Paper CT08

No Adobe Pro, No Worries

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ABSTRACT

Adobe Pro is a very handy tool when working with Tables, Listings, Figures (TFLs), and Patient Profiles using SAS. But it can be a high cost to the company or can't be installed on the server where you use your SAS. I will present how you can combine all your Tables, Listings, and Figures which are in RTF format into one PDF file with a Table of Contents (TOC) and bookmarks using SAS, VBScript, and Ghostscript. And how to create Patient Profiles straight into PDF with bookmarks using ODS Document and ODS PDF in SAS.

INTRODUCTION

TASKS	PROBLEM	SOLUTION
Combined PDF of all RTF Files of Table, Listings, and Figures with Table of Contents\Bookmarks. Patient Profiles in PDF with Bookmarks.	Adobe Pro can be a high cost to a company. Sometimes it can't be put on the server where SAS is used.	Present how to combine all RTF files of TFLs into a PDF using SAS, VBS, and GHOSTSCRIPT. Present how to create Patient Profiles straight into PDF with Bookmarks using ODS DOCUMENT and ODS PDF in SAS.

COMBINED PDF WITH TOC USING SAS MACRO

Developed a macro called COMBINE_RTF to combine TFLs with TOC into one RTF. See References for the source macro found and which we adapted.

Combine_rtf Macro Call

```
%combine_rtf(indir=s:/folder,          /**location of RTF TFLs files*/
             indata=keep,              /** work dataset with TFL filename, title for TOC & order*/
             outdir=s:/folder,        /**location of Combined RTF file**/
             outfile=CombinedOutputs,/**name of the Combined RTF File**/
             tocyn=y);                /**if want TOC or not**/
```

KEEP Dataset

Must contain variables TFL, TITLE, and ORDER.

TFL = Filename of the TFL
TITLE = Title for the TOC
ORDER= Order of TFL wanted

VIEWTABLE: Work.Keep

	TFL	TITLE	ORDER
1	Table_14.1.3(tdemo)	Table 14.1.3 Summary of Demographic and Baseline Characteristics - Safety Population	1
2	Table_14.1.5.1(tcm)	Table 14.1.5.1 Summary of Concomitant Medications - Safety Population	2
3	Table_14.3.3.1(tae)	Table 14.3.3.1 Summary of Treatment-Emergent Adverse Events (TEAEs) by System organ Class and Preferred Term - Safety Population	3
4	Table_14.3.4.2(tvs)	Table 14.3.4.2 Summary of Vital Signs - Safety Population	4

Example of the TOC off RTF output produced.

Sponsor Name: xxxxx CONFIDENTIAL
Protocol: xxxxx Version: xxxxx

Table of Contents

Table 14.1.3 Summary of Demographic and Baseline Characteristics - Safety Population
Table 14.1.5.1 Summary of Concomitant Medications - Safety Population
Table 14.3.3.1 Summary of Treatment-Emergent Adverse Events (TEAEs) by System organ Class and Preferred Term - Safety Population
Table 14.3.4.2 Summary of Vital Signs - Safety Population

Next, save the Combined RTF as a PDF.

- It is more user-friendly and reduces the size of the file by a great deal.
- TOC hyperlinks still work in PDF.

Notes

- If there are lots of outputs, the COMBINE_RTF macro can take a long time to run, and a long time to save as a PDF.
- PAGE X of Y at the bottom is updated to reflect the whole combined RTF file and not individual TFL. Therefore, would recommend keeping PAGE X of Y as a footnote under the output also.

COMBINED PDF WITH TOC & BOOKMARKS

Use GHOSTSCRIPT to add bookmarks to the combined PDF file. GHOSTSCRIPT can be downloaded for free.

