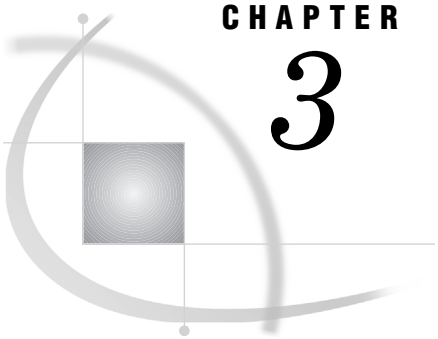


CHAPTER

3

SAS/ACCESS LIBNAME Statement

Introduction

The global SAS statement, LIBNAME, has been enhanced to enable you to assign a libref to a relational DBMS. This feature lets you reference a DBMS object directly in a DATA step or SAS procedure without using descriptors. This chapter describes the SAS/ACCESS LIBNAME statement and its options so that you can associate a SAS libref with a relational DBMS database, schema, server, or group of tables and views.

You can also use the New Library window to associate a libref with relational DBMS objects or a SAS data library. For details about how to use this window, see "Assigning a Libref Interactively" on page 26.

Using Librefs that Refer to DBMS Data

When you use the SAS/ACCESS LIBNAME statement to associate a libref with relational DBMS data, you might observe some behavior that differs from that of normal SAS librefs. Because these librefs refer to DBMS objects, such as DBMS tables and views, they are stored in the format of your DBMS, which differs from the format of normal SAS data sets. This is helpful to remember when you access and work with DBMS data.

For example, you can sort the observations in a normal SAS data set and store the output to another data set. However, in a relational DBMS, sorting data often has no effect on how it is stored. Because you cannot depend on your data to be sorted in the DBMS, you must sort the data at the time of query, by using an ORDER BY clause in PROC SQL, a BY statement in the DATA step, the SAS/ACCESS data set option DBCONDITION= described in this chapter, or by another method. When you sort DBMS data, the results might also vary, depending on whether your DBMS places data with NULL values (which are translated in SAS to missing values) at the beginning or end of the result set.

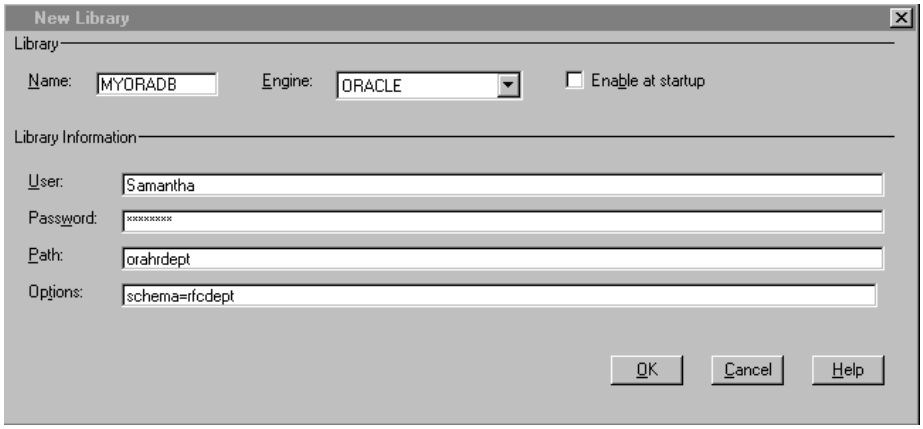
When you use librefs that refer to DBMS data with SAS functions, some functions might return a value that differs from what is returned when you use the functions with normal SAS data sets. For example, the PATHNAME function might return a blank value. For a normal SAS libref, a blank value means that the libref is not valid. However, for a libref associated with a DBMS object, a blank value means only that there no pathname associated with the libref.

Usage of some functions might also vary. For example, the LIBNAME function can accept an optional *SAS-data-library* argument. When you use the LIBNAME function to assign or deassign a libref that refers to DBMS data, you omit this argument. For full details on how to use these functions, see the *SAS Language Reference: Dictionary*.

Assigning a Libref Interactively

One of the easiest ways to associate a libref with a relational DBMS or SAS data library is to use the New Library window. To open this window, issue the LIBASSIGN command from your SAS session's command box or command line. In Display 3.1 on page 26, the user Samantha assigns a libref MYORADB to an ORACLE database referred to by the SQL*Net alias ORAHRDEPT. The LIBNAME option, SCHEMA=RFCDEPT, enables the user Samantha to access database objects that are owned by another user.

Display 3.1 New Library Window



The following list describes how to use the New Library window:

- **Name**: enter the libref that you want to assign to a SAS data library or a relational DBMS.
- **Engine**: enter the name of your SAS engine or SAS/ACCESS engine for your relational DBMS. Or, click the down arrow to select a name from the pull-down listing.
- **Enable at startup**: click on this if you want the specified libref to be assigned automatically when you open a SAS session.
- **Library Information**: these fields represent the SAS/ACCESS engine-connection options and vary according to SAS/ACCESS engine that you specify. Enter the appropriate information for your site's DBMS. The **Options** field enables you to enter SAS/ACCESS LIBNAME options. Use blanks to separate multiple options.
- OK: click on this button to assign the libref, or click on Cancel to exit the window without assigning a libref.

