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So You're Still Not Using PROC REPORT. Why Not?

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ABSTRACT
Everyone who can spell SAS knows how to use PROC PRINT. Its primary use may be as a development tool to help in debugging a long multi-step program, or as a simple report generator when all that is really needed is a quick look at the data, or even a basic low-level finished report. However, if a report generation/information delivery tool with powerful formatting, summarizing and analysis features is called for, then PROC REPORT is the solution. PROC REPORT can provide the standard PROC PRINT functionality, but in addition, can easily perform many of the tasks that you would otherwise have to use the SORT, MEANS, FREQ and TABULATE procedures to accomplish. PROC REPORT is part of the Base SAS product, can run in both an interactive screen-painting mode or a batch mode, and should be the basic tool of choice when there is a need to produce powerful and productive reports from SAS data sets. This paper will present the basics of PROC REPORT (non-interactive mode) through a series of progressively more sophisticated examples of code and output.

The original main thrust behind PROC REPORT was its interactive WYSIWYG ability, in which reports can be designed online via screen painting manipulation of actual output. When the desired result is achieved, the design and structure of the report can be saved as a catalog entry and called up repeatedly for additional runs with new sets of data. The design can then be modified at any time, and can either be replaced or saved as an additional entry. This is all done in a Display Manager like environment, and will certainly attract users comfortable with working interactively. The batch language of PROC REPORT did not at first receive the initial acclaim or publicity that was afforded the interactive product. In actual fact however, the batch language is every bit as powerful and feature laden as its online cousin, and is almost a mirror image.

The purpose of this paper is to introduce the batch version of PROC REPORT through a progressive series of annotated examples. It is not meant to be a full introductory text. There have been a series of stand-alone manuals published by the SAS Institute for PROC REPORT, and SAS documentation (hardcopy and online versions) from Release 8 onward includes full coverage of the procedure. In addition, PROC REPORT is fully implemented in the SAS Output Delivery System (ODS) including a very full and powerful use of styles, There are many excellent conference papers in existence as well as SAS documentation covering PROC REPORT in ODS. This basic introduction will not touch upon these features at all.

The data set used throughout this paper is a fictitious survey of the spending habits of 100 college students during an academic year.   The source code in **Example-1** describes the data contained in an external file (i.e. C:\PROCREP\PROCREP.DAT). Although the examples in this paper are PC-based, the REPORT procedure is identical on all platforms.   The example also contains code to create two SAS formats ($SEXFMT. and $YEARFMT.) which are used throughout the paper along with a simple PROC REPORT statement. **Output-1** (see appendix) displays a portion of the PROC REPORT output from this simple run (the full population is not included in any of the non-grouped outputs).

```
data survey;
   infile 'c:\procrep\procrep.dat';

   input @01 fname     $char10.
         @12 linit     $char1.
         @15 sex       $char1.
         @18 acadyear $char1.
         @21 gpa       3.1
         @27 age       2.
         @31 books     4.
         @40 food      4.
         @49 ent       4. ;
run;
*-------------------------------------------;
```

```
proc format;
   value $sexfmt   'M' = 'MALE'
                   'F' = 'FEMALE' ;

   value $yearfmt '1' = 'FRESHMAN'
                  '2' = 'SOPHOMORE'
                  '3' = 'JUNIOR'
                  '4' = 'SENIOR' ;
run;
*--------------------------------------------;
proc report nowd data=survey;
run;
```
Example -1

As **Output-1** shows, PROC REPORT output in its simplest format is similar to PROC PRINT output. The NOWD option on the REPORT statement is necessary to tell SAS that this is being run in the batch mode, and not in the interactive mode (NOWD is an alias for NOWINDOWS.) **Example-2** produces the report found in **Output-2**, and introduces the basic features of the REPORT Procedure syntax. The first items to note are the HEADLINE and HEADSKIP options on the PROC REPORT statement. These are two of the many formatting and structural options available on this statement, and produce the dashed and blank separator lines between the column headers and data. The COLUMN statement declares the variables to be included in the report structure and the order in which they are to be processed from left to right. Note that there are two variables listed in the COLUMN statement, NAME and TOTAL, which are not found in the input data set, but are rather created for use in the report via the COMPUTE statements described later in the paper. These variables are transient and exist only for the duration of the current REPORT run; they are *not* added to the data set named in the REPORT statement. The series of DEFINE statements is used to assign *optional* formatting information to the variables. The first two, for FNAME and LINIT, instruct REPORT not to print these two variables, via a NOPRINT option. They *must* be included in the COLUMN statement because the NAME variable is computed from the values of these two variables. They are therefore part of the data set being REPORTed, but are not included in the output. The order in which these variables appear in the COLUMN statement is important here, as NAME must be preceded by the variables it is computed from.

```
proc report nowd data=survey headline headskip;

   column fname linit name sex acadyear gpa age books food ent total;

   define fname    / display  noprint;
   define linit    / display  noprint;
   define sex      / display                   format=$sexfmt.  width=6;
   define acadyear / display  'ACADEMIC/YEAR'  format=$yearfmt. width=9;
   define gpa      / analysis                  format=3.1       width=3;
   define age      / analysis                  format=3.        width=3;
   define books    / analysis '$-BOOKS'        format=dollar6.  width=7;
   define food     / analysis '$-FOOD'         format=dollar6.  width=6;
   define ent      / analysis '$-ENTERTAIN'    format=dollar6.  width=11;
   define name     / computed                                   width=10;
   define total    / computed '$-TOTAL'        format=dollar6.  width=7;


   compute name /char length=10;
      name = trim(fname) || ' ' || linit || '.';
   endcomp;

   compute total;
      total = sum(books.sum, food.sum, ent.sum);
   endcomp;
run;
```
Example-2

PROC REPORT supports six different types of output variables with different uses: DISPLAY, ANALYSIS, COMPUTED, ORDER, GROUP, and ACROSS. In this example, the DEFINE statements declare FNAME, LINIT, SEX and ACADYEAR as DISPLAY variables, GPA, AGE, BOOKS, FOOD and ENT as ANALYSIS variables, and NAME and TOTAL as COMPUTED variables. By default, character variables are DISPLAY and numeric variables are ANALYSIS variables. It is good practice, however, to include these designations anyway; it makes for ease of reading and modification of the code. For DISPLAY and ANALYSIS, all values in the input data set are displayed in

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the output. The FORMAT and WIDTH options declare output value formats and column widths, and the quoted strings create the column headers. Note that ACADYEAR has a split header (two header lines separated by a split character). The default split character is the forward slash ("/"), but this can be changed with a SPLIT= option on the REPORT statement if a slash is a valid part of a header or data value. Note also that the WIDTHs must be adequate to contain both the data and the headers (e.g. '$-ENTERTAIN' needs a WIDTH=11).

