

**Covers Paradox  
Version 4**

# Paradox 4

*the*  
**COMPLETE REFERENCE**

**CAROLE BOGGS MATTHEWS  
and PATRICIA SHEPARD**

**A COMPREHENSIVE DESKTOP RESOURCE – IDEAL FOR EVERY PARADOX USER**

# **Paradox 4: The Complete Reference**

Carole Boggs Matthews  
and  
Patricia Shepard

**Osborne McGraw-Hill**

Berkeley New York St. Louis San Francisco  
Auckland Bogotá Hamburg London Madrid  
Mexico City Milan Montreal New Delhi Panama City  
Paris São Paulo Singapore Sydney  
Tokyo Toronto

**This book is dedicated to Marty Matthews and Dick Shepard for their  
encouragement and support on those dark days before the dawn.**

**Osborne McGraw-Hill**  
2600 Tenth Street  
Berkeley, California 94710  
U.S.A.

For information on translations and book distributors outside of the U.S.A., write  
to Osborne **McGraw-Hill** at the above address.

#### **Paradox 4: The Complete Reference**

Copyright © 1993 by Martin S. Matthews and Carol Boggs Matthews. All rights reserved. Printed in the United States of America. Except as permitted under the Copyright Act of 1976, no part of this publication may be reproduced or distributed in any form or by any means, or stored in a database or retrieval system, without the prior written permission of the publisher, with the exception that the program listings may be entered, stored, and executed in a computer system, but they may not be reproduced for publication.

1234567890 DOC 99876543

ISBN 0-07-881794-3

Information has been obtained by Osborne **McGraw-Hill** from sources believed to be reliable. However, because of the possibility of human or mechanical error by our sources, Osborne **McGraw-Hill**, or others, Osborne **McGraw-Hill** does not guarantee the accuracy, adequacy, or completeness of any information and is not responsible for any errors or omissions or the results obtained from use of such information.

# Acknowledgments

As with any book, many people contribute to creating a quality product. There are several people who deserve to be recognized for their parts in producing *Paradox 4: The Complete Reference*.

Ed Hartmann, owner of Database Consulting Services, contributed much to the programming content of the book. He wrote Chapter 13, "Summary of PAL Functions and Commands," and contributed much to Chapter 15, "Using Paradox SQL Link." Ed's technical expertise in these areas is greatly appreciated as well as his responsiveness to our tight deadlines. Karen Quick, Systems Engineer at Novell, Inc., supported Ed during his work on the Paradox SQL Link by providing access to the Novell SQL database server. P. T. Ong, software engineer and expert in SQL, provided technical editing of the chapter. Their contributions are greatly appreciated.

From Borland, Nan Borreson, Manager of Publishing Relations, and Administrative Assistant, Karen Giles, helped by responding to our continuous needs for information, beta copies, and documentation. They were very helpful and responsive—so very important when trying to write a book under deadlines.

From Borland, Technical Editor, Rick Elliott, performed the technical review of the book and kept us honest by verifying the accuracy of the book. His efforts are greatly appreciated.

Robin Rowe, of Rowe Software, soon to be a new neighbor in Washington, also gave valuable feedback on the book.

The excellent team from Osborne **McGraw-Hill** responsible for producing the book deserves a hearty round of applause. They pushed forward with good humor and expertise, supporting us in our efforts to write a quality book. A very big thanks to Bill Pollock, Acquisitions Editor; Vicki Van Ausdall, Associate Editor; Judith Brown, Project Editor; and Ann Spivack, Copy Editor, and all the others on the team.

# Introduction

Paradox 4 is a comprehensive database management system developed by Borland International. It is said to be a paradox in database systems, since it combines full database power with ease of use. This provides you with a tool to increase productivity and make better decisions in your business or profession.