SAS/ACCESS LIBNAME Statement

Associates a SAS libref with a DBMS database, schema, server, or group of tables and views.

Valid: Anywhere

Syntax

❶ **LIBNAME** *libref SAS/ACCESS-engine-name*
<*SAS/ACCESS-engine-connection-options*>
<*SAS/ACCESS-engine-LIBNAME-options*>;

❷ **LIBNAME** *libref* CLEAR | _ALL_ CLEAR;

❸ **LIBNAME** *libref* LIST | _ALL_ LIST;

Arguments

libref
is any SAS name that serves as an alias to associate the SAS System with a database, schema, server, or group of tables and views.

When you are disassociating a currently-assigned libref or when listing attributes with the LIBNAME statement, specify a libref that was previously assigned with a LIBNAME statement.

SAS/ACCESS-engine-name
is the SAS/ACCESS engine name for your DBMS, such as **`oracle`** or **`db2`**. SAS/ACCESS engines are implemented differently in different operating environments. See your DBMS-specific documentation for your engine's name. The engine name is required.

CLEAR
disassociates one or more currently assigned librefs.

Specify *libref* to disassociate a single libref. Specify _ALL_ to disassociate all currently assigned librefs.

ALL
specifies that the CLEAR or LIST argument applies to all currently-assigned librefs.

LIST
writes the attributes of one or more SAS/ACCESS libraries or SAS data libraries to the SAS Log.

Specify *libref* to list the attributes of a single SAS/ACCESS library or SAS data library. Specify _ALL_ to list the attributes of all libraries that have librefs in your current session.

SAS/ACCESS-engine-connection-options
are options that you specify to control how SAS software will manage the timing and concurrency of the connection to the DBMS; these options are different for each database. If the connection options contain characters that are not allowed in SAS names, enclose the values of the options in quotation marks. On some DBMSs, if you specify the appropriate system options or environment variables for your database, you can often omit the connection options. See your DBMS-specific documentation for details.

SAS/ACCESS-LIBNAME-options
are options that apply to the processing of objects and data in a DBMS, such as its tables or indexes. For example, the PRESERVE_COL_NAMES= option enables you to specify whether to preserve spaces, special characters, and mixed case in DBMS column names. Support for many of these options is DBMS specific.

Some SAS/ACCESS LIBNAME options have the same names as SAS/ACCESS engine data set options. When you specify an option in the LIBNAME statement, it applies to objects and data that are referenced by the libref. A SAS/ACCESS data set option applies only to the data set on which it is specified. If a like-named option is specified in both the SAS/ACCESS engine LIBNAME statement and after a data set name (which references a DBMS table or view), the SAS System uses the value that is specified later, on the data set name. For more information, see "SAS/ACCESS Data Set Options" on page 43.

Details

❶ Using Data from a DBMS You can use a LIBNAME statement to read from and write to a DBMS table or view as though it were a SAS data set. The LIBNAME statement associates a libref with a SAS/ACCESS engine to access tables or views in a DBMS. The SAS/ACCESS engine enables you to connect to a particular DBMS and to specify a DBMS table or view name in a two-level SAS name.

For example, in MYDBLIB.EMPLOYEES_Q2, MYDBLIB is a SAS libref that points to a particular group of DBMS objects, and EMPLOYEES_Q2 is a DBMS table name. When you specify MYDBLIB.EMPLOYEES_Q2 in a DATA step or procedure, you dynamically access the DBMS table. Beginning in Version 7, SAS software supports reading, updating, creating, and deleting DBMS tables dynamically.

❷ Disassociating a Libref from a SAS Data Library To dissassociate or clear a libref from a DBMS, use a LIBNAME statement, specifying the libref (for example, MYDBLIB) and the CLEAR option as follows:

```
libname mydblib CLEAR;
```

You can clear a single specified libref or all current librefs.

The database engine will disconnect from the database and close any free threads or resources that are associated with that libref's connection.

❸ Writing SAS Data Library Attributes to the SAS Log Use a LIBNAME statement to write the attributes of one or more SAS/ACCESS libraries or SAS data libraries to the SAS log. Specify *libref* to list the attributes of a single SAS/ACCESS library or SAS data library, as follows:

```
libname mydblib LIST;
```

Specify _ALL_ to list the attributes of all libraries that have librefs in your current session.

SAS/ACCESS LIBNAME Options

When you specify any of the following options on the LIBNAME statement, the option is applied to all objects (such as tables and views) in the database that the libref represents. These options can be used in the SAS/ACCESS interfaces that support the SAS/ACCESS LIBNAME functionality:

The LIBNAME options are described here in detail.

Note: Control over locking might not be available for every DBMS. See your DBMS-specific documentation for details on the availability of each of these options. △

ACCESS=READONLY
determines the access level with which a libref connection is opened. Using this option prevents writing to the DBMS. If you specify ACCESS=READONLY, tables and views can be read but not updated. If ACCESS= is omitted, tables and views can be read and updated if you have the necessary DBMS privileges.

CONNECTION=SHAREDREAD | GLOBALREAD | UNIQUE
indicates whether multiple table opens in a DBMS can use the same connection. Your DBMS might have different arguments for this option; see your DBMS chapter for details.

