────────────┐        ┌─────────────────────┐
│  NEWVLIST.SCL       │◀───────│  NEWDS.SCL          │
│  Select Parameter   │        │  Display HTML form  │
│  See Figure 6, 7    │        │  See Figure 5       │
└─────────────────────┘        └─────────────────────┘

          ┌─────────────────────┐
          │  NEWDS2HT.SCL       │
          │  Create HTML        │
          │  See Figure 8, 9    │
          └─────────────────────┘
```

XPLORE.MACRO: This macro queries all the SAS data sets available in the current libref's. As soon as you submit a query, all the available libraries will be listed as drilldown folder in one frame and description or result in another frame. Copied the source code of XPLORE.MACRO and submitted with 'MSTORE' option as NEWXPLOR.MACRO. This macro is copied back to WEBSAMP.SC2. Only change is made to original XPLORE.MACRO is the name of new SCL program which is called NEWDS.SCL instead of DATASET.SCL.

```
<HTML>
<TITLE>Explore SAS Data Sets, SCL, GRSEG,
Image, Source, Output, Log entries</TITLE>
<FRAMESET COLS="30%,70%" >
  <FRAME SRC =
"/scripts/broker.exe?_service=deshi&_program=ris.
websamp.newxplor.macro&_debug=0&bgtype=color
&bg=white" name="list">
  <FRAME SRC = "xptext.html" name="datasets">
</FRAMESET>
</HTML>
```
Figure 4: Run Compiled Macro

Name/value pair 'List' will contain all the available fields passed to the application server including the selected data set, Server and Scripts information.

NEWDS.SCL: This compiled SCL program displays an HTML form window which is populated by the variables of the selected data set. VARLIST.SCL is changed to NEWVLIST.SCL and DS2HTM.SCL is changed to NEWDS2HT.SCL. See Figure 5, for the syntax of this SCL program.

'Nextpgm' is used with HTML form 'SUBMIT' command and is saved in the 'List' entry.

```
nextpgm =
getnitemc(list,'_PGMLIB')||'.WEBSAMP.NEWDS2HT.
SCL'
rc = setnitemc(list,nextpgm,'NEXTPGM');
call display('NEWVLIST.SCL',list);
```
Figure 5: Display HTML Form

NEWVLIST.SCL: This SCL program is modified, so you can select all the available parameters for DS2HTM macro. If you do not select any parameters and submit the request, application dispatcher will create a default HTML table for you. Figure 6, show a sample SCL code to create HTML tags in the Web browser. Figure 7, shows the same code in the browser.

```
do i = 1 to attrn(dsid,'NVARS');
      var = varname(dsid,i);
      varlab = varlabel(dsid,i);
      if varlab = ' ' then varlab = var;
      submit;
       <BR>&var  :  <INPUT  TYPE="checkbox"
NAME="var" VALUE="&var">&varlab
      endsubmit;
    end;

    submit;
       <HR>
<DL>
<DT><Font Color="RED">WHERE Clause: <input
type="text" size="200"
 name="twhere">
<DD>You must subset your query if observation is too
large</font><BR>
<DT>BY Variable: <input type="text" size="35"
name="tby">
<DD>You may include var/s with a space and without
a comma<BR>
<DT>ID Variable: <input type="text" size="35"
name="tid">
<DD>You may include var/s with a space and without
a comma<BR>
<DT>SUM Variable: <input type="text" size="35"
name="tsum">
<DD>You may include var/s with a space and without
a comma<BR>
<DD>Only Numeric and Singles get totaled<BR>
<DT>Include Formats from the Data Set
<DD>Formats: <SELECT NAME="tformat">
        <OPTION VALUE="y" SELECTED>Yes
        <OPTION VALUE="n">No
        </select><BR>
<DT>Include SAS variable label not Variable Name
<DD>Variable Labels: <SELECT NAME="tlabels">
        <OPTION VALUE="y" SELECTED>Yes
        <OPTION VALUE="n">No
        </select><BR>
```
Figure 6: Sample Code to Create HTML Tags

Once you click the 'NEXTPGM' button, all the HTML form request is saved in the SCL list 'LIST' and processed by the NEWDS2HT.SCL. These parameter selections are available as macro variables to the application server.

'Content-type: text/html' must be the first SAS statement to be submitted in the application server. Otherwise, application server can not create the file for you.
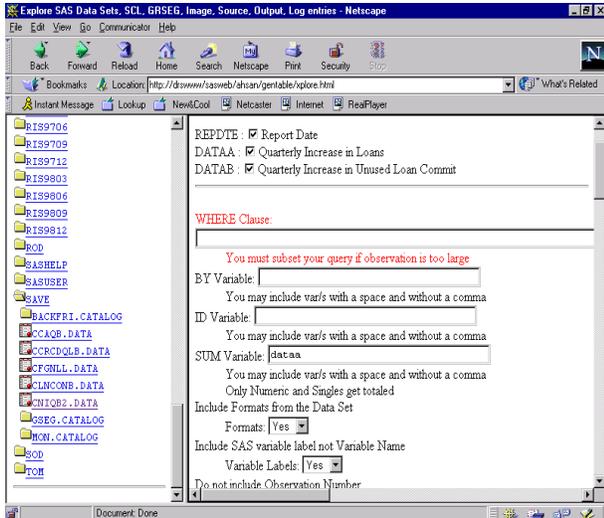

Figure 7: Browser with Parameters

NEWDS2HT.SCL: This SCL program retrieves all the fields from the browser selection, checks for values and passes these values to DS2HTM macro. HTML formatter must be installed properly, so DS2HTM macro can work. Figure 8, shows DS2HTM macro with the available parameter.