1) Create the dataset RTFTOC.

```
**BRING IN RTF AND FIND WHERE NEED BOOKMARKS**;
data _null_;
 set keep;
  call symputx('max',_n_);
  call symputx('filename'||compress(put(_n_,best.)),tfl);
  call symputx('ttl'||compress(put(_n_,best.)),title);
run;

%let npage=0;

%macro bookmark;
 %do i=1 %to &max.;
    **pull in each output in order**;
    filename rtf  "s:\folder\&&filename&i...rtf";

      data rtf_&i. ;
       infile rtf missover length = l end = lastobs lrecl = 2000;
       input text $varying2000. l;

       **find where a new page occurs in each output**;
        if index(text,'sas7bdata\line Page')  or  index(text,'Page\~') then pg+1;
        **add max page of previous output*;
        page=pg+&npage;

        **filename and bookmark**;
        length tfl bookmark $200.;
        tfl="&&filename&i.";
        bookmark="&&ttl&i.";
        order=&i;

        **No of pages for each output**;
       call symputx('npage',page);
       page=page+1;

       keep order page bookmark;
    run;

    **find the first page of each output**;
    proc sort data=rtf_&i nodupkey;
     by order ;
    run;
%end;
%mend bookmark;
%bookmark;

**Table of Contents**;
data toc;
length bookmark $2000.;
 page=0;
 bookmark='Table of Contents';
run;

**TOC with rest of Outputs**;
data rtftoc;
 set toc rtf_:;
     page+1; **add an extra page of TOC**;
run;
```

RTFTOC Dataset

VIEWTABLE: Work.Rtftoc

	BOOKMARK	PAGE
1	Table of Contents	1
2	Table 14.1.3 Summary of Demographic and Baseline Characteristics - Safety Population	2
3	Table 14.1.5.1 Summary of Concomitant Medications - Safety Population	4
4	Table 14.3.3.1 Summary of Treatment-Emergent Adverse Events (TEAEs) by System organ Class and Preferred Term - Safety Population	6
5	Table 14.3.4.2 Summary of Vital Signs - Safety Population	7

2) Bookmark.txt

Create BOOKMARKS.TXT using the dataset RTFTOC.

```
filename pdfmk "s:\folder\bookmarks.txt"  lrecl=2000;
data _null_;
 set rtftoc ;
  length line $2000;
  file pdfmk ;
  line="[/Page "||compress(put(page,best.))|"/Title"||' ('||strip(bookmark)||')/OUT
pdfmark';
    put  line;
run;
```

Bookmarks.txt

```
[/Page 1/Title (Table of Contents)/OUT pdfmark
[/Page 2/Title (Table 14.1.3 Summary of Demographic and Baseline Characteristics - Safety Population)/OUT pdfmark
[/Page 4/Title (Table 14.1.5.1 Summary of Concomitant Medications - Safety Population)/OUT pdfmark
[/Page 6/Title (Table 14.3.3.1 Summary of Treatment-Emergent Adverse Events (TEAEs) by System organ Class and Preferred
Term - Safety Population)/OUT pdfmark
[/Page 7/Title (Table 14.3.4.2 Summary of Vital Signs - Safety Population)/OUT pdfmark
```

