Power Up Your Reporting Using the SAS® Output Delivery System

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Power Up Your ODS Output

- Enhancing Microsoft Excel worksheets by using the SAS® Output Delivery System (ODS) Excel destination
- Enhancing email and HTML reports
- Automating your reports using Python open-source language

Enhancing Microsoft Excel Worksheets by Using the ODS Excel Destination

- Exploring the ODS Excel destination
- Enhancing the Microsoft Excel display by using formatting
- Creating and enhancing reports by using the Report Writing Interface and the ODS Excel destination

Enhancing Microsoft Excel Worksheets by Using the ODS Excel Destination

```
filename temp url
   "https://dashboard.hawaii.gov/resource/wz7p-e5jq.json";
libname temp json;


ods excel file="c:\temp\test.xlsx"
          options(frozen_headers="1"
                  frozen_rowheaders="1"
                  row_heights="30"
                  tab_color="blue");
```

Enhancing Microsoft Excel Worksheets by Using the ODS Excel Destination

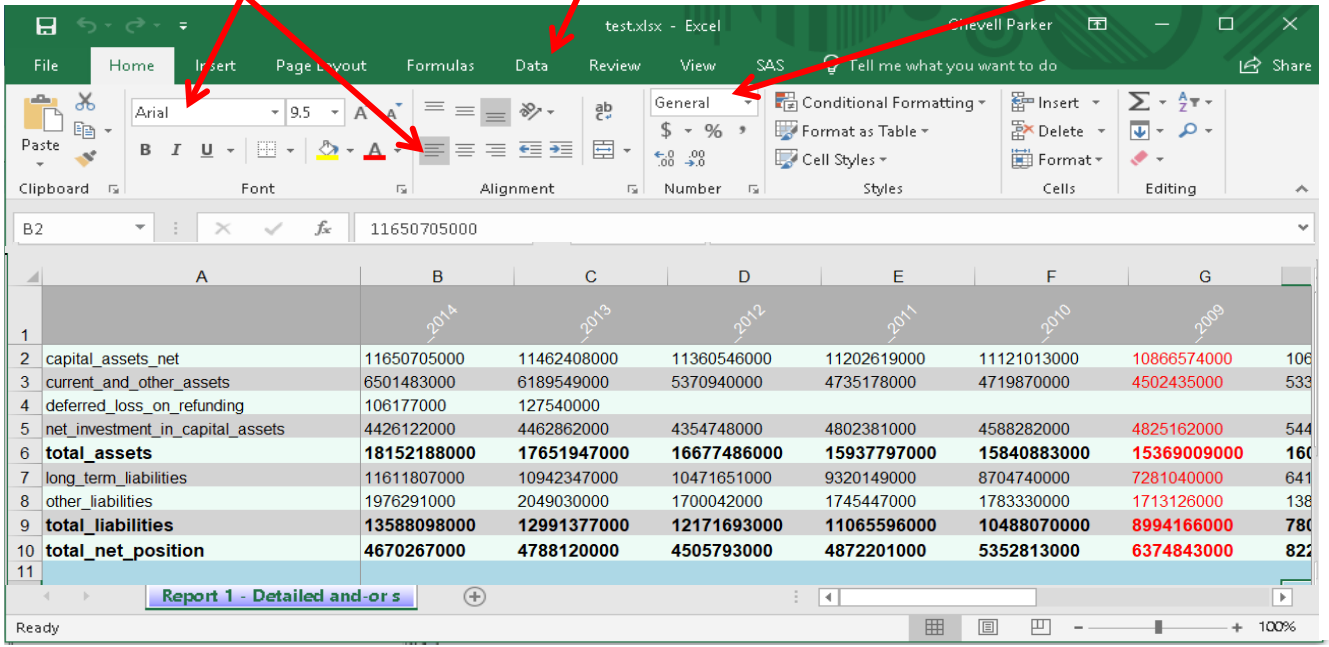
```
proc report data=budget style(header)={tagattr="rotate:45"
              color=white background=#b0b0b0};

   define category / " ";
   compute Category;
      count+1;
      if mod(count,2) then call define(_row_,"style",
         "style={background= #edfbf5}");
   endcomp;
run;

ods excel close;
```

Introduction to the ODS Excel Destination

Styles

Excel Options

TAGATTR= attribute



	A	B	C	D	E	F	G
1		2014	2013	2012	2011	2010	2009
2	capital_assets_net	11650705000	11462408000	11360546000	11202619000	11121013000	10866574000
3	current_and_other_assets	6501483000	6189549000	5370940000	4735178000	4719870000	4502435000
4	deferred_loss_on_refunding	106177000	127540000				
5	net_investment_in_capital_assets	4426122000	4462862000	4354748000	4802381000	4588282000	4825162000
6	**total_assets**	**18152188000**	**17651947000**	**16677486000**	**15937797000**	**15840883000**	**15369009000**
7	long_term_liabilities	11611807000	10942347000	10471651000	9320149000	8704740000	7281040000
8	other_liabilities	1976291000	2049030000	1700042000	1745447000	1783330000	1713126000
9	**total_liabilities**	**13588098000**	**12991377000**	**12171693000**	**11065596000**	**10488070000**	**8994166000**
10	**total_net_position**	**4670267000**	**4788120000**	**4505793000**	**4872201000**	**5352813000**	**6374843000**
11							

ORIENTATION=
SCALE=
FITTOPAGE=
PRINT_HEADER=
COLUMN_REPEAT=
PRINT_AREA=
SHEET_INTERVAL=
FLOW=
ROW_HEIGHTS=
ZOOM=

Enhancing the Microsoft Excel Display by Using Formatting

- The Excel General format is applied for all cells if you do not specify a SAS® format or a custom Excel format.
- SAS formats are converted to comparable Excel formats.
- Custom Excel formats are applied directly by using the TAGATTR= style attribute.
- Numbers that are stored as type character in SAS are stored as numbers in Excel.

Enhancing the Microsoft Excel Display by Using Formatting: SAS® Formats versus Custom Excel Formats

SAS® Formatting	Custom Excel Formatting
This formatting is convenient and easy to use.	You have total control of the formatting.
You should already be familiar with SAS formatting.	There is a small learning curve in using custom formatting.
SAS Formatting supports National Language Support (NLS).	Custom formatting is not validated with the TAGATTR= attribute.
SAS formats are documented extensively.	Custom Excel formatting changes the appearance, not the underlying value.

