

Exploring DICTIONARY Tables and SASHELP Views

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ABSTRACT

SAS® users can quickly and conveniently obtain useful information about their SAS session with a number of read-only SAS data views called DICTIONARY tables or SASHELP views. At any time during a SAS session, information about currently defined system options, libnames, table names, column names and attributes, formats, indexes, and more can be accessed and captured. This paper explores the purpose of DICTIONARY tables and views, how they are accessed, and what information is available to SAS users. Attendees will learn how these important tables and views can be accessed and applied using real-world scenarios.

INTRODUCTION

The SAS System generates and maintains valuable information at run time about SAS libraries, data sets, catalogs, indexes, macros, system options, titles, and views in a collection of read-only tables called dictionary tables. Although called tables, Dictionary tables are not real tables. Information is automatically generated at runtime and each table's contents are made available once a SAS session is started.

Dictionary tables and SASHELP views contents permit a SAS session's activities to be easily accessed and monitored. This becomes particularly useful in the design and construction of software applications since the information can be queried and the results acted upon in a specific task such as in the allocation of filerefs or librefs.

TABLES USED IN EXAMPLES

The data used in all the examples in this paper consists of a selection of movies that I've viewed over the years, along with actors. The Movies table consists of six columns: title, length, category, year, studio, and rating. Title, category, studio, and rating are defined as character columns with length and year being defined as numeric columns. The data stored in the Movies table is illustrated below.

MOVIES Table

| | Title | Length | Category | Year | Studio | Rating |
|----|-----------------------------|--------|----------------------|------|--------------------|--------|
| 1 | Brave Heart | 177 | Action Adventure | 1995 | Paramount Pictures | R |
| 2 | Casablanca | 103 | Drama | 1942 | MGM / UA | PG |
| 3 | Christmas Vacation | 97 | Comedy | 1989 | Warner Brothers | PG-13 |
| 4 | Coming to America | 116 | Comedy | 1988 | Paramount Pictures | R |
| 5 | Dracula | 130 | Horror | 1993 | Columbia TriStar | R |
| 6 | Dressed to Kill | 105 | Drama Mysteries | 1980 | Filmways Pictures | R |
| 7 | Forrest Gump | 142 | Drama | 1994 | Paramount Pictures | PG-13 |
| 8 | Ghost | 127 | Drama Romance | 1990 | Paramount Pictures | PG-13 |
| 9 | Jaws | 125 | Action Adventure | 1975 | Universal Studios | PG |
| 10 | Jurassic Park | 127 | Action | 1993 | Universal Pictures | PG-13 |
| 11 | Lethal Weapon | 110 | Action Cops & Robber | 1987 | Warner Brothers | R |
| 12 | Michael | 106 | Drama | 1997 | Warner Brothers | PG-13 |
| 13 | National Lampoon's Vacation | 98 | Comedy | 1983 | Warner Brothers | PG-13 |
| 14 | Poltergeist | 115 | Horror | 1982 | MGM / UA | PG |
| 15 | Rocky | 120 | Action Adventure | 1976 | MGM / UA | PG |
| 16 | Scarface | 170 | Action Cops & Robber | 1983 | Universal Studios | R |
| 17 | Silence of the Lambs | 118 | Drama Suspense | 1991 | Orion | R |
| 18 | Star Wars | 124 | Action Sci-Fi | 1977 | Lucas Film Ltd | PG |
| 19 | The Hunt for Red October | 135 | Action Adventure | 1989 | Paramount Pictures | PG |
| 20 | The Terminator | 108 | Action Sci-Fi | 1984 | Live Entertainment | R |
| 21 | The Wizard of Oz | 101 | Adventure | 1939 | MGM / UA | G |
| 22 | Titanic | 194 | Drama Romance | 1997 | Paramount Pictures | PG-13 |

The data stored in the ACTORS table is illustrated below.

ACTORS Table

| | Title | Actor_Leading | Actor_Supporting |
|----|-----------------------------|-----------------------|------------------|
| 1 | Brave Heart | Mel Gibson | Sophie Marceau |
| 2 | Christmas Vacation | Chevy Chase | Beverly D'Angelo |
| 3 | Coming to America | Eddie Murphy | Arsenio Hall |
| 4 | Forrest Gump | Tom Hanks | Sally Field |
| 5 | Ghost | Patrick Swayze | Demi Moore |
| 6 | Lethal Weapon | Mel Gibson | Danny Glover |
| 7 | Michael | John Travolta | Andie MacDowell |
| 8 | National Lampoon's Vacation | Chevy Chase | Beverly D'Angelo |
| 9 | Rocky | Sylvester Stallone | Talia Shire |
| 10 | Silence of the Lambs | Anthony Hopkins | Jodie Foster |
| 11 | The Hunt for Red October | Sean Connery | Alec Baldwin |
| 12 | The Terminator | Arnold Schwarzenegger | Michael Biehn |
| 13 | Titanic | Leonardo DiCaprio | Kate Winslet |