Default value: SHAREDREAD, unless noted otherwise in your DBMS chapter.

The CONNECTION= option enables you to control the number of connections, and therefore transactions, that your SAS/ACCESS engine executes and supports for each LIBNAME statement.

This option is supported by the SAS/ACCESS engines that support multiple, simultaneous connections to the DBMS. For most SAS/ACCESS engines, there must be a connection, also known as an *attach*, to the DBMS server before any data can be accessed. Typically, each DBMS connection has one transaction, or work unit, that is active in the connection. This transaction is affected by any SQL COMMITs or ROLLBACKs that the engine performs within the connection while executing the SAS application.

A DBMS table can be opened by the SAS/ACCESS engine for reading (a read-only open), for creation (an output open), or for updating (an update open).

The values for CONNECTION= are as follows:

SHAREDREAD

When CONNECTION=SHAREDREAD, the SAS/ACCESS LIBNAME statement makes one connection to the DBMS. All tables that are opened for reading by this LIBNAME or libref share this connection.

A separate connection is established for each table that is opened for update or output.

SHAREDREAD is the default value for CONNECTION= because it offers the best performance and it guarantees data integrity.

In the following example, MYDBLIB and MYDBLIB2 make the first and second connection to the DBMS, respectively. The first connection is used to print the data from MYDBLIB.TAB. A third connection is made for updating MYDBLIB.TAB. The third connection is closed at the end of the PROC SQL UPDATE statement, whereas the first and second connections are closed with the CLEAR option.

```
libname mydblib oracle user=testuser  /* connection 1 */
  pw=testpass path='abc'
  connection=sharedread;

libname mydblib2 oracle user=testuser /* connection 2 */
  pw=testpass path='abc'
  connection=sharedread;

proc print data=mydblib.tab ...       /* connection 3 */
proc sql;
  update mydblib.tab ...

libname mydblib clear;
libname mydblib2 clear;
```

GLOBALREAD

When CONNECTION=GLOBALREAD, multiple SAS/ACCESS LIBNAME statements or librefs that use identical values for all SAS/ACCESS engine connection options can share the same connection to the DBMS. All tables that are opened for reading by any of these LIBNAME statements share this read-only access.

A separate connection is established for each table that is opened for update or output.

GLOBALREAD can be used if you want to minimize the cost of having a separate connection for each LIBNAME statement.

In the following example, the two librefs, MYDBLIB and MYDBLIB2, share the same connection for read access because CONNECTION=GLOBALREAD and the connection options are identical. The first connection is used to print the data from MYDBLIB.TAB while a second connection is made for updating MYDBLIB.TAB. The second connection is closed at the end of the step. Note that

```
libname mydblib clear;
```

does not close the first connection.The first connection is closed with the final LIBNAME statement.

```
libname mydblib oracle user=testuser /* connection 1 */
  pw=testpass path='abc'
  connection=globalread;
```

```
libname mydblib2 oracle user=testuser
  pw=testpass path='abc'
  connection=globalread;

proc print data=mydblib.tab ...     /* connection 2 */
proc sql;
  update mydblib.tab ...

libname mydblib clear;
libname mydblib2 clear;
```

UNIQUE
When CONNECTION=UNIQUE, a new connection to the DBMS is made for every table that is opened in your SAS application. This is useful if you want each use of a table to have its own unique connection and transaction.

In the following example, the libref, MYDBLIB, makes the first connection. The first connection is used to print the data from MYDBLIB.TAB while a second connection is made for updating MYDBLIB.TAB. The second connection is closed at the end of the step. Any subsequent connection is opened and closed on the step boundary. The first connection is closed with the CLEAR option in the LIBNAME statement.

```
libname mydblib oracle user=testuser
  pw=testpass path='abc'
  connection=unique;

proc print data=mydblib.tab ...
proc sql;
  update mydblib.tab ...

libname mydblib clear;
```

See the glossary for the definitions of connection, commit, rollback, query, and transaction.

See also the options DEFER= on page 37, ACCESS= on page 29, and CONNECTION_GROUP= on page 31.

Note: The number of simultaneous connections supported by each DBMS varies. Also, some SAS/ACCESS products support more values for the CONNECTION= option. See your DBMS documentation for details. △

CONNECTION_GROUP=*connection_group_name*
specifies a connection that can be shared among several LIBNAME statements (or librefs) or by connections made with the SQL Procedure Pass-Through Facility CONNECT statement.

Default value: none

By specifying the name of a connection group, you can share one DBMS connection among several different LIBNAME statements. The connection to the DBMS can be shared only if each LIBNAME statement specifies the same CONNECTION_GROUP= value and specifies identical DBMS connection options.

When CONNECTION_GROUP= is specified, it implies that the value of the CONNECTION= option will be GLOBALREAD.