The variables NAME and TOTAL were included in the COLUMN statement, and declared in the DEFINE statements as COMPUTED variables. These variables are created in 'compute blocks', each block beginning with a COMPUTE statement and ending with an ENDCOMP statement. The compute blocks contain DATA step statements which create the COMPUTED variables. Options on the COMPUTE statement which create NAME declare it to be a CHARACTER variable with a LENGTH of 10. When referring to an ANALYSIS variable in a compute block, you must use "compound name" syntax (e.g. BOOKS.SUM) to name both the variable and the statistic associated with it, delimiting them with a dot (".").

Output -2 displays a useful, formatted, one line per observation report as created with the code in **Example-2**. Much can be done however in terms of ordering the data for presentation. **Example-3** contains the code which produces the categorized and sorted data displayed in **Output-3**. Here the data is ordered by ACADYEAR and SEX.

The first change to note from the code in the previous listing is that the order of variables in the COLUMN statement has been changed. Variables used to order the data, referred to as ORDER variables, must be processed before (to the left of) any DISPLAY variables. This makes intuitive sense as you look at the output, and is backed up by rigid syntactical placement rules. The DEFINE statements declare ACADYEAR and SEX to be ORDER variables. This is what actually creates the sorted display. Note that only the first unique value of each of these variables is displayed. Using ORDER variables eliminates the need for a prior sorting of the data set with PROC SORT. Note that although the sequenced order of variables is critical in the COLUMN statement, it is of no concern in the series of DEFINE statements. The DEFINE statement for ACADYEAR also includes the ORDER= option, which in this case is assigned as INTERNAL. This instructs the REPORT procedure to sort (and display) the observations by their INTERNAL values (1, 2, 3, 4) rather than their formatted values (FRESHMAN, JUNIOR, SENIOR, SOPHOMORE). Other possible presentation orders (FORMATTED, DATA, FREQUENCY) are available as they are in the MEANS, FREQ, and TABULATE procedures.   NOTE: The default display order for PROC REPORT is FORMATTED, unlike all the other SAS procedures which use INTERNAL as the default.

```
proc report nowd data=survey headline headskip;

   column  acadyear sex fname linit name gpa age books food ent total;

   define fname    / display  noprint;
   define linit    / display  noprint;
   define sex      / order                     format=$sexfmt.  width=6;
   define acadyear / order     'ACADEMIC/YEAR' format=$yearfmt. width=9
                               order=internal;
   define gpa      / analysis                  format=3.1       width=3;
   define age      / analysis                  format=3.        width=3;
   define books    / analysis '$-BOOKS'        format=dollar6.  width=7;
   define food     / analysis '$-FOOD'         format=dollar6.  width=6;
   define ent      / analysis '$-ENTERTAIN'    format=dollar6.  width=11;
   define name     / computed                                   width=10;
   define total    / computed '$-TOTAL'        format=dollar6.  width=7;

   compute name / char length=10;
      name = trim(fname) || ' ' || linit || '.';
   endcomp;

   compute total;
      total = sum(books.sum, food.sum, ent.sum);
   endcomp;
run;
```

Example-3

The next feature of PROC REPORT to be discussed is the ability to collapse (group) observations sharing the same value of any variable or set of variables, and to display summary statistics for each subset of observations. This is done in **Example‑4** by changing ACADYEAR and SEX to GROUP variables, with the results displayed in **Output‑4**.

```
proc report nowd data=survey headline headskip;

   column acadyear sex gpa age books food ent total;

   define sex      / group                      format=$sexfmt.  width=6;
   define acadyear / group     'ACADEMIC/YEAR' format=$yearfmt. width=9
                               order=internal;
   define gpa      / analysis                   format=3.1       width=3;
   define age      / analysis                   format=3.        width=3;
   define books    / analysis '$-BOOKS'        format=dollar6.  width=7;
   define food     / analysis '$-FOOD'         format=dollar7.  width=7;
   define ent      / analysis '$-ENTERTAIN'    format=dollar7.  width=11;
   define total    / computed '$-TOTAL'        format=dollar7.  width=7;


 compute total;
     total = sum(books.sum, food.sum, ent.sum);
   endcomp;
run;
```

                                          Example-4

FNAME, LINIT and NAME can not be meaningfully summarized within other (GROUP) variables, and are therefore removed from the COLUMN and DEFINE statements, and also from the summarized report output. Although they can be changed to ORDER or GROUP variables, they can not remain in the design as DISPLAY variables with GROUP variables to their left; and changing them to ORDER or GROUP variables in this example would not provide useful information. Note that the NAME compute block must also be removed. The remaining variables, including the COMPUTED variable TOTAL, are summarized over each ACADYEAR-SEX combination. The resulting sum is displayed in each cell of the report.

