



Go Where Few Have Gone Before

(Learn to Use SAS Metadata!)

**Presented by Steve Ezzy for BASUG
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What Are Metadata Anyway?

- Quite simply, metadata are data about your data (see <http://en.wikipedia.org/wiki/Metadata>)
- Every time you run a PROC CONTENTS or use a PROC SQL “Describe Table”, you are displaying metadata.
- Where can you find SAS metadata in a more useable form?
 - The SASHelp Library!

Sample SAS Dataset for Today's Presentation

```
data tv_folks;
  input @1  fname $char9.
        @10 lname $char10.
        @20 age 3.
        @25 gender $char1.
  ;
  label fname = 'First Name'
        lname = 'Last Name'
        age   = 'Age'
        gender = 'Gender';
  datalines;
  ANGUS    MACGYVER    037    M
  LISA     SIMPSON     008    F
  PAT      RILEY       033    U
  LEONARD  MCCOY       064    M
  JAIME    SOMMERS     025    F
  THEODORE CLEAVER     012    M
  ELLY MAY CLAMPETT    023    F
  JACK     BENNY       039    M
  ;
run;
```

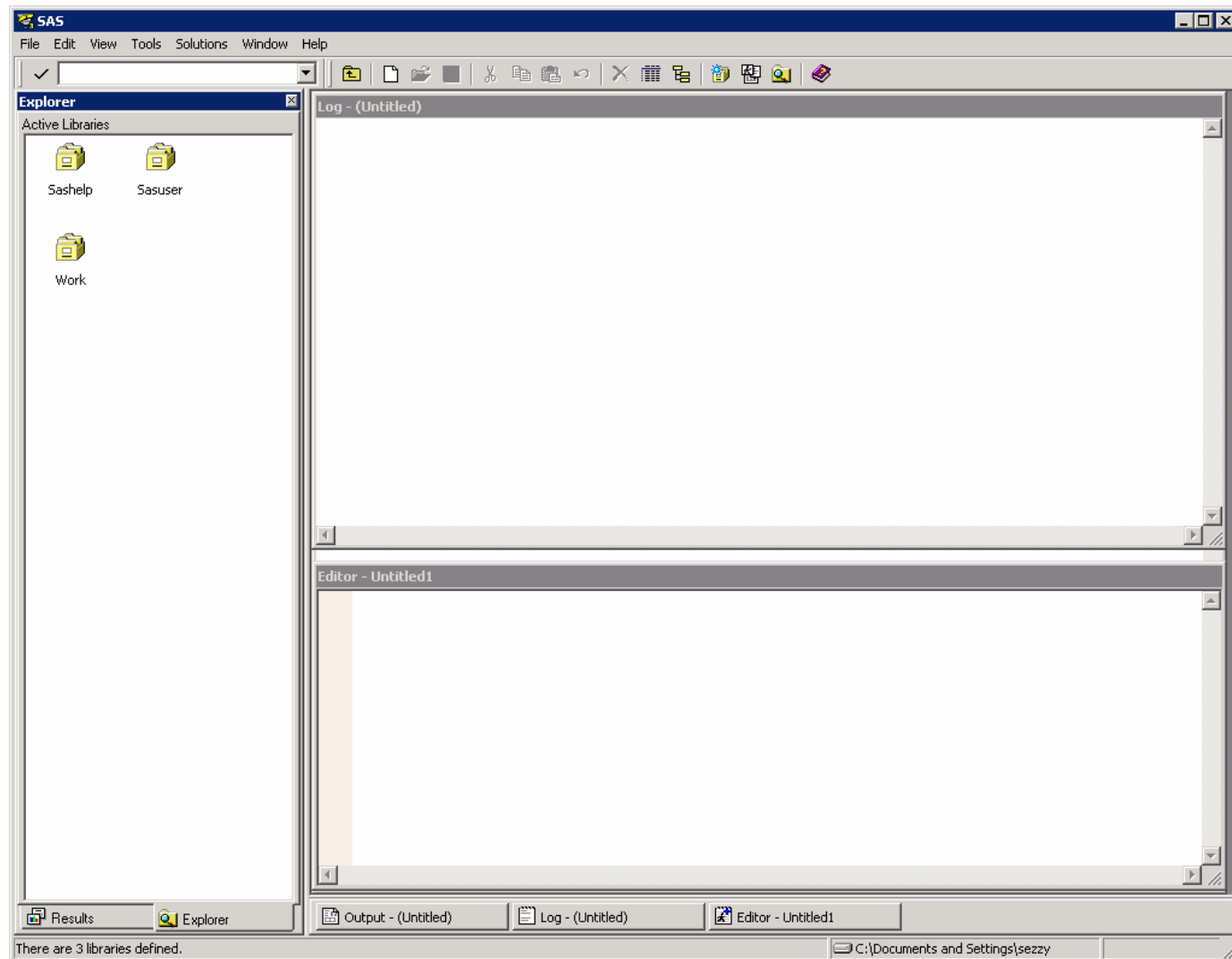
← METADATA

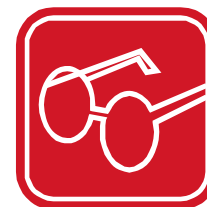
← DATA

Contents of the SASHelp Library

- **Sample Data Sets (PRDSALE, ORSALES, RETAIL etc.)**
- **SAS Error Message Files (SASMSG etc.)**
- **ZIP Code Lookup File (ZIPCODE)**
- **Metadata in SAS Views (VTABLE etc.)**
- **And More**
- **... in the form of:**
 - **47 data sets**
 - **30 views**
 - **12,725 catalogs**

Hey SASHelp, where have you been all my life?

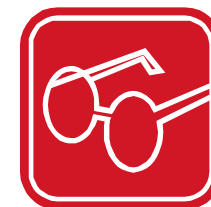




Quick List of SASHELP Views

SASHELP View (Available to any PROC or DATA step)	DICTIONARY Table (Available only to PROC SQL)	Description
SASHELP.VCATALG	dictionary.catalogs	Contains a row of information for each SAS catalog: the name, location, and type of catalog (MACRO, FORMAT, and so on).
SASHELP.VCOLUMN	dictionary.columns	Includes one observation for every variable available in the session. Information includes name, type, length, and the library and member name of the data set in which the variable resides.
SASHELP.VEXTFL	dictionary.extfiles	Lists the file references assigned in the SAS session and the name of the external file they are assigned to.
SASHELP.VINDEX	dictionary.indexes	Lists the indexes available in the session as well as the data sets in which they reside and the variables they index.