In the following example, the MYDBLIB libref shares a connection with MYDBLIB2 by specifying CONNECTION_GROUP=MYGROUP and by specifying identical connection options. The libref, MYDBLIB3, makes a second connection to another connection group called ABC. The first connection is used to print the data

from MYDBLIB.TAB while a third connection is made for updating MYDBLIB.TAB. The third connection is closed at the end of the step. Note that

```
libname mydblib clear;
```

does not close the first connection. The first connection is closed with the final LIBNAME statement for that connection

```
libname mydblib2 clear;
```

Similarly, the second connection is closed with

```
libname mydblib3 clear;
```

```
libname mydblib oracle user=testuser    /* connection 1 */
  pw=testpass
  connection_group=mygroup;

libname mydblib2 oracle user=testuser
  pw=testpass
  connection_group=mygroup;

libname mydblib3 oracle user=testuser   /* connection 2 */
  pw=testpass
  connection_group=abc;

proc print data=mydblib.tab ...         /* connection 3 */
proc sql;
  update mydblib.tab ...

libname mydblib clear;
libname mydblib2 clear;
libname mydblib3 clear;
```

DBCONINIT=<'>*DBMS-user-command*<'>
specifies a user-defined initialization command to be executed immediately after every connection to the DBMS that is within the scope of the LIBNAME statement or libref.

Default value: none

The initialization command that you select can be a script, stored procedure, or any DBMS SQL language statement that might provide additional control over the interaction between your SAS/ACCESS engine and the DBMS.

You can specify any DBMS command that can be executed by the SAS/ACCESS engine and that does not return a result set or output parameters. The command executes immediately after each DBMS connection is successfully established. If the command fails, a disconnect occurs, and the libref is not assigned. You must specify the command as a single, quoted string, unless it is an environment variable.

In the following example, the DBCONINIT= option causes the DBMS to apply the SET statement to every connection that uses the MYDBLIB libref.

```
libname mydblib db2 ssid=db2
  dbconinit="SET CURRENT SQLID='myauthid'";

proc sql;
  select * from mydblib.customers;
```

```
  insert into mydblib.customers
    values('33129804', 'VA', '22809', 'USA',
           '540/545-1400', 'BENNETT SUPPLIES',
           '2199 LAUREL ST', 'ELKTON', '22APR97');

  update mydblib.invoice
    set amtbilled = amtbilled*1.10
    where country = 'USA';

  delete mydblib.specprod
    where productid = 8934;

quit;
```

In the next example, a UNIX environment variable, DBMSINIT, contains a procedure to be passed to DBCONINIT=. The SAS/ACCESS engine checks for this environment variable and executes it.

```
libname mydblib oracle user=testuser pass=testpass
   dbconinit=dbmsinit;
```

The SAS/ACCESS engine recognizes the environment variable, retrieves the stored procedure, and executes it.

See also DBCONTERM= on page 33.

Note: The initialization command might execute more than once, since one LIBNAME statement might have multiple connections; for example, one for reading and one for updating. △

DBCONTERM=<'>*DBMS-user-command*<'>
specifies a user-defined termination command to be executed before every disconnect from the DBMS that is within the scope of the LIBNAME statement or libref.

Default value: none

The termination command that you select can be a script, stored procedure, or any DBMS SQL language statement that might provide additional control over the interaction between the SAS/ACCESS engine and the DBMS. You can specify any valid command that can be executed by the SAS/ACCESS engine and that does not return a result set or output parameters. The command executes immediately before SAS terminates each connection to the DBMS. If the command fails, SAS provides a warning message but the library deassignment and disconnect still occurs. You must specify the command as a single, quoted string.

In this example, the DBMS drops the Q1_SALES table before SAS disconnects from the DBMS.

```
libname mydblib db2 user=testuser using=testpass
  db=invoice
  dbconterm='drop table q1_sales';
```

In this example, the stored procedure, SALESTAB_STORED_PROC, is executed each time SAS connects to the DBMS, and the BONUSES table is dropped when SAS terminates each connection.

```
libname mydblib db2 user=testuser
  using=testpass db=sales
  dbconinit='exec salestab_stored_proc'
  dbconterm='drop table bonuses';
```

See also DBCONINIT= on page 32.

Note: The termination command might execute more than once, since one LIBNAME statement might have multiple connections; for example, one for reading and one for updating. △

DBGEN=DBMS | SAS
specifies whether to automatically rename DBMS columns containing characters that SAS software does not allow, such as **$**, to valid SAS variable names. SAS software retains column names when reading data from tables, unless a column name contains characters that SAS does not allow, such as **$**. SAS allows alphanumeric characters and the underscore (_).

Default value: DBMS

If you specify DBGEN_NAME=SAS, DBMS columns are renamed to the format _COL*n*, where *n* is the column number (starting with zero). For example, a DBMS column named **dept$amt** is renamed to **_COL*n***.

If you specify DBGEN_NAME=DBMS, the DBMS columns are renamed to valid SAS variable names. Disallowed characters are converted to underscores, so the **dept$amt** column would be renamed **dept_amt**. If a column is converted to a name that already exists, a sequence number is appended to the end.

This option is intended primarily for National Language Support, notably for the conversion of Kanji to English characters. English characters that are converted from Kanji are often those that are not allowed in SAS.

