Contents

Figures, Tables, and Listings xv About This Book Preface xxiii Format of a Typical Chapter xxiv Conventions Used in This Book xxv Special Fonts xxv Types of Notes xxv Assembly-Language Information xxvi The Development Environment xxvi Introduction to Interapplication Communication Chapter 1 1-1 1-3 **Overview of Interapplication Communication** Sharing Data Among Applications 1-6 Sending and Responding to Apple Events 1-9 Standard Apple Events 1 - 10Handling Apple Events 1-12 Supporting AppleScript and Other Scripting Languages 1-13 Scriptable Applications 1-16 **Recordable Applications** 1-18 Applications That Manipulate and Execute Scripts 1-19 Exchanging Message Blocks 1-22 Chapter 2 Edition Manager 2-1 Introduction to Publishers, Subscribers, and Editions 2-4 About the Edition Manager 2 - 122-12 Using the Edition Manager Receiving Apple Events From the Edition Manager 2 - 13Creating the Section Record and Alias Record 2 - 15Saving a Document Containing Sections 2 - 192-22 **Opening and Closing a Document Containing Sections** Reading and Writing a Section 2 - 24Formats in an Edition 2-24 2-26 **Opening an Edition** Format Marks 2-27 Reading and Writing Edition Data 2-27 Closing an Edition 2 - 28

Creating a Publisher 2-29
Creating the Edition Container 2-32
Opening an Edition Container to Write Data 2-35
Creating a Subscriber 2-37
Opening an Edition Container to Read Data 2-41
Choosing Which Edition Format to Read 2-41
Using Publisher and Subscriber Options 2-43
Publishing a New Edition While Saving or Manually 2-47
Subscribing to an Edition Automatically or Manually 2-48
Canceling Sections Within Documents 2-48
Locating a Publisher Through a Subscriber 2-49
Renaming a Document Containing Sections 2-50
Displaying Publisher and Subscriber Borders 2-50 Text Borders 2-54
Spreadsheet Borders 2-55 Object-Oriented Graphics Borders 2-56
Bitmapped Graphics Borders 2-57
Duplicating Publishers and Subscribers 2-58
Modifying a Subscriber 2-59
Relocating an Edition 2-60
Customizing Dialog Boxes 2-60
Subscribing to Non-Edition Files 2-62
Getting the Current Edition Opener 2-63
Setting an Edition Opener 2-63
Calling an Edition Opener 2-64
Opening and Closing Editions 2-68
Listing Files That Can Be Subscribed To 2-68
Reading From and Writing to Files 2-68
Calling a Format I/O Function 2-68
Edition Manager Reference 2-71
Data Structures 2-71
The Edition Container Record 2-71
The Section Record 2-72
Edition Manager Routines 2-73
Initializing the Edition Manager 2-74
Creating and Registering a Section 2-74
Creating and Deleting an Edition Container 2-79
Setting and Getting a Format Mark 2-81
Reading in Edition Data 2-83
Writing out Edition Data 2-86
Closing an Edition After Reading or Writing 2-88
Displaying Dialog Boxes 2-90
Locating a Publisher and Edition From a Subscriber 2-98
Edition Container Formats 2-101
Edition Container Formats 2-101 Reading and Writing Non-Edition Files 2-102
Edition Container Formats 2-101 Reading and Writing Non-Edition Files 2-102 Application-Defined Routines 2-105

Summary of the Edition Manager 2-106 2-106 Pascal Summary Constants 2-106 Data Types 2-108 **Edition Manager Routines** 2-111 Application-Defined Routines 2-113 C Summary 2-114 Constants 2-114 Data Types 2-116 Edition Manager Routines 2-119 Application-Defined Routines 2-122 **Result Codes** 2-122

Chapter 3

Introduction to Apple Events 3-1

About Apple Events 3-3
Apple Events and Apple Event Objects 3-6
Apple Event Attributes and Parameters 3-7
Apple Event Attributes 3-8
Apple Event Parameters 3-9
Interpreting Apple Event Attributes and Parameters 3-10
Data Structures Within Apple Events 3-12
Descriptor Records 3-12
Keyword-Specified Descriptor Records 3-15
Descriptor Lists 3-16
Responding to Apple Events 3-20
Accepting and Processing Apple Events 3-20
About Apple Event Handlers 3-23
Extracting and Checking Data 3-23
Interacting With the User 3-25
Performing the Requested Action and Returning a Result 3-25
Creating and Sending Apple Events 3-28
Creating an Apple Event Record 3-29
Adding Apple Event Attributes and Parameters 3-29
Sending an Apple Event and Handling the Reply 3-30
Working With Object Specifier Records 3-32
Data Structures Within an Object Specifier Record 3-34
The Classification of Apple Event Objects 3-39
Object Classes 3-39
Properties and Elements 3-42
Finding Apple Event Objects 3-46
About the Apple Event Manager 3-48
Supporting Apple Events as a Server Application 3-48
Supporting Apple Events as a Client Application 3-49
Supporting Apple Event Objects 3-49
Supporting Apple Event Recording 3-50

