

PYTHON

IN A NUTSHELL

Second Edition

Alex Martelli

O'REILLY®

Beijing • Cambridge • Farnham • Köln • Sebastopol • Taipei • Tokyo

Table of Contents

Preface	ix
---------------	----

Part I. Getting Started with Python

1. Introduction to Python	3
The Python Language	3
The Python Standard Library and Extension Modules	5
Python Implementations	5
Python Development and Versions	8
Python Resources	9
2. Installation	14
Installing Python from Source Code	14
Installing Python from Binaries	18
Installing Jython	20
Installing IronPython	21
3. The Python Interpreter	22
The python Program	22
Python Development Environments	26
Running Python Programs	28
The jython Interpreter	29
The IronPython Interpreter	30

Part II. Core Python Language and Built-ins

4. The Python Language	33
Lexical Structure	33
Data Types	38
Variables and Other References	46
Expressions and Operators	50
Numeric Operations	52
Sequence Operations	53
Set Operations	58
Dictionary Operations	59
The print Statement	61
Control Flow Statements	62
Functions	70
5. Object-Oriented Python	81
Classes and Instances	82
Special Methods	104
Decorators	115
Metaclasses	116
6. Exceptions	121
The try Statement	121
Exception Propagation	126
The raise Statement	128
Exception Objects	129
Custom Exception Classes	132
Error-Checking Strategies	134
7. Modules	139
Module Objects	139
Module Loading	144
Packages	149
The Distribution Utilities (distutils)	150
8. Core Built-ins	153
Built-in Types	154
Built-in Functions	158
The sys Module	168
The copy Module	172
The collections Module	173

The functional Module	175
The bisect Module	176
The heapq Module	177
The UserDict Module	178
The optparse Module	179
The itertools Module	183
9. Strings and Regular Expressions	186
Methods of String Objects	186
The string Module	191
String Formatting	193
The pprint Module	197
The repr Module	198
Unicode	198
Regular Expressions and the re Module	201
<hr/>	
Part III. Python Library and Extension Modules	
10. File and Text Operations	215
Other Chapters That Also Deal with Files	215
Organization of This Chapter	215
File Objects	216
Auxiliary Modules for File I/O	224
The StringIO and cStringIO Modules	229
Compressed Files	230
The os Module	240
Filesystem Operations	241
Text Input and Output	256
Richer-Text I/O	258
Interactive Command Sessions	265
Internationalization	269
11. Persistence and Databases	277
Serialization	278
DBM Modules	285
Berkeley DB Interfacing	288
The Python Database API (DBAPI) 2.0	292

12. Time Operations	302
The time Module	302
The datetime Module	306
The pytz Module	313
The dateutil Module	313
The sched Module	316
The calendar Module	317
The mx.DateTime Module	319
13. Controlling Execution	328
Dynamic Execution and the exec Statement	328
Internal Types	331
Garbage Collection	332
Termination Functions	337
Site and User Customization	338
14. Threads and Processes	340
Threads in Python	341
The thread Module	341
The Queue Module	342
The threading Module	344
Threaded Program Architecture	350
Process Environment	353
Running Other Programs	354
The mmap Module	360
15. Numeric Processing	365
The math and cmath Modules	365
The operator Module	368
Random and Pseudorandom Numbers	370
The decimal Module	372
The gmpy Module	373
16. Array Processing	375
The array Module	375
Extensions for Numeric Array Computation	377
The Numeric Package	378
Array Objects	378
Universal Functions (ufuncs)	399
Auxiliary Numeric Modules	403

17. Tkinter GUIs	405
Tkinter Fundamentals	406
Widget Fundamentals	408
Commonly Used Simple Widgets	415
Container Widgets	420
Menus	423
The Text Widget	426
The Canvas Widget	436
Layout Management	442
Tkinter Events	446
18. Testing, Debugging, and Optimizing	451
Testing	452
Debugging	461
The warnings Module	471
Optimization	474

Part IV. Network and Web Programming

19. Client-Side Network Protocol Modules	493
URL Access	493
Email Protocols	503
The HTTP and FTP Protocols	506
Network News	511
Telnet	515
Distributed Computing	517
Other Protocols	519
20. Sockets and Server-Side Network Protocol Modules	520
The socket Module	521
The SocketServer Module	528
Event-Driven Socket Programs	533
21. CGI Scripting and Alternatives	545
CGI in Python	546
Cookies	553
Other Server-Side Approaches	557

22. MIME and Network Encodings	561
Encoding Binary Data as Text	561
MIME and Email Format Handling	564
23. Structured Text: HTML	575
The sgmllib Module	576
The htmlllib Module	580
The HTMLParser Module	583
The BeautifulSoup Extension	585
Generating HTML	586
24. Structured Text: XML	591
An Overview of XML Parsing	592
Parsing XML with SAX	593
Parsing XML with DOM	598
Changing and Generating XML	606

Part V. Extending and Embedding

25. Extending and Embedding Classic Python	613
Extending Python with Python's C API	614
Extending Python Without Python's C API	645
Embedding Python	647
Pyrex	650
26. Extending and Embedding Jython	655
Importing Java Packages in Jython	656
Embedding Jython in Java	659
Compiling Python into Java	662
27. Distributing Extensions and Programs	666
Python's distutils	666
py2exe	675
py2app	676
cx_Freeze	676
PyInstaller	676
Index	677