



CHAPTER

1

Introducing SAS/ACCESS Software

<i>Using This Book</i>	3
<i>SAS/ACCESS Changes and Enhancements for Version 7 and Version 8</i>	4
<i>SAS Explorer Window</i>	5
<i>SAS/ACCESS LIBNAME Statement</i>	5
<i>SAS/ACCESS Data Set Options</i>	5
<i>Enhanced Naming Conventions and Support</i>	6
<i>Performance Optimization</i>	6
<i>New Macro Variables</i>	6
<i>Relational DBMS Support in the SQL Procedure</i>	6
<i>ACCESS Procedure UPDATE Statement</i>	7
<i>Changes and Enhancements in SAS/ACCESS-DBMS Product Support</i>	7
<i>Sample Data in This Book</i>	8

Using This Book

SAS/ACCESS Software for Relational Databases: Reference provides reference and usage information about SAS/ACCESS software for relational database management systems (DBMSs). This book applies to Version 7 and Version 8, as well as SAS/ACCESS interfaces that have been available since Release 6.06 of the SAS System.

Introductory, example, and reference information is presented in this book. Part 1, the introductory portion, provides an overview of SAS/ACCESS software. Part 2, the reference portion, describes all the SAS options and statements that can be used with the SAS/ACCESS LIBNAME statement, the ACCESS and DBLOAD procedures, and with the SQL Procedure Pass-Through Facility. Part 4, the examples section, explains how you can use SAS/ACCESS software to accomplish some common tasks. Part 6, the last section of this book, lists the sample data that is used in the book's examples.

The information in this book applies generally to all the relational database management systems that are supported by SAS/ACCESS software. Information on using individual relational DBMSs is included in a separate chapter in Part 5 of this book. Features of each SAS/ACCESS interface, such as RDBMS-specific procedure statements, options, and system options, are described in each DBMS-specific chapter. Appendix 2 also includes a brief overview of RDBMSs and how your database administrator (DBA) can best run SAS/ACCESS software with the RDBMS at your site.

This book is intended for applications programmers and users who know how to use their host operating system, but who may not be familiar with the SAS System, the relational DBMS, or with the specific SQL (Structured Query Language) that the RDBMS supports. Database administrators might also want to read this book to understand how the interface is implemented and how they should administer it.

SAS/ACCESS Changes and Enhancements for Version 7 and Version 8

SAS/ACCESS software provides an interface between the SAS System and relational database management systems (DBMSs). In Version 6, the SAS/ACCESS interface consisted of one or more of the following: the ACCESS and DBLOAD procedures, a SAS/ACCESS interface view engine, and the SQL Procedure Pass-Through Facility. These features continue to be supported in Versions 7 and 8, in addition to the following new features that are available in Version 7 and later:

- SAS Explorer window
 - enables you to navigate within an interactive SAS session by using a new, point-and-click interface. This window replaces the ACCESS window, which was available in earlier releases of SAS software. For details about using this window, see your host companion or *SAS Language Reference: Concepts*.
- SAS/ACCESS LIBNAME statement for Relational Database InterfacesChapter 3, “SAS/ACCESS LIBNAME Statement,” on page 25
 - enables you to assign a SAS libref directly to a relational DBMS (RDBMS) or to objects in an RDBMS, such as tables and views. You no longer need to create access and view descriptors, although all previously created access and view descriptors are fully supported in Version 7 and later.
 - enables you to use many new SAS/ACCESS LIBNAME options to specify how objects in your RDBMS data are processed by SAS.
 - enables you to customize how to connect to your RDBMS and how to control data locking.
- SAS/ACCESS data set options for Relational Database InterfacesChapter 4, “SAS/ACCESS Data Set Options,” on page 43
 - enable you to use many new SAS/ACCESS data set options to specify how your relational DBMS data are processed by SAS and how to control data locking.
 - enable you to use several base SAS data set options on data sets that access RDBMS data.
- Enhanced naming conventions and supportChapter 2, “SAS Names and Support for DBMS Names,” on page 9
 - enable you to use 32-byte names for SAS data set and variable names and for relational DBMS table and column names when you use the new SAS/ACCESS LIBNAME statement.
 - enable you to store character data in SAS software up to 32,767 bytes.
 - enable you to use mixed case and nonstandard names that are not supported in Version 6.
- Performance optimization“Using SAS/ACCESS LIBNAME and Data Set Options to Improve Performance” on page 89
 - passes joins directly to the relational DBMS for processing.
 - makes better use of RDBMS indexes.
 - provides enhanced interrupt- and error-handling.
- New macro variables“About the Macro Facility” on page 59
 - enable you to use two new macro variables, SYSDBRC and SYSDBMSG, for reporting RDBMS-specific errors.
- Relational DBMS support in PROC SQLChapter 6, “SQL Procedure’s Interaction with SAS/ACCESS Software,” on page 65
 - enables you to access RDBMS data directly by using PROC SQL.