Enhancing the Microsoft Excel Display by Using Formatting: The General Format

- Leading and trailing zeros are not displayed except for numbers between -1 to 1.
- Numbers with twelve or more digits are displayed in scientific notation.
- Numbers with an embedded E might be interpreted by the Excel General Format as a value that is in scientific notation.
- Ranges might be translated into dates.
- Unrecognized values are stored as text (for example, **$-5555**).

Enhancing the Microsoft Excel Display by Using Formatting: SAS® Formats

```
data one;
   Char_leading="0001";        Num_leading=0001;
   Char_long="123456789012";   Num_long=123456789012;
   Char_string="22.900";       Num_string=22.900;
   Char_sci="1e9";
run;

ods excel file="c:\format.xlsx";
  proc print data=one;
  run;
ods excel close;
```

	A	B	C	D	E	F	G	H
1	Obs	Char_leading	Num_leading	Char_long	Num_long	Char_string	Num_string	Char_sci
2	1	1	1	1.23457E+11	1.23457E+11	22.9	22.9	1000000000

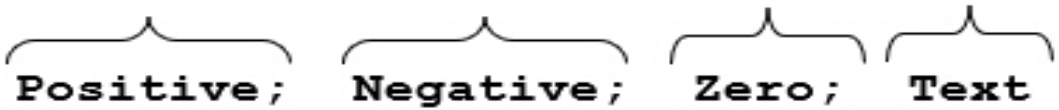
Enhancing the Microsoft Excel Display by Using Formatting: SAS® Formats

```
data one;
   Char_leading="0001";        Num_leading=0001;
   Char_long="123456789012";   Num_long=123456789012;
   Char_string="22.900";       Num_string=22.900;
   Char_sci="1e9";
run;

ods excel file="c:\format.xlsx";
   proc print data=one;
      format Char_leading $char4. Num_leading z4.;
      format Char_long $13.       Num_long best.;
      format Char_string $6.      Num_string 6.3;
      format Char_sci $3.;
   run;
ods excel close;
```

Enhancing the Microsoft Excel Display by Using Formatting: SAS® Formats

	A	B	C	D	E	F	G	H
1	Obs	Char_leading	Num_leading	Char_long	Num_long	Char_string	Num_string	Char_sci
2	1	0001	0001	123456789012	123456789012	22.900	22.900	1e9

Enhancing the Microsoft Excel Display by Using Formatting: Custom Excel Formatting



Formats	$#,###.00;	-$#,###.00;	0;	@;
Colors	[blue] #,###.00;	[red] #,###.00		
Conditions	[>100] #,###.00;	[red] ###.00		

Enhancing the Microsoft Excel Display by Using Formatting: Custom Excel Formatting *(continued)*

```
ods excel file="format.xlsx";
   proc report data=sashelp.heart ;
       column sex height weight diastolic systolic
              cholesterol bmi;
       define height / style(column)={tagattr='format:##.#
                                              "in"'};
       define weight / style(column)={tagattr='format:###
                                              "lbs"'};
       define diastolic /
              style(column)={tagattr='format:[red][>90];
                                     ###'};
```

Enhancing the Microsoft Excel Display by Using Formatting: Custom Excel Formatting *(continued)*

```
   define systolic / style(column)=
          {tagattr='format:[blue][<120];[red][>140]
                    "High";###'};
   define cholesterol / style(column)=
          {tagattr='format:[red][>200]; ##'};
   define BMI / style(column)=
          {tagattr='formula:RC[-4]/RC[-5]/RC[-5]*703
                    format:[red][>29] ##;##'};
   run;
ods excel close;
```

Enhancing the Microsoft Excel Display by Using Formatting: Custom Excel Formatting *(continued)*

	A	B	C	D	E	F	G
1	Heart Health Report						
2							
3	Sex	Height	Weight	Diastolic	Systolic	Cholesterol	BMI
4	Female	62.5 in	140 lbs	78	124	.	25
5	Female	59.8 in	194 lbs	92	High	181	38
6	Female	62.3 in	132 lbs	90	High	250	24
7	Female	65.8 in	158 lbs	80	128	242	26
8	Male	66. in	156 lbs	76	110	281	25
9	Female	61.8 in	131 lbs	92	High	196	24
10	Female	64.8 in	136 lbs	80	112	196	23
11	Male	65.5 in	130 lbs	80	114	276	21

Creating and Enhancing Reports with the ODS Excel Destination and the Report Writing Interface

- Generates output using object- oriented code in the DATA step
- Allows merging of columns and rows
- Enables you to add Excel formats and formulas
- Enables you to generate custom financial reports and other types of reports easily

The ODS Excel Destination and the Report Writing Interface: Formats and Formulas

```
data _null_;
   set budget end=last;
   if _n_=1 then do;
   declare odsout obj();
   obj.image(file:'c:\logo.jpg');
   obj.table_start();
```

The ODS Excel Destination and the Report Writing Interface: Formats and Formulas

```
obj.row_start();
obj.format_cell(data:' ');
obj.format_cell(data:'Report for
     December 31.',column_span:3);
obj.row_end()
```

The ODS Excel Destination and the Report Writing Interface: Formats and Formulas

```
obj.row_start();
obj.format_cell(data:'(In Millions)';
obj.format_cell(data:'2014');
obj.format_cell(data:'2013');
obj.format_cell(data:'2012');
obj.row_end();
obj.row_start();
obj.format_cell(data:'Assets',
column_span:4,style_attr:"textalign=left");
   obj.row_end();
end;
```

The ODS Excel Destination and the Report Writing Interface: Formats and Formulas *(continued)*

```
obj.row_start();
   if category ='total_assets' then do;
   obj.format_cell(data:category,style_attr:"textalign=left");
   obj.format_cell(data:_2014,
              style_attr:"tagattr='formula:=SUM(R[- 4]C:R[-1]C)
                                   format:currency'");
   obj.format_cell(data:_2013,
              style_attr:"tagattr='formula:=SUM(R[-4]C:R[-1]C)
                                   format:currency'");
   obj.format_cell(data:_2012,
               style_attr:"tagattr='formula:=SUM(R[-4]C:R[-1]C)
                                   format:currency'");
 obj.row_end();
```

