

Creating HTML Output with Output Delivery System

Kirk Paul Lafler, Software Intelligence Corporation, Spring Valley, CA

ABSTRACT

Have you ever wanted to turn your basic monospace SAS® Listing output into formatted output viewable by all on the web? If the answer is "yes", then this workshop will show you how to use the Output Delivery System (ODS) to create HTML output by formatting output in Hypertext Markup Language (HTML). ODS controls the formatting of all procedure and DATA step output and provides great flexibility when working with output. You will learn how to use ODS to create an HTML file, a table of contents, a table of pages, and a frame file.

This workshop is intended for SAS Software users with some PC-SAS and HTML experience. Before attending this workshop, you should be comfortable using PC-SAS, an Internet browser such as Internet Explorer or Netscape, and HTML.

INTRODUCTION

The SAS® System Output Delivery System (ODS) controls the formatting of all output objects. It has many great features and provides flexibility when working with output since each output is split into two component objects: ① a *data* component and ② a *template* component. The data object contains the raw data values for each piece of output while the template object contains how the piece should look.

Prior to ODS, SAS users were accustomed to using the basic output available with each procedure or with using techniques of merging SAS output into document editors such as MS-Word. The advantages for using default procedure print formats are that they are familiar to users and easy to use. Beyond that, there is not too much motivation for using them, especially when incorporating procedure output into a formatted document.

Inherent limitations exist with listing files: ① monospace fonts are used, ② each output line is rendered at a time, ③ inability to control formatting, and ④ difficult to create HTML code for web deployment.

This paper highlights several areas where ODS can turn your basic monospace SAS® Listing output into formatted output viewable by all on the web.

OUTPUT DESTINATIONS

Specific types of output can be generated with ODS:

- ① Standard SAS listing
- ② HTML code for web deployment
- ③ Output data set,
- ④ Rich Text Format (RTF)

ODS has been designed so multiple output destinations can be created at the same time. Each output destination is selected by specifying the desired ODS statement option prior to the execution of your SAS program. The syntax for the ODS statement follows:

ODS <output destination> ;

where <option destination> can be: ① rtf, ② html or ③ output.

TRACING ODS OUTPUT COMPONENTS

Output producing procedures often create multiple pieces or tables of information. At times, it may be useful to know the names assigned to each piece of information. By knowing the names of each piece of output, you can better control what tables of information to be displayed in your output. The ODS statement syntax to use for procedure code is:

ODS trace output ;
< SAS procedure code >
ODS trace off ;

HTML IN REVIEW

A quick review of the major features of Hypertext Markup Language (HTML) is in order. HTML is used to format text for the World Wide Web or the Web for short. It is read and understood with any of the popular web browsers such as Internet Explorer or Netscape.

Special instructions can be provided to HTML by using one or more tags. Tags provide important information about how text should be formatted and are specified in pairs. Some browser software may interpret tags differently. So before deploying your output on the Web, verify that it can first be read by the different browsers.

HTML provides a way to modify tags through attributes. Specific attributes control text formats including font type, font size, and color as well as provide important information about linking to other places in the same document or another document.

An HTML link allows a browser to understand how to transfer control to other locations. As a browser sees each link, it usually highlights the associated text. Links are constructed using a pair of anchor tags to identify where to link to. An anchor tag that links to a Uniform Resource Locator (URL) destination might look like the following example:

```
<A href="http://www.software-intelligence.com">
</A>
```

The HREF attribute specifies what to link to and references a starting point for a link – in this case another URL. Once clicked, the corresponding home page for the URL is displayed. When using ODS, you will find that links and references are automatically created for you. To override any automatic link and reference features provided by ODS, you may need to make minimal changes to one or more HTML statements.

HTML DESTINATION FILES

Four types of files are produced with the ODS HTML destination: ① body, ② contents, ③ page, and ④ frame. Each of file is created by specifying one or more options in the ODS HTML statement. To better understand the purpose for each file, a brief explanation appears below.