3) Combine.bat

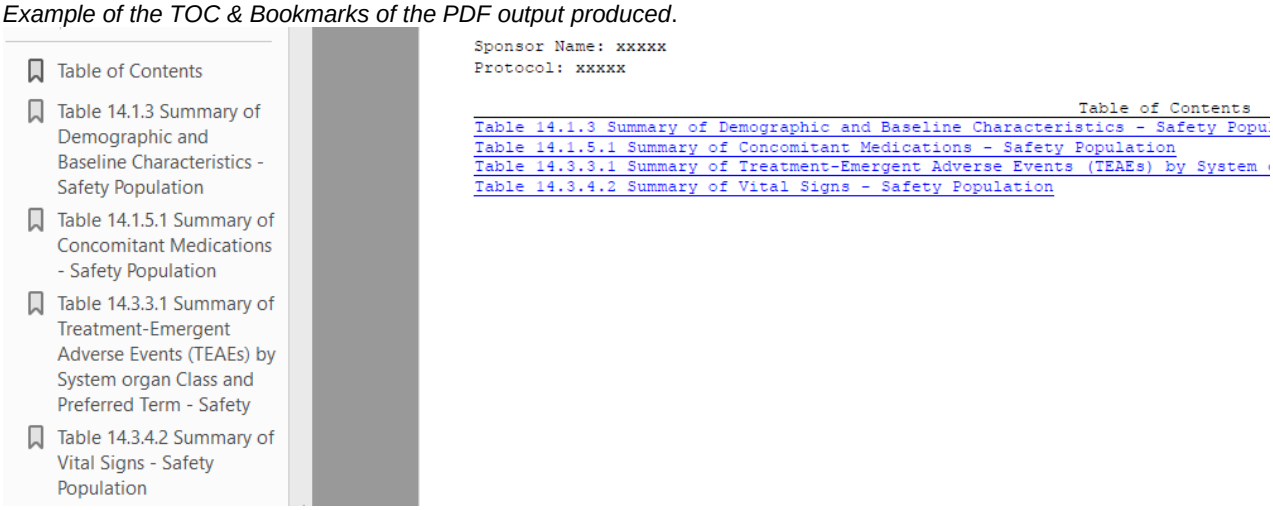
Create a BAT file to combine the bookmarks.txt with the combined PDF file using GHOSTSCRIPT.

```
%let locbat=%sysfunc(tranwrd(s:\folder,\,/)); /**change direction of \ in BAT file**/

data _null_;
  file "s:\folder\Combine.bat";                                /**name of BAT file**/
   put "gswin64c.exe ^";                                       /**Call GHOSTSCRIPT**/
   put "-o &locbat./_CombinedOutputs_TOC_Bookmarks.pdf ^";     /**Output file     **/
   put "-sDEVICE=pdfwrite ^";                                  /**settings        **/
   put "-dPDFSettings=/Screen ^";                              /**settings        **/
   put "&locbat/bookmarks.txt ^";                              /**Bookmarks       **/
   put "&locbat/CombinedOutputs.pdf ";                         /**input File      **/
run;
```

Double-click on the BAT file and this will create the combined PDF with TOC and bookmarks.

Example of the TOC & Bookmarks of the PDF output produced.



COMBINED PDF WITH BOOKMARKS WITHOUT SAS MACRO

Instead of using combine_rtf macro, create a pdf of each TFL and combine them together using Ghostscript.

1. PDFs using pdf.vbs

- Save all individual TFLs to PDF by using VBScript.
- Double-click on file pdf.vbs and it will save all RTFs in the same folder to PDF.
- On the right is the code in pdf.vbs.

```
bRecursive = False
Set oFSO = CreateObject("Scripting.FileSystemObject")
Set oWord = CreateObject("Word.Application")
oWord.Visible = True

docInputFile = oFSO.GetAbsolutePathName(docInputFile)
Set oFolder = oFSO.GetFolder(docInputFile)
ConvertFolder(oFolder)
oWord.Quit

Sub ConvertFolder(oFldr)
    For Each oFile In oFldr.Files
        If LCase(oFSO.GetExtensionName(oFile.Name)) = "rtf" Then
            Set oDoc = oWord.Documents.Open(oFile.path)
            Str = left(oFile,instr(1,oFile,".rtf")-1)
            oWord.ActiveDocument.SaveAs Str & ".pdf", 17
            oDoc.Close
        End If
    Next

    If bRecursive Then
        For Each oSubfolder In oFldr.Subfolders
            ConvertFolder oSubfolder
        Next
    End If
End Sub
```

2. Bookmarks.txt

Create bookmarks.txt again but without TOC.

