Paper 40-27

Optional and Multi-Select Parameters with SAS/IntrNet®

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ABSTRACT

When building SAS Applications to be deployed to the web with SAS/IntrNet, it's often desirable or even necessary to allow optional parameters. When selected, those parameters are passed to a SAS program via macro variables through the SAS/IntrNet Broker Common Gateway Interface (CGI). If the SAS program tries to reference a macro variable that was not passed through the CGI, the SAS program may end with an error. This paper will discuss the use of a SAS Macro developed primarily for dealing with optional parameters. The macro also includes functionality for efficiently dealing with multi-select parameters. Both macro code and proper use of the macro will be demonstrated. This paper is intended for SAS/IntrNet developers of all skill levels who have not already found a simple solution for these common problems.

INTRODUCTION

Throughout this discussion the HTML SELECT code shown in exhibit 1 will be used to demonstrate the problem and the macro solution. The HTML code contains a select box with three options for country (Canada, Germany, and USA). In reality, I would not encourage anyone to hard code select option values in an HTML page. Instead, you should use htmSQL, JSP, or an application server to query the actual values from your SAS dataset so that your web pages change dynamically with the data. However, each of those subjects could be a SUGI presentation of its own.

EXHIBIT 1: HTML CODE SNIPPET

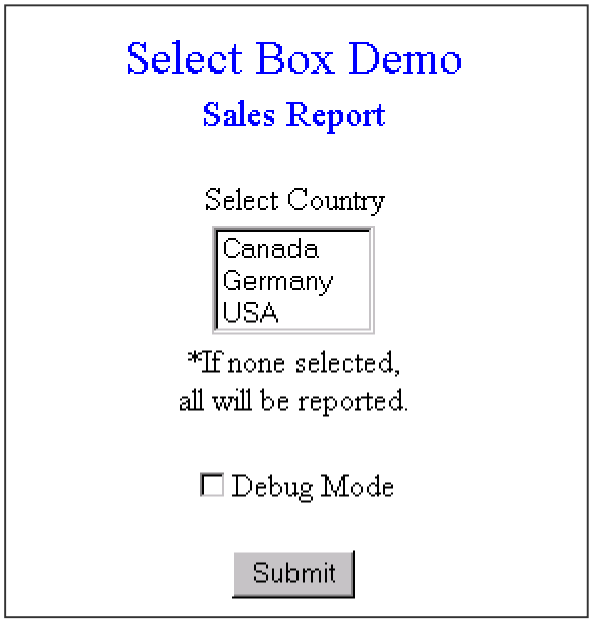
```
<html>
<head>
<title>Multi-Select Demo</title>
</head>
<body>
<form action=
"http://localhost/cgi-bin/broker.exe?"
method="post">
<input type="Hidden" name="_program"
value="web.sugidemo.sas">
<table align="center"><tr align="center"><td>
<br><br><font color="Blue" size="+2">
Select Box Demo</font></td></tr>
<tr align="center"><td><font color="Blue"
size="+1">Sales Report</font></td></tr>
<tr align="center"><td><br>Select
Country</td></tr><tr align="center"><td>

<select multiple name="country" size="3">
     <option value="CANADA"> Canada
     <option value="GERMANY"> Germany
     <option value="U.S.A."> USA
</select>

</td></tr><tr align="center"><td>*If none
selected,<br>all will be reported. </font>
</td></tr><tr align="center"><td><br>
<input type="Checkbox" name="_debug"
value=131>Debug Mode</td></tr>
<tr align="center"><td><br><input
type="Submit" value="Submit"></td></tr>
</table>
</form>
</body>
</html>
```

The HTML code produces the select box shown in exhibit 2. Notice that the country selection is optional. If the user selects a country, the country value selected will be passed to our SAS program as a macro variable named country. If the user does NOT select a country, then no macro variable is passed to our SAS application.