## About This Book

If you have purchased Paradox 4 or are contemplating buying it to use in your business, *Paradox 4: The Complete Reference* is for you. As a reference book, it can help you learn how to use the features of Paradox 4 to solve business problems, it can serve as a quick learning tool, or simply as a reminder for how to perform a function. *Paradox 4: The Complete Reference* will help you whether you're a new user of Paradox or a somewhat experienced user who now wants to develop more advanced skills or get some new ideas on how to apply the program. If you are new to Version 4, *Paradox 4: The Complete Reference* can help you get oriented quickly to the new features.

Instructions in the book are generally presented with a step-by-step technique, explaining not only what you should do, but also why, and what the implications of each procedure are. Icons (see "Conventions" below) mark tips, notes, and cautionary tidbits, which are scattered throughout the book to emphasize certain subjects. Shortcut keys and mouse actions, also marked with icons, are identified when appropriate, so that you can learn how to accomplish a task the most convenient or quickest way. As you work with the examples, you will be able to compare the screens on your monitor with reproductions of the screen throughout the book, so that you will always be firmly anchored in the program.

*Paradox 4: The Complete Reference* supplements Borland's own documentation, by continuing where that documentation leaves off. Whereas the Borland documenta-

tion presents you with several manuals covering each of the major parts of Paradox, *Paradox 4: The Complete Reference* consolidates this information into one comprehensive reference book. *Paradox 4: The Complete Reference* covers Paradox thoroughly and efficiently by presenting what you need to know to use the product effectively in one easy-to-use book.

## How This Book Is Organized

The organization of *Paradox 4: The Complete Reference* provides both flexibility and ease of use in learning the program. The book is primarily organized by operation or task, for example, creating a table or printing a report. Then, indexes organized by command name, like Chapter 13 on PAL commands and Appendix D on Paradox commands, supplement this task-oriented organization. You can find what you need by finding either the command name or the operation you want to accomplish.

The book is divided into six parts. Part I, "The Paradox Environment," introduces databases and Paradox 4. If you are new to Paradox, you will want to read these chapters; if you are an experienced user of Paradox, you still will find it worthwhile scanning these chapters since they provide an overview of Paradox's environment, and also a grounding in terminology and concepts that are used in the rest of the book.

Chapter 1, "Introducing Paradox," defines databases and then describes Paradox features, first from a generic viewpoint and then from the viewpoint of the particular capabilities of Paradox 4. It discusses the concepts of relational databases in order to put the product in perspective with other packages. (Relational databases are discussed further in Chapter 3.)

Chapter 1 also describes the basic elements of the Paradox 4 environment. It includes a detailed description of the menus and screens and how Paradox 4 uses the keyboard. Submenus, error messages, and prompts are discussed. Common database terminology, such as columns, rows, fields, and queries, are explained, as are Paradox-specific terms such as tables, forms, images, scripts, and objects.

Chapter 2, "Database Basics," provides a reference for all the housekeeping and basic functions that must be performed in a computer environment. Such activities as using Help, bringing up Paradox and exiting, setting up directories, working with disk files, naming objects, and backing up are discussed. This chapter also covers renaming, copying, and deleting files.

Chapters 3, 4, and 5 comprise Part II, "Creating and Modifying," which describes how a database is created and maintained. Chapter 3, "Creating and Editing a Database," describes how to design and then create a database—that is, one or more tables. Defining columns or fields and field types is covered, as are alternate ways to view the table structure. Then the basics of entering data into the table are discussed. (Chapter 4 also describes how to edit data in a table using the Editor.) Chapter 3 also

covers moving the cursor, adding information to a record, inserting and deleting records, undoing editing changes, and using the field editor to change data.

The Paradox Editor, which has been expanded to include text editing in Version 4, is covered in Chapter 4, "Using the Editor." Using the Editor to enter or change Memo fields (a new addition to Version 4) or any text file is discussed. Primarily, however, the Editor is used to create and edit PAL scripts, which are discussed in Chapter 12.

