

TABLE OF CONTENTS

PREFACE

xv

1. INTRODUCTION

1.1 Introduction to Objects	1-1
1.1.1 Object	1-2
1.1.2 Message	1-3
1.1.3 Method.....	1-3
1.1.4 Selector.....	1-3
1.1.5 Class.....	1-3
1.1.6 Instance	1-4
1.2 Storage of Data in Objects	1-4
1.2.1 Class Variables and Instance Variables	1-4
1.2.2 Properties	1-5
1.3 Metaclasses	1-6
1.4 Introduction to Inheritance.....	1-6
1.4.1 Single Superclasses	1-7
1.4.2 Multiple Superclasses.....	1-8
1.5 Introduction to Access-Oriented Programming: Using Active Values	1-9
1.6 Introduction to the LOOPS User Interface	1-10
1.6.1 SEdit	1-10
1.6.2 Inspector	1-10
1.6.3 Masterscope	1-10
1.6.4 File Manager.....	1-11
1.6.5 Grapher Module.....	1-11

TABLE OF CONTENTS

2. INSTANCES

2.1 Instance Naming Conventions	2-1
2.2 Creating Instances	2-4
2.3 Data Storage in Instances at Creation Time	2-8
2.4 Changing the Number of Instance Variables in an Instance	2-10
2.5 Moving Variables.....	2-13
2.6 Destroying Instances.....	2-15
2.7 Methods Concerning the Class of an Object.....	2-16
2.8 Copying Instances.....	2-19
2.9 Querying Structure of Instances.....	2-21
2.10 Other Instance Items.....	2-24

3. CLASSES

3.1 Creating Classes.....	3-1
3.1.1 Function Calling and Message Sending	3-2
3.1.2 Dynamic Mixins.....	3-4
3.2 Destroying Classes	3-5
3.3 Inheritance	3-7
3.4 Editing Classes	3-10
3.5 Modifying Classes	3-11
3.6 Methods for Manipulating Class Names	3-16
3.7 Querying the Structure of a Class	3-17
3.8 Copying Classes and Their Contents.....	3-23
3.9 Enumerating Instances of Classes.....	3-24
3.10 Dealing with Inheritance.....	3-27

4. METACLASSES

4.1 Specific Metaclasses.....	4-1
4.1.1 Metaclass Class.....	4-1

4.1.2 Metaclass Metaclass	4-2
4.1.3 Metaclass AbstractClass	4-2
4.1.4 Metaclass DestroyedClass	4-2
4.2 Pseudoclasses	4-2
4.3 Defining New Metaclasses	4-5
4.4 Tofu	4-6

5. ACCESSING DATA

5.1 Generalized Get and Put Functions	5-1
5.2 Accessing Data in Instances	5-4
5.2.1 Compact Accessing Forms.....	5-10
5.2.2 Support for Changetrans	5-13
5.3 Accessing Data in Classes.....	5-13
5.3.1 Metaclasses and Property Access.....	5-13
5.3.2 Class Variable Access	5-16
5.3.3 Instance Variable Access	5-19

6. METHODS

6.1 Categories.....	6-1
6.2 Structure of Method Functions	6-3
6.3 Creating, Editing, and Destroying Methods.....	6-4
6.4 Escaping from Message Syntax.....	6-6
6.5 Movement between Classes	6-8
6.5.1 Movement of Methods	6-8
6.5.2 Stack Method Macros	6-10

7. MESSAGE SENDING FORMS

TABLE OF CONTENTS

8. ACTIVE VALUES

8.1 Using Active Values	8-2
8.2 Specializations of the Class ActiveValue	8-2
8.2.1 IndirectVariable	8-3
8.2.2 LocalStateActiveValue	8-6
8.2.2.1 ExplicitFnActiveValue	8-8
8.2.2.2 NoUpdatePermittedAV	8-9
8.2.2.3 LispWindowAV	8-10
8.2.2.4 Breaking and Tracing Active Values	8-10
8.2.2.5 AppendSuperValue	8-11
8.2.2.6 FirstFetchAV	8-12
8.2.3 InheritingAV	8-14
8.2.4 ReplaceMeAV	8-15
8.2.5 NotSetValue	8-15
8.2.5.1 NestedNotSetValue	8-16
8.2.6 User Specializations of Active Values	8-16
8.3 Active Value Methods	8-16
8.3.1 Adding and Deleting Active Values	8-17
8.3.2 Fetching and Replacing Wrapped Values	8-19
8.3.3 Get and Put Functions Bypassing the ActiveValue Mechanism	8-22
8.3.4 Shared Active Values in Variable Inheritance	8-22
8.3.5 Creating Your Own Active Values	8-23
8.4 Annotated Values	8-24
8.4.1 Explicit Control over Annotated Values	8-25
8.4.2 Saving and Restoring Annotated Values	8-26
8.5 Active Values in Class Structures	8-27