EXPLORING DICTIONARY TABLES AND SASHELP VIEWS

SAS users can quickly and conveniently obtain useful information about their SAS session with a number of read-only SAS data views called DICTIONARY tables. At any time during a SAS session, DICTIONARY tables can be used to capture information related to currently defined libnames, table names, column names and attributes, formats, and much more. DICTIONARY tables are accessed using the libref DICTIONARY in the FROM clause of a PROC SQL SELECT statement. SASHELP views can be accessed in the DATA and procedure steps. The name of each DICTIONARY table and SASHELP view is presented below.

DICTIONARY Tables and SASHELP Views

| DICTIONARY Table | SASHELP View | Purpose |
|--------------------------------|---------------------|---|
| CATALOGS | VCATALG | Provides information about SAS catalogs. |
| CHECK_CONSTRAINTS | VCHKCON | Provides check constraints information. |
| COLUMNS | VCOLUMN | Provides information about column in tables. |
| CONSTRAINT_COLUMN_USAGE | VCNCOLU | Provides column integrity constraints information. |
| CONSTRAINT_TABLE_USAGE | VCNTABU | Provides information related to tables with integrity constraints defined. |
| DICTIONARIES | VDCTNRY | Provides information about all the DICTIONARY tables. |
| ENGINES | VENGINE | Provides information about known SAS engines available to the session. |
| EXTFILES | VEXTFL | Provides information related to external files. |
| FORMATS | VFORMAT | Provides information related to defined formats and informats. |
| GOPTIONS | VGOPT | Provides information about currently defined SAS/GRAPH software graphics options. |
| INDEXES | VINDEX | Provides information related to defined indexes. |
| LIBNAMES | VLIBNAM | Provides information related to defined SAS data libraries. |
| MACROS | VMACRO | Provides information related to any defined macros. |
| MEMBERS | VMEMBER | Provides information related to objects currently defined in SAS data libraries. |

| | | |
|--------------------------------|----------------|--|
| OPTIONS | VOPTION | Provides information related to SAS system options. |
| REFERENTIAL_CONSTRAINTS | VREFCON | Provides information related to tables with referential constraints. |
| STYLES | VSTYLE | Provides information related to select ODS styles. |
| TABLE_CONSTRAINTS | VTABCON | Provides information related to tables containing integrity constraints. |
| TABLES | VTABLE | Provides information related to currently defined tables. |
| TITLES | VTITLE | Provides information related to currently defined titles and footnotes. |
| VIEWS | VVIEW | Provides information related to currently defined data views. |

DISPLAYING DICTIONARY TABLE DEFINITIONS

A dictionary table's definition can be displayed by specifying a DESCRIBE TABLE statement. The results of the statements and clauses used to create each dictionary table can be displayed on the SAS Log. For example, a DESCRIBE TABLE statement is illustrated below to display the CREATE TABLE statement used in building the OPTIONS dictionary table containing current SAS System option settings.

PROC SQL Code

```
PROC SQL;
  DESCRIBE TABLE
    DICTIONARY.OPTIONS;
QUIT;
```

SAS Log Results

```
create table DICTIONARY.OPTIONS
(
  optname char(32) label='Option Name',
  setting char(1024) label='Option Setting',
  optdesc char(160) label='Option Description',
  level char(8) label='Option Location'
);
```

Note: The information contained in dictionary tables is also available to DATA and PROC steps outside the SQL procedure. Referred to as SASHELP views, each view is prefaced with the letter “V” and may be shortened with abbreviated names. SASHELP views can be accessed by referencing the view by its name in the SASHELP library. Please refer to the SAS Procedures Guide for further details on accessing and using dictionary views in the SASHELP library.

THE DICTIONARIES TABLE AND VDCTNRY SASHELP VIEW

SAS users can easily identify any new Dictionary table release by accessing the read-only DICTIONARIES Dictionary table or VDCTNRY SASHELP view. The contents of the DICTIONARIES Dictionary table and VDCTNRY SASHELP view reveals the names of supported tables and views. The following PROC SQL query specifies the UNIQUE keyword to generate a listing of existing Dictionary tables.