Chapter 5, "Modifying the Database," discusses how to add a new table or change the table structure (restructure) in a database. Adding or deleting a field to or from an existing table, changing the field type, or renaming a field are described. In addition, the chapter addresses how to sort data in a single field and then in multiple fields. Finally, creating and using secondary indexes is covered here.

Chapters 6, 7, 8, and 9 make up Part III, "Querying and Reporting." Chapter 6, "Querying a Database," describes querying a single table versus querying more than one table, which includes such tasks as selecting fields, specifying a sort order, and entering the query criteria. Key fields used to link data in more than one table are described. Also included are calculating values, querying a group of records, defining and querying a set of records, and applying inclusive links to display all records in linked tables. Chapter 6 also covers saving and retrieving queries.

In Chapter 7, "Creating and Using Forms," you learn how to use a standard or preferred form to enter, edit, or view data, as well as how to use a custom form for one or multiple tables. Designing the custom form, creating it for one or more tables, merging forms for multiple tables, and then using the form to enter, edit, and view information are covered. When dealing with multiple tables, master tables and linked detail tables are discussed.

Using the standard free-form or tabular report format is described in Chapter 8, "Creating and Using Reports." In a discussion of custom reports, you learn how to add page or report headers, insert and delete fields from the report, change the page layout, group and summarize data, and combine multiple tables in a report. Creating form letters and mailing labels are also described.

Chapter 9, "Working with the Image Menu and Graphs," covers how to alter the information displayed on the screen and how to create lines and markers graphs, bar graphs, pie charts, plus seven other types of graphs.

Part IV, "Scripts and Programming," consists of chapters 10 through 13. Chapter 10, "Creating and Using Scripts," addresses how to create scripts (PAL programs or macros) by recording frequently used keystrokes and then saving and using them. The chapter covers how to create a script without knowing PAL. Chapter 10 also includes how to execute a script repeatedly, how to edit a script, and how to save it.

In Chapter 11, "Using the Application Workshop," you learn how to install the Workshop and then how to use it to create an application. This includes selecting tables to be used in the application, creating and editing application menus and submenus, defining menu commands and actions, and changing a menu or action.

Chapter 12, "Using PAL," assumes you have some programming experience in the discussion of the PAL programming language. It describes some of the newer, more complex commands available in Version 4, such as SHOWPULLDOWN and



GETEVENT. The chapter covers how to use such facilities of PAL as the PAL menu and the PAL Debugger. Concepts and basic features of the language are discussed, such as event driven programming, new pull-down menus and dialog box commands, and the PAL layered environment. You also learn how to enter commands and expressions, and how to use variables, arrays, and dynamic arrays.

Each PAL command, its syntax, a short description, an example when needed, and helpful hints about the command are listed in Chapter 13, "Summary of PAL Functions and Commands." Particularly useful is a list of the commands by category, which is at the end of the chapter. If you are not sure which command to use, you can look it up by category, for example, Financial, Input/Output, or Date and Time.

In Part V, "Tools and Networking," Chapter 14, "Using Paradox Tools," describes the comprehensive Tools menu and its options, QuerySpeed, ExportImport, Info, Net, and More. The chapter describes how to enter passwords, establish access with Lock and PreventLock, provide protection of a network, export and import files, plus other features. (The Tools options to rename, copy and delete tables, forms, reports, scripts, and graphs are covered in Chapter 2.)

Chapter 15, "Using Paradox SQL Link," describes how to use the Paradox SQL Link to connect to one or more SQL database servers. It defines SQL (Structured Query Language) and then describes how to install an SQL link, connect to a server, query a remote table, and create and use a remote table. Paradox's unique SQL commands are summarized in the chapter.

Part VI, "Appendixes," includes Appendix A, "Installing Paradox," Appendix B, "Customizing Paradox," Appendix C, "ASCII and Extended ASCII Character Sets," and Appendix D, "Command Index." Particularly useful is the Paradox command index in Appendix D. It is a table of Paradox menu paths with a cross-reference to where the path is discussed in the book.