SASHELP.VMACRO	dictionary.macros	A data set containing the names and values of all macro variables available to the session. Includes automatic and user-defined variables.
SASHELP.VMEMBER	dictionary.members	Lists all data sets, catalogs, views, and multidimensional databases available in the session.
SASHELP.VOPTION	dictionary.options	Includes the name, description, current setting and scope for each option. Scope defines whether the option is operating system specific (level= 'Host') or available on all operating systems (level= 'Portable').
SASHELP.VTABLE	dictionary.tables	Contains the library reference, data set name, and other information for every data set available in the session. Does not include data views.

Quick List of SASHELP Views (Continued)



SASHELP View (Available to any PROC or DATA step)	DICTIONARY Table (Available only to PROC SQL)	Description
SASHELP.VTITLE	dictionary.titles	Gives the location (type), number and value of each title and footnote currently available. Type= 'F' indicates a footnote. Type= 'T' indicates a title.
SASHELP.VVIEW	dictionary.views	Lists the name and engine types of all views available in the session. Engine= 'SASDSV' indicates a DATA step view. Engine= 'SASESQL' indicates an SQL view. SQL views are portable across operating systems. DATA step views are not.
SASHELP.VSACCES	subset of dictionary.members where memtype='ACCESS'	Lists SAS/ACCESS views available in the session.
SASHELP.VSCATLG	subset of dictionary.members where memtype='CATALOG'	Quick list of catalogs and the libraries they are located in. VSCATLG is smaller than VCATLG and therefore runs faster.
SASHELP.VSLIB	subset of dictionary.members	Lists library names and the operating system locations they are assigned to.
SASHELP.VSTABLE	subset of dictionary.members where memtype='DATA'	Lists data set names and the libraries they are located in. VSTABLE is smaller than VTABLE and therefore runs faster.
SASHELP.VSTABVW	subset of dictionary.members where memtype='VIEW' or memtype='DATA'	VSTABVW includes both data sets and views and has fewer variables than VTABLE. This means it runs faster and uses fewer system resources.
SASHELP.VSVIEW	subset of dictionary.members where memtype='VIEW'	Includes the name and location of each view but not the type.