9. DATA TYPE PREDICATES AND ITERATIVE OPERATORS

9.1 Data Type Predicates.....	9-1
9.2 Iterative Operators	9-3

10. BROWSERS

10.1 Types of Built-in Browsers	10-1
10.1.1 Lattice Browsers	10-2
10.1.2 Class Browsers.....	10-2
10.1.3 File Browsers	10-2
10.1.4 Supers Browsers	10-2
10.1.5 Metaclass Browsers.....	10-2
10.1.6 Instance Browsers	10-3
10.2 Opening Browsers.....	10-3
10.2.1 Using Menu Options to Open Browsers	10-3
10.2.1.1 Overview of Background Menu and LOOPS Icon.....	10-3
10.2.1.2 Command Summary	10-4
10.2.2 Using Commands to Open Browsers	10-5
10.3 Using Class Browsers, Meta Browsers, and Supers Browsers.....	10-7
10.3.1 Selecting Options in the Title Bar Menu	10-8
10.3.1.1 Recompute and its Suboptions	10-8
10.3.1.2 AddRoot and its Suboptions	10-10
10.3.1.3 Add Category Menu	10-10
10.3.2 Selecting Options in the Left Menu	10-11
10.3.2.1 PrintSummary and its Suboptions.....	10-12
10.3.2.2 Doc (ClassDoc) and its Suboptions	10-13
10.3.2.3 Wherels and its Suboptions	10-14
10.3.2.4 DeleteFromBrowser and its Suboptions	10-16
10.3.2.5 SubBrowser	10-16
10.3.2.6 TypeInName	10-16
10.3.2.7 Extending Functionality with the Left Mouse Button	10-16
10.3.3 Selecting Options in the Middle Menu	10-17

TABLE OF CONTENTS

10.3.3.1 Box/UnBoxNode	10-17
10.3.3.2 Methods (EditMethod) and its Suboptions	10-18
10.3.3.3 Add (AddMethod) and its Suboptions	10-20
10.3.3.4 Delete (DeleteMethod) and its Suboptions	10-21
10.3.3.5 Move (MoveMethodTo) and its Suboptions	10-22
10.3.3.6 Copy (CopyMethodTo) and its Suboptions	10-23
10.3.3.7 Rename (RenameMethod) and its Suboptions	10-23
10.3.3.8 Edit (EditClass) and its Suboptions.....	10-24
10.4 Using File Browsers	10-24
10.4.1 Selecting Options in the Title Bar Menu	10-25
10.4.1.1 Recompute and its Suboptions	10-25
10.4.1.2 AddRoot and its Suboptions	10-25
10.4.1.3 Add Category Menu	10-25
10.4.1.4 Change display mode and its Suboptions.....	10-25
10.4.1.5 Uses IV? and its Suboptions.....	10-26
10.4.1.6 Edit FileComs and its Suboptions	10-28
10.4.1.7 CLEANUP file and its Suboptions.....	10-30
10.4.2 Selecting Options in the Left Menu	10-30
10.4.2.1 PrintSummary and its Suboptions.....	10-30
10.4.2.2 Doc (ClassDoc) and its Suboptions	10-30
10.4.2.3 Wherels (WherelsMethod) and its Suboptions	10-30
10.4.2.4 DeleteFromBrowser and its Suboptions	10-31
10.4.2.5 SubBrowser	10-31
10.4.2.6 TypeInName	10-31
10.4.2.7 AddSubs and its Suboptions.....	10-31
10.4.3 Selecting Options in the Middle Menu	10-31
10.4.3.1 BoxNode	10-32
10.4.3.2 Methods (EditMethod) and its Suboptions	10-32
10.4.3.3 Add (AddMethod) and its Suboptions	10-32
10.4.3.4 Delete (DeleteMethod) and its Suboptions	10-32
10.4.3.5 Move (MoveMethodTo) and its Suboptions	10-32
10.4.3.6 Copy (CopyMethodTo) and its Suboptions	10-32
10.4.3.7 Rename (RenameMethod) and its Suboptions.....	10-32
10.4.3.8 Edit (EditClass) and its Suboptions.....	10-32

