

The Definitive Guide to Django

Web Development Done Right



Adrian Holovaty and Jacob Kaplan-Moss

The Definitive Guide to Django: Web Development Done Right

Copyright © 2008 by Adrian Holovaty and Jacob Kaplan-Moss

All rights reserved. No part of this work may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying, recording, or by any information storage or retrieval system, without the prior written permission of the copyright owner and the publisher.

ISBN-13 (pbk): 978-1-59059-725-5

ISBN-10 (pbk): 1-59059-725-7

ISBN-13 (electronic): 978-1-4302-0331-5

ISBN-10 (electronic): 1-4302-0331-5

Printed and bound in the United States of America 9 8 7 6 5 4 3 2 1

Trademarked names may appear in this book. Rather than use a trademark symbol with every occurrence of a trademarked name, we use the names only in an editorial fashion and to the benefit of the trademark owner, with no intention of infringement of the trademark.

Lead Editor: Jason Gilmore

Technical Reviewer: Jeremy Dunck

Editorial Board: Steve Anglin, Ewan Buckingham, Tony Campbell, Gary Cornell, Jonathan Gennick, Jason Gilmore, Kevin Goff, Jonathan Hassell, Matthew Moodie, Joseph Ottinger, Jeffrey Pepper, Ben Renow-Clarke, Dominic Shakeshaft, Matt Wade, Tom Welsh

Project Manager | Production Director: Grace Wong

Copy Editor: Nicole Flores

Associate Production Director: Kari Brooks-Copony

Production Editor: Ellie Fountain

Composer and Artist: Kinetic Publishing Services, LLC

Proofreaders: Lori Bring and Christy Wagner

Indexer: Brenda Miller

Cover Designer: Kurt Krames

Manufacturing Director: Tom Debolski

Distributed to the book trade worldwide by Springer-Verlag New York, Inc., 233 Spring Street, 6th Floor, New York, NY 10013. Phone 1-800-SPRINGER, fax 201-348-4505, e-mail orders-ny@springer-sbm.com, or visit <http://www.springeronline.com>.

For information on translations, please contact Apress directly at 2855 Telegraph Avenue, Suite 600, Berkeley, CA 94705. Phone 510-549-5930, fax 510-549-5939, e-mail info@apress.com, or visit <http://www.apress.com>.

The information in this book is distributed on an “as is” basis, without warranty. Although every precaution has been taken in the preparation of this work, neither the author(s) nor Apress shall have any liability to any person or entity with respect to any loss or damage caused or alleged to be caused directly or indirectly by the information contained in this work.

The source code for this book is available to readers at <http://www.apress.com> and at <http://www.djangobook.com>.

Contents at a Glance

About the Authors	xxvii
About the Technical Reviewer	xxviii
Acknowledgments	xxix
Introduction	xxxi

PART 1 ■ ■ ■ Getting Started

■ CHAPTER 1	Introduction to Django	3
■ CHAPTER 2	Getting Started	11
■ CHAPTER 3	The Basics of Dynamic Web Pages	17
■ CHAPTER 4	The Django Template System	31
■ CHAPTER 5	Interacting with a Database: Models	59
■ CHAPTER 6	The Django Administration Site	83
■ CHAPTER 7	Form Processing	95
■ CHAPTER 8	Advanced Views and URLconfs	107

PART 2 ■ ■ ■ Django's Subframeworks

■ CHAPTER 9	Generic Views	125
■ CHAPTER 10	Extending the Template Engine	135
■ CHAPTER 11	Generating Non-HTML Content	157
■ CHAPTER 12	Sessions, Users, and Registration	175
■ CHAPTER 13	Caching	197
■ CHAPTER 14	Other Contributed Subframeworks	209
■ CHAPTER 15	Middleware	227
■ CHAPTER 16	Integrating with Legacy Databases and Applications	235
■ CHAPTER 17	Extending Django's Admin Interface	241
■ CHAPTER 18	Internationalization	251
■ CHAPTER 19	Security	265
■ CHAPTER 20	Deploying Django	275