The ODS Excel Destination and the Report Writing Interface: Formats and Formulas *(continued)*

```
   else if category='total_liabilities' then do;
      obj.format_cell(data:category,style_attr:"textalign=left");
      obj.format_cell(data:_2014,
             style_attr:"tagattr=""formula:R[-2]C+R[-1]C
                                   format:currency""");
      obj.format_cell(data:_2013,
             style_attr:"tagattr=""formula:R[-2]C+R[-1]C
                                   format:currency""");
      obj.format_cell(data:_2012,
             style_attr:"tagattr=""formula:R[-2]C+R[-1]C
                                   format:currency""");
   obj.row_end();
end;
```

The ODS Excel Destination and the Report Writing Interface: Formats and Formulas *(continued)*

```
  else if category='total_net_position' then do;
     obj.format_cell(data:_name_,style_attr:"textalign=left");
     obj.format_cell(data:_2014,
                style_attr:"tagattr=""formula:R[-8]C+R[-3]C
                                      format:currency""");
     obj.format_cell(data:_2013,
                style_attr:"tagattr=""formula:R[-8]C+R[-3]C
                                      format:currency""");
     obj.format_cell(data:_2012,
                style_attr:"tagattr=""formula:R[-8]C+R[-3]C
                                      format:currency""");
    obj.row_end();
end;
```

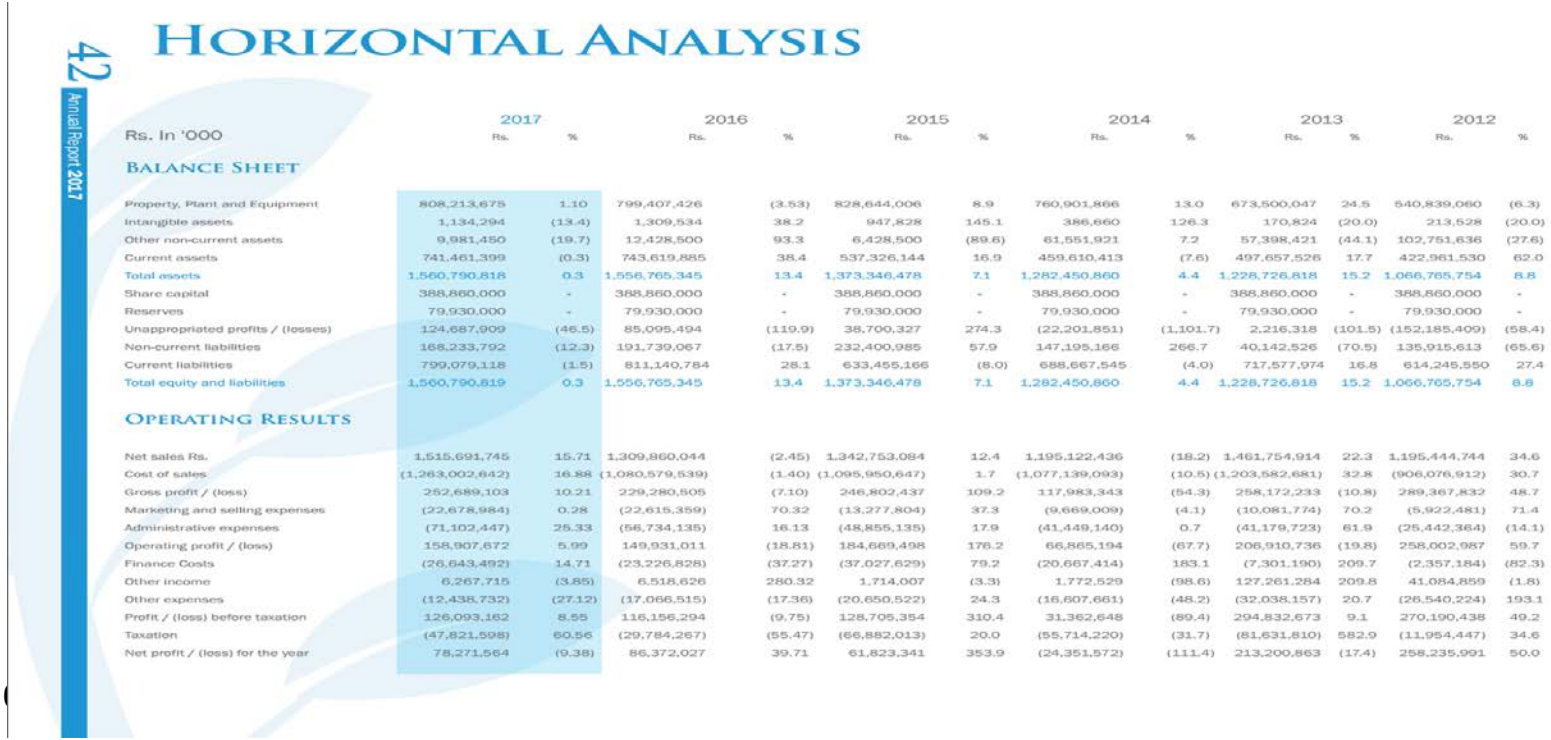
The ODS Excel Destination and the Report Writing Interface: Formats and Formulas *(continued)*

```
      else do;
         obj.row_start();
            obj.format_cell(data:category,style_attr:"just=l"
                            pretext='  ' asis=on");
            obj.format_cell(data:_2014);
            obj.format_cell(data:_2013);
            obj.format_cell(data:_2012);
         obj.row_end();
      end;
      if last then do;
         obj.table_end();
      end;
   run;
ods excel close;
```

The ODS Excel Destination and the Report Writing Interface: Formats and Formulas *(continued)*

	A	B	C	D
1				
2	XYZ Corporation			
3				
4				
5				
6				
7				
8		Report for December 31.		
9	(In Millions)	2014	2013	2012
10	Assets			
11	capital_assets_net	11650705000	11462408000	11360546000
12	current_and_other_assets	6501483000	6189549000	5370940000
13	deferred_loss_on_refunding	106177000	127540000	
14	net_investment_in_capital_assets	4426122000	4462862000	4354748000
15	**total_assets**	$22,684,487,000.00	$22,242,359,000.00	$21,086,234,000.00
16				
17	Liabilities			
18	long_term_liabilities	11611807000	10942347000	10471651000
19	other_liabilities	1976291000	2049030000	1700042000
20	**total_liabilities**	$13,588,098,000.00	$12,991,377,000.00	$12,171,693,000.00
21				
22				
23	**total_net_position**	$9,096,389,000.00	$9,250,982,000.00	$8,914,541,000.00