3. Combine.bat

Create a BAT file to combine the bookmarks.txt with the individual PDF file using GHOSTSCRIPT.

```
%let locbat=%sysfunc(tranwrd(s:\folder,\,/));
   data _null_;
      file "s:\folder\Combine.bat";
      set keep end=last;
      length line $2000;
        if _N_=1 then do;
          put "gswin64c.exe ^";
          put "-o &locbat./CombinedOutputs_Bookmarks.pdf ^";
```

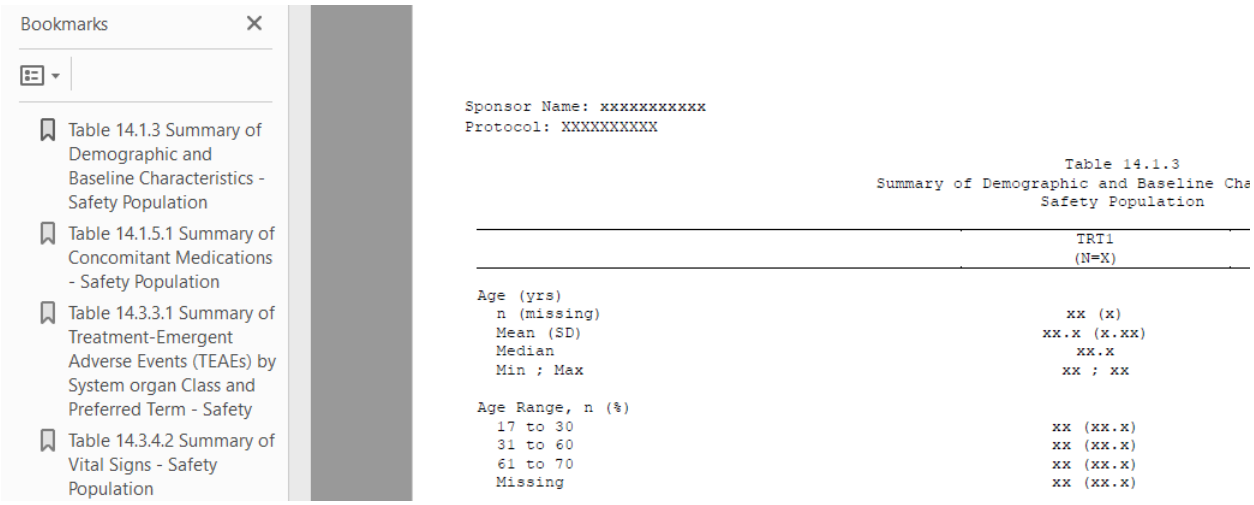
```
          put "-sDEVICE=pdfwrite ^";
          put "-dPDFSettings=/Screen ^";
          put "&locbat/bookmarks.txt ^";
        end;
        if not last then line = "&locbat./"||compress(tfl)||".pdf ^";
        else          line = "&locbat./"||compress(tfl)||".pdf ";
        put line;
        run;
```

Combine.bat

```
gswin64c.exe ^
-o P:/PHUSE/PHUSE_CODE/Part3/CombinedOutputs_Bookmarks.pdf ^
-sDEVICE=pdfwrite ^
-dPDFSettings=/Screen ^
P:/PHUSE/PHUSE_CODE/Part3/bookmarks.txt ^
P:/PHUSE/PHUSE_CODE/Part3/Table_14.1.3(tdemo).pdf ^
P:/PHUSE/PHUSE_CODE/Part3/Table_14.1.5.1(tcm).pdf ^
P:/PHUSE/PHUSE_CODE/Part3/Table_14.3.3.1(tae).pdf ^
P:/PHUSE/PHUSE_CODE/Part3/Table_14.3.4.2(tvs).pdf
```

Double-click on the BAT file and this will create the combined PDF with bookmarks.