PART 3 ■ ■ ■ Appendixes

■ APPENDIX A	Case Studies	297
■ APPENDIX B	Model Definition Reference	305
■ APPENDIX C	Database API Reference	333
■ APPENDIX D	Generic View Reference	359
■ APPENDIX E	Settings	379
■ APPENDIX F	Built-in Template Tags and Filters	395
■ APPENDIX G	The django-admin Utility	415
■ APPENDIX H	Request and Response Objects	425
■ INDEX	433

Contents

About the Authors	xxvii
About the Technical Reviewer	xxviii
Acknowledgments	xxix
Introduction	xxxii

PART 1 ■ ■ ■ Getting Started

■ CHAPTER 1	Introduction to Django	3
	What Is a Web Framework?	3
	The MVC Design Pattern	5
	Django's History	6
	How to Read This Book	7
	Required Programming Knowledge	8
	Required Python Knowledge	8
	New Django Features	8
	Getting Help	9
	What's Next?	9
■ CHAPTER 2	Getting Started	11
	Installing Python	11
	Installing Django	11
	Installing an Official Release	11
	Installing Django from Subversion	12
	Setting Up a Database	13
	Using Django with PostgreSQL	13
	Using Django with SQLite 3	14
	Using Django with MySQL	14
	Using Django Without a Database	14
	Starting a Project	14
	The Development Server	15
	What's Next?	16

CHAPTER 3	The Basics of Dynamic Web Pages	17
	Your First View: Dynamic Content	17
	Mapping URLs to Views	18
	How Django Processes a Request	21
	How Django Processes a Request: Complete Details	22
	URLconfs and Loose Coupling	23
	404 Errors	23
	Your Second View: Dynamic URLs	24
	A Word About Pretty URLs	25
	Wildcard URLpatterns	25
	Django's Pretty Error Pages	28
	What's Next?	30
CHAPTER 4	The Django Template System	31
	Template System Basics	31
	Using the Template System	33
	Creating Template Objects	33
	Rendering a Template	34
	Multiple Contexts, Same Template	36
	Context Variable Lookup	37
	Playing with Context Objects	40
	Basic Template Tags and Filters	40
	Tags	40
	Filters	46
	Philosophies and Limitations	47
	Using Templates in Views	48
	Template Loading	49
	render_to_response()	52
	The locals() Trick	53
	Subdirectories in get_template()	53
	The include Template Tag	54
	Template Inheritance	54
	What's Next?	58
CHAPTER 5	Interacting with a Database: Models	59
	The "Dumb" Way to Do Database Queries in Views	59
	The MTV Development Pattern	60
	Configuring the Database	62
	Your First App	64

Defining Models in Python	65
Your First Model	66
Installing the Model	68
Basic Data Access	71
Adding Model String Representations	72
Inserting and Updating Data	73
Selecting Objects	74
Filtering Data	75
Retrieving Single Objects	76
Ordering Data	76
Chaining Lookups	77
Slicing Data	78
Deleting Objects	78
Making Changes to a Database Schema	79
Adding Fields	79
Removing Fields	81
Removing Many-to-Many Fields	82
Removing Models	82
What's Next?	82
CHAPTER 6 The Django Administration Site	83
Activating the Admin Interface	83
Using the Admin Interface	85
Users, Groups, and Permissions	90
Customizing the Admin Interface	91
Customizing the Admin Interface's Look and Feel	93
Customizing the Admin Index Page	93
When and Why to Use the Admin Interface	94
What's Next?	94
CHAPTER 7 Form Processing	95
Search	95
The "Perfect Form"	98
Creating a Feedback Form	98
Processing the Submission	101
Custom Validation Rules	103
A Custom Look and Feel	103
Creating Forms from Models	105
What's Next?	106

CHAPTER 8	Advanced Views and URLconfs	107
	URLconf Tricks	107
	Streamlining Function Imports	107
	Using Multiple View Prefixes	109
	Special-Casing URLs in Debug Mode	109
	Using Named Groups	110
	Understanding the Matching/Grouping Algorithm	112
	Passing Extra Options to View Functions	112
	Using Default View Arguments	117
	Special-Casing Views	118
	Capturing Text in URLs	119
	Determining What the URLconf Searches Against	119
	Including Other URLconfs	120
	How Captured Parameters Work with include()	121
	How Extra URLconf Options Work with include()	121
	What's Next?	122