The ODS Excel Destination and the Report Writing Interface: Formats and Formulas *(continued)*



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HORIZONTAL ANALYSIS

Rs. In '000	2017 Rs.	%	2016 Rs.	%	2015 Rs.	%	2014 Rs.	%	2013 Rs.	%	2012 Rs.	%
BALANCE SHEET												
Property, Plant and Equipment	808,213,675	1.10	799,407,426	(3.53)	828,644,006	8.9	760,901,866	13.0	673,500,047	24.5	540,839,060	(6.3)
Intangible assets	1,134,294	(13.4)	1,309,534	38.2	947,828	145.1	386,660	126.3	170,824	(20.0)	213,528	(20.0)
Other non-current assets	9,981,450	(19.7)	12,428,500	93.3	6,428,500	(89.6)	61,551,921	7.2	57,398,421	(44.1)	102,751,636	(27.6)
Current assets	741,461,399	(0.3)	743,619,885	38.4	537,326,144	16.9	459,610,413	(7.6)	497,657,526	17.7	422,961,530	62.0
Total assets	1,560,790,818	0.3	1,556,765,345	13.4	1,373,346,478	7.1	1,282,450,860	4.4	1,228,726,818	15.2	1,066,765,754	8.8
Share capital	388,860,000	-	388,860,000	-	388,860,000	-	388,860,000	-	388,860,000	-	388,860,000	-
Reserves	79,930,000	-	79,930,000	-	79,930,000	-	79,930,000	-	79,930,000	-	79,930,000	-
Unappropriated profits / (losses)	124,687,909	(46.5)	85,095,494	(119.9)	38,700,327	274.3	(22,201,851)	(1,101.7)	2,216,318	(101.5)	(152,185,409)	(58.4)
Non-current liabilities	168,233,792	(12.3)	191,739,067	(17.5)	232,400,985	57.9	147,195,166	266.7	40,142,526	(70.5)	135,915,613	(65.6)
Current liabilities	799,079,118	(1.5)	811,140,784	28.1	633,455,166	(8.0)	688,667,545	(4.0)	717,577,974	16.8	614,245,550	27.4
Total equity and liabilities	1,560,790,819	0.3	1,556,765,345	13.4	1,373,346,478	7.1	1,282,450,860	4.4	1,228,726,818	15.2	1,066,765,754	8.8
OPERATING RESULTS												
Net sales Rs.	1,515,691,745	15.71	1,309,860,044	(2.45)	1,342,753,084	12.4	1,195,122,436	(18.2)	1,461,754,914	22.3	1,195,444,744	34.6
Cost of sales	(1,263,002,642)	16.88	(1,080,579,539)	(1.40)	(1,095,950,647)	1.7	(1,077,139,093)	(10.5)	(1,203,582,681)	32.8	(906,076,912)	30.7
Gross profit / (loss)	252,689,103	10.21	229,280,505	(7.10)	246,802,437	109.2	117,983,343	(54.3)	258,172,233	(10.8)	289,367,832	48.7
Marketing and selling expenses	(22,678,984)	0.28	(22,615,359)	70.32	(13,277,804)	37.3	(9,669,009)	(4.1)	(10,081,774)	70.2	(5,922,481)	71.4
Administrative expenses	(71,102,447)	25.33	(56,734,135)	16.13	(48,855,135)	17.9	(41,449,140)	0.7	(41,179,723)	61.9	(25,442,364)	(14.1)
Operating profit / (loss)	158,907,672	5.99	149,931,011	(18.81)	184,669,498	176.2	66,865,194	(67.7)	206,910,736	(19.8)	258,002,987	59.7
Finance Costs	(26,643,492)	14.71	(23,226,828)	(37.27)	(37,027,629)	79.2	(20,667,414)	183.1	(7,301,190)	209.7	(2,357,184)	(82.3)
Other income	6,267,715	(3.85)	6,518,626	280.32	1,714,007	(3.3)	1,772,529	(98.6)	127,261,284	209.8	41,084,859	(1.8)
Other expenses	(12,438,732)	(27.12)	(17,066,515)	(17.36)	(20,650,522)	24.3	(16,607,661)	(48.2)	(32,038,157)	20.7	(26,540,224)	193.1
Profit / (loss) before taxation	126,093,162	8.55	116,156,294	(9.75)	128,705,354	310.4	31,362,648	(89.4)	294,832,673	9.1	270,190,438	49.2
Taxation	(47,821,598)	60.56	(29,784,267)	(55.47)	(66,882,013)	20.0	(55,714,220)	(31.7)	(81,631,810)	582.9	(11,954,447)	34.6
Net profit / (loss) for the year	78,271,564	(9.38)	86,372,027	39.71	61,823,341	353.9	(24,351,572)	(111.4)	213,200,863	(17.4)	258,235,991	50.0

Using HTML and the ODS Word Destination to Enhance Reporting

- Sending HTML output to the body of an email
- Adding interactive features to your HTML files
- Previewing the pre-production ODS WORD destination

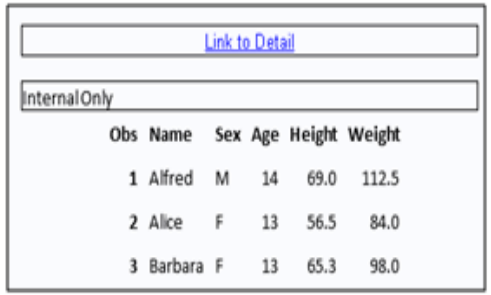
Using the HTML Destination to Enhance Email Content

- Effective handling of style information in email
- Performance considerations when you email HTML
- Details for incorporating images into the body of an email

Using HTML and the ODS Word Destination to Enhance Email Content: Generating HTML Email

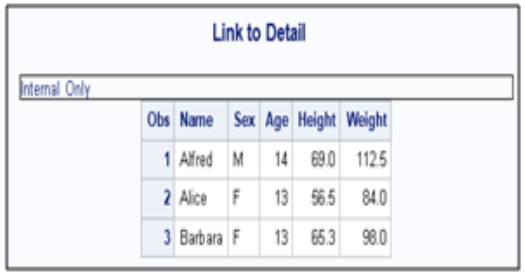
```
options emailsys=smtp emailhost=email-host-name;
filename temp email to="your-email-address"
                    content_type="text/html";
ods html file=temp rs=none;
   ods text="This is a second link";
   proc print data=sashelp.class(obs=3);
      title link=http://www.sas.com "Link to Detail";
   run;
ods html close;
```