EXHIBIT 2: WEB PAGE



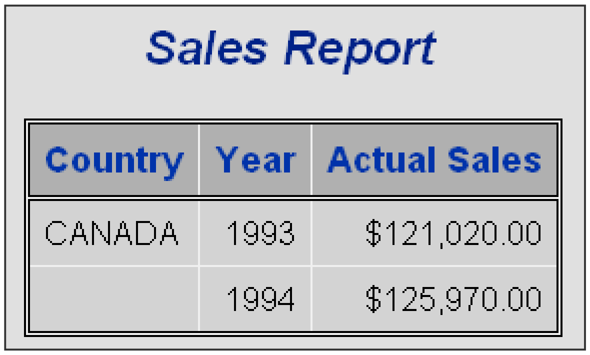
In the HTML code of exhibit 1 is a hidden form variable named _program. The _program variable tells our broker CGI which program to run. In this case, the program we'll use is sugidemo1.sas which is shown is exhibit3.

EXHIBIT 3: SUGIDEMO1.SAS

```
ods html file=_webout;
proc report data=sashelp.prdsale;
   title1 'Sales Report';
   where country = "&country";
   col country year actual;
   define country /group;
   define year    /group;
   define actual  /analysis;
run;
ods html close;
```

If we select a single country (like Canada) from the web page, the broker CGI intercepts the country variable, converts it to a macro variable, and sends it to our SAS program. The SAS program runs without error and displays the results in exhibit4.

EXHIBIT 4: RESULTS OF SINGLE SELECT WITH SUGIDEMO1.SAS



Sales Report

Country	Year	Actual Sales
CANADA	1993	$121,020.00
	1994	$125,970.00

However, if we don't select a country (afterall, the web page tells us we don't have to select one), then our program returns nothing but a blank screen. If we turn on debug and view the SAS log, we see in exhibit 5, that the "Apparent symbolic reference COUNTRY [is] not resolved". Since the macro variable is not resolved, the program passes the value "&country" to the where clause and we get no results because there are no records in SASHELP.PRDSALE where country = "&country".

EXHIBIT 5: SAS LOG

```
NOTE: running request program
web.sugidemo1.sas
NOTE: %INCLUDE (level 1) file
/home/sasapps/web/sugidemo1.sas
2 +ods html file=_webout;
NOTE: Writing HTML Body file: _WEBOUT
3 +proc report data=sashelp.prdsale;
4 + title1 'Sales Report';
5 + where country = "&country";
WARNING: Apparent symbolic reference COUNTRY
not resolved.
6 + col country year actual;
7 + define country /group;
8 + define year /group;
9 + define actual /analysis;
10 +run;
NOTE: No observations in input dataset.
NOTE: There were 0 observations read from the
data set SASHELP.PRDSALE. WHERE country=
'&country';
```

To fix the problem, we think simple: just write a macro to test whether the COUNTRY macro variable exists and add the where clause only when it does. So how do we test for the macro variable? There is no %isdefined function in SAS, so a couple other ideas are to test the length of the resolved macro variable, or test to see if macro variable is equal to itself unresolved. For example:

```
%if %length(&country) > 0 ...
%if &country = %NRSTR(&country) ...
```

The %length trick doesn't quite work. If the macro variable is unresolved, then the length is equal to the length of the text "&country" which is eight characters. So this test always returns true even if the macro variable &country is undefined. Also, when the macro variable &country is undefined, we get a warning in our SAS log.