Although the SUM statistic might carry some meaning with the financial variables (BOOKS, FOOD, ENT, and TOTAL), a MEAN value would probably be more desirable. For GPA and AGE however, the SUM statistic is meaningless and a MEAN value is absolutely needed. **Example-5** accomplishes these goals by using the 'alias' feature of the REPORT procedure as well as demonstrating the use of different statistics for ANALYSIS variables. This example also demonstrates the powerful ability of the procedure to produce summary break lines, as well as compound column-spanning headers. A few more goodies are demonstrated in the example as well. The resulting much enhanced display is found in **Output-5**.

```
title1 'PROC REPORT - SAMPLE SUMMARY REPORT';
title2 '--------- ACADEMIC SURVEY ---------';
title3;
*-------------------------------------------;
proc report nowd data=survey split='\';

   column acadyear sex gpa age ('-ANNUAL AMOUNT SPENT ON-'
                               ('-BOOKS-'     books books=booksm)
                               ('-FOOD-'      food  food =foodm)
                               ('-ENTERTAIN-' ent   ent  =entm)
                               ('-TOTAL-'     total totalm));

   define sex      / group     'SEX\--'         format=$sexfmt.  width=6;
   define acadyear / group     'ACADEMIC\YEAR\--' format=$yearfmt. width=9
                               order=internal;
   define gpa      / analysis 'MEAN\GPA\--'     format=3.1 mean  width=4;
   define age      / analysis 'MEAN\AGE\--'     format=3.  mean  width=4;
   define books    / analysis 'TOTAL\--'        format=dollar7.  width=7  sum;
   define booksm   / analysis 'MEAN\--'         format=dollar4.  width=4  mean;
   define food     / analysis 'TOTAL\--'        format=dollar7.  width=7  sum;
   define foodm    / analysis 'MEAN\--'         format=dollar4.  width=4  mean;
   define ent      / analysis 'TOTAL\--'        format=dollar7.  width=7  sum;
```

```
   define entm     / analysis 'MEAN\--'        format=dollar4.  width=4  mean;
   define total    / computed 'TOTAL\--'        format=dollar8.  width=8;
   define totalm   / computed 'MEAN\--'         format=dollar7.  width=7;


   compute total;
      total = sum(books.sum, food.sum, ent.sum);
   endcomp;

   compute totalm;
      totalm = sum(bookm, foodm, entm);
   endcomp;

   break after acadyear / ol ul skip summarize suppress;

   rbreak after / dol dul skip summarize;
run;
```

<center>Example -5</center>

Much is happening in this example. The HEADLINE and HEADSKIP options are removed from the REPORT statement in lieu of another method of creating header underlines. Each DEFINE statement now contains an additional final segment in its title option, namely '\--'. These two dashes will automatically expand to the width of the column, yielding a broken, but perhaps more pleasing set of column header underlines (the keyword is 'perhaps' as it is somewhat subjective, but at least the alternative is available). Notice that the SPLIT='\' option is used (any character can be defined as a line splitting delimiter). When this technique is used, all variables should be given this type of title for uniformity of display.

The next major change is the enhanced COLUMN statement. Aliases are created for the BOOKS, FOOD and ENT variables, namely BOOKM, FOODM and ENTM. This is done so that the information for each of these variables can be presented in two different manners via separate DEFINE statements for each variable and its alias. Each variable is displayed first as a SUM (this is the default presentation for all ANALYSIS variables) and then as a MEAN, by including these statistics in the appropriate DEFINE statements. New variables are *not* being created; each variable with an alias is merely being displayed multiple times.

The COLUMN statement now also contains column-spanning headers. These can be simple (a header which spans multiple columns) or compound as in this example. A column spanning header is created by including a quoted string in parentheses preceding the columns it is to span. In the header, the initial and final characters can be extended to the total width of the set of columns it spans. In our example, the uppermost header, '-ANNUAL AMOUNT SPENT ON-' spans all the displayed variables, and the next level down headers, '-BOOKS-', etc. each span one variable and its alias.

The DEFINE statements for the ANALYSIS variables and their aliases, and for the COMPUTED variables TOTAL and TOTALM are enhanced in various ways. REPORT is now instructed to display each of the GROUP and ANALYSIS variables as both a MEAN and a SUM (if no statistic is presented, the default SUM is used). In addition, WIDTHs and FORMATs are changed judiciously (trial and error) to accommodate the new headers and data displayed. A new COMPUTED variable TOTALM is now calculated from the aliases of the components making up TOTAL. Since they are MEAN values, the new variable TOTALM will reflect MEAN values as well. Note that aliases do *not* use the compound dot notation.

Another enhancement to the new display is the addition of summary break lines to the report. The BREAK command inserts a break line AFTER each new value of ACADYEAR (the keyword BEFORE can also be used to place break lines before grouped variables). Each new line has a summary statistic (SUMMARIZE) with an overline (OL), an underline (UL) and a blank line (SKIP) before the next printed line. The RBREAK command instructs REPORT to print a break line AFTER the entire report (BEFORE is also available), with double over and underlining (DOL, DUL) and overall summary statistics (SUMMARIZE). Each of the BREAK commands also uses the SUPPRESS option to prevent printing BREAK information (values, under- and overlining) under the GROUP variable columns (ACADYEAR, SEX). The last enhancements to the code in **Example-5** is the addition of TITLE statements. These statements are standard SAS syntax, and are not saved with the REPORT definition if it is stored as a catalog entry.

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Output -5 presents a useful display of grouped information. PROC REPORT also allows other types of useful formatted output, both grouped and non-grouped. **Example-6** contains code used to display the telephone-book-column style display found in **Output-6**.