Sending HTML Output to the Body of an Email: Maintaining Styles in Outlook

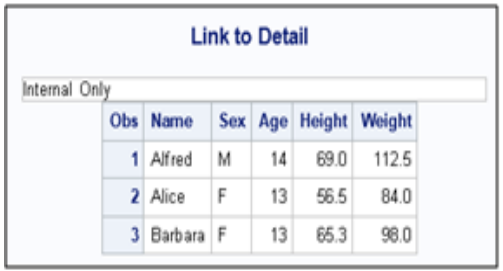


ODS HTML

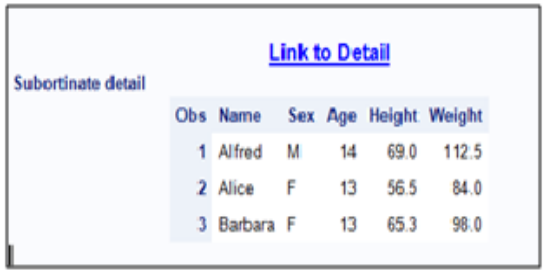
ODS HTML5



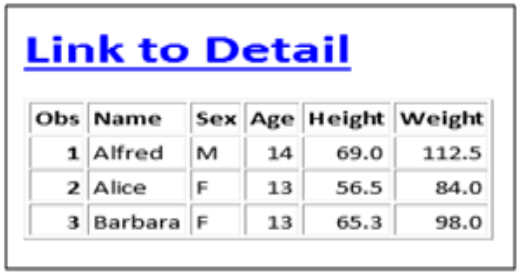
ODS MSOFFICE2K



ODS PHTML



ODS HTML3



ODS CHTML

Sending HTML Output to the Body of an Email: Performance

- Consider size as one of the first factors when you decide to email HTML output.
- Consider mobile clients from the start when you plan to email such output.
- Select the most efficient method of sending email.

Sending HTML Output to the Body of an Email: Size Considerations

ODS HTML

```
<td class="l data">Alfred</td>  (30)
```

ODS MSOFFICE2K

```
<td class="data" style=" text-align: left;">Alfred</td> (56)
```

ODS HTML3

```
<TD ALIGN=LEFT bgcolor="#D3D3D3"><font  face="Arial, Helvetica,
    sans-serif" size="3" color="#000000">Alfred</font></TD>  (123)
```

ODS PHTML

```
<td class="l">Alfred</td> (26)
```

ODS HTML5

```
<td class="data">Alfred</td>  (28)
```

Sending HTML Output to the Body of an Email: Incorporating Images

- Determine whether images should be hosted or emailed.
- Add compressed images (for example, GIF, JPG, or PNG formats).
- Add alternate text to the images.

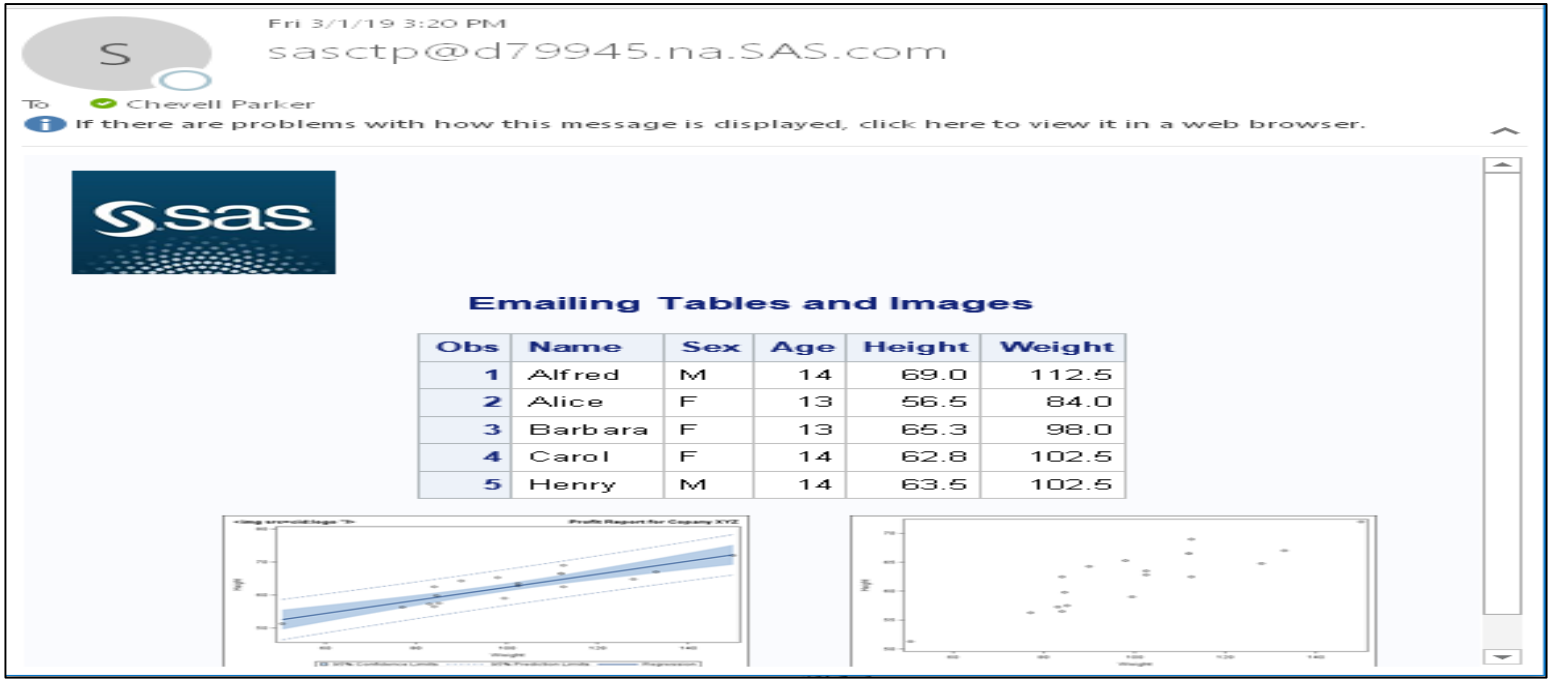
Sending HTML Output to the Body of the Email: Example

```
options emailsys=smtp emailhost=email-host-name;
filename output email to="your-email-address"
           attach=('C:\images\SAS.jpg' inlined="logo"
                   'C:\images\sgplot.png'  inlined='logo1'
                   'C:\images\sgplot1.png' inlined='logo2')
           content_type="text/html";

ods phtml file=output rs=none style=htmlblue ;
   title j=l '<img src=cid:logo width=100 height=100/>';

   proc print data=sashelp.class(obs=5);
   run;
```