- enables you to update and delete RDBMS data directly through SQL or through a simple PROC SQL view that references the underlying data.
- enables you to join RDBMS data so that the RDBMS processes the join more efficiently.
- enables you to use the new DBCONDITION= data set option to subset RDBMS data within a PROC SQL view so that the RDBMS processes the subsetting conditions.
- enables you to store embedded LIBNAME statements in PROC SQL views by using the new **using libname** syntax.
- The PROC windowing interface is not supported in Version 7 and later
 - The Access and View Descriptor windows for creating and editing descriptors are not supported in Version 7 and later. If the ACCESS procedure was available in Version 6 for your relational DBMS, then you can use ACCESS procedure statements to perform these tasks. For information about how to look at or update the contents of your descriptors, see “Reviewing Variables” on page 186 or “UPDATE” on page 123.
Similarly, the DBLOAD windows are no longer supported. If the DBLOAD procedure was available in Version 6 for your RDBMS, then you can use DBLOAD procedure statements to perform the same tasks.
 - The UPDATE statement “UPDATE” on page 123 has been added to the ACCESS procedure Chapter 9, “ACCESS Procedure Reference,” on page 103 so that you can update descriptor files.
 - Full Version 6 compatibility Chapter 8, “SAS/ACCESS Procedures,” on page 99 for existing SAS programs that use descriptors, the ACCESS procedure, the DBLOAD procedure, and the SQL Procedure Pass-Through Facility.

SAS Explorer Window

The new graphical interface to the SAS System, the SAS Explorer window, enables you to manage your SAS files. For example, you can display your SAS data libraries, select one, and open a SAS data set or view with the Viewtable. In Version 7 and later, you use the Explorer window instead of the ACCESS window, which was available in earlier releases of SAS software. For details about using this window, see your host companion or the *SAS Language Reference: Concepts*.

SAS/ACCESS LIBNAME Statement

SAS/ACCESS engines now provide direct and dynamic access to your relational DBMS data without using access descriptors or view descriptors. You can now assign a SAS libref directly to an RDBMS and then use this libref to identify a table or view in that DBMS. This *libref.dbms_table* behaves like a SAS data set and, therefore, can be used in the DATA step and in SAS procedures just like a SAS data set. You can read, update, insert, or delete RDBMS data, as well as create SAS data sets from or SAS data views on the RDBMS data. In addition, you can use many new options in the LIBNAME statement to specify how to connect to your RDBMS and how to access and process your RDBMS data.

SAS/ACCESS Data Set Options

Because the new SAS/ACCESS LIBNAME statement enables you to access relational DBMS tables and views through a SAS libref, you can use them as data sets. You can

use many new SAS/ACCESS data set options, as well as several existing SAS data set options, to specify how your data set is processed by SAS. The SAS/ACCESS data set options provide greater flexibility and control over row and table locking, buffering data, indexing, the use of DBMS data types, and other RDBMS functionality.

Note: Control over locking and buffering might not be available for your RDBMS. See your RDBMS chapter for details. \triangle

Enhanced Naming Conventions and Support

SAS software and SAS/ACCESS software now support the following names up to 32 bytes: SAS data set, SAS variable, relational DBMS table name, and RDBMS column name. You can also use mixed case and special characters when you specify a SAS or RDBMS even if the name does not conform to SAS naming conventions. See “SAS/ACCESS LIBNAME and PROC SQL Options” on page 11 and your RDBMS chapter for details about the availability of each of these options. The SQL Procedure Pass-Through Facility fully supports long names as well.

Performance Optimization

SAS/ACCESS provides several enhancements in the areas of indexing, error-handling, support of relational DBMS objects such as triggers and stored procedures, and passing joins to the RDBMS. Whenever possible, SAS software now optimizes queries to use indexes. You can also use SAS/ACCESS LIBNAME and data set options to take advantage of RDBMS indexes.

In addition, you can list your RDBMS tables by using the SAS Explorer window or PROC DATASETS, and you can list the SAS metadata for each RDBMS table or view by using the Explorer window or PROC CONTENTS.

New Macro Variables

Two new macro variables, SYSDBMSG and SYSDBRC, provide relational DBMS error message and return code information. These variables are similar to the SQLXMSG and SQLXRC macro variables that are available in the SQL Procedure Pass-Through Facility.

Relational DBMS Support in the SQL Procedure

The SQL procedure has several enhancements in Version 7 and later, and many of the enhancements interact with SAS/ACCESS software. For a complete description of PROC SQL, see the *SAS Procedures Guide*.

After you assign a libref to a relational DBMS, you can reference this new data set in a PROC SQL statement in order to access, update, or delete RDBMS data. You can also embed LIBNAME information in a PROC SQL view; therefore, every time the PROC SQL view is processed, you automatically connect to the RDBMS and you can access its data.

You can specify a simple PROC SQL view—that is, a view based on one table—in a PROC SQL UPDATE or DATA step UPDATE statement to update the view’s underlying data.

Joins are passed to the RDBMS to process whenever possible. The RDBMS performs the join and returns only the results of the join to your SAS session. This provides a major performance enhancement for many of your SAS programs that perform joins.