PART 2 ■ ■ ■ Django's Subframeworks

CHAPTER 9	Generic Views	125
	Using Generic Views	125
	Generic Views of Objects	127
	Extending Generic Views	128
	Making “Friendly” Template Contexts	128
	Adding Extra Context	129
	Viewing Subsets of Objects	130
	Complex Filtering with Wrapper Functions	131
	Performing Extra Work	131
	What's Next?	133
CHAPTER 10	Extending the Template Engine	135
	Template Language Review	135
	RequestContext and Context Processors	136
	django.core.context_processors.auth	140
	django.core.context_processors.debug	140
	django.core.context_processors.i18n	140
	django.core.context_processors.request	141
	Guidelines for Writing Your Own Context Processors	141

Inside Template Loading	141
Extending the Template System	142
Creating a Template Library	142
Writing Custom Template Filters	144
Writing Custom Template Tags	145
Shortcut for Simple Tags	150
Inclusion Tags	151
Writing Custom Template Loaders	152
Using the Built-in Template Reference	154
Configuring the Template System in Standalone Mode	154
What's Next?	155
CHAPTER 11 Generating Non-HTML Content	157
The Basics: Views and MIME Types	157
Producing CSV	158
Generating PDFs	159
Installing ReportLab	160
Writing Your View	160
Complex PDFs	161
Other Possibilities	162
The Syndication Feed Framework	162
Initialization	163
A Simple Feed	164
A More Complex Feed	165
Specifying the Type of Feed	167
Enclosures	167
Language	168
URLs	168
Publishing Atom and RSS Feeds in Tandem	168
The Sitemap Framework	169
Installation	169
Initialization	170
Sitemap Classes	170
Shortcuts	171
Creating a Sitemap Index	172
Pinging Google	173
What's Next?	174

CHAPTER 12 Sessions, Users, and Registration	175
Cookies	175
Getting and Setting Cookies	176
The Mixed Blessing of Cookies	177
Django's Session Framework	178
Enabling Sessions	178
Using Sessions in Views	179
Setting Test Cookies	180
Using Sessions Outside of Views	181
When Sessions Are Saved	181
Browser-Length Sessions vs. Persistent Sessions	182
Other Session Settings	182
Users and Authentication	183
Enabling Authentication Support	184
Using Users	184
Logging In and Out	186
Limiting Access to Logged-in Users	188
Limiting Access to Users Who Pass a Test	189
Managing Users, Permissions, and Groups	190
Using Authentication Data in Templates	193
The Other Bits: Permissions, Groups, Messages, and Profiles	193
Permissions	193
Groups	194
Messages	195
Profiles	196
What's Next?	196
CHAPTER 13 Caching	197
Setting Up the Cache	198
Memcached	198
Database Caching	199
Filesystem Caching	199
Local-Memory Caching	200
Simple Caching (for Development)	200
Dummy Caching (for Development)	200
CACHE_BACKEND Arguments	200
The Per-Site Cache	201
The Per-View Cache	202
Specifying Per-View Cache in the URLconf	203

The Low-Level Cache API	203
Upstream Caches	204
Using Vary Headers	205
Other Cache Headers	207
Other Optimizations	208
Order of MIDDLEWARE_CLASSES	208
What's Next?	208
CHAPTER 14 Other Contributed Subframeworks	209
The Django Standard Library	209
Sites	210
Scenario 1: Reusing Data on Multiple Sites	210
Scenario 2: Storing Your Site Name/Domain in One Place	211
How to Use the Sites Framework	211
The Sites Framework's Capabilities	212
CurrentSiteManager	215
How Django Uses the Sites Framework	216
Flatpages	216
Using Flatpages	217
Adding, Changing, and Deleting Flatpages	218
Using Flatpage Templates	219
Redirects	219
Using the Redirects Framework	220
Adding, Changing, and Deleting Redirects	220
CSRF Protection	221
A Simple CSRF Example	221
A More Complex CSRF Example	221
Preventing CSRF	222
Form Tools	223
django.contrib.formtools.preview	223
Using FormPreview	224
Humanizing Data	225
apnumber	225
intcomma	225
intword	225
ordinal	226
Markup Filters	226
What's Next?	226