PROC SQL Code:

```
PROC SQL;  
  SELECT UNIQUE MEMNAME  
  FROM DICTIONARY.DICTIONARIES;  
QUIT;
```

Results:

| Member Name |
|-------------------------|
| CATALOGS |
| CHECK_CONSTRAINTS |
| COLUMNS |
| CONSTRAINT_COLUMN_USAGE |
| CONSTRAINT_TABLE_USAGE |
| DICTIONARIES |
| ENGINES |
| EXTFILES |
| FORMATS |
| GOPTIONS |
| INDEXES |

| Member Name |
|-------------------------|
| LIBNAMES |
| MACROS |
| MEMBERS |
| OPTIONS |
| REFERENTIAL_CONSTRAINTS |
| REMEMBER |
| STYLES |
| TABLES |
| TABLE_CONSTRAINTS |
| TITLES |
| VIEWS |

The corresponding SASHELP views are listed below.

Results:

| Member Name |
|-------------|
| VCATALG |
| VCHKCON |
| VCOLUMN |
| VCNCOLU |
| VCNTABU |
| VDCTNRY |
| VENGINE |
| VEXTFL |
| VFORMAT |
| VGOPT |
| VINDEX |

| Member Name |
|-------------|
| VLIBNAM |
| VMACRO |
| VMEMBER |
| VOPTION |
| VREFCON |
| VREMEMB |
| VSTYLE |
| VTABCON |
| VTABLE |
| VTITLE |
| VVIEW |

Dictionary.COLUMNS

Retrieving information about the columns in one or more data sets or tables is easy with the COLUMNS dictionary table. Similar to the results of the CONTENTS procedure, users are able to capture column-level information including column name, type, length, position, label, format, informat, and indexes, as well as produce cross-reference listings containing the location of columns in a SAS library. For example, the following code requests a cross-reference listing of the tables containing the TITLE column in the WORK library.

Note: Care should be used when specifying multiple functions on the WHERE clause since the SQL Optimizer is unable to optimize the query resulting in all allocated SAS session librefs being searched. This can cause the query to run much longer than expected.

PROC SQL Code

```
PROC SQL;
  SELECT *
    FROM DICTIONARY.COLUMNS
      WHERE UPCASE(LIBNAME)="WORK" AND
           UPCASE(NAME)="TITLE";
QUIT;
```

Results

| Library Name | Member Name | Member Type | Column Name | Column Type | Column Length | Column Position | Column Number in Table | Column Label | Column Format | Column Informat | Column Index Type |
|--------------|------------------------------|----------------------|------------------|------------------|---------------|--------------------|------------------------|--------------|---------------|-----------------|-------------------|
| | Order in Key Sequence | Extended Type | Not NULL? | Precision | Scale | Transcoded? | | | | | |
| WORK | ACTORS | DATA | Title | char | 30 | 0 | 1 | | | | |
| 0 | char | no | | | | yes | | | | | |
| WORK | MOVIES | DATA | Title | char | 30 | 7 | 1 | | | | SIMPLE |
| 0 | char | no | | | | yes | | | | | |

Dictionary.TABLES

When users need more information about SAS files consider using the TABLES dictionary table. The TABLES dictionary table provides detailed information about the library name, member name and type, date created and last modified, number of observations, observation length, number of variables, password protection, compression, encryption, number of pages, reuse space, buffer size, number of deleted observations, type of indexes, and requirements vector. For example, to obtain a detailed list of files in the WORK library, a PROC SQL SELECT query can be constructed as follows.

Note: Because the TABLE Dictionary table produces a considerable amount of information, users should consider specifying a WHERE clause when accessing this table.

PROC SQL Code

```
PROC SQL;
  SELECT *
    FROM DICTIONARY.TABLES
      WHERE UPCASE(LIBNAME)="WORK";
QUIT;
```

Results

| 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 | Compression Routine | Encryption | Number of Pages | Size of File | Percent Compression | Reuse Space | Bufsize | |
| Number of Deleted Observations | Number of Logical Observations | Longest variable name | Longest label | Maximum number of generations | Generation number | Dataset Attributes | Type of Indexes | Data Representation | | |
| Name of Collating Sequence | Sorting Type | Charset Sorted By | Requirements Vector | | | | Data Representation Name | Data Encoding | Audit Trail Active? | |
| Audit Before Image? | Audit Admin Image? | Audit Error Image? | Audit Data Image? | | | | | | | |
| WORK | ACTORS | DATA | | | DATA | 09AUG04:15:40:18 | 09AUG04:15:40:18 | 13 | | |
| 70 | 3 | --- | NO | NO | 1 | 16384 | 0 | no | 8192 | |
| 0 | 13 | 16 | 0 | 0 | . | ON | | NATIVE | | |
| | | | 181F101122220032220102320432012222003E0000100301 | | | | WINDOWS_32 | wlatin1 Western (Windows) | no | |
| no | no | no | no | | | | | | | |
| WORK | MOVIES | DATA | | | DATA | 09AUG04:15:40:18 | 09AUG04:15:40:18 | 22 | | |
| 88 | 6 | --- | NO | NO | 2 | 24576 | 0 | no | 8192 | |
| 0 | 22 | 8 | 0 | 0 | . | ON | SIMPLE | NATIVE | | |
| | | | 181F101122220032220102320432012222003E0000100301 | | | | WINDOWS_32 | wlatin1 Western (Windows) | no | |
| no | no | no | no | | | | | | | |