Example of PDF output with bookmarks



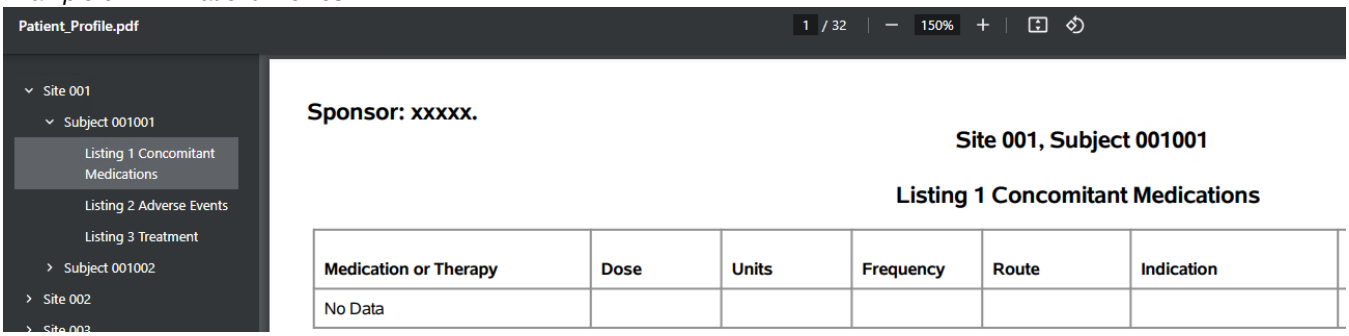
Notes:

- There is no TOC but can save time by not combining all into one RTF first.
- Can deliver the individual PDF outputs instead of the RTF.
- PAGE X of Y does not change from the TFL output.
- Don't have any Word files opened when using VBScript as can stop it from working.

PDF PATIENT PROFILES

Listings of all subject's data by site and subject using ODS DOCUMENT, PROC REPORT, PROC DOCUMENT, and ODS PDF.

Example of PDF Patient Profiles



1. ODS Document PP
   - Proc report for each output after each other. The example above has 3 listings in PDF. Below is the code showing the proc report for the first listing.
   - Do this for each subject within the ODS Document.
   - ODS PROCLABEL is used for 1st Bookmark of Site number.
   - CONTENTS used in proc report first statement is for 2nd Bookmark of Subject Number.
   - CONTENTS used in proc report first define variable is for 3rd Bookmark of Listing Title.

```
**CREATE ODS DOCUMENT**;
ods document name=pp(write);

%macro pp;

%do i=1 %to &maxsub.;**1 to max number of subject**;

** site and subject headers**;
  title2 j=c "Site &&site&i., Subject &&subject&i.";
  ods proclabel "Site &&site&i." ;
*******************************************************************************;
    **Listing 1  Report**;
*******************************************************************************;
      title4 j=c "Listing 1 Concomitant Medications";
     proc report data=pp.conmed(where=(subject= "&&subject&i.")) split='¬' style(header)={just=l
asis=on}  contents="Subject &&subject&i.";
        column  v: ;
        define v1    /  display order=data style(column)=[cellwidth=4.7 cm just=l]
contents="Listing 1 Concomitant Medications" page;
        define v2-v4 / display style(column)=[cellwidth=2.2 cm ];
        define v5    / display style(column)=[cellwidth=2.5 cm ];
        define v6    / display style(column)=[cellwidth=3.5 cm ];
        define v7    / display style(column)=[cellwidth=2.2 cm ];
        define v8-v9 / display style(column)=[cellwidth=2.5 cm ];
        define v10   / display style(column)=[cellwidth=1.7 cm ];
```

1st Bookmark (Site)

2nd Bookmark (Subject)

3rd Bookmark (Listing Title)

   - Repeat Proc Report needed for each listing.
   - Then close all.

```
%end;

%mend pp;
%pp;

ods document close;**CLOSE ODS DOCUMENT**;
```