Handling Apple Events 4-4
Accepting an Apple Event 4-5
Installing Entries in the Apple Event Dispatch Tables 4-7
Installing Entries for the Required Apple Events 4-8
Installing Entries for Apple Events Sent by the Edition Manager 4-9
How Apple Event Dispatching Works 4-9
Handling the Required Apple Events 4-11
Required Apple Events 4-11
Handling the Open Application Event 4-14
Handling the Open Documents Event 4-15
Handling the Print Documents Event 4-17
Handling the Quit Application Event 4-19
Handling Apple Events Sent by the Edition Manager 4-20
The Section Read, Section Write, and Section Scroll Events 4-21
Handling the Create Publisher Event 4-22
Getting Data Out of an Apple Event 4-25
Getting Data Out of an Apple Event Parameter 4-26
Getting Data Out of an Attribute 4-28
Getting Data Out of a Descriptor List 4-31
Writing Apple Event Handlers 4-33
Replying to an Apple Event 4-36
Disposing of Apple Event Data Structures 4-39
Writing and Installing Coercion Handlers 4-41
Interacting With the User 4-45
Setting the Client Application's User Interaction Preferences 4-46
Setting the Server Application's User Interaction Preferences 4-48
Requesting User Interaction 4-49
Reference to Responding to Apple Events 4-56
Data Structures Used by the Apple Event Manager 4-56
Descriptor Records and Related Data Structures 4-56
Apple Event Array Data Types 4-60
Routines for Responding to Apple Events 4-61
Creating and Managing the Apple Event Dispatch Tables 4-61
Dispatching Apple Events 4-66
Getting Data or Descriptor Records Out of Apple Event Parameters and
Attributes 4-68
Counting the Items in Descriptor Lists 4-74
Getting Items From Descriptor Lists 4-74
Getting Data and Keyword-Specified Descriptor Records Out of AE
Records 4-78
Requesting User Interaction 4-81
Requesting More Time to Respond to Apple Events 4-84
Suspending and Resuming Apple Event Handling 4-85
Getting the Sizes and Descriptor Types of Descriptor Records 4-89
Deleting Descriptor Records 4-92

Deallocating Memory for Descriptor Records 4-93 4-94 **Coercing Descriptor Types** Creating and Managing the Coercion Handler Dispatch Tables 4-96 4-99 Creating and Managing the Special Handler Dispatch Tables Getting Information About the Apple Event Manager 4-103 **Application-Defined Routines** 4-104 Summary of Responding to Apple Events 4-108 Pascal Summary 4-108 Constants 4-108 Data Types 4-112 Routines for Responding to Apple Events 4-114 **Application-Defined Routines** 4-118 4-118 C Summary Constants 4-118 4-123 Data Types Routines for Responding to Apple Events 4-124 **Application-Defined Routines** 4-128 Assembly-Language Summary 4-128 4-128 Trap Macros Result Codes 4-129

Chapter 5

Creating and Sending Apple Events 5-1

Creating an Apple Event 5-3
Adding Parameters to an Apple Event 5-5
Specifying Optional Parameters for an Apple Event 5-7
Specifying a Target Address 5-10
Creating an Address Descriptor Record 5-11
Addressing an Apple Event for Direct Dispatching 5-13
Sending an Apple Event 5-13
Dealing With Timeouts 5-21
Writing an Idle Function 5-22
Writing a Reply Filter Function 5-24
Reference to Creating and Sending Apple Events 5-25
Routines for Creating and Sending Apple Events 5-25
Creating Apple Events 5-26
Creating and Duplicating Descriptor Records 5-27
Creating Descriptor Lists and AE Records 5-29
Adding Items to Descriptor Lists 5-30
Adding Data and Descriptor Records to AE Records 5-33
Adding Data and Descriptor Records to AE Records5-33Adding Parameters and Attributes to Apple Events5-34