In **Example-6**, the REPORT statement contains three new options which instruct the procedure to display the data in three repeating 'snaking' sets of variables (PANELS) with a pagesize (PS) of 50 lines, and 10 spaces between each panel (PSPACE). Only NAME, ACADYEAR and AGE are printed (note that FNAME and LINIT must be included in the COLUMN statement for processing, but are not printed via NOPRINT).

```
title1 'PROC REPORT - SAMPLE COLUMNAR REPORT';
title2 '---------- ACADEMIC SURVEY ---------';
title3;
*-------------------------------------------;
proc report nowd data=survey headline headskip panels=3 ps=50 pspace=10;

   column fname linit name acadyear gpa;

   define fname    / display  noprint;
   define linit    / display  noprint;
   define acadyear / display  'ACADEMIC/YEAR' format=$yearfmt. width=9;
   define gpa      / analysis                 format=3.1      width=3;
   define name     / computed                                 width=10;

   compute name / char length=10;
      name = trim(fname)||' '||linit||'.';
   endcomp;
run;
```

<div align="center">Example-6</div>

Example-7 also uses PANELS to display its data, but now uses the FLOW option to achieve a different presentation style. The FLOW option instructs the procedure to wrap the value of a character variable within its column width. In this example, the COMPUTEd character variable BLOCK is constructed to include the defined split character '\' between each of its components. As the FLOW option honors split characters, the effect is a wrapping to a new line for each component in BLOCK. The FLOW option can easily be used to generate name and address listings. Note that all the components that make up BLOCK are required in the COLUMN statement, but they are all NOPRINTed. Note also that an artificially large number of PANELS (99) is stated. This technique allows the procedure to determine how many PANELS to produce based on the linesize used.

```
title1 'PROC REPORT - SAMPLE FLOW REPORT';
title2 '-------- ACADEMIC SURVEY -------';
title3;
*----------------------------------------;
proc report nowd data=survey split='\' panels=99  ps=50  ;

   column fname linit acadyear age sex gpa block;

   define  fname    / display  noprint;
   define  linit    / display  noprint;
   define  acadyear / display  noprint;
   define  age      / display  noprint;
   define  sex      / display  noprint;
   define  gpa      / display  noprint;
   define  block    / computed          flow width=20 '';

   compute block / char length=100;
     block = 'name: '||trim(fname)||' '||linit||'.'
             ||'\YEAR: '||put(acadyear,$yearfmt.)
             ||'\ AGE: '||put(age,2.)
             ||'\ SEX: '||put(sex,$sexfmt.)
             ||'\ GPA: '||put(gpa,3.1)
             ||'\\';
   endcomp;
run;
```

<div align="center">Example-7</div>

Example -8 also contains code for a non-grouped data display as shown in **Output-8**. In this example, the WRAP option in the REPORT statement causes the values for all variables in an observation to be printed in a line-wrap fashion before printing of the next observation is begun.

```
title1 'PROC REPORT - SAMPLE WRAPPED REPORT';
title2 '--------- ACADEMIC SURVEY ---------';
title3;
*--------------------------------------------;
data survey2;
   set survey;
   obsno = _n_;
run;
*--------------------------------------------;
proc report nowd data=survey2 headline headskip named wrap ls=70;

   column obsno fname linit name acadyear age sex gpa books food ent total;

   define obsno    / order    noprint;
   define fname    / display  noprint;
   define linit    / display  noprint;
   define sex      / display                   format=$sexfmt.  width=6;
   define acadyear / display  'YEAR'           format=$yearfmt. width=9;
   define gpa      / analysis                  format=3.1       width=3;
   define age      / analysis                  format=3.        width=3;
   define books    / analysis '$-BOOKS'     format=dollar6.  width=6;
   define food     / analysis '$-FOOD'      format=dollar6.  width=6  spacing=3;
   define ent      / analysis '$-ENTERTAIN' format=dollar6.  width=6  spacing=3;
   define name     / computed                     width=10;
   define total    / computed '$-TOTAL'     format=dollar6.  width=7  spacing=3;

   compute name /char length=10;
      name = trim(fname)||' '||linit||'.';
   endcomp;

   compute total;
      total = sum(books.sum, food.sum, ent.sum);
   endcomp;

   break after obsno / skip;

run;
```

<div align="center">

Example-8

</div>

The NAMED option causes each variable to be preceded by its header (variable names would be used if no headers were presented) followed by "=". The LS or Linesize option causes REPORT to restrict horizontal printing to 70 columns. Some of the DEFINE statements use a SPACING option to manipulate the number of blank spaces printed before each value. This was done to create the quasi columnar alignment which makes for easier reading. Each observation is also followed by a blank line before the next one is started. The REPORT procedure does not at present provide for double-spacing, so it had to be tricked into it. This was done with the aid of some pre-processing of the data set before the REPORT procedure was called. Data set SURVEY2 was created by SET'ing SURVEY, and then creating a new variable, OBSNO, by assigning it the value of the observation counter (_N_), an automatic system variable provided by the SAS system. The REPORT procedure was then run against data set SURVEY2. In the REPORT code, OBSNO is DEFINE'd as an ORDER variable, and a BREAK statement is used with the SKIP option to add a blank line after each new value of OBSNO. As each value of OBSNO (_N_) is unique, the effect is to skip a line after each new observation printed.

The final example is shown in **Output-9**, and was created with the code found in **Example-9**. This example demonstrates the last variable type allowed in PROC REPORT. The variables included in the example are ACADYEAR, SEX, GPA, where SEX is DEFINE'd as an ACROSS variable. This causes its values to be grouped like a GROUP variable, but displayed horizontally rather than vertically. The next enhancement is in the format of the COLUMN statement. The order of processing the variable is: ACADYEAR SEX GPA. The "," in the statement after SEX instructs REPORT to print the summary values of the ANALYSIS variable GPA *under* the unique values of the ACROSS variable SEX (if no statistics were included for GPA, the frequency of observations in each cell would

<div align="center">

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</div>

be printed). This syntax allows PROC REPORT to display its data in a simple PROC TABULATE like manner, and demonstrates more of the power of the REPORT procedure.

```
title1 'PROC REPORT - SAMPLE ACROSS REPORT';
title2 '--------- ACADEMIC SURVEY --------';
title3;
*-----------------------------------------------;
proc report nowd data=survey headline headskip out=out_ex;

   column acadyear sex,gpa;

   define sex      / across                     format=$sexfmt.  width=6;
   define acadyear / group    'ACADEMIC/YEAR' format=$yearfmt. width=9;
   define gpa      / analysis                   format=3.1       width=6   mean;
run;
*-----------------------------------------------;
title1 "CONTENTS OF PROC REPORT OUTPUT DATA SET";
title2 "----- PRODUCED WITH 'OUT=' OPTION -----";
title3;
*-----------------------------------------------;
proc print data=out_ex;
run;
```
Example -9