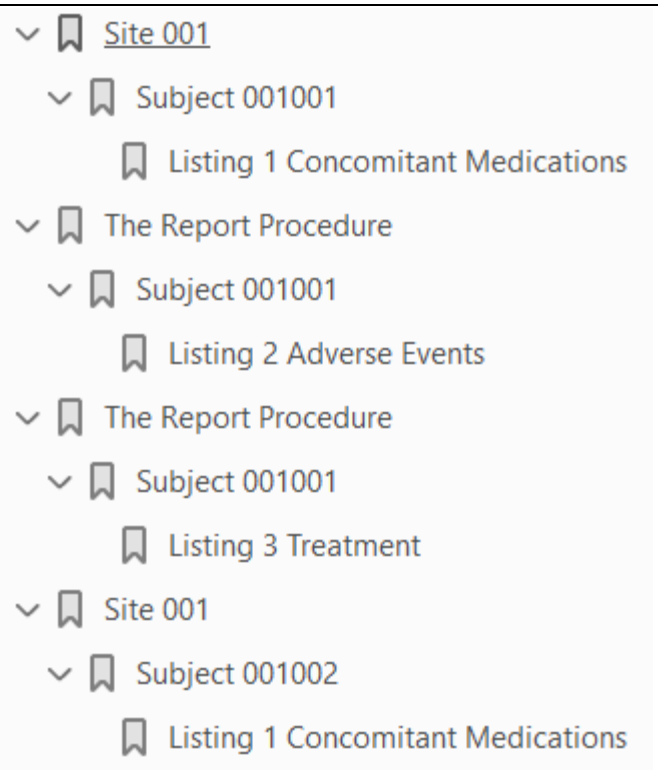
2. ODS PDF

Use ODS PDF to create the PDF of all the listings by site and subject. Use PROC DOCUMENT calling PP.

```
ods pdf file="s:\folder\Patient_Profile.pdf" ;

     proc document name=pp ;
         replay ;
     quit;
ods pdf close;
```

- But when opened in PDF, the bookmarks are not what is needed.
- Sites are not together.
- Subjects are not together.
- The listings are not after each other.



3. Move Bookmarks
   - To move the bookmarks, create a dataset book with the number of subjects per site and the number of outputs per site plus previous sites.
   - Create macro variable OUTPUTS for the number of outputs per subject.

```
%let outputs=3;**number of outputs for each subject**;

**variables needed for updating bookmarks**;
data book;
 set pp.demog;
  by site subject;
     **number of subjects in each site**;
     if first.site then subsite=1;
     else subsite+1;
     **outputs per subject**;
     outputs=&outputs;
     **no of outputs times the no of subjects**;
     if last.site then out=outputs*subsite;
     *find the number of outputs per site plus previous sites**;
     retain item;
     item+lag(out);
     if _n_=1 then item=1;
     **keep only the last subject per site**;
     if last.site;
run;
```

Book Dataset

VIEWTABLE: Work.Book

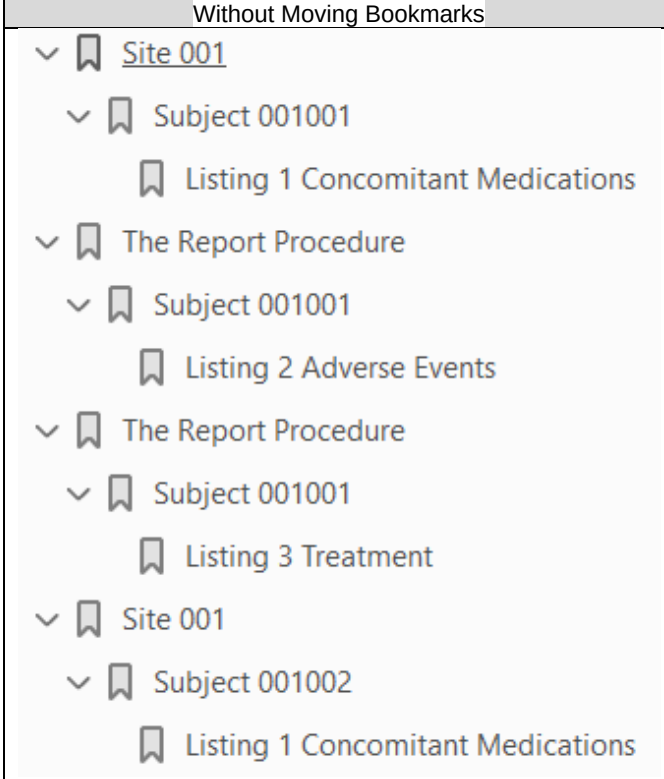
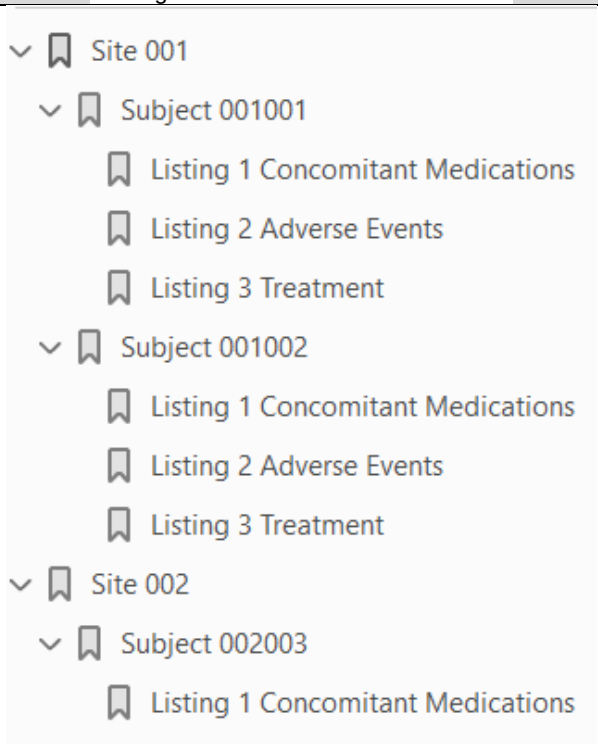
	SUBJECT	SITE	SUBSITE	OUTPUTS	OUT	ITEM
1	001002	001	2	3	6	1
2	002005	002	3	3	9	7
3	003008	003	3	3	9	16
4	004010	004	2	3	6	25