The Body File

The body file consists of output created by your SAS job. When output is routed to the HTML destination, it is placed within one of three HTML tags: ① TABLE, ② IMG, or ③ as an HTML table. The nature of the output object determines which of the three tags are used for displaying with a Web browser.

When creating the body file, ODS handles output objects differently depending on the nature of the output. If the output object consists of tabular data without any graphics, ODS places the object within TABLE tags. When the object contains a graphic image, it is placed within IMG tags. And when the object does not contain tabular data or any graphic images, it is tagged as an HTML table.

The Contents File

The contents file consists of a link to each HTML table within the body file. It uses an anchor tag to link to each table. By using your browser software, you can view the contents file directly or as part of the frame file.

The Page File

The page file consists of a link to each page of ODS created output. By using your browser software, you can view the page file directly or as part of the frame file.

The Frame File

The frame file displays the body file and the contents file, the page file, or both.

LINKS AND REFERENCES IN ODS

The ODS statement controls how links and references are constructed between one or more of the HTML destination files. The basic syntax of the ODS statement follows:

```
ODS HTML ODS-action ;
```

```
< or >
```

```
ODS HTML HTML-file-specification < options > ;
```

When an ODS-action is specified, one or more output objects are selected or excluded, or the HTML destination

is closed. The available ODS-actions are: ① CLOSE, ② EXCLUDE, ③ SELECT, and ④ SHOW.

When an HTML-file-specification is specified, ODS routes one or more pieces of output to a designated file or files. The available HTML-file-specifications are: BODY=, ② CONTENTS=, ③ PAGE=, and ④ FRAME=. The available options include:

```
ANCHOR='anchor-name'
BASE='string'
GFOOTNOTE <or> NOGFOOTNOTE
GPATH=file-specification
GTITLE <or> NOGTITLE
HEADTEXT='HTML-document-head'
METATEXT='HTML-document-head'
NEWFILE=NONE <or> OUPUT <or> PAGE <or> PROC
PATH=file-specification
RECORD_SEPARATOR='string' <or> NONE
STYLE='style-definition'
TRANTAB='translation-table'
```

DEPLOYING OUTPUT TO THE WEB WITH ODS

We are all painfully aware that standard SAS output has many limitations. With the popularity of the Internet, you may find it useful to deploy all, or selected pieces of output, on your web site. Figure 1 illustrates standard monospace SAS output from the PRINT procedure.

Movie Buff Listing					
Title	Length	Category	Year	Studio	Rating
Brave Heart	177	Action Adventure	1995	Paramount Pictures	2
Casablanca	133	Drama	1942	KCM / UA	PC
Christmas Vacation	97	Comedy	1989	Warner Brothers	PC-13
Coming to America	116	Comedy	1988	Paramount Pictures	2
Dracula	133	Horror	1959	Columbia TriStar	2
Dressed to Kill	105	Drama Mystery	1980	Paramount Pictures	2
Forrest Gump	142	Drama	1994	Paramount Pictures	PC-13
Ghost	127	Drama Romance	1990	Paramount Pictures	PC-13
Jaws	125	Action Adventure	1975	Universal Studios	PC
Jurassic Park	127	Action	1993	Universal Pictures	PC-13
Letal Weapon	113	Action Cop & Robber	1987	Warner Brothers	2
Michael	106	Drama	1987	Warner Brothers	PC-13
Nat. Lampoon's Vacation	98	Comedy	1983	Warner Brothers	PC-13
Poltergeist	115	Horror	1982	KCM / UA	PC
Scarface	133	Action Adventure	1983	KCM / UA	PC
Silence of the Lambs	118	Drama Suspense	1991	Universal Studios	2
Star Wars	124	Action Sci-Fi	1977	Lucas Film Ltd	PC
The Hunt for Red October	132	Action Adventure	1990	Paramount Pictures	2
The Terminator	108	Action Sci-Fi	1984	Live Entertainment	2
The Wizard of Oz	101	Adventure	1939	KCM / UA	C
Titanic	194	Drama Romance	1997	Paramount Pictures	PC-13

Figure 1. Standard SAS Output

ODS makes deploying standard SAS output to the web a simple process. Syntactically-correct HTML code is automatically produced and ready for you to deploy using your favorite Internet browser software. The ODS statement syntax follows:

```
ODS html body = 'user-defined-file-name' ;
< SAS procedure code > ;
ODS html close ;
```

Figure 2 illustrates web-ready SAS output from the PRINT procedure.