The "&country = %NRSTR(&country)" looks promising, but when attempted gives an error as shown in exhibit 6:

EXHIBIT 6: SASLOG SHOWING ERROR WITH %NRSTR()

```
2       %if &country ne %NRSTR(&country) %then
%do;
3          where country = "&country";
4       %end;
5    %mend;
6    data junk;
7       set sashelp.prdsale;
8       %test;
9    run;
WARNING: Apparent symbolic reference COUNTRY
not resolved.
ERROR: A character operand was found in the
%EVAL function or %IF condition where a
numeric operand is required. The condition
was: &country ne &country
ERROR: The macro TEST will stop executing.
NOTE: The SAS System stopped processing this
step because of errors.
WARNING: The data set WORK.JUNK may be
incomplete.  When this step was stopped there
were 0 observations and 10 variables
```

So, to resolve the problem, I'll use the view SASHELP.VMACRO. SASHELP.VMACRO is one of many metadata (data about data) views provided automatically in SAS. We'll use the view to determine whether the macro variable exists. And, since this is a section of code that I'll use over and over again, I'll place it in a macro named MVEXIST. The code for MVEXIST is shown in exhibit 7.

EXHIBIT 7: MVEXIST MACRO (VERSION 1)

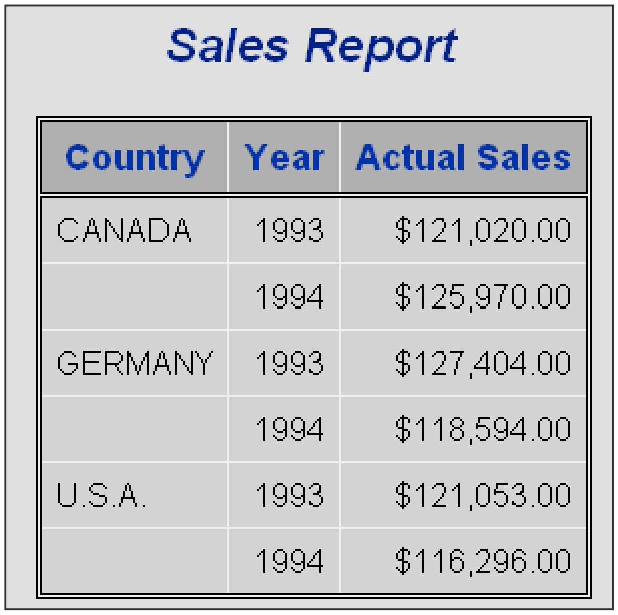
```
%macro mvexist(mvarname);
   %global &mvarname;
   proc sql noprint;
      select count(*) into :mvcntval
      from sashelp.vmacro
      where name = "%upcase(&mvarname)";
   quit;
   %if &mvcntval = 0 %then %let &mvarname=;
%mend;
```

So far, the only thing the macro does, is test to see if the macro variable exists. If it does exist, the macro does nothing. If it doesn't exist, the macro creates a variable of the same name with a null value. That, in turn enables our %length trick previously discussed to work as desired. Now I can add a simple macro to my sugidemo1.sas program (shown in exhibit 8, sugidemo2.sas), and if no country is selected, the program works just fine (results in exhibit 9).

EXHIBIT8: SUGIDEMO2.SAS

```
%mvexist(country);
%macro wherecl;
   %if %length(&country) > 0 %then %do;
      where country = "&country";
   %end;
%mend;
ods html file=_webout;
proc report data=sashelp.prdsale;
   title1 'Sales Report';
   %wherecl;
   col country year actual;
   define country /group;
   define year    /group;
   define actual  /analysis;
run;
ods html close;
```

EXHIBIT9: SUGIDEMO2.SAS RESULTS WITH NO COUNTRY SELECTED



Sales Report

Country	Year	Actual Sales
CANADA	1993	$121,020.00
	1994	$125,970.00
GERMANY	1993	$127,404.00
	1994	$118,594.00
U.S.A.	1993	$121,053.00
	1994	$116,296.00

So now that that works, what do we do about multi-selects? What happens if the user selects more than one country? Well if we turn on debug, we can see in the partial SAS log of exhibit 10 that each country is passed as a separate macro variable. If we select two countries (Canada and Germany), the original macro variable &country is equal to the first selection “Canada” but now we have three other macro variables: &country0, &country1, and &country2. &country0 contains the number of country variables passed, while &country1 and &country2 contain the value of the first and second countries. The number of variables will always be equal to the number of selections plus two (one with the original name of the variable with a value equal to the first selection and another with zero appended to the name and a value equal to the number of selections made.)