Note: These rules apply when the SAS system option VALIDVARNAME=V8. When you set VALIDVARNAME=V6, DBGEN_NAME=SAS behaves the same way, but DBGEN_NAME=DBMS handles duplicate column names differently. Instead of appending a sequence number to the end of the column name, SAS replaces the last character with the sequence number, for example, a column named **_DEPT** becomes **_DEP0**. △

DBINDEX=YES | NO
indicates whether SAS applications attempt to use any indexes on DBMS tables referenced by the specified libref.

Default value: NO

The default value is NO because there are advantages and disadvantages to using indexes and, therefore, the user must control their usage.

If you specify DBINDEX=YES in SAS applications, such as PROC SQL and the DATA step, SAS attempts to use indexes on a DBMS table to improve performance. If you specify a BY statement in a PROC or DATA step that references a DBMS table or view, you will improve your performance if the BY variable is associated with an indexed DBMS column.

See your DBMS chapter for DBMS-specific details. For more information about setting the DBINDEX= option for performance enhancement, see Chapter 7, “Advanced Topics in SAS/ACCESS,” on page 85.

If you specify DBINDEX=NO, SAS makes no attempt to use indexes on a DBMS table.

In this example, setting DBINDEX=YES in the LIBNAME statement improves the efficiency of the PROC SQL join because the EMPLOYEES.BIRTHDATE column has an index defined on it.

```
libname mydblib oracle user=testuser
   password=testpass dbindex=yes;

proc sql;
  select employees.lastname,
         employees.idnum,
         payroll.salary
   from mydblib.employees, mydblib.payroll
```

```
   where employees.birthdate=payroll.birth;
quit;
```

DBLIBINIT= <'>*DBMS-user-command*<'>
specifies a user-defined initialization command to be executed once within the scope of the LIBNAME statement or libref that established the first connection to the DBMS.

Default value: none

The initialization command that you select can be a script, stored procedure, or any DBMS SQL language statement that might provide additional control over the interaction between your SAS/ACCESS engine and the DBMS.

You can specify any DBMS command that can be executed by the SAS/ACCESS engine and that does not return a result set or output parameters. The command executes immediately after the first DBMS connection is successfully established. If the command fails, a disconnect occurs, and the libref is not assigned. You must specify the command as a single, quoted string, unless it is an environment variable.

DBLIBINIT= will fail if either CONNECTION=UNIQUE or DEFER=YES or if both of these LIBNAME options are specified. When CONNECTION=GLOBALREAD is specified, the initialization command will be executed for each LIBNAME statement that has the GLOBALREAD specification. However, any of the LIBNAME statements that have CONNECTION=GLOBALREAD specified, but do not have the same initialization command as the first LIBNAME statement, will fail to share the same connection to the DBMS.

When two LIBNAME statements have the same initialization command, so that they both share the same physical connection, the initialization command is executed only once.

In this example, CONNECTION=GLOBALREAD is specified on both LIBNAME statements but the TEST command is specified only for the first LIBNAME statement.

```
libname mydblib oracle user=testuser pass=testpass
   connection=globalread dblibinit='Test';

libname mydblib2 oracle user=testuser pass=testpass
   connection=globalread;
```

In this example, CONNECTION=GLOBALREAD is specified on both LIBNAME statements but the DBLIBINIT commands are different. Therefore, the second LIBNAME statement fails to share the same physical connection.

```
libname mydblib oracle user=testuser pass=testpass
   connection=globalread dblibinit='Test';

libname mydblib2 oracle user=testuser pass=testpass
   connection=globalread dblibinit='NoTest';
```

See also DBLIBTERM= on page 36.

DBLIBTERM= <'>*DBMS-user-command*<'>
specifies a user-defined termination command to be executed once before the DBMS disconnect that is associated with the first connection made by the LIBNAME statement or libref.

Default value: none

The termination command that you select can be a script, stored procedure, or any DBMS SQL language statement that might provide additional control over the interaction between the SAS/ACCESS engine and the DBMS. You can specify any valid command that can be executed by the SAS/ACCESS engine and that does not return a result set or output parameters. The command executes immediately before SAS terminates the last connection to the DBMS.[TRUE??] If the command fails, SAS provides a warning message but the library deassignment and disconnect still occurs. You must specify the command as a single, quoted string.

This option will fail if either the CONNECTION=UNIQUE or DEFER=YES or both of these LIBNAME options are specified. When CONNECTION=GLOBALREAD is specified, the termination command will be executed for each LIBNAME statement that has the GLOBALREAD specification. However, any of the LIBNAME statements that have CONNECTION=GLOBALREAD specified, but do not have the same termination command as the first LIBNAME statement, will fail.

When two LIBNAME statements have the same termination command, so that they both share the same physical connection, the command is executed only once.

In this example, CONNECTION=GLOBALREAD is specified on both LIBNAME statements but the TEST command is specified only for the first LIBNAME statement.

```
libname mydblib oracle user=testuser pass=testpass
   connection=globalread dblibterm='Test';

libname mydblib2 oracle user=testuser pass=testpass
   connection=globalread;
```

In this example, CONNECTION=GLOBALREAD is specified on both LIBNAME statements but the DBLIBTERM commands are different. Therefore, the second LIBNAME statement will fail to share the same physical connection..

```
libname mydblib oracle user=testuser pass=testpass
   connection=globalread dblibterm='Test';

libname mydblib2 oracle user=testuser pass=testpass
   connection=globalread dblibterm='NoTest';
```

See also DBLIBINIT= on page 35.