Item	Category	Value	Page
1. Summary	17. ODS Summary	100	1
2. Descriptive	18. Descriptive	100	2
3. Diagnostic	19. Diagnostic	100	3
4. Diagnostic	20. Diagnostic	100	4
5. Diagnostic	21. Diagnostic	100	5
6. Diagnostic	22. Diagnostic	100	6
7. Diagnostic	23. Diagnostic	100	7
8. Diagnostic	24. Diagnostic	100	8
9. Diagnostic	25. Diagnostic	100	9
10. Diagnostic	26. Diagnostic	100	10
11. Diagnostic	27. Diagnostic	100	11
12. Diagnostic	28. Diagnostic	100	12
13. Diagnostic	29. Diagnostic	100	13
14. Diagnostic	30. Diagnostic	100	14
15. Diagnostic	31. Diagnostic	100	15
16. Diagnostic	32. Diagnostic	100	16
17. Diagnostic	33. Diagnostic	100	17
18. Diagnostic	34. Diagnostic	100	18
19. Diagnostic	35. Diagnostic	100	19
20. Diagnostic	36. Diagnostic	100	20
21. Diagnostic	37. Diagnostic	100	21
22. Diagnostic	38. Diagnostic	100	22
23. Diagnostic	39. Diagnostic	100	23
24. Diagnostic	40. Diagnostic	100	24
25. Diagnostic	41. Diagnostic	100	25
26. Diagnostic	42. Diagnostic	100	26
27. Diagnostic	43. Diagnostic	100	27
28. Diagnostic	44. Diagnostic	100	28
29. Diagnostic	45. Diagnostic	100	29
30. Diagnostic	46. Diagnostic	100	30
31. Diagnostic	47. Diagnostic	100	31
32. Diagnostic	48. Diagnostic	100	32
33. Diagnostic	49. Diagnostic	100	33
34. Diagnostic	50. Diagnostic	100	34
35. Diagnostic	51. Diagnostic	100	35
36. Diagnostic	52. Diagnostic	100	36
37. Diagnostic	53. Diagnostic	100	37
38. Diagnostic	54. Diagnostic	100	38
39. Diagnostic	55. Diagnostic	100	39
40. Diagnostic	56. Diagnostic	100	40
41. Diagnostic	57. Diagnostic	100	41
42. Diagnostic	58. Diagnostic	100	42
43. Diagnostic	59. Diagnostic	100	43
44. Diagnostic	60. Diagnostic	100	44
45. Diagnostic	61. Diagnostic	100	45
46. Diagnostic	62. Diagnostic	100	46
47. Diagnostic	63. Diagnostic	100	47
48. Diagnostic	64. Diagnostic	100	48
49. Diagnostic	65. Diagnostic	100	49
50. Diagnostic	66. Diagnostic	100	50
51. Diagnostic	67. Diagnostic	100	51
52. Diagnostic	68. Diagnostic	100	52
53. Diagnostic	69. Diagnostic	100	53
54. Diagnostic	70. Diagnostic	100	54
55. Diagnostic	71. Diagnostic	100	55
56. Diagnostic	72. Diagnostic	100	56
57. Diagnostic	73. Diagnostic	100	57
58. Diagnostic	74. Diagnostic	100	58
59. Diagnostic	75. Diagnostic	100	59
60. Diagnostic	76. Diagnostic	100	60
61. Diagnostic	77. Diagnostic	100	61
62. Diagnostic	78. Diagnostic	100	62
63. Diagnostic	79. Diagnostic	100	63
64. Diagnostic	80. Diagnostic	100	64
65. Diagnostic	81. Diagnostic	100	65
66. Diagnostic	82. Diagnostic	100	66
67. Diagnostic	83. Diagnostic	100	67
68. Diagnostic	84. Diagnostic	100	68
69. Diagnostic	85. Diagnostic	100	69
70. Diagnostic	86. Diagnostic	100	70
71. Diagnostic	87. Diagnostic	100	71
72. Diagnostic	88. Diagnostic	100	72
73. Diagnostic	89. Diagnostic	100	73
74. Diagnostic	90. Diagnostic	100	74
75. Diagnostic	91. Diagnostic	100	75
76. Diagnostic	92. Diagnostic	100	76
77. Diagnostic	93. Diagnostic	100	77
78. Diagnostic	94. Diagnostic	100	78
79. Diagnostic	95. Diagnostic	100	79
80. Diagnostic	96. Diagnostic	100	80
81. Diagnostic	97. Diagnostic	100	81
82. Diagnostic	98. Diagnostic	100	82
83. Diagnostic	99. Diagnostic	100	83
84. Diagnostic	100. Diagnostic	100	84