Sending HTML Output to the Body of the Email: Example

```
   proc odstext;
      p "<span style='white-space:pre'>
            <img src='cid:logo1' width=200 height=100/>
            <img src='cid:logo2' width=200 height=150 />
         </span>" / style={just=center};
   run;
ods phtml close;
```

Sending HTML Output to the Body of the Email: Example



Adding Interactive Features to Your Web Pages

```
ods tagsets.tableeditor path="c:\" body="test.html"
                                    options(JQ_DataTable="yes");

   proc print data=sashelp.cars noobs label;
   run;

ods tagsets.tableeditor close;
```

Adding Interactive Features to Your Web Pages

Link to Detail

Show 10 entries Search: Male

Sex	Height	Weight	Diastolic	Systolic	Cholesterol
Male	65.25	157	75	130	96
Male	72	169	98	155	568
Male	67.5	205	92	154	534
Male	66.25	164	104	164	492
Male	70.75	180	80	120	435
Male	71	194	90	150	429
Male	66	180	98	140	420
Male	69.25	196	90	135	386
Male	64.5	143	92	158	386
Male	63.25	160	104	134	375

Showing 1 to 10 of 5,209 entries Previous 1 2 3 4 5 … 521 Next

A Preview of the Pre-Production ODS WORD Destination

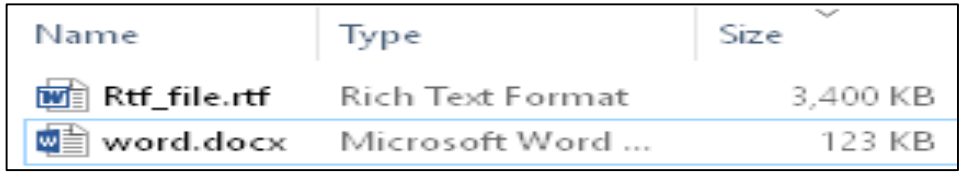
- Creates native Word files (.DOCX)
- Creates files that are usually substantially smaller
- Can use themes
- Is more secure than the RTF destination
- Enables you to create files that can be used with mobile devices

A Preview of the Pre-Production ODS WORD Destination *(continued)*

17:04 Friday, January 11, 2019 1

The SAS System

Obs	ACTUAL	PREDICT	COUNTRY	REGION	DIVISION	PRODTYPE	PRODUCT	QUARTER	YEAR	MONTH
1	$925.00	$850.00	CANADA	EAST	EDUCATION	FURNITURE	SOFA	1	1993	Jan
2	$999.00	$297.00	CANADA	EAST	EDUCATION	FURNITURE	SOFA	1	1993	Feb
3	$608.00	$846.00	CANADA	EAST	EDUCATION	FURNITURE	SOFA	1	1993	Mar
4	$642.00	$533.00	CANADA	EAST	EDUCATION	FURNITURE	SOFA	2	1993	Apr
5	$656.00	$646.00	CANADA	EAST	EDUCATION	FURNITURE	SOFA	2	1993	May



Enhancing Output Using the Python Open-Source Language

- Using Python with SAS®:
  - The **SASPy** package
  - The Python API to SAS® Viya®
  - The SAS FCMP procedure
- Executing Python scripts from SAS

Using the SASPy Package to Enhance Reporting

- You can connect to SAS and run your analytics directly from Python.
- You can use methods or APIs in Python which are converted into SAS language.
- You can also create your own methods.

Using the SASPy Package to Enhance Reporting *(continued)*

In [ ]:

```
import pandas as pd
import matplotlib.pyplot as plt
from wordcloud import WordCloud

# Read CSV fie an create a pandas DataFrame

df= pd.read_csv('https://data.cityofnewyork.us/api/views/25th-nujf/rows.csv?accessType=DOWNLOAD')

# Create text string which has all first names

text=' '.join(df["Child's First Name"].tolist())

# create word cloud and save image

wordcloud=WordCloud(relative_scaling= 1.0,background_color='white').generate(text)
plt.imshow(wordcloud)
plt.axis("off")
plt.savefig('wordcloud.png')
```

Using the SASPy Package to Enhance Reporting *(continued)*

```
In [ ]: import p
        import m
        from wor

        # Read (

        df= pd.r

        # Create

        text=' '

        # create

        wordclou
        plt.imsh
        plt.axis
        plt.save
```

```
# Import saspy package and create a SAS data set from the DataFrame

import saspy
sas=saspy.SASsession(cfgname='winlocal')
sasds=sas.df2sd(df)

sas.submit(
"""
 ods _all_ close;
 ods excel file="c:\temp\test.xlsx"                                    NLOAD')

 options(embedded_titles="yes" sheet_interval="none");
 goptions iback="c:\temp\wordcloud.png" imagestyle=fit hsize=3.5in
 vsize=3.5in;

 proc gslide;
 run;

 title "Most popular baby names in NYC from 2011-2016";
 proc freq data=_df order=freq;
 table Child_s_First_Name;
 run;

 ods excel close;
 """  )
```

Using the SASPy Package to Enhance Reporting *(continued)*

Most popular baby names in NYC from 2011-2016

The FREQ Procedure

Child_s_First_Name	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Avery	24	0.21	24	0.21
Ariel	19	0.17	43	0.38
Riley	19	0.17	62	0.55
Dylan	18	0.16	80	0.71
Logan	18	0.16	98	0.86

Using Python to Enhance Reporting: Modifying Existing XLSX Files

- The **`openpyxl`** package enables you to create or update Existing Excel files.
- This package is a good option for adding functionality that is not available currently.
- The API, which is documented, enables you to modify an Excel file completely.
- The first step is to install the openpyxl package by submitting this command:

```
$ pip install openpyxl
```

Using Python to Enhance Your Reporting: Modifying Existing XLSX Files

```
proc export data=sashelp.class
            outfile= "c:\temp\export.xlsx"
            dbms=xlsx replace;
            sheet="class";
run;
```