DBMAX_TEXT=<*integer*>
determines the length of a very long DBMS character data type that is read into SAS or written from SAS using a SAS/ACCESS engine. Examples of a DBMS data type would be the SYBASE TEXT data type or the ORACLE LONG RAW data type. The <*integer*> can be between 1 and 32, 767.

Default value: 1024

DBPROMPT=YES | NO
specifies whether SAS displays a window that prompts the user to enter DBMS connection information prior to connecting to the DBMS in interactive mode.

Default value: NO

If you specify DBPROMPT=YES, SAS displays a window that interactively prompts you for the DBMS connection options the first time the libref is used.

Therefore, it is not necessary to provide connection options with the LIBNAME statement. If you do specify connection options with the LIBNAME statement and you specify DBPROMPT=YES, the connection option values are displayed in the window. These values can be overridden interactively.

If you specify DBPROMPT=NO, SAS does not display the prompting window.

The DBPROMPT= option interacts with the DEFER= option to determine when the prompt window appears. If DEFER=NO, the DBPROMPT window opens when the LIBNAME statement is executed. If DEFER=YES, the DBPROMPT window opens the first time a table or view is opened. The DEFER= option normally defaults to NO but defaults to YES if DBPROMPT=YES. You can override this default by explicitly setting DEFER=NO.

The DBPROMPT window usually opens only once for each time that the LIBNAME statement is specified. It might open multiple times if DEFER=YES and the connection fails when SAS tries to open a table. In these cases, the DBPROMPT window opens until a successful connection occurs or the user selects Cancel.

In this example, the DBPROMPT window does not open when the LIBNAME statement is submitted because DEFER=YES. The DBPROMPT window opens when the PRINT procedure is processed, a connection is made, and the table is opened.

```
libname mydblib oracle dbprompt=yes
   defer=yes;

proc print data=mydblib.staff;
run;
```

In the next example, the DBPROMPT window opens while the LIBNAME statement is processing. The DBPROMPT window does not open in subsequent statements because the DBPROMPT window opens only once per LIBNAME.

```
libname mydblib oracle dbprompt=yes
   defer=no;
```

In the next example, values provided in the LIBNAME statement are pulled into the DBPROMPT window. The values **testuser** and **ABC_server** appear in the DBPROMPT window and can be edited and confirmed by the user.

```
libname mydblib oracle
 user=testuser pw=testpass
  path='ABC_server' dbprompt=yes defer=no;
```

See also DEFER= on page 37.

DEFER=NO | YES

determines when the connection to the DBMS occurs.

Default value: NO

If DEFER=YES, the connection to the DBMS occurs when a table in the DBMS is opened. If DEFER=NO, the connection to the DBMS occurs when the libref is assigned by a LIBNAME statement. The DEFER= option is ignored when CONNECTION=UNIQUE because a connection is performed for every open.

DIRECT_SQL=NO | YES
allows you to specify whether the SQL Procedure uses the Direct SQL Join feature.

Default value: YES

If DIRECT_SQL=YES, joins are sent to the DBMS for processing, when possible. If DIRECT_SQL=NO, direct joins are processed in SAS.

For example, the following code shows how you can prevent the join between two tables from being processed in the DBMS server. Instead, the SAS System processes the join.

```
proc sql;
select tab1.deptno, dname from
    mydblib.table1 tab1,
    mydblib.table2 tab2
where tab1.deptno=tab2.deptno
    using libname mydblib oracle user=testuser
      password=testpass path=myserver direct_sql=no;
```

PRESERVE_COL_NAMES=NO | YES
preserves spaces, special characters, and case sensitivity in DBMS column names. For details about how to use this option, see Chapter 2, "SAS Names and Support for DBMS Names," on page 9 and your DBMS chapter.

Default value: specific to your DBMS

If PRESERVE_COL_NAMES=NO, column names that are read from the DBMS are converted to SAS variable names by using the SAS name normalization rules. These rules allow the name to be mixed case but to contain only alphanumerics or the underscore character (_). If a character in a DBMS column name is not an alphanumeric or underscore, it is converted to an underscore in the corresponding SAS variable name. For example, the ORACLE column, "Total$Cost", can be referenced in a SAS program as "Total_Cost".

If PRESERVE_COL_NAMES=NO, column names that are passed to the DBMS from a SAS application must conform to the SAS name normalization rules or an error message will be printed.

If PRESERVE_COL_NAMES=YES, column names are read from and passed to the DBMS with special characters and the exact, case-sensitive spelling of the name preserved. To use column names in your SAS program that are not valid SAS names, you must use one of the following techniques that are supported by the SAS language:

- Use the DQUOTE option in PROC SQL and then reference your columns using double quotes. For example:

```
proc sql dquote=ansi;
  select "Total$Cost" from mydblib.mytable;
```

- Specify the global system option VALIDVARNAME=ANY and use name literals in the SAS language. For example:

```
proc print data=mydblib.mytable;
  format 'Total$Cost'n 22.2;
```

Specify the alias PRESERVE_NAMES=YES | NO, if you plan to specify both the PRESERVE_COL_NAMES= and PRESERVE_TAB_NAMES= options in your LIBNAME statement. Using this alias saves you some time when coding.

