

Dynamic SAS programming with XML templates

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Introduction

- Problem:
 - Different sources
 - Adapting standard programs takes time
- Dynamic input:
 - Excel
 - SAS programs
 - ...
- **XML Templates**
 - Structured
 - Text files:
 - Small storage
 - Easy to maintain
 - No extra software needed
 - Scope can increase



Ingredients

- Source
- Map file
- Template file
- SAS program to read in source
- SAS program to do functionality

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Library AE1
Freeze
Table
1 <TABLE LIBNAME SI
2 <T FILENAME I
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```
*****;
** Preparation of libnames, time and directories    **;
** Install path is the installation directory      **;
** Creation of output directories will be timestamped **;
*****;
```



```
{TEMPLATE_NAME."";
= .map";
```

```
***;
**;
**;
**;
**;
**;
**;
```

```
= FILE_XML;
```

```
PROC SORT DATA=COLUMNS;
  BY DATASETNAME ISKEY COLUMNNAME;
RUN;
```

Easy example (1)

- SAS dataset

```
<?xml version="1.0" encoding="UTF-8"?>
<tables>
  <library libraryname="INLIB" librarytype="SAS"/>
  <dataset
    datasetname="INPUT_01"
    retrievetable="INLIB.INPUT_01">
    <column columnname="COLUMN1" tablekey="Y"/>
    <column columnname="COLUMN2" tablekey="N"/>
    <column columnname="COLUMN3" tablekey="N"/>
    <column columnname="COLUMN4" tablekey="N"/>
  </dataset>
</tables>
```

- Use program to start the process

```
%LET INSTALL_PATH = <installpath>;
%LET DATA_PATH = <datapath>;
%LET TEMPLATE_NAME = <template01>.xml;
%INCLUDE "&INSTALL_PATH./Code/ReadXMLTemplates.sas";
%INCLUDE "&INSTALL_PATH./Code/DoOtherPrograms.sas";
```

Easy example (2)

- Example results from ReadXMLTemplates.sas

Libraries

	name	type
1	INLIB	SAS

Datasetsprepared

	name	querytable	COMBINEELEMENTS
1	INPUT_01	INLIB.INPUT_01	!COLUMN2!COLUMN3!COLUMN4!COLUMN1

Columnsfinal

	VAR	KEY	datasetname
1	COLUMN2 COLUMN3 COLUMN4	COLUMN1	INPUT_01

...

Easy example (3)

- Usage

Columnsfinal

	VAR	KEY	datasetname
1	COLUMN2 COLUMN3 COLUMN4	COLUMN1	INPUT_01

```
%MACRO CREATEREPORT (DATASET =, COLUMNS =, BYCOL=);
```

```
PROC SORT DATA = &DATASET.;
  BY &BYCOL.;
RUN;
```

```
PROC REPORT DATA=&DATASET.;
  TITLE1 "Simple Report";
  COLUMN &BYCOL. &COLUMNS.;
  %LET I=1;
  %DO %WHILE(%SCAN(&BYCOL.,&I) NE %STR());
    DEFINE %SCAN(&BYCOL.,&I)/group;
    %LET I=%EVAL(&I + 1);
  %END;
  %LET J=1;
  %DO %WHILE(%SCAN(&COLUMNS.,&J) NE %STR());
    DEFINE %SCAN(&COLUMNS.,&J)/ display;
    %LET J=%EVAL(&J + 1);
  %END;
  BREAK AFTER %SCAN(&BYCOL.,1) / ol;
RUN;

%MEND CREATEREPORT;

DATA _NULL_;
  SET COLUMNSFINAL;
  CALL EXECUTE ('%CREATEREPORT (DATASET=' || DATASETNAME || ',COLUMNS=' || VAR || ',BYCOL=' || KEY || ');')
RUN;
```

“Advanced” example

- SAS dataset and excel sheet
- Use of join

```
<tables>
  <library libraryname="INLIB" librarytype="SAS"/>
  <library libraryname="XLSLIB" librarytype="EXCEL"/>
  <dataset
    datasetname="DATASETTOUSE"
    retrievetable="INLIB.INPUT_01 AS A LEFT JOIN XLSLIB.INPUT_02 AS B
ON A.ID = B.SOURCE_ID">
    <column columnname="COLU1" tablekey="Y" src="A.COLUMN1"/>
    <column columnname="COLU2" tablekey="N" src="A.COLUMN2"/>
    <column columnname="COLU3" tablekey="N" src="B.COL1"/>
    <column columnname="COLU4" tablekey="N" src="B.COL2"/>
  </dataset>
</tables>
```

“Advanced” example

- Call program contains dynamic source reading (PROC SQL)