```
%ds2htm(data=&dataset, var=&vlist1 &vlist2,
by=&tby, id=&tid, sum=&tsum, htmlfref=_webout,
runmode=b, openmode=replaceencode=Y,
bgtype=color, bg=&bgvalue, septype=&tseptyp,
brtitle=&tbrtitl, talign=&ttalign, border=&tborder,
bwidth=&tbwidth, cpad=&tcpad,
cspace=&tcspace,  tbbgcolr=&ttbbgcol,
vbgcolr=&tvbgcol,  obgcolr=&tobgcol,
ibgcolr=&tibgcol, sbgcolr=&tsbgcol,
clbgcolr=&tclbgcol,  vface=&tvface,
vcolor=&tvcolor, vsize=&tvsize, vhalign=&tvhalig,
vvalign=&tvvalig, vwrap=&tvwrap, vtag=&tvtag,
bface=&tbface, bcolor=&tbcolor, bsize=&tbsize,
prttitle=&tprttitl, prtfoot=&tprtfoot,
bwrap=&tbwrap, btag=&tbtag, iface=&tiface,
icolor=&ticolor, isize=&tisize, ihalign=&tihalig,
ivalign=&tivalig, iwrap=&tiwrap, itag=&titag,
sface=&tsface, scolor=&tscolor, ssize=&tssize,
shalign=&tshalig, svalign=&tsvalig,      stag=&tstag,
oface=&toface, ocolor=&tocolor, osize=&tosize,
ohalign=&tohalig, ovalign=&tovalig, otag=&totag,
where=&twhere, clface=&tclface,
clcolor=&tclcolo, clsize=&tclsize,
clhalign=&tclhalig, clvalign=&tclvalig,
clwrap=&tclwrap, cltag=&tcltag, cface=&tcface,
ccolor=&tccolor, csize=&tcsize, cvalign=&tcvalig,
chalign=&tchalig, ctag=&tctag, tface=&ttface,
tcolor=&ttcolor, tsize=&ttsize, ttag=&tttag,
fface=&tfface, fcolor=&tfcolor, fsize=&tfsize,
ftag=&tftag, obsnum=&tobsnum, labels=&tlabels,
formats=&tformat,  caption=&tcaptio );
```

Figure 8: DS2HTM Macro with Parameters

'Content-type: text/html' must be the first SAS statement to be submitted in the application server, otherwise HTML table would not be created. '_Webout' is a special fileref which send the Web output to the browser. Figure 9, shows output of the selection made earlier in this paper.
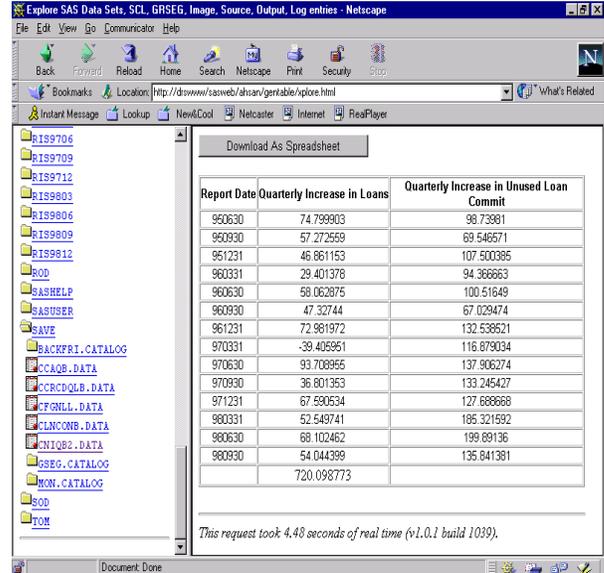

Figure 9: Sample Output from the Selection

Using the back browser button you can select and submit different parameters to control how the table should be printed, such as overall color, font, and border. HTML tags.

GIF/VRML IMAGE

SETUP
Like HTML table, it also uses the XPLORE.MACRO as a guideline. The parameters which are used in the browser window are different than that of HTML table window. Mostly SAS/Graph statements are used as selection parameters.
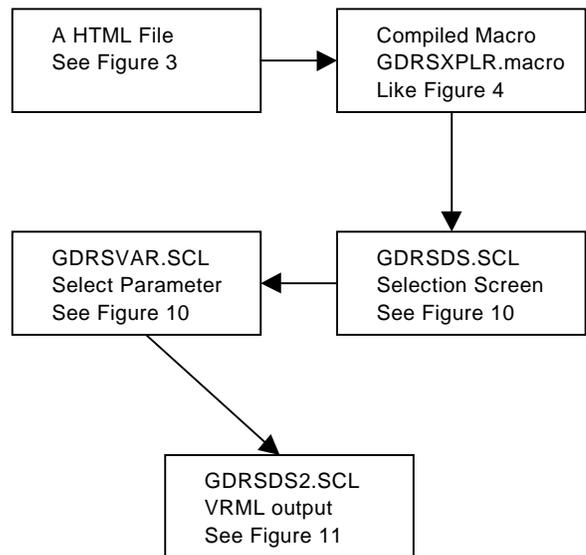
XPLORE.MACRO: Functionality of this macro is also kept same. Copied the source code of XPLORE.MACRO and submitted with 'MSTORE' option as GDRSXPLR.MACRO. This macro is also copied back to WEBSAMP.SC2. Only

name change is made to original XPLORE.MACRO. The file called DATASET.SCL is changed to instead of GDRSDS.SCL.