(The URL for a similar table of views will be given at the conclusion of this presentation.)

SASHelp.VTABLE

	Library Name	Member Name	Member Type	DBMS Member Type	Dataset Label	Dataset Type	Date Created	Date Modified	Number of Physical Observations	Observation Length	Number of Variables	Type of Password Protection	Comments
46	SASHELP	VCNCOLU	VIEW			VIEW	13MAY04:00:16:35	13MAY04:00:16:35	.	152	7 ---	NO	
47	SASHELP	VCNTABU	VIEW			VIEW	13MAY04:00:16:34	13MAY04:00:16:34	.	120	6 ---	NO	
48	SASHELP	VCOLUMN	VIEW			VIEW	13MAY04:00:16:41	13MAY04:00:16:41	.	523	18 ---	NO	
49	SASHELP	VDCTNRY	VIEW			VIEW	13MAY04:00:16:43	13MAY04:00:16:43	.	706	10 ---	NO	
50	SASHELP	VENGINE	VIEW			VIEW	13MAY04:00:16:49	13MAY04:00:16:49	.	1083	5 ---	NO	
51	SASHELP	VERBMGR	DATA			DATA	13MAY04:00:02:48	13MAY04:00:02:48	19	440	15 ---	NO	
52	SASHELP	VEXTFL	VIEW			VIEW	13MAY04:00:16:53	13MAY04:00:16:53	.	1040	3 ---	NO	
53	SASHELP	VFORMAT	VIEW			VIEW	13MAY04:00:16:57	13MAY04:00:16:57	.	1184	13 ---	NO	
54	SASHELP	VGOPT	VIEW			VIEW	13MAY04:00:17:00	13MAY04:00:17:00	.	1264	6 ---	NO	
55	SASHELP	VDMSG	DATA			MSGFILE	13MAY04:00:22:36	13MAY04:00:22:36	7	288	6 ---	NO	
56	SASHELP	VINDEX	VIEW			VIEW	13MAY04:00:17:06	13MAY04:00:17:06	.	142	9 ---	NO	
57	SASHELP	VLIBNAM	VIEW			VIEW	13MAY04:00:17:08	13MAY04:00:17:08	.	4134	10 ---	NO	
58	SASHELP	VMACRO	VIEW			VIEW	13MAY04:00:17:15	13MAY04:00:17:15	.	272	4 ---	NO	
59	SASHELP	VMEMBER	VIEW			VIEW	13MAY04:00:17:17	13MAY04:00:17:17	.	1144	7 ---	NO	
60	SASHELP	VOPTION	VIEW			VIEW	13MAY04:00:17:22	13MAY04:00:17:22	.	1264	6 ---	NO	
61	SASHELP	VREFCON	VIEW			VIEW	13MAY04:00:17:27	13MAY04:00:17:27	.	176	9 ---	NO	
62	SASHELP	VREMEMB	VIEW			VIEW	13MAY04:00:17:29	13MAY04:00:17:29	.	256	5 ---	NO	
63	SASHELP	VSACCES	VIEW			VIEW	13MAY04:00:17:35	13MAY04:00:17:35	.	40	2 ---	NO	
64	SASHELP	VSCATLG	VIEW			VIEW	13MAY04:00:17:37	13MAY04:00:17:37	.	40	2 ---	NO	
65	SASHELP	VSLIB	VIEW			VIEW	13MAY04:00:17:43	13MAY04:00:17:43	.	1032	2 ---	NO	
66	SASHELP	VSTABLE	VIEW			VIEW	13MAY04:00:17:48	13MAY04:00:17:48	.	40	2 ---	NO	
67	SASHELP	VSTABVW	VIEW			VIEW	13MAY04:00:17:52	13MAY04:00:17:52	.	48	3 ---	NO	
68	SASHELP	VSTYLE	VIEW			VIEW	13MAY04:00:17:56	13MAY04:00:17:56	.	80	4 ---	NO	
69	SASHELP	VSVIEW	VIEW			VIEW	13MAY04:00:18:02	13MAY04:00:18:02	.	40	2 ---	NO	
70	SASHELP	VTABCON	VIEW			VIEW	13MAY04:00:18:03	13MAY04:00:18:03	.	130	9 ---	NO	
71	SASHELP	VTABLE	VIEW			VIEW	13MAY04:00:18:10	13MAY04:00:18:10	.	1025	39 ---	NO	
72	SASHELP	VTITLE	VIEW			VIEW	13MAY04:00:18:12	13MAY04:00:18:12	.	272	3 ---	NO	
73	SASHELP	VVIEW	VIEW			VIEW	13MAY04:00:18:18	13MAY04:00:18:18	.	56	4 ---	NO	
74	SASHELP	WEBMSG	DATA			MSGFILE	13MAY04:00:23:49	13MAY04:00:23:49	349	288	6 ---	NO	
75	SASHELP	ZHC	DATA			DATA	12MAY04:22:54:29	12MAY04:22:54:29	7445	14	3 ---	NO	
76	SASHELP	ZIPCODE	DATA		zipcodedownload April 2004, UNIQUE-update May 2004, Release 9.1.3	DATA	23JUN04:20:14:50	23JUN04:20:14:50	41988	192	16 ---	NO	
77	SASHELP	ZTC	DATA			DATA	12MAY04:22:54:06	12MAY04:22:54:06	18161	26	6 ---	NO	
78	SASUSER	SASMBC	DATA		Columns Database	ASTCOL	10JUN06:12:30:22	10JUN06:12:30:22	0	240	3 ---	CHA	
79	WORK	TV_FOLKS	DATA			DATA	07NOV07:10:40:07	07NOV07:10:40:07	8	28	4 ---	CHA	