PRESERVE_COL_NAMES= does not apply to the PROC SQL Pass-Through facility. However, PRESERVE_COL_NAMES= does interact with the PROC SQL

option, DQUOTE=ANSI, and the VALIDVARNAME=ANY system option as described above.

See your DBMS chapter for DBMS specific details. See also PRESERVE_TAB_NAMES= on page 39. For more information about SAS names, see Chapter 2, "SAS Names and Support for DBMS Names," on page 9 and the *SAS Language Reference: Dictionary*.

PRESERVE_TAB_NAMES=NO | YES
preserves spaces, special characters, and case-sensitivity in DBMS table names. For details about how to use this option, see Chapter 2, "SAS Names and Support for DBMS Names," on page 9 and your DBMS chapter.

Default value: specific to your DBMS

If PRESERVE_TAB_NAMES=NO, table names that are read from the DBMS are converted to SAS data set names by using the SAS name normalization rules. These rules allow the name to be mixed case but to contain only alphanumerics or the underscore (_).

If PRESERVE_TAB_NAMES=YES, table names are read from and passed to the DBMS with special characters and the exact, case-sensitive spelling of the name preserved.

Specify the alias PRESERVE_NAMES=YES | NO, if you would be specifying both PRESERVE_COL_NAMES= and PRESERVE_TAB_NAMES= in your LIBNAME statement. Using this alias saves you some time when coding.

See also PRESERVE_COL_NAMES= on page 38.

READ_LOCK_TYPE=ROW | PAGE | TABLE | NOLOCK
specifies how data in a DBMS table is locked when data is read.

Default value: specific to your DBMS

See your DBMS chapter for details on the option values supported for your DBMS and details on locking.

READ_LOCK_TYPE= can take one of the following values:

ROW
locks a row if any of its columns are accessed. If you are using the SAS/ACCESS Interface to ODBC or DB2CS, READ_LOCK_TYPE= ROW indicates that locking is based on the READ_ISOLATION_LEVEL= option.

PAGE
locks a page of data, which is a DBMS specific number of bytes.

TABLE
locks the entire DBMS table.

NOLOCK
does not lock the DBMS table, pages, or any rows during a read transaction.

If you omit READ_LOCK_TYPE=, you get the default action for the DBMS that you are using. You can set a lock for one DBMS table by using the data set option or for all tables in a particular DBMS by using the LIBNAME option.

If you specify READ_LOCK_TYPE=TABLE, you must also specify CONNECTION=UNIQUE, or you will receive an error message. Setting CONNECTION=UNIQUE ensures that your table lock is not lost, for example, due to another table closing and committing rows in the same connection.

In this example, the libref MYDBLIB uses the SAS/ACCESS engine to ORACLE to connect to an ORACLE database. The SAS/ACCESS engine connection options are USER=, PASSWORD=, and PATH=. The LIBNAME options specify that row-level locking be used when data is read or updated:

```
libname mydblib oracle user=tester1 password=tst1
  path=myorapth schema=heroraschema
  read_lock_type=row update_lock_type=row;

proc print data=mydblib.employees
  where jobcode=602;
run;
```

See also the data set option "READ_LOCK_TYPE=" on page 56 and the LIBNAME option UPDATE_LOCK_TYPE on page 40.

REREAD_EXPOSURE=NO | YES
specifies whether the SAS/ACCESS engine will behave like a random access engine for the scope of the LIBNAME statement.

Default value: NO

CAUTION:
Using REREAD_EXPOSURE= could cause data integrity exposures If you specify REREAD_EXPOSURE=YES, the SAS/ACCESS engine behaves like a random access engine when rereading a row so that you cannot guarantee that the same row will be returned. For example, if you read row #5 and someone else deletes it, the next time you read row #5, you will read a different row. You will have the potential for data integrity exposures within the scope of your SAS session. △

If you specify REREAD_EXPOSURE=NO, the SAS/ACCESS engine behaves as an RMOD engine, which means that your data is protected by the normal data protection that SAS provides.

SPOOL=YES | NO | DBMS
specifies whether SAS creates a utility spool file during read transactions that read data more than once.

Default value: YES

In some cases, SAS processes data in more than one pass through the same set of rows. Spooling is the process of writing rows, that have been retrieved during the first pass of a data read, to a spool file. In the second pass, rows can be reread without performing I/O to the DBMS a second time. When data must be read more than once, spooling improves performance. Spooling also guarantees that the data remains the same between passes, as most SAS/ACCESS engines do not support member-level locking.

If you specify SPOOL=YES, SAS creates a utility spool file into which it writes the rows that are read the first time. For subsequent passes through the data, the rows are read from the utility spool file rather than rereading them from the DBMS table. This guarantees that the row set is the same for every pass through the data.

If you specify SPOOL=NO, the required rows for all passes of the data are read from the DBMS table. No spool file is written. There is no guarantee that the row set will be the same for each pass through the data.