Summary of Creating and Sending Apple Events 5-45	,
Pascal Summary 5-45	
Constants 5-45	
Data Types 5-49	
Routines for Creating and Sending Apple Events	5-51
Application-Defined Routines 5-52	
C Summary 5-52	
Constants 5-52	
Data Types 5-57	
Routines for Creating and Sending Apple Events	5-58
Application-Defined Routines 5-60	
Assembly-Language Summary 5-60	
Trap Macros 5-60	
Result Codes 5-61	

Chapter 6 Resolving and Creating Object Specifier Records 6-1

Resolving Object Specifier Records 6-4 Descriptor Records Used in Object Specifier Records 6-8 **Object Class** 6-9 Container 6-9 Key Form 6-11 6-12 Key Data Key Data for a Property ID 6-13 Key Data for an Object's Name 6-14 Key Data for a Unique ID 6-14 Key Data for Absolute Position 6-14 Key Data for Relative Position 6-15 Key Data for a Test 6-15 Key Data for a Range 6-20 Installing Entries in the Object Accessor Dispatch Tables 6-21 6-23 Installing Object Accessor Functions That Find Apple Event Objects Installing Object Accessor Functions That Find Properties 6-27 Writing Object Accessor Functions 6-28 Writing Object Accessor Functions That Find Apple Event Objects 6-29 Writing Object Accessor Functions That Find Properties 6-37 **Defining Tokens** 6-39 Handling Whose Tests 6-41 Writing Object Callback Functions 6-45 Writing an Object-Counting Function 6-48 Writing an Object-Comparison Function 6-50 Writing Marking Callback Functions 6-53 **Creating Object Specifier Records** 6-55 Creating a Simple Object Specifier Record 6-57 Specifying the Container Hierarchy 6-61

Specifying a Property 6-63 Specifying a Relative Position 6-64 Creating a Complex Object Specifier Record 6-64 Specifying a Test 6-64 6-72 Specifying a Range Reference to Resolving and Creating Object Specifier Records 6-75 Data Structures Used in Object Specifier Records 6-75 Routines for Resolving and Creating Object Specifier Records 6-77 Initializing the Object Support Library 6-77 Setting Object Accessor Functions and Object Callback Functions 6-77 Getting, Calling, and Removing Object Accessor Functions 6-81 **Resolving Object Specifier Records** 6-85 **Deallocating Memory for Tokens** 6-87 **Creating Object Specifier Records** 6-88 6-94 **Application-Defined Routines Object Accessor Functions** 6-94 6-96 **Object Callback Functions** Summary of Resolving and Creating Object Specifier Records 6-104 Pascal Summary 6-104 Constants 6-104 6-106 Data Types Routines for Resolving and Creating Object Specifier Records 6-106 **Application-Defined Routines** 6-108 6-109 C Summary Constants 6-109 Data Types 6-111 Routines for Resolving and Creating Object Specifier Records 6-112 **Application-Defined Routines** 6-114 6-115 Assembly-Language Summary Trap Macros 6-115 **Result Codes** 6-115

Chapter 7

Introduction to Scripting 7-1

About Scripts and Scripting Components 7-4	
Script Editors and Script Files 7-6	
Scripting Components and Scriptable Applications 7-8	
Scripting Components and Applications That Execute Scripts	7-11
Making Your Application Scriptable 7-14	
About Apple Event Terminology Resources 7-15	
How AppleScript Uses Terminology Information 7-17	
Dynamic Loading of Terminology Information 7-20	
Making Your Application Recordable 7-20	
Manipulating and Executing Scripts 7-22	
Compiling, Saving, Modifying, and Executing Scripts 7-24	
Using a Script Context to Handle an Apple Event 7-25	