SASHelp.VCOLUMN (= 1 entry for every column of every data set of every library in your SAS session)

Column Names →

Explorer	
Contents of 'Sashelp'	
Name	Size
Slkwox	485.1
Smemsg	33.1
Sql	1.1
Table	17.1
Treport	69.1
Vallopt	5.1
Vcatlg	5.1
Vcformat	5.1
Vchkcon	5.1
Vncolu	5.1
Vcntabu	5.1
Vcolumn	5.1
Vdctnry	5.1
Vengine	5.1
Verbmgr	17.1
Vextfl	5.1
Vformat	5.1
Vgopt	5.1
Video	53.1
Vidmsg	33.1
Vindex	5.1
Vlibnam	5.1
Vmacro	5.1
Vmember	5.1
Voption	5.1
Vrefcon	5.1
Vrememb	5.1
Vsacces	5.1
Vscatlg	5.1
Vslib	5.1
Vstable	5.1
Vstabvw	5.1
Vstyle	5.1
Vsview	5.1
Vtabcon	5.1
Vtable	5.1
Vtitle	5.1
Vview	5.1
Webeis	837.1
Webmsg	129.1
Webprog	33.1
Webutil	57.1
Windows	65.1
Wizard	213.1
Zhc	109.1
Zipcode	7.8

libname	memname	memtype	name	type	length	npos	varnum	label
Library Name	Member Name	Member Type	Column Name	Column Type	Column Length	Column Position	Column Number in Table	Column Label
623	WORK	TV_FOLKS	DATA	fname	char	9	8	1 First Name
624	WORK	TV_FOLKS	DATA	lname	char	10	17	2 Last Name
625	WORK	TV_FOLKS	DATA	age	num	8	0	3 Age (years)
626	WORK	TV_FOLKS	DATA	gender	char	1	27	4 Gender