The final addition in **Example-9** is the use of the output data set option, OUT=*output data set*, in the REPORT statement.   This instructs the procedure to produce an output SAS data set containing one observation for each output line of data in the REPORT output. If the report contains summary (BREAK) lines, then the name of the BREAK variable is contained in a new variable called "_BREAK_". If there are no BREAKs, the value of "_BREAK_" is missing. We include a simple PROC PRINT here (we are not REPORT bigots) to display the contents of the output data set OUT_EX. Whenever an ACROSS variable is used, PROC REPORT uses a "_Cn_" notation to name each column. In this example, the two values of the ACROSS variable SEX ("FEMALE" and "MALE") are represented in OUT_EX as _C2_ and _C3_ respectively. Getting used to the "_Cn_" notation is a chore, but well worth it. Although other procedures can produce output data sets of summary values, using ACROSS variables with output data sets can be used to produce summarized cross-tabular output data.

There are many additional features in the REPORT procedure which have not been included in this paper due to the desire to keep this on a very basic introductory level, but which add significantly to the utility of the procedure. One example is the ability to include strings of literal text in the body of the output, and the ability to conditionally include whole segments of output based on values of data set or COMPUTED variables. Other new features are being developed and will be included in future releases of the SAS System base product, and its accompanying documentation.

CONCLUSION
The REPORT procedure is a powerful and productive tool in the SAS user's report writing arsenal, and should be fully examined and exploited. It provides a much expanded realm of utility over the PRINT procedure alone. PROC REPORT can do much of the work of PROC SORT, PROC MEANS and a fair amount of PROC TABULATE. It is by no means a reporting panacea, and should never be used to the total exclusion of other procedures. It can, and should however be used appropriately and cooperatively with other SAS System tools to provide a powerful synergy.

So if you're still not using PROC REPORT, or have no intention to at least investigate it, once again we can only ask, *Why Not?*

REFERENCES

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```
                                    The SAS System

                        A
                        C
                        A
                L       D
                I       Y
                N   S   E
                I   E   A
FNAME           T   X   R        GPA       AGE      BOOKS       FOOD       ENT
DORY            A   F   3        4.0        20        381        945      1144
GERALD          A   M   3        3.5        20        265        655       687
HARRY           A   M   4        3.6        19        544        855       478
REGGIE          A   F   3        3.6        20        100        841       654
VALERIE         A   F   3        3.2        20        532        756       250
ANTHONY         B   M   1        2.0        16        425        855       965
GEORGE          B   M   3        2.5        21        522        752       425
TOM             B   M   2        3.8        19        215        625       622
CAROL           C   F   4        1.6        21        344       1200       602
EDWARD          C   M   1        2.9        18        451        466      2101
KATHY           C   F   4        2.5        21        544        842       874
BILL            D   M   3        3.8        18        244        810       620
CARMEN          D   F   4        3.9        18        522       1022       587
DONNA           D   F   1        3.2        19        652        802       785
FRANK           D   M   4        3.6        21        675        841       254
JOAN            D   F   2        2.0        27        680        789       855
LEON            D   M   1        2.9        18        201        755       400
ROSE            D   F   2        3.6        18        205        866       100
TOM             D   M   2        3.6        18        406        485       544
ALLAN           E   M   3        3.5        21        345        455       852
BETTY           E   F   2        3.6        20        222        755       962
DENNIS          E   M   3        2.8        19        541        480       221
EVELYN          E   F   2        3.2        19        265        855       452
```

Output - 1

```
                               The SAS System

                        ACADEMIC
NAME            SEX     YEAR     GPA  AGE  $-BOOKS   $-FOOD   $-ENTERTAIN  $-TOTAL
--------------------------------------------------------------------------------

DORY A.         FEMALE  JUNIOR    4.0  20    $381     $945      $1,144     $2,470
GERALD A.       MALE    JUNIOR    3.5  20    $265     $655        $687     $1,607
HARRY A.        MALE    SENIOR    3.6  19    $544     $855        $478     $1,877
REGGIE A.       FEMALE  JUNIOR    3.6  20    $100     $841        $654     $1,595
VALERIE A.      FEMALE  JUNIOR    3.2  20    $532     $756        $250     $1,538
ANTHONY B.      MALE    FRESHMAN  2.0  16    $425     $855        $965     $2,245
GEORGE B.       MALE    JUNIOR    2.5  21    $522     $752        $425     $1,699
TOM B.          MALE    SOPHOMORE 3.8  19    $215     $625        $622     $1,462
CAROL C.        FEMALE  SENIOR    1.6  21    $344   $1,200        $602     $2,146
EDWARD C.       MALE    FRESHMAN  2.9  18    $451     $466      $2,101     $3,018
KATHY C.        FEMALE  SENIOR    2.5  21    $544     $842        $874     $2,260
BILL D.         MALE    JUNIOR    3.8  18    $244     $810        $620     $1,674
CARMEN D.       FEMALE  SENIOR    3.9  18    $522   $1,022        $587     $2,131
DONNA D.        FEMALE  FRESHMAN  3.2  19    $652     $802        $785     $2,239
FRANK D.        MALE    SENIOR    3.6  21    $675     $841        $254     $1,770
JOAN D.         FEMALE  SOPHOMORE 2.0  27    $680     $789        $855     $2,324
LEON D.         MALE    FRESHMAN  2.9  18    $201     $755        $400     $1,356
ROSE D.         FEMALE  SOPHOMORE 3.6  18    $205     $866        $100     $1,171
TOM D.          MALE    SOPHOMORE 3.6  18    $406     $485        $544     $1,435
ALLAN E.        MALE    JUNIOR    3.5  21    $345     $455        $852     $1,652
BETTY E.        FEMALE  SOPHOMORE 3.6  20    $222     $755        $962     $1,939
DENNIS E.       MALE    JUNIOR    2.8  19    $541     $480        $221     $1,242
EVELYN E.       FEMALE  SOPHOMORE 3.2  19    $265     $855        $452     $1,572
JONAH E.        MALE    SENIOR    3.2  17    $569     $785        $457     $1,811
```

Output-2

