

# 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 Xerox 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



---

## 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
--------------------------	-----

## TABLE OF CONTENTS

---

4.1.1 The Metaclass Class	4-1
4.1.2 The Metaclass Metaclass	4-2
4.1.3 The Metaclass AbstractClass	4-2
4.1.4 The 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 Changetran	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

---

---

## 8. ACTIVE VALUES

---

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

## TABLE OF CONTENTS

---

### 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 WhereIs 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
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 WhereIs (WhereIsMethod) 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

## TABLE OF CONTENTS

---

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

## 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

## 12. BREAKING AND TRACING

---

12.1	Breaking and Tracing Methods	12-1
12.2	Breaking and Tracing Data	12-3



---

13. EDITING

---

13.1 Editing Classes	13-1
----------------------	------

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

---

14. FILE MANAGER

---

14.1 Manipulating Files	14-1
-------------------------	------

14.2 Loading Files	14-2
--------------------	------

14.3 Xerox LOOPS File Manager Commands	14-3
--	------

14.4 Saving Xerox 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
-----------------------------	-------

## TABLE OF CONTENTS

---

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
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
----------	------------

---