CONCLUSION

The SAS System read-only Dictionary tables and SASHELP views provide valuable information about SAS libraries, data sets, columns and attributes, catalogs, indexes, macros, system options, titles, views, and much more. Users are encouraged to research these powerful providers of information in the SAS System.

REFERENCES

- Lafler, Kirk Paul (2009), "Exploring DICTIONARY Tables and SASHELP Views," Western Users of SAS Software Conference (September 1st – 3rd, 2009), Software Intelligence Corporation, Spring Valley, CA, USA.
- Lafler, Kirk Paul (2009), "Exploring DICTIONARY Tables and SASHELP Views," PharmaSUG SAS Users Group Conference (May 31st – June 3rd, 2009), Software Intelligence Corporation, Spring Valley, CA, USA.
- Lafler, Kirk Paul (2008), "Kirk's Top Ten Best PROC SQL Tips and Techniques," Wisconsin Illinois SAS Users Conference (June 26th, 2008), Software Intelligence Corporation, Spring Valley, CA, USA.
- Lafler, Kirk Paul (2008), "Undocumented and Hard-to-find PROC SQL Features," Greater Atlanta SAS Users Group (GASUG) Meeting (June 11th, 2008), Software Intelligence Corporation, Spring Valley, CA, USA.
- Lafler, Kirk Paul (2008), "Undocumented and Hard-to-find PROC SQL Features," PharmaSUG SAS Users Group Conference (June 1st - 4th, 2008), Software Intelligence Corporation, Spring Valley, CA, USA.
- Lafler, Kirk Paul (2008), "Undocumented and Hard-to-find PROC SQL Features," Michigan SAS Users Group (MSUG) Meeting (May 29th, 2008), Software Intelligence Corporation, Spring Valley, CA, USA.
- Lafler, Kirk Paul (2008), "Undocumented and Hard-to-find PROC SQL Features," Vancouver SAS Users Group Meeting (April 23rd, 2008), Software Intelligence Corporation, Spring Valley, CA, USA.
- Lafler, Kirk Paul (2008), "Undocumented and Hard-to-find PROC SQL Features," PhilaSUG 2008 User Group Meeting (March 13th, 2008), Software Intelligence Corporation, Spring Valley, CA, USA.
- Lafler, Kirk Paul (2007), "Undocumented and Hard-to-find PROC SQL Features," Proceedings of the PharmaSUG 2007 Conference, Software Intelligence Corporation, Spring Valley, CA, USA.

Lafler, Kirk Paul (2006), "Exploring Dictionary Tables with PROC SQL," SAS Press Webinar Series – June 27, 2006.

Lafler, Kirk Paul (2005), "Exploring Dictionary Tables and SASHELP Views," Proceedings of the Thirteenth Annual Western Users of SAS Software Conference.

Lafler, Kirk Paul (2004). *PROC SQL: Beyond the Basics Using SAS*, SAS Institute Inc., Cary, NC, USA.

Lafler, Kirk Paul (2003), "Undocumented and Hard-to-find PROC SQL Features," Proceedings of the Eleventh Annual Western Users of SAS Software Conference.

Lafler, Kirk Paul (1992-2004). *PROC SQL for Beginners*; Software Intelligence Corporation, Spring Valley, CA, USA.

Lafler, Kirk Paul (1998-2004). *Intermediate PROC SQL*; Software Intelligence Corporation, Spring Valley, CA, USA.

Lafler, Kirk Paul (2001-2004). *Advanced PROC SQL*; Software Intelligence Corporation, Spring Valley, CA, USA.

Lafler, Kirk Paul (2002). *PROC SQL Programming Tips*; Software Intelligence Corporation, Spring Valley, CA, USA.

SAS® *Guide to the SQL Procedure: Usage and Reference, Version 6, First Edition (1990)*. SAS Institute, Cary, NC, USA.

SAS® *SQL Procedure User's Guide, Version 8 (2000)*. SAS Institute Inc., Cary, NC, USA.

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