GDRSDS.SCL: Like NEWDS.SCL, it creates link of two SCL programs. VARLIST.SCL is changed to GDRSVAR.SCL and DS2HTM.SCL is changed to GDRSDS2.SCL.

GDRSVAR.SCL: When this SCL programs get submitted, it creates a Web output with Dependent, Independent, Subgroup, Group and By variable list boxes. The selection values to these list boxes are the variables from the data set selected from the drill down. The list box 'Statistic' which has option values of 'SUM', 'MEAN', 'PERCENT' and 'FREQ'. Two list boxes were also created to sort the Independent or Dependent values. Figure 10, illustrate this selection screen.
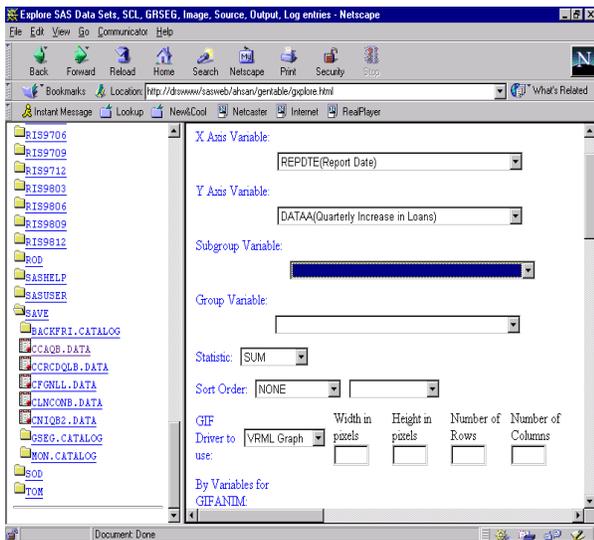

Figure 10: Selection screen for Web Image

Device Driver list box has four available values. If you choose 'GIF733', it will simply create a GIF output for the Web browser. If you choose 'Yours', you must provide 'Width', 'Height', 'Rows' and 'Columns' values of the screen output. GIF733 is recalculated in the Goptions statement to create the Web output. If you select 'VRML' image, then only the 3d images of the selected type of graph would be created. If you select GIFANIM, you must provide a 'By' variable. Data is sorted by this By variable and a GIF with every By values are appended to the Web output. Not all type of graph can be created with this GIFANIM device driver. Hex code of '3b'x must be sent at the end of the last GIF file.
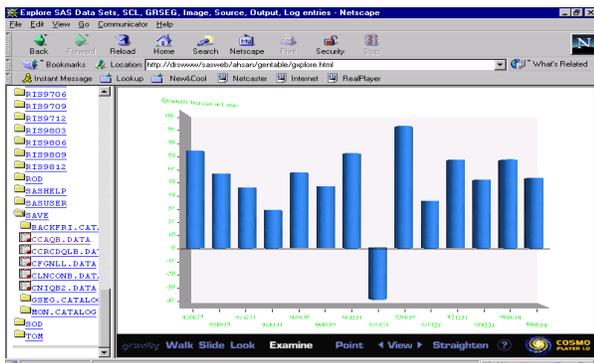

Figure 11: VRML Output

GDRSDS2.SCL: For each type of graph, a source is created in the WEBSAMP.SC2 catalog. This SCL program checks for the graph type and submits the source code to the application dispatcher. See Figure 11, shows the Web Output of a VRML file.

This SCL program also checks for the Device Driver information's and writes the appropriate 'Content-Type' to the Web output. 'Content-type' for GIF image is 'image/gif' and for VRML image is 'model/vrml'.

PROC GGRAF: The GGRAPH package is downloaded from the Institute Web site and installed before the procedure is used in the SAS/IntrNet software. Netscape uses COSMO Player as a VRML browser to show VRML file created by this procedure. Not all the options of PROC GGRAF are used in this example.

Thumb Images: All the Graph type resides in SASHELP.C0C0C. Code of Figure is used to create a GIF thumb print. So, these images can be imported in the Web output file. GIF images are used with radio boxes as shown in Figure 12.