Finally, you can still retrieve RDBMS data from or send RDBMS statements to an RDBMS through the Pass-Through facility.

ACCESS Procedure UPDATE Statement

You can now use the ACCESS procedure's UPDATE statement to update existing access descriptors and view descriptors that you have created by using the ACCESS procedure. You can use the LIST statement in PROC ACCESS to display the descriptor's content before you update it. UPDATE is provided because the ACCESS procedure windowing interface is not supported in Version 7 and later.

Changes and Enhancements in SAS/ACCESS-DBMS Product Support

In Version 7 and later, SAS/ACCESS Software for Relational Databases consists of one or more of the following: the SAS/ACCESS LIBNAME statement (and new options), the ACCESS and DBLOAD procedures, a SAS/ACCESS interface view engine, and the SQL Procedure Pass-Through Facility (with new options). Not all of these components are available in every SAS/ACCESS interface. Please refer to your DBMS chapter for details. The ACCESS and DBLOAD procedures remain compatible with Version 6.

There are a number of relational DBMS changes and enhancements in Version 7 and Version 8:

New relational DBMS Interfaces have been added:

V8 SAS/ACCESS interfaces to OLE DB and Teradata are new in Version 8. See their DBMS chapters for more information.

SAS/ACCESS Interface to ODBC has new access:

In Version 7 and later, the SAS/ACCESS Interface to ODBC enables you to access various kinds of DBMS data, including AS/400 data and Microsoft SQL Server data. You can no longer access these databases directly; instead, you use a new conversion procedure, PROC CV2ODBC, which is described in *SAS/ACCESS Software for Relational Databases: Reference (ODBC Chapter)*. This procedure enables you to convert Version 6 view descriptors (SAS/ACCESS to AS/400 or SAS/ACCESS to SQL Server) and PROC SQL views (that are based on Pass-Through code) to Version 7 or Version 8 PROC SQL views. This new procedure is provided for upward compatibility. See your ODBC chapter for more information about the CV2ODBC procedure.

Oracle Rdb Support:

The SAS/ACCESS LIBNAME and data set options are not supported under the Oracle Rdb interface.

SYBASE

V8 For Version 8, the SAS/ACCESS interface to SYBASE is no longer supported in the OS/2 operating environment. It continues to be supported in other operating environments. The software vendor has ceased SYBASE support under OS/2.

Some RDBMS products have changed their names since the previous release:

DB2 for UNIX (AIX) and DB2 for OS/2

are now both supported in the SAS/ACCESS Interface to DB2 Under UNIX and PC Hosts. You can use previous aliases to access the data, or you can use the alias DBMS=DB2.

DEC Rdb

is now Oracle Rdb. You use the same alias to access your database data (DBMS=RDB).

INGRES

is now CA-OpenIngres. You use the same alias to access your database data (for example, DBMS=INGRES).

Note: Information about Δ

Sample Data in This Book

This book uses two sets of tables to show you how to use SAS/ACCESS software, as described in “DBMS Tables (Textile Data)” on page 217 and “DBMS Tables (Airline Data)” on page 225. One set of tables was created for a fictitious international textile manufacturer. The second set of tables was created for a fictitious international airline. All the data in the tables is fictitious.

The tables are designed to show how the SAS/ACCESS interface treats data that is stored in relational DBMS tables. They are not meant as examples for you to follow in designing tables for any purpose.

The following list describes the files that contain examples and data that are used in this book. These files are packaged with your SAS software; see your site administrator for details.

GENSQL.SAS

contains the PROC SQL code that creates the RDBMS tables used in the Version 7 and later examples. These tables contain the international airline data.

GENDBL.SAS

contains the SAS code that creates the RDBMS tables for the Version 6 compatibility examples. These tables contain the international textile manufacturer data.

GENSAMP.SAS

contains the SAS code used in the examples chapters.

DBMACS.SAS

contains macros that enable any SAS/ACCESS interface to a relational DBMS to create the database connection statements that are used by the DBLOAD procedure in the GENDBL.SAS and GENSAMP.SAS files.

DBPTMACS.SAS

contains macros that enable any SAS/ACCESS interface to a relational database to create the database connection statements that are used by the SQL Procedure Pass-Through Facility in the GENDBL.SAS and GENSAMP.SAS files.

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

Copyright © 1999 by SAS Institute Inc., Cary, NC, USA.

ISBN 1-58025-558-2

All rights reserved. Produced in the United States of America. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, or otherwise, without the prior written permission of the publisher, SAS Institute Inc.

U.S. Government Restricted Rights Notice. Use, duplication, or disclosure of the software and related documentation by the U.S. government is subject to the Agreement with SAS Institute and the restrictions set forth in FAR 52.227-19 Commercial Computer Software-Restricted Rights (June 1987).

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

1st printing, October 1999

SAS® and all other SAS Institute Inc. product or service names are registered trademarks or trademarks of SAS Institute Inc. in the USA and other countries.® indicates USA registration.

Other brand and product names are registered trademarks or trademarks of their respective companies.

The Institute is a private company devoted to the support and further development of its software and related services.