Finally, you will find a pull-out command card at the back of the book with all of the shortcut keys and key combinations that can be used in each mode in Paradox.

## Equipment You Will Need

To run Paradox 4, you must have at least 2MB of RAM. Although more memory is not required, additional extended memory provides benefits in performance.

A hard disk is required, and you need 5MB of disk space to install Paradox 4 without the optional programs, or 5.5MB with the optional software. You also need to maintain free disk space of about three times the size of the largest table you will be using. Paradox uses the space to create several temporary tables when you are working with the program, particularly during queries.

You will need a monitor with an adapter, and to display graphics, you need a CGA, EGA, VGA, 8514, 3270, ATT, TandyT1000, or Hercules monitor with adapter.

You will make best use of Paradox 4 with a mouse. Paradox supports any mouse compatible with Microsoft's or Logitech's bus or serial mice, or IBM's PS/2 mouse.



## Conventions

*Paradox 4: The Complete Reference* uses several conventions designed to make the book easier for you to use. These are as follows:

- **Bold** type is used when you are instructed to type text from the keyboard.
- Keys on the keyboard that are commands are presented in small capital letters; for example, RIGHT ARROW and ENTER.
- When you are expected to enter a command, you will be told to press the key(s). If you are to enter text or date, you will be told to type.
- Menu paths are indicated by menu option names separated by slashes, such as **T**ools/**M**ore/**D**irectory.
- Some Menu options contain a boldface letter, for example, Scripts. This indicates that the S is a *hot key*, and that pressing it will invoke the menu as if you selected the menu option with the mouse or keyboard.
- Icons mark paragraphs that emphasize tips, notes, cautions, shortcut keys, and mouse actions, for example:



*This icon advises you about how to use shortcut keys to accomplish a task without using the system of menus and submenus.*



*This icon advises you about how to use your mouse to accomplish a task without using the menus and submenus.*



*This icon advises the reader about a useful tip*



*This icon advises the reader about notes which emphasizes information or expands on it.*



*This icon warns the user about potentially harmful actions.*

# Contents

Acknowledgments	vii
Introduction	viii

---

## Part I

### The Paradox Environment

---

<b>1</b>	
<b>Introducing Paradox</b>	<b>3</b>
Database Concepts	4
Elements of a Paradox Database	9
Paradox 4's Screens and Menus	15
Features of Paradox 4	18
Paradox Main Menu Options	19
<b>2</b>	
<b>Database Basics</b>	<b>31</b>
Bringing Up Paradox 4	31
Leaving Paradox	32
Canceling an Action or Closing a Window	32
Working with Directories	33

Working with Files	39
Backing Up Data	55
Saving Files to Disk	55
Using Help	56
About the Paradox Option	60
Working with Windows	60

---

## Part II

### Creating and Modifying

---

<b>3</b>	
<b>Creating and Editing a Database</b>	<b>69</b>
Designing a Database	69
Creating a Table	72
Entering Data	80
Using the Edit Command to Enter New Data	90
Editing Data	92

---

## **4**

---

### **Using the Editor 105**

Creating a New File in the Text Editor	105
Closing a File	111
Opening a Text File	111
Working with Editor Windows	111
Editing Text	112
Entering and Editing Text in a Memo Field	125

---

## **5**

---

### **Modifying the Database 131**

Restructuring Tables	131
Restructuring Tables on a Network	138
Sorting Data	138
Adding a Secondary Index	144
Changing the Format for a Field	149

---

## **Part III**

### **Querying and Reporting**

---

---

## **6**

---

### **Querying a Database 155**

Operators Used in Query Forms	156
Querying a Single Table	159
Saving the Answer Table	173
Querying Multiple Tables	175
Using Calculations	185
Using Query Operations	187
Grouping Records	193
Sets of Records	199
Using Scripts/QuerySave	203
Using the MultiEntry Command	204
Using Queries on a Network	207