Using SAS Metadata to Write SAS code

* Let's say you'd like to create a set of INDEX CREATE statements for all character variables in work.tv_folks. *;

```
proc datasets library=work;
  modify tv_folks;
    INDEX CREATE fname_idx = (fname);
  .
  .
  .
quit;
```

* Try this ... *;

```
proc sql;
  select 'INDEX CREATE ' || trim(name) || '_idx = (' || trim(name) || ');'
  FROM sashelp.vcolumn
  WHERE upcase(libname) = 'WORK' AND
        upcase(memname) = 'TV_FOLKS' AND
        upcase(type) = 'CHAR';
quit;
```

* ... and you would get this ... *;

```
INDEX CREATE fname_idx = (fname);
INDEX CREATE lname_idx = (lname);
INDEX CREATE gender_idx = (gender);
```

Use SAS Metadata to extract values to a macro variable separated by commas (or other delimiter)

- `proc sql noprint;`
- `select trim(name)`
- `into :names_var`
- `separated by ','`
- `FROM sashelp.vcolumn`
- `WHERE libname = 'WORK' AND`
- `memname = 'TV_FOLKS' AND`
- `upcase(name) like '%NAME%';`
- `quit;`
- `%put &names_var;`
- `fname, lname`

Finding Conflicting Variable Attributes

```
proc sql noprint;
  select memname, name, length, type
    from sashelp.vcolumn
   where libname = 'WORK'
  group by name
 having count(distinct length) > 1
    or count(distinct type) > 1
    ;
quit;
```

Member Name	Column Name	Column Length	Column Type
MOVIE_FOLKS	fname	11	char
TV_FOLKS	fname	9	char

(Adapted from "Dictionary Tables and Views: Essential Tools for Serious Applications" – F. Dilorio & J. Abolafia, 2004)

Use SASHELP.VTABLE to get a list of selected temporary datasets created in a session and then create a PROC DATASETS statement to clean them up at the end of your job!

```
proc sql;  
  select memname into :allfinancetables  
    separated by ' '  
  from sashelp.vtable  
  where libname = 'WORK' and  
         upcase(memname) like 'FINANCE%';  
quit;
```

```
proc datasets library=work;  
  delete &allfinancetables;  
quit;
```



When you don't know the number of variables in your incoming SAS data set...

Each month, the client supplies a SAS data set (surg) with an unpredictable number of 'SURGDT' date variables (SURGDT1, SURGDT2, etc.)

This step finds the max number of surgery dates for any member so we can set our array below;

```
proc sql noprint;
    select max(input(substr(name,7),8.))
        into :maxsurg
        from sashelp.vcolumn
        where upcase(memname) = upcase('surg') and
              name like upcase('surgdt%');
quit;

%let maxsurg = %cmpres(&maxsurg);

data surg_any;
    set surg;
    keep id surgdt1-surgdt&maxsurg;
run;
```

Links Related to SASHelp

- **Using Meta and Project Data for Data Driven Programming – B. Varney, 2004**
(<http://www2.sas.com/proceedings/sugi29/249-29.pdf>)
- **Dictionary Tables and Views: Essential Tools for Serious Applications – F. Dilorio & J. Abolafia, 2004** (<http://www2.sas.com/proceedings/sugi29/237-29.pdf>)
- **Exploring DICTIONARY Tables & Views – K. Lafler, 2005**
(<http://www2.sas.com/proceedings/sugi30/070-30.pdf>)
- **The Wealth of Information Found in the SASHELP Data Dictionary Views and How to Use It – C. Mack, 2006**
(http://www.pnwsug.org/Conference_2006/Proceedings/PNWSUGOtherfiles/PN02CurtisMackSASHELP.pdf)
- **Summary of SAS Dictionary Tables and Views**
(<http://www.codecraftersinc.com/pdf/DictionaryTablesRefCard.pdf>)

Remember!



If you remember one term from today's presentation, let it be “SASHelp”!

Remembering this will lead you a wealth of information (data and metadata) available to you in your SAS session!