	A	B	C	D	E
1	Name	Sex	Age	Height	Weight
2	Alfred	M	14	69	112.5
3	Alice	F	13	56.5	84
4	Barbara	F	13	65.3	98
5	Carol	F	14	62.8	102.5
6	Henry	M	14	63.5	102.5
7	James	M	12	57.3	83

Using Python to Enhance Your Reporting: Modifying Existing XLSX Files

Export.py

```
# import the openpyxl package
import openpyxl

# create workbook object from file
wb=openpyxl.load_workbook('c:/temp/export.xlsx’)

# create a worksheet object from active sheet
ws=wb.active

# freeze rows and columns
ws.freeze_panes='A2'
ws.freeze_panes='b2’
```

Using Python to Enhance Your Reporting: Modifying Existing XLSX Files

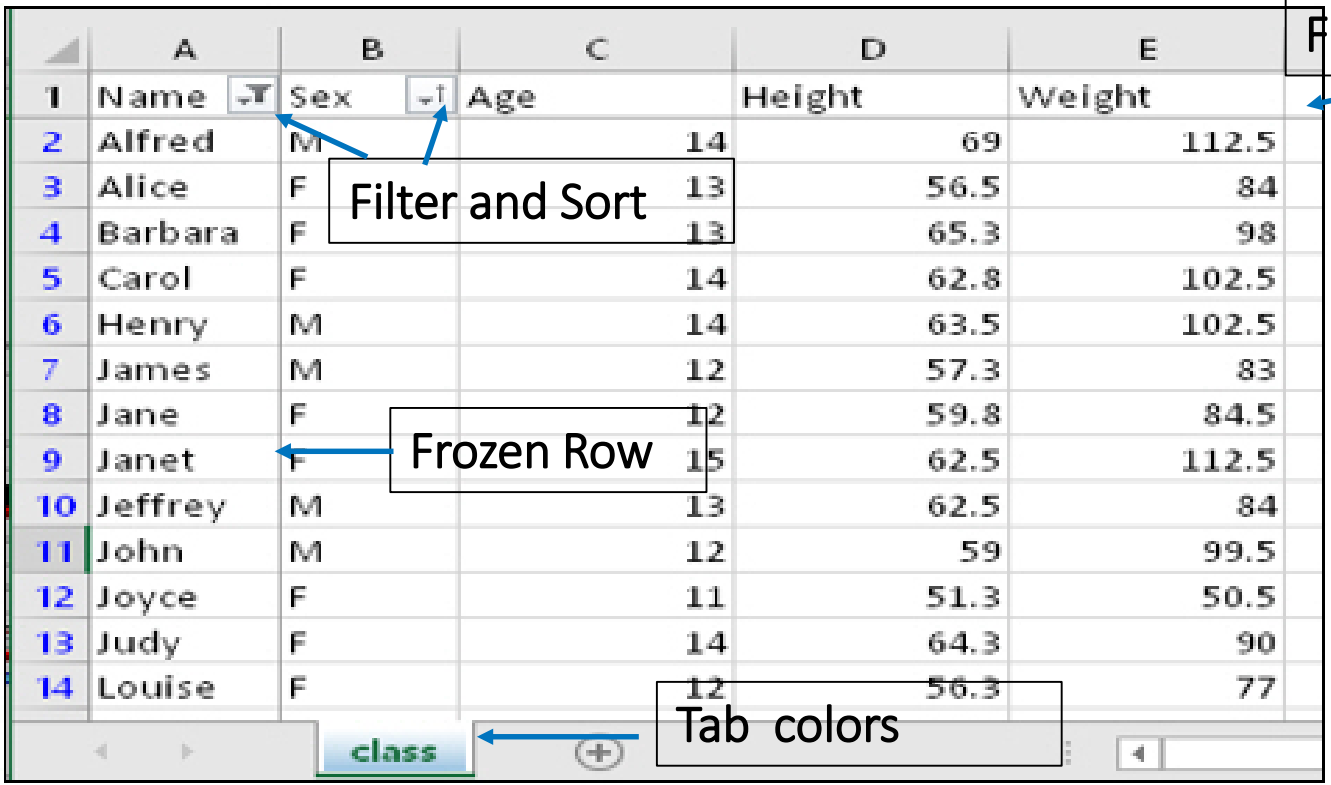
Export.py

```
# add filtering and sorting to columns
ws.auto_filter.add_filter_column(0,["Alice","Carol","Henry"])
ws.auto_filter.add_sort_condition('B2:B19’)

# add tab color
ws.sheet_properties.tabColor = "1072BA“

# save new file
wb.save('c:/temp/export_update.xlsx')
```

Using Python to Enhance Your Reporting: Modifying Existing XLSX Files *(continued)*

```
%let _loc=C:\temp\scripts\export.py;
filename temp pipe "C:\users\user\Anaconda3\python.exe &_loc";
data _null_;
    infile temp;
    input;
    put _infile_;
run;
```

Using Python to Enhance Your Reporting: Modifying Existing XLSX Files *(continued)*



	A	B	C	D	E
1	Name	Sex	Age	Height	Weight
2	Alfred	M	14	69	112.5
3	Alice	F	13	56.5	84
4	Barbara	F	13	65.3	98
5	Carol	F	14	62.8	102.5
6	Henry	M	14	63.5	102.5
7	James	M	12	57.3	83
8	Jane	F	12	59.8	84.5
9	Janet	F	15	62.5	112.5
10	Jeffrey	M	13	62.5	84
11	John	M	12	59	99.5
12	Joyce	F	11	51.3	50.5
13	Judy	F	14	64.3	90
14	Louise	F	12	56.3	77

Using Python with the ODS Excel Destination to Enhance Your Reporting

- Updating Excel files that are generated with the Excel destination generates errors during loading of the file.
- Setting the environment variable OPENPYXL_ LXML enables the Excel file to be loaded.
- Then, you can add methods to update the functionality of the worksheet or workbook.