---

## **7**

---

### **Creating and Using Forms 209**

Using the Standard Form	210
Designing a Custom Form for a Single Table	211
Designing Multitable Forms	228

Using Multitable Forms	237
Using Forms on a Network	241

---

## **8**

---

### **Creating and Using Reports 243**

Using InstantReport	243
Report Designer	244
Designing Tabular Reports Based on a Single Table	250
Using the Report Previewer	283
Ending a Report Design Session	285
Printing the Report	286
Changing the Report Design	290
Designing Tabular Reports Based on Multiple Tables	290
Designing Free-Form Reports	299
Working with Reports on a Network	308

---

## **9**

---

### **Working with the Image Menu and Graphs 309**

Using the Image Menu	309
Working with Graphs	319
Planning Custom Graphs	330
Using the Graph Designer with Modify	338
Using the Other Graph Options	354
Working with Graphs on a Network	357

---

## **Part IV**

### **Scripts and Programming**

---

---

## **10**

---

### **Creating and Using Scripts 361**

Recording a Script	361
Scripts Menu Options Available While Recording	364
Playing the Script	365

Using Instant Script	366
Handling Script Errors	368
Editing a Script	369
Using ShowPlay	371
Using QuerySave	372
Using RepeatPlay	373
Planning Scripts	375
Using Scripts with Graphs	376
Creating an Init Script	379
Scripts on a Network	379

## 11

### Using the Application Workshop 383

Planning for an Application	384
Starting the Application Workshop	386
Creating the Menu Structure	393
Defining and Assigning Action Objects	401
Creating Paradox Objects in the Workshop	442
Changing the Application	447
Testing the Application	450
Finishing the Application	451
Running the Application	452
Using Tools to Manage the Application	453
Using the Documentation Menu	457

## 12

### Using PAL 463

Introducing PAL	463
PAL Building Blocks	465
Essential Programming Tasks	480
The Paradox User Interface	516
Attributes Available for Windows	543
Style Canvas Attribute	545

## 13

### Summary of PAL Functions and Commands 549

PAL Functions and Commands	550
Functions and Commands by Category	659

## Part V Tools and Networking

## 14

### Using Paradox Tools 671

Using QuerySpeed	671
Using ExportImport	672
Using the Info Option	677
Using Net	684
Using More	690

## 15

### Using Paradox SQL Link 705

Client-Server Architecture	705
Structured Query Language	706
Installing SQL Link	708
Starting Paradox With or Without SQL	710
Selecting a Server Connection	710
Working with Remote Tables	713
Using Tools/SQL	718
Using Tools/More	725
Using the SQL Command Editor	727
Using SQL Setup	735
Using Paradox SQL Commands	748

## Part VI Appendixes

## A

### Installing Paradox 4 769

System Requirements	769
Installing Paradox 4 on a Stand-alone Unit	771
Installing Paradox 4 on a Network	775

Printing the Readme Document	777
Running Paradox 4	777
Installing the Application Workshop	778

## **B** \_\_\_\_\_

<b>Customizing Paradox</b>	<b>781</b>
Starting CCP	781
Displaying Machine Information	783
Changing the Video and Color Settings	785
Changing Reports	793
Changing Graphs	797
Changing Standard Settings	802
Changing Data Formats	804

Changing Network Features	805
Changing PAL Features	807
Changing ASCII Settings	808

## **C** \_\_\_\_\_

<b>ASCII and Extended ASCII Character Sets</b>	<b>811</b>
--	------------

## **D** \_\_\_\_\_

<b>Command Index</b>	<b>815</b>
----------------------	------------

<b>Index</b>	<b>828</b>
--------------	------------

# *Part I*

## **The Paradox Environment**





# Chapter 1

## Introducing Paradox

The name "Paradox" is a tribute to the modern trend in database development. Database software has always been thought to be *either* easy to use and limited in capability, *or* comprehensive in capability and therefore hard to use. Paradox is both easy to use and comprehensive in capability—a *paradox* in database software.