10.4.3.9 UsesIV and its Suboptions.....	10-33
10.5 Programmer's Interface to Lattice Browsers	10-33
10.5.1 Instance Variables for the Class LatticeBrowser	10-33
10.5.2 Class Variables for the Class LatticeBrowser.....	10-34
10.5.3 Methods for the Class LatticeBrowser	10-35
10.6 Instance Browsers.....	10-50
10.6.1 Instance Variables for the Class InstanceBrowser	10-50
10.6.2 Methods for the Class InstanceBrowser	10-50
10.6.3 Selecting Options in the Title Bar Menu	10-51
10.6.4 Selecting Options in the Left Menu	10-51
10.6.5 Selecting Options in the Middle Menu	10-52
10.7 Automatic Updates of Class Browsers.....	10-52
 <hr/>	
11. ERRORS AND BREAKS	
11.1 Error Handling Functions and Methods.....	11-1
11.2 Error Messages.....	11-5
11.1.1 Classes and Instances.....	11-6
11.1.2 Methods and Messages.....	11-7
11.1.3 Naming Objects	11-8
11.1.4 Annotated and Active Values.....	11-9
11.1.5 Miscellaneous	11-9
 <hr/>	
12. BREAKING AND TRACING	
12.1 Breaking and Tracing Methods	12-1
12.2 Breaking and Tracing Data	12-3
 <hr/>	
13. EDITING	
13.1 Editing Classes	13-1

TABLE OF CONTENTS

13.2 Editing Instances.....	13-5
-----------------------------	------

14. FILE MANAGER

14.1 Manipulating Files	14-1
14.2 Loading Files.....	14-2
14.3 LOOPS File Manager Commands	14-3
14.4 Saving LOOPS Objects on Files	14-6
14.5 Storing Files	14-10
14.6 Compiling Files.....	14-12

15. PERFORMANCE ISSUES

15.1 Garbage Collection	15-1
15.2 Instance Variable Access.....	15-1
15.3 Method Lookup	15-3
15.4 Cache Clearing	15-3

16. PROCESSES

17. READING AND PRINTING

17.1 Reading Objects	17-1
17.2 Print Flags	17-2
17.3 Printing Classes	17-4
17.4 Printing Objects	17-8
17.5 Printing Active Values	17-11
17.6 Printing Methods	17-12
17.7 Unique Identifiers (UIDs)	17-14

18. USER INPUT/OUTPUT MODULES

18.1 Inspector	18-1
18.1.1 Overview of the User Interface	18-1
18.1.2 Using Instance Inspectors	18-2
18.1.2.1 Titles of Instance Inspector Windows	18-2
18.1.2.2 Menu for the Title Bar	18-3
18.1.2.3 Menu for the Left Column	18-4
18.1.2.4 Menu for the Right Column	18-6
18.1.3 Using Class Inspectors	18-7
18.1.3.1 Titles of Class Inspector Windows	18-7
18.1.3.2 Menu for the Title Bar	18-8
18.1.3.3 Menu for the Left Column	18-8
18.1.3.4 Menu for the Right Column	18-8
18.1.4 Using Class IVs Inspectors	18-9
18.1.4.1 Titles of Class IVs Inspector Windows	18-9
18.1.4.2 Menu for the Title Bar	18-9
18.1.4.3 Menu for the Left Column	18-10
18.1.4.4 Menu for the Right Column	18-10
18.1.5 Functional Interface for Instance Inspectors	18-11
18.1.6 Customizing the Inspector	18-15
18.2 Extensions to ?=	18-16
18.2.1 Message Sending	18-16
18.2.2 Record Creation	18-17

19. WINDOWS

19.1 The Class Window	19-1
19.2 Basic Window Methods	19-2
19.3 Prompt Windows	19-9
19.4 Mouse and Menu Functionality	19-14

TABLE OF CONTENTS

19.4.1 Menu Item Structure	19-17
19.4.2 Caching Menus.....	19-18
19.5 Subclasses of a Window	19-18
19.6 Lisp Windows	19-22

20. SYSTEM VARIABLES AND FUNCTIONS

INDEX	INDEX-1
-------------	---------

GLOSSARY	GLOSSARY-1
----------------	------------