Chapter 8	Apple Event Terminology Resources 8-1
	Defining Terminology for Use by the AppleScript Component8-3Structure of Apple Event Terminology Resources8-8Creating an Apple Event Terminology Extension Resource8-13Supporting Standard Suites Without Extensions8-14Extending the Standard Suites8-16Supporting Subsets of Suites8-23Supporting New Suites8-23Handling the Get AETE Event8-23Reference to Apple Event Terminology Resources8-26Header Data for an Apple Event Terminology Resource8-27Suite Data for an Apple Event Terminology Resource8-27Suite Data8-36Comparison Operator Data8-42Enumeration and Enumerator Data8-43The Scripting Size Resource8-45
Chapter 9	Recording Apple Events 9-1
	About Recordable Applications 9-3 Factoring Your Application for Recording 9-6 Factoring the Quit Command and the New Command 9-6 Sending Apple Events Without Executing Them 9-12 What to Record 9-14 Recording User Actions 9-15 Recording the Selection of Text Objects 9-18 Recording Insertion Points 9-23 Recording Typing 9-27 Recording the Selection of Nontext Objects 9-30 Identifying Objects 9-32 Moving the Selection During Recording 9-34 Recording Interactions With Dialog Boxes 9-35 How Apple Event Recording Works 9-35
Chapter 10	Scripting Components 10-1
	Connecting to a Scripting Component10-3Using Scripting Component Routines10-7Compiling and Executing Source Data10-7Saving Script Data10-12Storage Formats for Script Data10-12Resource and File Types for Script Data10-13

Loading and Executing Script Data 10 - 14Modifying and Recompiling a Compiled Script 10-17 Using a Script Context to Handle an Apple Event 10-19 Supplying a Resume Dispatch Function 10-21 Supplying an Alternative Active Function 10-23 Supplying Alternative Create and Send Functions 10-24 Alternative Create Functions 10-24 Alternative Send Functions 10-25 **Recording Scripts** 10-26 Writing a Scripting Component 10-27 Scripting Components Reference 10-28 Data Structures 10-29 **Required Scripting Component Routines** 10 - 30Saving and Loading Script Data 10-30 **Executing and Disposing of Scripts** 10-33 Setting and Getting Script Information 10-41 Manipulating the Active Function 10-45 **Optional Scripting Component Routines** 10-46 **Compiling Scripts** 10-47 Getting Source Data 10-51**Coercing Script Values** 10-52 Manipulating the Create and Send Functions 10-55 **Recording Scripts** 10-59**Executing Scripts in One Step** 10-61 Manipulating Dialects 10-67 Using Script Contexts to Handle Apple Events 10-71 AppleScript Component Routines 10-80 Initializing AppleScript 10-80 Getting and Setting Styles for Source Data 10-82 10-84 Generic Scripting Component Routines Getting and Setting the Default Scripting Component 10-86 10-87 Using Component-Specific Routines Routines Used by Scripting Components 10-92 Manipulating Trailers for Generic Storage Descriptor Records 10-92 10-94 **Application-Defined Routines** 10-99 Summary of Scripting Components Pascal Summary 10-99 Constants 10-99 Data Types 10-105 **Required Scripting Component Routines** 10-106 **Optional Scripting Component Routines** 10-107 AppleScript Component Routines 10-110 Generic Scripting Component Routines 10-110 Routines Used by Scripting Components 10-111 Application-Defined Routines 10-111

C Summary	10-112		
Constants	10-112		
Data Types	10-118		
Required Scri	pting Component	Routines	10-119
Optional Scri	pting Component	Routines	10-120
AppleScript C	Component Routin	nes 10-1	23
Generic Scrip	ting Component I	Routines	10-123
Routines Use	d by Scripting Cor	mponents	10-124
Application-I	Defined Routines	10-124	
Result Codes	10-125		

Chapter 11

Program-to-Program Communications Toolbox 11-1

About the PPC Toolbox 11-4	
Ports, Sessions, and Message Blocks 11-4	
Setting Up Authenticated Sessions 11-6	
Using the PPC Toolbox 11-10	
PPC Toolbox Calling Conventions 11-14	
Specifying Port Names and Location Names 11-17	
Opening a Port 11-20	
Browsing for Ports Using the Program Linking Dialog Box	11-22
Obtaining a List of Available Ports 11-27	
Preparing for a Session 11-29	
Initiating a PPC Session 11-29	
Receiving Session Requests 11-35	
Accepting or Rejecting Session Requests 11-37	
Exchanging Data During a PPC Session 11-39	
Reading Data From an Application 11-40	
Sending Data to an Application 11-42	
Ending a Session and Closing a Port 11-43	
Invalidating Users 11-44	
PPC Toolbox Reference 11-46	
Data Structures 11-46	
The PPC Toolbox Parameter Block 11-46	
The PPC Port Record 11-49	
The Location Name Record 11-50	
The Port Information Record 11-51	
PPC Toolbox Routines 11-51	
Initializing the PPC Toolbox 11-52	
Using the Program Linking Dialog Box 11-52	
Obtaining a List of Ports 11-55	
Opening and Closing a Port 11-57	
Starting and Ending a Session 11-60	
Receiving, Accepting, and Rejecting a Session 11-67	
Reading and Writing Data 11-72	
Locating a Default User and Invalidating a User 11-76	