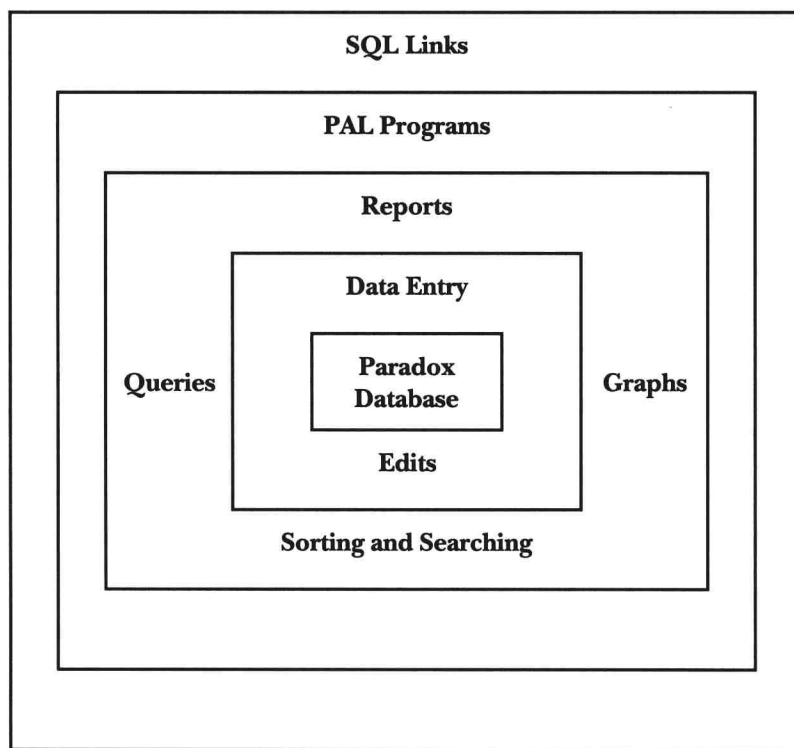
Database programs vary greatly in capability and capacity. On the one extreme are mainframe computer databases that require complete staffs to manage and use them; on the other are limited database programs that allow simple uses, such as name and address listings, that one person would use, perhaps for addressing Christmas cards or tracking golf teams. Paradox is much more than a limited, single-use database. It offers many of the features of a larger and more sophisticated database on a mainframe, but without the staff requirements. In many ways the large mainframe and microcomputer databases are approaching each other in capabilities. When you consider the availability of remote database systems to a Paradox user, through the Paradox SQL Link, for instance, the transition from micro to mainframe is really made.

This chapter explains the concepts of databases and some of their more common features, including searching and sorting, editing, and reporting. Then the chapter explains the basic elements of the Paradox environment, such as screens and menus, working with multiple tables, and using the mouse. In addition to common database terminology, specific terms unique to Paradox are covered. Some of the new features in Paradox 4 are described. Finally, the chapter gives a brief overview of each of the Main menu options.

## Database Concepts

A database program's job is to help organize lists and files of items. Almost any list or table of data, such as lists of names, inventory items, accounting data, customer or vendor information, and so on, can be entered into a database. Information is placed into a database so that it can be quickly and easily retrieved and arranged. Once you have entered data into a database, you can rearrange and report on it as needed to see or analyze the desired data.

Most database programs offer organizational possibilities that are unavailable with nonautomated files. As Figure 1-1 illustrates, Paradox is centered around a database itself, called a *table* in Paradox. The most basic functions to Paradox, or any database, are data entry and editing—to enter data and then correct or modify it until you can trust it to give you the information you need. The next layer of functions involves retrieving information—the prime reason for having a database in the first place.



**Figure 1-1.** Paradox functions are centered around the core of the system, the database