EXHIBIT 10: SAS LOG WITH MULTI-SELECT

```
Symbols passed to SAS
"_program" = "web.sugidemo2.sas"
 "country" = "CANADA"
   #symbols: 3
    "country0" = "2"
    "country1" = "CANADA"
    "country2" = "GERMANY"
```

We could write a lot of code to determine whether a multi-value selection has been passed and do the right thing if it has been. Since again this is code that I will use over and over, I’ll just add it to the MVEXIST macro. The new macro is shown in exhibit 11.

This macro will now test to see if a multiple selection has been made, and if so, convert all those macro variables into a single macro variable with the same name as the original macro variable and with values delimited by commas. That alone, will almost make our sugidemo.sas program work with multi-selects. The only remaining problems are that the where clause needs to be changed from an equal operator to an in operator, and somehow, we need to get quotes around each value of country because country is a character variable rather than numeric. To add the quotes I’ll use another macro. This is another macro that I use often. The macro code for “addquotes.sas” is shown in exhibit 12.

EXHIBIT 11: MVEXIST MACRO (FINAL VERSION)

```
%macro mvexist(mvarname);
   %global &mvarname;
   proc sql noprint;
      select count(*) into :mvcntval
      from sashelp.vmacro
      where name = "%upcase(&mvarname)";
   quit;
   %if &mvcntval = 0 %then %let &mvarname=;
   %else %do;
      proc sql noprint;
         select count(*) into :mvcntval
         from sashelp.vmacro
         where name = "%upcase(&mvarname.0)";
      quit;
      %if &mvcntval = 1 %then
      %do i = 1 %to &&&mvarname.0;
          %if &i > 1 %then %let &mvarname =
              &&&mvarname&&&mvarname&i;
          %if &i < &&&mvarname.0 %then %let
              &mvarname = &&&mvarname,;
      %end;
   %end;
%mend;
```

EXHIBIT 12: ADDQUOTES MACRO

```
%macro addquotes(mvarname);
  %let i=1;
  %let acctlist=;
  %let acctv=%scan(%quote(&&&mvarname),&i,
       %str(%', ));
  %do %while(%length(&acctv) > 0);
      %if &i > 1 %then %let acctlist=
          %trim(%quote(&acctlist)),;
      %let acctlist=%trim(%quote(&acctlist))
           %str(%')%trim(&acctv)%str(%');
      %let i=%eval(&i+1);
      %let acctv=%scan(%quote(&&&mvarname),
           &i,%str(%', ));
  %end;
  %let &mvarname = %trim(%quote(&acctlist));
%mend addquotes;
```

EXHIBIT 13: SUGIDEMO.SAS (FINAL VERSION)

```
%mvexist(country);
%addquotes(country);
%macro bldwhere;
   %if %length(&country) > 0 %then %do;
       where country in (&country);
   %end;
%mend;
ods html file=_webout;
proc report data=sashelp.prdsale;
   title1 'Sales Report';
   %bldwhere;
   col country year actual;
   define country /group;
   define year    /group;
   define actual  /analysis;
run;
ods html close;
```

The final SAS program is shown in exhibit 13. Now if we select more than one country, like Canada and Germany, the program works without a hitch.

CONCLUSION

The MVEXIST macro and ADDQUOTES macro shown in exhibits 11 and 12 are two macros that I use for nearly every web application that I build using SAS/IntrNet. The MVEXIST macro is the primary topic of this paper and is an easy solution for dealing with optional and multi-select parameters with SAS/IntrNet. The ADDQUOTES macro provides a means for quoting delimited text in a macro variable. It comes in handy when building multi-select where clauses for character variables. I hope that you will find both of these macros useful.

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TRADEMARK CITATION

CONTACT INFORMATION

Your comments and questions are valued and encouraged. You may contact the author at:

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