```
                          The SAS System

ACADEMIC
YEAR        SEX     NAME        GPA  AGE  $-BOOKS   $-FOOD  $-ENTERTAIN  $-TOTAL
--------------------------------------------------------------------------------

FRESHMAN    FEMALE  DONNA D.    3.2  19     $652     $802        $785   $2,239
                    LILLY E.    3.6  18     $489     $966        $954   $2,409
                    JANE K.     2.9  18     $402   $1,300        $541   $2,243
                    JACKIE M.   2.1  16     $402   $1,200        $454   $2,056
                    JOAN O.     2.8  18     $306     $522        $777   $1,605
                    DEBBIE R.   3.8  18     $432     $230        $556   $1,218
                    SALLY R.    3.8  18     $524     $600        $400   $1,524
                    ERICA S.    4.0  18     $560     $455        $201   $1,216
                    ARLENE T.   3.5  18     $512     $466        $412   $1,390
            MALE    ANTHONY B.  2.0  16     $425     $855        $965   $2,245
                    EDWARD C.   2.9  18     $451     $466      $2,101   $3,018
                    LEON D.     2.9  18     $201     $755        $400   $1,356
                    SAM E.      3.4  18     $894     $688        $865   $2,447
                    JOHN F.     3.8  20     $512     $741        $905   $2,158
                    JOEL H.     2.5  24     $524     $987        $950   $2,461
                    MIKE J.     3.2  19     $254     $522        $656   $1,432
                    FRANK L.    3.5  19     $478     $946        $125   $1,549
                    GEORGE L.   2.8  18     $490     $954        $795   $2,239
                    JIM R.      3.7  38     $452     $866        $555   $1,873
                    ROBERT S.   3.8  17     $500     $547        $220   $1,267
                    MANNY V.    3.4  34     $325     $862        $544   $1,731
SOPHOMORE   FEMALE  JOAN D.     2.0  27     $680     $789        $855   $2,324
                    ROSE D.     3.6  18     $205     $866        $100   $1,171
                    BETTY E.    3.6  20     $222     $755        $962   $1,939
                    EVELYN E.   3.2  19     $265     $855        $452   $1,572
                    CHERYL F.   3.8  19     $245     $577        $622   $1,444
                    CINDY F.    3.7  19     $318     $622        $455   $1,395
                    LAURIE F.   3.2  19     $345     $844        $650   $1,839
                    CONNIE K.   2.9  19     $156     $544        $999   $1,699
                    MARIE K.    3.2  19     $523     $684        $787   $1,994
                    ELLEN T.    3.0  19     $241     $622        $956   $1,819
                    MILLY T.    4.0  28     $325     $876        $557   $1,758
                    ROBIN Y.    3.5  20     $345     $788        $454   $1,587
                    DINA Z.     3.5  18     $255     $655        $445   $1,355
            MALE    TOM B.      3.8  19     $215     $625        $622   $1,462
                    TOM D.      3.6  18     $406     $485        $544   $1,435
```

Output-3

```
                       The SAS System

ACADEMIC
YEAR        SEX      GPA  AGE  $-BOOKS    $-FOOD   $-ENTERTAIN   $-TOTAL
-----------------------------------------------------------------------

FRESHMAN    FEMALE    30  161   $4,279    $6,541        $5,080   $15,900
            MALE      38  259   $5,506    $9,189        $9,081   $23,776
SOPHOMORE   FEMALE    43  264   $4,125    $9,477        $8,294   $21,896
            MALE      57  335   $5,115   $12,034       $10,979   $28,128
JUNIOR      FEMALE    45  285   $5,985   $10,820        $8,122   $24,927
            MALE      61  393   $7,185   $15,963        $9,860   $33,008
SENIOR      FEMALE    21  143   $3,031    $6,281        $4,696   $14,008
            MALE      26  207   $5,164    $6,801        $5,007   $16,972
```

Output-4

```
                    PROC REPORT – SAMPLE SUMMARY REPORT
                    --------- ACADEMIC SURVEY ---------

                           -------------------ANNUAL AMOUNT SPENT ON-------------------
ACADEMIC          MEAN  MEAN  ----BOOKS----  ----FOOD-----  --ENTERTAIN--  ------TOTAL------
YEAR      SEX     GPA   AGE    TOTAL   MEAN   TOTAL   MEAN    TOTAL   MEAN    TOTAL     MEAN
--------- ------  ----  ----  -------  ----  -------  ----  -------  ----  --------  -------
FRESHMAN  FEMALE  3.3   18    $4,279  $475   $6,541  $727   $5,080  $564   $15,900   $1,767
          MALE    3.2   22    $5,506  $459   $9,189  $766   $9,081  $757   $23,776   $1,981
                  ----  ----  -------  ----  -------  ----  -------  ----  --------  -------
                  3.2   20    $9,785  $466  $15,730  $749  $14,161  $674   $39,676   $1,889
                  ----  ----  -------  ----  -------  ----  -------  ----  --------  -------


SOPHOMORE FEMALE  3.3   20    $4,125  $317   $9,477  $729   $8,294  $638   $21,896   $1,684
          MALE    3.3   20    $5,115  $301  $12,034  $708  $10,979  $646   $28,128   $1,655
                  ----  ----  -------  ----  -------  ----  -------  ----  --------  -------
                  3.3   20    $9,240  $308  $21,511  $717  $19,273  $642   $50,024   $1,667
                  ----  ----  -------  ----  -------  ----  -------  ----  --------  -------


JUNIOR    FEMALE  3.2   20    $5,985  $428  $10,820  $773   $8,122  $580   $24,927   $1,781
          MALE    3.2   21    $7,185  $378  $15,963  $840   $9,860  $519   $33,008   $1,737
                  ----  ----  -------  ----  -------  ----  -------  ----  --------  -------
                  3.2   21   $13,170  $399  $26,783  $812  $17,982  $545   $57,935   $1,756
                  ----  ----  -------  ----  -------  ----  -------  ----  --------  -------