Using Python with the ODS Excel Destination to Enhance Your Reporting *(continued)*

```
ods excel file="ods.xlsx" options(embedded_titles="yes"
                                  start_at="3,3");
   proc print data=sashelp.prdsale;
      title "Financial Report for Company XYZ.";
      var country region product prodtype year actual;
   run;
ods excel close;
```

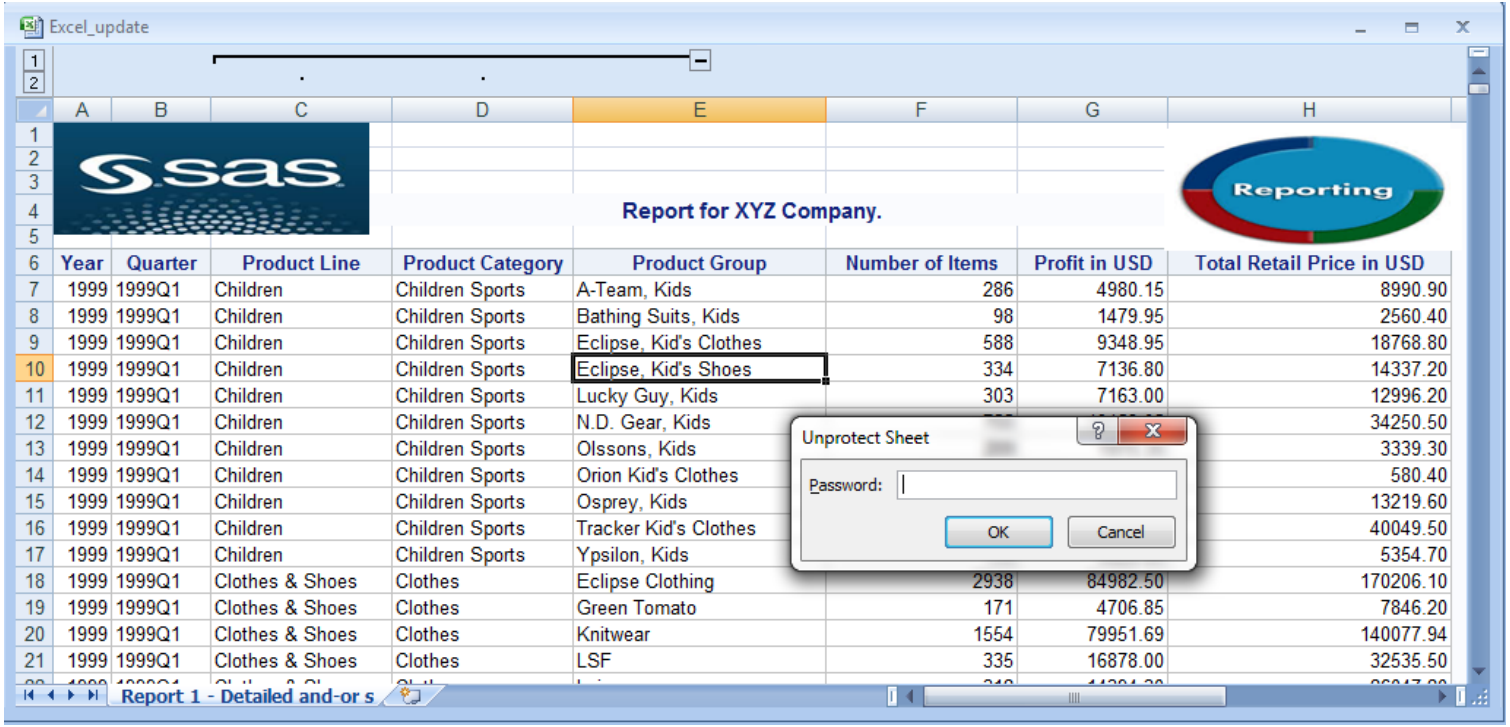
Using Python with the ODS Excel Destination to Enhance Your Reporting *(continued)*

```
from openpyxl import  load_workbook
from openpyxl.drawing.image import Image

# load workboook created with ODS Exce1
wb=openpyxl.load_workbook("c:/temp/temp.xlsx")

# open the active worksheet
ws=wb.active

# create anchors with images
img=Image("c:/temp/sas_image.jpg")
img1=Image("c:/temp/reporting.jpg")
```

Using Python with the ODS Excel Destination to Enhance Your Reporting *(continued)*

```
# add images to worksheet
ws.add_image(img,'a1');
ws.add_image(img1,'j1’);

# set password for worksheet
ws.protection.set_password("test")

# Add column group to the worksheet
ws.column_dimensions.group('C','D',hidden='false')

# Save to a new worksheet
wb.save("c:/temp/Excel_update.xlsx")
```

Using Python with the ODS Excel Destination to Enhance Your Reporting *(continued)*



Year	Quarter	Product Line	Product Category	Product Group	Number of Items	Profit in USD	Total Retail Price in USD
1999	1999Q1	Children	Children Sports	A-Team, Kids	286	4980.15	8990.90
1999	1999Q1	Children	Children Sports	Bathing Suits, Kids	98	1479.95	2560.40
1999	1999Q1	Children	Children Sports	Eclipse, Kid's Clothes	588	9348.95	18768.80
1999	1999Q1	Children	Children Sports	Eclipse, Kid's Shoes	334	7136.80	14337.20
1999	1999Q1	Children	Children Sports	Lucky Guy, Kids	303	7163.00	12996.20
1999	1999Q1	Children	Children Sports	N.D. Gear, Kids			34250.50
1999	1999Q1	Children	Children Sports	Olssons, Kids			3339.30
1999	1999Q1	Children	Children Sports	Orion Kid's Clothes			580.40
1999	1999Q1	Children	Children Sports	Osprey, Kids			13219.60
1999	1999Q1	Children	Children Sports	Tracker Kid's Clothes			40049.50
1999	1999Q1	Children	Children Sports	Ypsilon, Kids			5354.70
1999	1999Q1	Clothes & Shoes	Clothes	Eclipse Clothing	2938	84982.50	170206.10
1999	1999Q1	Clothes & Shoes	Clothes	Green Tomato	171	4706.85	7846.20
1999	1999Q1	Clothes & Shoes	Clothes	Knitwear	1554	79951.69	140077.94
1999	1999Q1	Clothes & Shoes	Clothes	LSF	335	16878.00	32535.50

Questions?

Resources

Parker, Chevell. 2018. " A Deep Dive into the SAS® ODS Excel Destinations."
support.sas.com/resources/papers/proceedings10/003-2010.pdf.

Parker, Chevell. 2019. "Power Up Your Reporting Using the SAS® Output Delivery System ."
https://www.sas.com/content/dam/SAS/support/en/sas-global-forum-proceedings/2019/3388-2019.pdf

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Thank you!

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