

Contents

1	Introduction: Principles and Concepts	1
1.1	Exploration: The Mission	1
1.2	Trustworthy Software: The Prime Directive	3
1.3	Concepts for Programming with R	4
1.4	The R System and the S Language	9
2	Using R	11
2.1	Starting R	11
2.2	An Interactive Session	13
2.3	The Language	19
2.4	Objects and Names	24
2.5	Functions and Packages	25
2.6	Getting R	29
2.7	Online Information About R	31
2.8	What’s Hard About Using R?	34
3	Programming with R: The Basics	37
3.1	From Commands to Functions	37
3.2	Functions and Functional Programming	43
3.3	Function Objects and Function Calls	50
3.4	The Language	58
3.5	Debugging	61
3.6	Interactive Tracing and Editing	67
3.7	Conditions: Errors and Warnings	74
3.8	Testing R Software	76
4	R Packages	79
4.1	Introduction: Why Write a Package?	79
4.2	The Package Concept and Tools	80

4.3	Creating a Package	85
4.4	Documentation for Packages	95
4.5	Testing Packages	101
4.6	Package Namespaces	103
4.7	Including C Software in Packages	108
4.8	Interfaces to Other Software	108
5	Objects	111
5.1	Objects, Names, and References	111
5.2	Replacement Expressions	115
5.3	Environments	119
5.4	Non-local Assignments; Closures	125
5.5	Connections	131
5.6	Reading and Writing Objects and Data	135
6	Basic Data and Computations	139
6.1	The Evolution of Data in the S Language	140
6.2	Object Types	141
6.3	Vectors and Vector Structures	143
6.4	Vectorizing Computations	157
6.5	Statistical Data: Data Frames	166
6.6	Operators: Arithmetic, Comparison, Logic	184
6.7	Computations on Numeric Data	191
6.8	Matrices and Matrix Computations	200
6.9	Fitting Statistical models	218
6.10	Programming Random Simulations	221
7	Data Visualization and Graphics	237
7.1	Using Graphics in R	238
7.2	The x-y Plot	242
7.3	The Common Graphics Model	253
7.4	The <code>graphics</code> Package	263
7.5	The <code>grid</code> Package	271
7.6	Trellis Graphics and the <code>lattice</code> Package	280
8	Computing with Text	289
8.1	Text Computations for Data Analysis	289
8.2	Importing Text Data	294
8.3	Regular Expressions	298
8.4	Text Computations in R	304

8.5	Using and Writing Perl	309
8.6	Examples of Text Computations	318
9	New Classes	331
9.1	Introduction: Why Classes?	331
9.2	Programming with New Classes	334
9.3	Inheritance and Inter-class Relations	344
9.4	Virtual Classes	351
9.5	Creating and Validating Objects	359
9.6	Programming with S3 Classes	362
9.7	Example: Binary Trees	369
9.8	Example: Data Frames	375
10	Methods and Generic Functions	381
10.1	Introduction: Why Methods?	381
10.2	Method Definitions	384
10.3	New Methods for Old Functions	387
10.4	Programming Techniques for Methods	389
10.5	Generic Functions	396
10.6	How Method Selection Works	405
11	Interfaces I: C and Fortran	411
11.1	Interfaces to C and Fortran	411
11.2	Calling R-Independent Subroutines	415
11.3	Calling R-Dependent Subroutines	420
11.4	Computations in C++	425
11.5	Loading and Registering Compiled Routines	426
12	Interfaces II: Other Systems	429
12.1	Choosing an Interface	430
12.2	Text- and File-Based Interfaces	432
12.3	Functional Interfaces	433
12.4	Object-Based Interfaces	435
12.5	Interfaces to OOP Languages	437
12.6	Interfaces to C++	440
12.7	Interfaces to Databases and Spreadsheets	446
12.8	Interfaces without R	450

13 How R Works	453
13.1 The R Program	453
13.2 The R Evaluator	454
13.3 Calls to R Functions	460
13.4 Calls to Primitive Functions	463
13.5 Assignments and Replacements	465
13.6 The Language	468
13.7 Memory Management for R Objects	471
A Some Notes on the History of S	475
Bibliography	479
Index	481
Index of R Functions and Documentation	489
Index of R Classes and Types	497



<http://www.springer.com/978-0-387-75935-7>

Software for Data Analysis
Programming with R
Chambers, J.
2008, XIV, 500 p., Hardcover
ISBN: 978-0-387-75935-7