```
Imgdat_class=loadclass('sashelp.fsp.imgdat');
imgdat_id=instance(imgdat_class);
path=lnamemk(5,'sashelp.c0c0c.barchrts.image','for
mat=cat');
 call send(imgdat_id,'_read_',path);
filen='d:/inetpub/wwwroot/gentable/barchrts.gif';
call send(imgdat_id,'_write_',filen,'format=gif');
call send(image_id,'_term_');
```

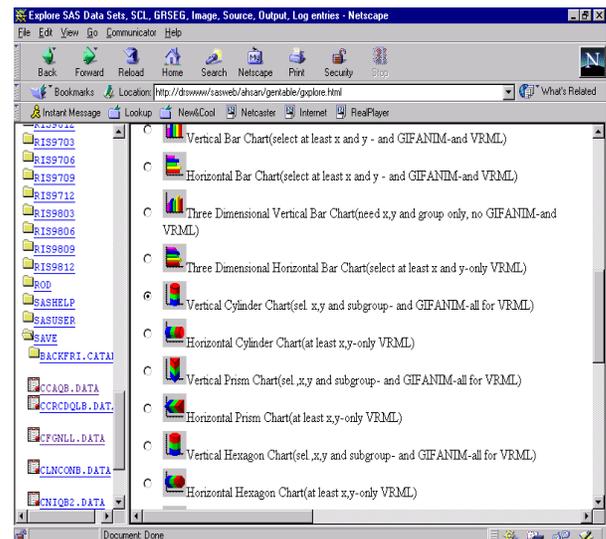**Figure 12: SCL Program to Convert Image Entry**

Figure 13: Graph Type Thumb Print

CONCLUSION

Customized Table and Image Web output can be produced using all the available parameters in the HTML formatter. You need to be cautious putting all the parameters, you might run out of memory or browser can time you out before you can get all the parameters in the screen. This will also

slows down the performance of your application. You need to select only the selected parameters you are going to use to improve the performance.

This application is created only to investigate SAS/IntrNet software and it's capabilities. Lot of enhancement can be made the way the application presented in this paper. htmSQL can be combined with the Application Dispatcher to increase the performance of the application.

REFERENCES

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