If you specify SPOOL=DBMS, the required rows for all passes of the data are read from the DBMS table but additional enforcements are made on the DBMS server side to ensure the row set is the same for every pass through the data.

See your DBMS chapter for details.

UPDATE_LOCK_TYPE=ROW | PAGE | TABLE | NOLOCK
specifies how data in a DBMS table is locked during an update transaction.

Default value: specific to your DBMS

See your DBMS chapter for details on the option values supported for your DBMS and details on locking.

UPDATE_LOCK_TYPE= can take one of the following values:

ROW
locks a row if any of its columns are going to be updated.

PAGE
locks a page of data, which is a DBMS specific number of bytes.

TABLE
locks the entire DBMS table.

NOLOCK
does not lock the DBMS table, page, or any rows when reading them for update.

You can set a lock for one DBMS table by using the data set option or for all tables in a particular DBMS by using the LIBNAME option.

See also the data set option "UPDATE_LOCK_TYPE=" on page 58 and the LIBNAME option READ_LOCK_TYPE on page 39.

Example 1: Assigning a Libref with a SAS/ACCESS LIBNAME Statement

In the following example, the SAS libref MYDBLIB is associated with an ORACLE database that uses the SQL*Net alias AIRDB_REMOTE. You can specify options on the SAS/ACCESS LIBNAME statement that enable you to connect to a particular database. In this example,the SCHEMA= option lists the ORACLE schema in which the database resides. (If you set certain environment variables or system options—depending on your operating environment and DBMS—you can omit the connection options.)

The AIRDB_REMOTE database contains a number of DBMS objects, including several tables, such as STAFF. By assigning a libref, the ORACLE table can be referenced like a SAS data set and can be a data source in any DATA step or SAS procedure.

```
libname mydblib oracle user=georg password=fussball
   path=airdb_remote schema=hrdept;

proc sql;
  select idnum, lname
    from mydblib.staff
    where state='NY'
    order by lname;
```

You can use the DBMS data to create a SAS data set, as in this example.

```
data newds;
   set mydblib.staff(keep idnum lname fname);
run;
```

You can also use the libref and data set with any other SAS procedure.

```
proc print data=mydblib.staff;
run;

proc datasets library=mydblib;
quit;
```

Example 2: Using the Prompt Window When Specifying LIBNAME Options

In this example, the DBPROMPT= option enables you to enter connection information in a prompting window rather than in the SAS/ACCESS LIBNAME statement. The DEFER=NO option specifies that the New Library window opens when the libref is assigned rather than when the table is opened. You can enter the rest of the LIBNAME options in this window's fields. For more information on using this window, see "Assigning a Libref Interactively" on page 26.

```
libname mydblib oracle dbprompt=yes
   dbindex=yes defer=no;

proc print data=mydblib.payroll;
run;
```

For this example, the libref MYDBLIB uses the SAS/ACCESS engine for DB2 to create a table. The DATA step statement ABORT causes the SAS/ACCESS engine to issue an SQL ROLLBACK command. The resulting behavior of the engine is DBMS-specific.

```
libname mydblib db2 ssid=db2a authid=gomez server=os390svr;
   data mydblib.x;
 j=1;
 abort;
 run;
```

Example 3: Assigning a Libref to a Remote DBMS

SAS/CONNECT (single-user) and SAS/SHARE (multiple user) software give you access to data by means of *remote library services* (RLS). RLS enables you to access your data on a remote machine as if it were local. For example, it permits a graphical interface to reside on the local machine while the data remains on the remote machine.

This access is given to data stored in many kinds of SAS files, such as external databases (through the SAS/ACCESS LIBNAME statement and views created with it) and SAS data views (views created with PROC SQL, the DATA step, and SAS/ACCESS software). RLS enables you to access SAS data sets, SAS views, and relational DBMS data that are defined by SAS/ACCESS LIBNAME statements. For more information, see the "Remote Library Services" topic in *SAS/SHARE User's Guide*.

You can use RLS to update relational DBMS tables that are referenced with the SAS/ACCESS LIBNAME statement. Updates to a DBMS table using a SAS/ACCESS view descriptor are supported only on a single-user SAS/SHARE server.

In the following example, the SAS/SHARE LIBNAME statement makes a connection to a DB2 database that resides on the remote server, REMOS390. This LIBNAME statement is submitted in a local SAS session. The SAS/ACCESS engine name is specified in the remote option, RENGINE=. The DB2 engine-connection option and any LIBNAME options are specified in the remote option, ROPTIONS=; options are separated by a blank space. RLSDB2.EMPLOYEES is a SAS data set that references the DB2 table, EMPLOYEES.

```
libname rlsdb2 rengine=db2 server=remos390
               roptions="ssid=db2a authid=kyoko";

proc print data=rlsdb2.employees;
run;
```

The correct bibliographic citation for this manual is as follows: SAS Institute Inc., *SAS/ACCESS® Software for Relational Databases: Reference, Version 8*, Cary, NC: SAS Institute Inc., 1999.

SAS/ACCESS® Software for Relational Databases: Reference, Version 8

ISBN 1–58025–558–2

SAS Institute Inc., SAS Campus Drive, Cary, North Carolina 27513.

1st printing, October 1999