SENIOR    FEMALE  3.0   20    $3,031  $433   $6,281  $897   $4,696  $671   $14,008   $2,001
          MALE    2.9   23    $5,164  $574   $6,801  $756   $5,007  $556   $16,972   $1,886
                  ----  ----  -------  ----  -------  ----  -------  ----  --------  -------
                  2.0   22    $8,195  $512  $13,082  $818   $9,703  $606   $30,980   $1,936
                  ----  ----  -------  ----  -------  ----  -------  ----  --------  -------


                  ====  ====  =======  ====  =======  ====  =======  ====  ========  =======
                  3.2   20   $40,390  $404  $77,106  $771  $61,119  $611  $178,615   $1,786
                  ====  ====  =======  ====  =======  ====  =======  ====  ========  =======
```

Output-5

```
                         PROC REPORT – SAMPLE COLUMNAR REPORT
                         ---------- ACADEMIC SURVEY ---------

              ACADEMIC                           ACADEMIC                           ACADEMIC
NAME          YEAR       GPA        NAME         YEAR       GPA        NAME          YEAR       GPA
---------------------------        ---------------------------        ---------------------------
DORY A.       JUNIOR     4.0        SALLY I.     JUNIOR     3.5        ARLENE T.     FRESHMAN   3.5
GERALD A.     JUNIOR     3.5        WILLIAM I.   SOPHOMORE  3.6        BEN T.        JUNIOR     3.2
HARRY A.      SENIOR     3.6        ALAN J.      JUNIOR     3.4        ELLEN T.      SOPHOMORE  3.0
REGGIE A.     JUNIOR     3.6        MIKE J.      FRESHMAN   3.2        MILLY T.      SOPHOMORE  4.0
VALERIE A.    JUNIOR     3.2        CONNIE K.    SOPHOMORE  2.9        WILL T.       SENIOR     2.9
ANTHONY B.    FRESHMAN   2.0        DAVID K.     SOPHOMORE  3.8        ANNA V.       JUNIOR     2.3
GEORGE B.     JUNIOR     2.5        EILEEN K.    SENIOR     3.0        MANNY V.      FRESHMAN   3.4
TOM B.        SOPHOMORE  3.8        JANE K.      FRESHMAN   2.9        DAVID W.      JUNIOR     2.5
CAROL C.      SENIOR     1.6        JOSE K.      SOPHOMORE  3.5        PAUL W.       SENIOR     3.0
EDWARD C.     FRESHMAN   2.9        MARIE K.     SOPHOMORE  3.2        AL X.         SOPHOMORE  2.5
KATHY C.      SENIOR     2.5        PETER K.     SOPHOMORE  3.6        ROBIN Y.      SOPHOMORE  3.5
BILL D.       JUNIOR     3.8        TERRY K.     JUNIOR     4.0        SAM Y.        SOPHOMORE  4.0
CARMEN D.     SENIOR     3.9        FRANK L.     FRESHMAN   3.5        TONY Y.       SENIOR     2.0
DONNA D.      FRESHMAN   3.2        GEORGE L.    FRESHMAN   2.8        DINA Z.       SOPHOMORE  3.5
FRANK D.      SENIOR     3.6        SHEILA L.    SENIOR     4.0
JOAN D.       SOPHOMORE  2.0        STEVE L.     SOPHOMORE  3.5
LEON D.       FRESHMAN   2.9        DAN M.       JUNIOR     1.6
ROSE D.       SOPHOMORE  3.6        DANIEL M.    SOPHOMORE  2.3
TOM D.        SOPHOMORE  3.6        JACKIE M.    FRESHMAN   2.1
ALLAN E.      JUNIOR     3.5        LOU M.       JUNIOR     2.0
BETTY E.      SOPHOMORE  3.6        FRED O.      SENIOR     2.5
DENNIS E.     JUNIOR     2.8        JOAN O.      FRESHMAN   2.8
EVELYN E.     SOPHOMORE  3.2        HARRIET P.   JUNIOR     3.0
JONAH E.      SENIOR     3.2        PAUL P.      SOPHOMORE  2.6
LILLY E.      FRESHMAN   3.6        LARRY Q.     JUNIOR     3.7
MARIA E.      JUNIOR     3.4        CARL R.      JUNIOR     3.6
SAM E.        FRESHMAN   3.4        CYNTHIA R.   JUNIOR     3.0
WILLIAM E.    SOPHOMORE  3.7        DEBBIE R.    FRESHMAN   3.8
CHERYL F.     SOPHOMORE  3.8        HENRY R.     JUNIOR     3.8
```

Output-6

```
                         PROC REPORT – SAMPLE FLOW REPORT
                         -------- ACADEMIC SURVEY -------

     NAME: DORY A.          NAME: TOM B.           NAME: FRANK D.         NAME: DENNIS E.
     YEAR: JUNIOR           YEAR: SOPHOMORE        YEAR: SENIOR           YEAR: JUNIOR
      AGE: 20                AGE: 19                AGE: 21                AGE: 19
      SEX: FEMALE            SEX: MALE              SEX: MALE              SEX: MALE
      GPA: 4.0               GPA: 3.8               GPA: 3.6               GPA: 2.8

     NAME: GERALD A.        NAME: CAROL C.         NAME: JOAN D.          NAME: EVELYN E.
     YEAR: JUNIOR           YEAR: SENIOR           YEAR: SOPHOMORE        YEAR: SOPHOMORE
      AGE: 20                AGE: 21                AGE: 27                AGE: 19
      SEX: MALE              SEX: FEMALE            SEX: FEMALE            SEX: FEMALE
      GPA: 3.5               GPA: 1.6               GPA: 2.0               GPA: 3.2