Figure 2. Web-ready SAS Output

CONCLUSION

With the growing popularity of the Internet, you may find the Output Delivery System (ODS) useful in deploying selected pieces of output on the Web. ODS makes the deployment of SAS output a simple process. Syntactically-correct HTML code is produced consisting of an HTML file, a table of contents, a table of pages, and a frame file for deployment using your favorite Internet browser.

REFERENCES

- Heffner, William F. (1998), "ODS: The DATA Step Knows," Proceedings of the 23rd Annual SAS Users Group International Conference, Cary, NC: SAS Institute Inc.
- Lafier, Kirk Paul (2000), The SAS® Output Delivery System (ODS) Answer Guide, Revised and Updated, Software Intelligence Corporation, Spring Valley, CA, USA.
- Lafier, Kirk Paul (1999), "Delivering Results with the Output Delivery System," Proceedings of the 24th Annual SAS Users Group International Conference.
- Olinger, Christopher R. (1998), "ODS for Data Analysis: Output As-You-Like-It in Version 7," Proceedings of the 23rd Annual SAS Users Group International Conference, Cary, NC: SAS Institute Inc.
- Patel, Himesh (1998), "Using SAS/GRAPH® Software to Create Graphs on the Web," Proceedings of the 23rd Annual SAS Users Group International Conference, Cary, NC: SAS Institute Inc.
- SAS Institute Inc. (1999), The Complete Guide to the SAS® Output Delivery System, Version 7-1, Cary, NC, USA.
- Wehr, Paul (1998), "Building Clinical Information Spaces on the World Wide Web," Proceedings of the 23rd Annual SAS Users Group International Conference, Ann Arbor, MI: STATPROBE, Inc.

TRADEMARKS

Internet Explorer and MS-Word are the registered trademarks of Microsoft Corporation, Redmond, WA, USA.

Netscape is the registered trademark of Netscape Corporation.

SAS is the registered trademark of SAS Institute Inc., Cary, NC, USA. SAS Institute Quality Partner is the trademark of SAS Institute Inc., Cary, NC, USA.

AUTHOR'S BIOGRAPHY

Kirk Paul Lafier is a SAS Institute Quality Partner™ and senior consultant with twenty-three years experience working with the SAS System. His expertise includes application design and development, training, and programming using base-SAS, SAS/SQL, ODS, SAS/FSP, SAS/AF, SCL, FRAME, and SAS/EIS software. Comments and suggestions can be sent to:

Kirk Paul Lafier
Software Intelligence Corporation
P. O. Box 1390
Spring Valley, California 91979-1390
Voice: (619) 660-2400
E-mail: KirkLafier@CompuServe.com
Web Site: www.software-intelligence.com