```

❏ %MACRO CREATEDATA(DATASET=, QUERYTABLE=, ELEMENTS=);

PROC SQL NOPRINT;
    CREATE TABLE &DATASET. AS
    SELECT DISTINCT %SUBSTR(%NRQUOTE(%SYSFUNC(TRANWRD(&ELEMENTS.,%STR(!),%STR(,)))),2)
    FROM &QUERYTABLE.;
QUIT;

%MEND CREATEDATA;

❏ DATA _NULL_;
    SET DATASETPREPARED;
    CALL EXECUTE('%CREATEDATA(DATASET=' || NAME || ', QUERYTABLE=' || QUERYTABLE || ',
    ELEMENTS=' || COMBINEDELEMENTS || ');');
RUN;

```

Real example

- Template

```
<tables>
- <dataset datasetname="IDS_GL_DOMAIN" retrievetable="ORALIB.IDS_GL_DOMAIN AS A LEFT JOIN
  ORALIB.IDS_GL_DOMAIN_CLASS AS LOOKUPB ON A.DOMAINCLASS_ID = LOOKUPB.ID LEFT JOIN
  ORALIB.IDS_GL_DOMAIN_PURPOSE AS LOOKUPC ON A.DOMAINPURPOSE_ID = LOOKUPC.ID LEFT JOIN
  ORALIB.IDS_GL_LIBRARY_VERSION AS LIBVERS ON A.LIBRARYVERSION_ID = LIBVERS.ID">
  <column columnname="AID" tablekey="Y"/>
  <column columnname="DATASET" tablekey="Y"/>
  <column columnname="DESCRIPTION" tablekey="N"/>
  <column columnname="STRUCTURE" tablekey="N"/>
  <column columnname="REPEATED" tablekey="N"/>
  <column columnname="REFDATA" tablekey="N"/>
  <column columnname="DOMAINORDER" tablekey="N"/>
  <column columnname="CLASS" tablekey="N" src="LOOKUPB.NAME"/>
  <column columnname="PURPOSE" tablekey="N" src="LOOKUPC.NAME"/>
</dataset>
</tables>
```

Real example

- Part of compare program using dynamic source

```
%MACRO CREATECOMBDATA(DATASET=, QUERYTABLE=, ELEMENTS=);

PROC SQL NOPRINT;
  CREATE TABLE &DATASET. AS
  SELECT DISTINCT "&SOURCEWORD1." AS VERSIONDESCR %NRQUOTE(%SYSFUNC(TRANWRD(&ELEMENTS.,%STR(!),%STR(,))))
  FROM &QUERYTABLE.
  WHERE A.INWORKSPACE = "N"
  AND A.ACTIVEFROM <= "&VERSION1.:12:00:00"dt AND A.ACTIVETO >= "&VERSION1.:12:00:00"dt
  AND LIBVERS.NAME = "&DATA_MODEL.";
QUIT;

PROC SQL NOPRINT;
  CREATE TABLE &DATASET._2 AS
  SELECT DISTINCT "&SOURCEWORD2." AS VERSIONDESCR %NRQUOTE(%SYSFUNC(TRANWRD(&ELEMENTS.,%STR(!),%STR(,))))
  FROM &QUERYTABLE.
  WHERE A.INWORKSPACE = "N"
  AND A.ACTIVEFROM <= "&VERSION2.:12:00:00"dt AND A.ACTIVETO >= "&VERSION2.:12:00:00"dt
  AND LIBVERS.NAME = "&DATA_MODEL.";
QUIT;

PROC APPEND BASE=&DATASET. DATA=&DATASET._2 FORCE NOWARN;
%RUN;

%MEND CREATECOMBDATA;

%DATA _NULL_;
  SET DATASETS=PREPARED;
  CALL EXECUTE('%CREATECOMBDATA(DATASET=' || NAME || ', QUERYTABLE=' || QUERYTABLE || ',
  ELEMENTS=' || %NRQUOTE(COMBINEDELEMENTS) || ');');
RUN;

%MEND DOPREPAREDATASETS;
```

Conclusion

- **Dynamic programming:**
 - Limit (re)programming time
- **XML Templates:**
 - Not the only solution, but: easy to use
- **Accessible** for business users

Questions?