Application-Defined Routines 11-78 Completion Routines for PPC Toolbox Routines 11-78 Port Filter Functions 11-79 Summary of the PPC Toolbox 11-81 Pascal Summary 11-81 Constants 11-81 Data Types 11-82 PPC Toolbox Routines 11-88 **Application-Defined Routines** 11-89 C Summary 11-90 Constants 11-90 Data Types 11-91 PPC Toolbox Routines 11-96 **Application-Defined Routines** 11-97 Assembly-Language Summary 11-97 Trap Macros 11-97 **Result Codes** 11-98

Chapter 12

Data Access Manager 12-1

The High-Level Interface 12-7 Sending a Query Through the High-Level Interface 12-8 Retrieving Data Through the High-Level Interface 12-9 The Low-Level Interface 12-9 Sending a Query Through the Low-Level Interface 12-10 Retrieving Data Through the Low-Level Interface 12-11 Comparison of the High-Level and Low-Level Interfaces 12-11 Using the Data Access Manager 12-12 Executing Routines Asynchronously 12-12 General Guidelines for the User Interface 12-13
Retrieving Data Through the High-Level Interface 12-9 The Low-Level Interface 12-9 Sending a Query Through the Low-Level Interface 12-10 Retrieving Data Through the Low-Level Interface 12-11 Comparison of the High-Level and Low-Level Interfaces 12-11 Using the Data Access Manager 12-12 Executing Routines Asynchronously 12-12
The Low-Level Interface 12-9 Sending a Query Through the Low-Level Interface 12-10 Retrieving Data Through the Low-Level Interface 12-11 Comparison of the High-Level and Low-Level Interfaces 12-11 Using the Data Access Manager 12-12 Executing Routines Asynchronously 12-12
Sending a Query Through the Low-Level Interface 12-10 Retrieving Data Through the Low-Level Interface 12-11 Comparison of the High-Level and Low-Level Interfaces 12-11 Using the Data Access Manager 12-12 Executing Routines Asynchronously 12-12
Retrieving Data Through the Low-Level Interface 12-11 Comparison of the High-Level and Low-Level Interfaces 12-11 Using the Data Access Manager 12-12 Executing Routines Asynchronously 12-12
Comparison of the High-Level and Low-Level Interfaces 12-11 Using the Data Access Manager 12-12 Executing Routines Asynchronously 12-12
Using the Data Access Manager 12-12 Executing Routines Asynchronously 12-12
Executing Routines Asynchronously 12-12
°
Constal Cuidalings for the User Interface 12.12
Keep the User in Control 12-13
Provide Feedback to the User 12-13
Using the High-Level Interface 12-14
Writing a Status Routine for High-Level Functions 12-22
Using the Low-Level Interface 12-28
Getting Information About Sessions in Progress 12-36
Processing Query Results 12-37
Getting Query Results 12-37
Converting Query Results to Text 12-43
Creating a Query Document 12-47
User Interface Guidelines for Query Documents 12-47
Contents of a Query Document 12-49
Query Records and Query Resources 12-52
Writing a Query Definition Function 12-52

Data Access Manager Reference 12-55 12-55 Data Structures The Asynchronous Parameter Block 12-56 The Query Record 12-57 The Results Record 12-59 Data Access Manager Routines 12-60 Initializing the Data Access Manager 12-61 High-Level Interface: Handling Query Documents 12-62 High-Level Interface: Handling Query Results 12-66 Low-Level Interface: Controlling the Session 12-69 12-77 Low-Level Interface: Sending and Executing Queries Low-Level Interface: Retrieving Results 12-83 Installing and Removing Result Handlers 12-87 **Application-Defined Routines** 12-90 Resources 12-91 The Query Resource 12-91 The Query String Resource 12-92 The Query Definition Function Resource 12-93 Summary of the Data Access Manager 12-94 Pascal Summary 12-94 12-94 Constants Data Types 12-95 Data Access Manager Routines 12-97 12-99 **Application-Defined Routines** C Summary 12-99 Constants 12-99 12-101 Data Types Data Access Manager Routines 12-102 **Application-Defined Routines** 12-104 Assembly-Language Summary 12-104 Trap Macros 12-104 **Result Codes** 12-105

Glossary GL-1

Index IN-1