     NAME: HARRY A.         NAME: EDWARD C.        NAME: LEON D.          NAME: JONAH E.
     YEAR: SENIOR           YEAR: FRESHMAN         YEAR: FRESHMAN         YEAR: SENIOR
      AGE: 19                AGE: 18                AGE: 18                AGE: 17
      SEX: MALE              SEX: MALE              SEX: MALE              SEX: MALE
      GPA: 3.6               GPA: 2.9               GPA: 2.9               GPA: 3.2

     NAME: REGGIE A.        NAME: KATHY C.         NAME: ROSE D.          NAME: LILLY E.
     YEAR: JUNIOR           YEAR: SENIOR           YEAR: SOPHOMORE        YEAR: FRESHMAN
      AGE: 20                AGE: 21                AGE: 18                AGE: 18
      SEX: FEMALE            SEX: FEMALE            SEX: FEMALE            SEX: FEMALE
      GPA: 3.6               GPA: 2.5               GPA: 3.6               GPA: 3.6

     NAME: VALERIE A.       NAME: BILL D.          NAME: TOM D.           NAME: MARIA E.
     YEAR: JUNIOR           YEAR: JUNIOR           YEAR: SOPHOMORE        YEAR: JUNIOR
      AGE: 20                AGE: 18                AGE: 18                AGE: 20
      SEX: FEMALE            SEX: MALE              SEX: MALE              SEX: FEMALE
      GPA: 3.2               GPA: 3.8               GPA: 3.6               GPA: 3.4
```

Output-7

```
                  PROC REPORT - SAMPLE WRAPPED REPORT
                  --------- ACADEMIC SURVEY ---------

----------------------------------------------------------------------

NAME=DORY A.      YEAR=JUNIOR      AGE= 20   SEX=FEMALE   GPA=4.0
$-BOOKS=  $381    $-FOOD=  $945    $-ENTERTAIN=$1,144     $-TOTAL= $2,470

NAME=GERALD A.    YEAR=JUNIOR      AGE= 20   SEX=MALE     GPA=3.5
$-BOOKS=  $265    $-FOOD=  $655    $-ENTERTAIN=  $687     $-TOTAL= $1,607

NAME=HARRY A.     YEAR=SENIOR      AGE= 19   SEX=MALE     GPA=3.6
$-BOOKS=  $544    $-FOOD=  $855    $-ENTERTAIN=  $478     $-TOTAL= $1,877

NAME=REGGIE A.    YEAR=JUNIOR      AGE= 20   SEX=FEMALE   GPA=3.6
$-BOOKS=  $100    $-FOOD=  $841    $-ENTERTAIN=  $654     $-TOTAL= $1,595

NAME=VALERIE A.   YEAR=JUNIOR      AGE= 20   SEX=FEMALE   GPA=3.2
$-BOOKS=  $532    $-FOOD=  $756    $-ENTERTAIN=  $250     $-TOTAL= $1,538

NAME=ANTHONY B.   YEAR=FRESHMAN    AGE= 16   SEX=MALE     GPA=2.0
$-BOOKS=  $425    $-FOOD=  $855    $-ENTERTAIN=  $965     $-TOTAL= $2,245

NAME=GEORGE B.    YEAR=JUNIOR      AGE= 21   SEX=MALE     GPA=2.5
$-BOOKS=  $522    $-FOOD=  $752    $-ENTERTAIN=  $425     $-TOTAL= $1,699

NAME=TOM B.       YEAR=SOPHOMORE   AGE= 19   SEX=MALE     GPA=3.8
$-BOOKS=  $215    $-FOOD=  $625    $-ENTERTAIN=  $622     $-TOTAL= $1,462

NAME=CAROL C.     YEAR=SENIOR      AGE= 21   SEX=FEMALE   GPA=1.6
$-BOOKS=  $344    $-FOOD=$1,200    $-ENTERTAIN=  $602     $-TOTAL= $2,146

NAME=EDWARD C.    YEAR=FRESHMAN    AGE= 18   SEX=MALE     GPA=2.9
$-BOOKS=  $451    $-FOOD=  $466    $-ENTERTAIN=$2,101     $-TOTAL= $3,018

NAME=KATHY C.     YEAR=SENIOR      AGE= 21   SEX=FEMALE   GPA=2.5
$-BOOKS=  $544    $-FOOD=  $842    $-ENTERTAIN=  $874     $-TOTAL= $2,260

NAME=BILL D.      YEAR=JUNIOR      AGE= 18   SEX=MALE     GPA=3.8
$-BOOKS=  $244    $-FOOD=  $810    $-ENTERTAIN=  $620     $-TOTAL= $1,674

NAME=CARMEN D.    YEAR=SENIOR      AGE= 18   SEX=FEMALE   GPA=3.9
$-BOOKS=  $522    $-FOOD=$1,022    $-ENTERTAIN=  $587     $-TOTAL= $2,131

NAME=DONNA D.     YEAR=FRESHMAN    AGE= 19   SEX=FEMALE   GPA=3.2
$-BOOKS=  $652    $-FOOD=  $802    $-ENTERTAIN=  $785     $-TOTAL= $2,239

NAME=FRANK D.     YEAR=SENIOR      AGE= 21   SEX=MALE     GPA=3.6
$-BOOKS=  $675    $-FOOD=  $841    $-ENTERTAIN=  $254     $-TOTAL= $1,770
```

Output -8

```
PROC REPORT-SAMPLE ACROSS REPORT
------- ACADEMIC SURVEY --------

                   SEX
  ACADEMIC    FEMALE     MALE
     YEAR        GPA      GPA
------------------------

  FRESHMAN       3.3      3.2
  SOPHOMORE      3.3      3.3

  JUNIOR         3.2      3.2
  SENIOR         3.0      2.9
```

Output-9a

```
       CONTENTS OF PROC REPORT OUTPUT DATA SET
          ----- PRODUCED WITH 'OUT=' OPTION -----

  OBS     ACADYEAR       _C2_        _C3_       _BREAK_

   1         1        3.30000     3.15833
   2         2        3.32308     3.34706
   3         3        3.24286     3.22632
   4         4        3.00000     2.90000
```

Output-9b