- Move Bookmarks using PROC DOCUMENT using variables ITEM and SUBSITE from the dataset book. And OUTPUTS macro variable.

```
%macro bookmarks(i,out);
    proc document name=pp;
        *move the 1st subject of each site to the correct place*;
        %do l=1 %to %eval(&outputs.-1);
            move \Report#%eval(&i.+ &l.)\Report#1\Report#1 to \Report#&i.\Report#1;
        %end;
        *move the 2nd + subject of each site to the correct place*;
        %do j=2 %to &out.;
            %let k=%eval(&outputs.*&j.-&outputs.);
            move \Report#%eval(&i.+&k.)\Report#1  to \Report#&i.;
            %do l=1 %to %eval(&outputs.-1);
               move \Report#%eval(&i.+&k.+ &l.)\Report#1\Report#1 to \Report#&i.\Report#&j.;
            %end;
        %end;
      run;
    quit;
%mend bookmarks;

data _null_;
  set book;
     **call bookmarks macro**;
  call execute('%bookmarks('||compress(put(item,best.))||','||compress(put(subsite,best.))||')');
run;
```

4. Final PDF
   - Create PDF again using ODS PDF.
   - Set up to work for any number of outputs per subject by updating the macro variable OUTPUTS.

Without Moving Bookmarks	Moving bookmarks with Proc Document
	

CONCLUSION

I have presented ways to create the PDF tasks that can be needed for studies in clinical trials, without having to use Adobe Pro, to save money for the business.

For combining TFLs into PDFs, I believe in using the PDF.VBS to create PDFs of TFLs and Ghostscript to combine with bookmarks is the best approach as a faster process, especially when have a lot of TFLs in a study.

Creating the TFLs in RTF means you can pull them into SAS to work on the bookmarks. Whereas if the TFLs were created in PDF using SAS it's my understanding that it isn't possible to pull PDF into SAS to work out pages, but this would need more investigation.

Creating the patient's profiles into PDFs using SAS, saves time as previously it would create the patient profiles in RTF and then combine them together. Having code set up so doesn't matter how many outputs per subject or how many subjects makes the code more efficient to use across studies.

REFERENCES

SAS/combine.sas at master · Lwan12/SAS · GitHub

CONTACT INFORMATION

Your comments and questions are valued and encouraged. Contact the author at:

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