CHAPTER 15	Middleware	227
	What's Middleware?	227
	Middleware Installation	228
	Middleware Methods	229
	Initializer: <code>__init__(self)</code>	229
	Request Preprocessor: <code>process_request(self, request)</code>	229
	View Preprocessor:	
	<code>process_view(self, request, view, args, kwargs)</code>	229
	Response Postprocessor:	
	<code>process_response(self, request, response)</code>	230
	Exception Postprocessor:	
	<code>process_exception(self, request, exception)</code>	230
	Built-in Middleware	230
	Authentication Support Middleware	231
	"Common" Middleware	231
	Compression Middleware	232
	Conditional GET Middleware	232
	Reverse Proxy Support (X-Forwarded-For Middleware)	232
	Session Support Middleware	232
	Sitewide Cache Middleware	233
	Transaction Middleware	233
	"X-View" Middleware	233
	What's Next?	233
CHAPTER 16	Integrating with Legacy Databases and Applications	235
	Integrating with a Legacy Database	235
	Using <code>inspectdb</code>	235
	Cleaning Up Generated Models	236
	Integrating with an Authentication System	237
	Specifying Authentication Back-Ends	237
	Writing an Authentication Back-End	237
	Integrating with Legacy Web Applications	239
	What's Next?	240

CHAPTER 17	Extending Django’s Admin Interface	241
	The Zen of Admin	242
	“Trusted users ...”	242
	“... editing ...”	242
	“... structured content”	243
	Full Stop	243
	Customizing Admin Templates	243
	Custom Model Templates	244
	Custom JavaScript	245
	Creating Custom Admin Views	246
	Overriding Built-in Views	249
	What’s Next?	249
CHAPTER 18	Internationalization	251
	Specifying Translation Strings in Python Code	252
	Standard Translation Functions	252
	Marking Strings As No-op	253
	Lazy Translation	253
	Pluralization	254
	Specifying Translation Strings in Template Code	254
	Creating Language Files	256
	Creating Message Files	256
	Compiling Message Files	258
	How Django Discovers Language Preference	258
	The set_language Redirect View	260
	Using Translations in Your Own Projects	261
	Translations and JavaScript	262
	The javascript_catalog View	262
	Using the JavaScript Translation Catalog	263
	Creating JavaScript Translation Catalogs	263
	Notes for Users Familiar with gettext	264
	What’s Next?	264
CHAPTER 19	Security	265
	The Theme of Web Security	265
	SQL Injection	266
	The Solution	266

Cross-Site Scripting	267
The Solution	268
Cross-Site Request Forgery	269
Session Forging/Hijacking	269
The Solution	270
Email Header Injection	271
The Solution	271
Directory Traversal	271
The Solution	272
Exposed Error Messages	273
The Solution	273
A Final Word on Security	273
What's Next?	273

CHAPTER 20 Deploying Django

Shared Nothing	276
A Note on Personal Preferences	278
Using Django with Apache and mod_python	278
Basic Configuration	279
Running Multiple Django Installations on the Same	
Apache Instance	280
Running a Development Server with mod_python	280
Serving Django and Media Files from the Same	
Apache Instance	281
Error Handling	281
Handling a Segmentation Fault	282
Using Django with FastCGI	282
FastCGI Overview	282
Running Your FastCGI Server	283
Using Django with Apache and FastCGI	284
FastCGI and lighttpd	285
Running Django on a Shared-Hosting Provider with Apache	287
Scaling	288
Running on a Single Server	288
Separating Out the Database Server	289
Running a Separate Media Server	289
Implementing Load Balancing and Redundancy	290
Going Big	292

Performance Tuning	293
There's No Such Thing As Too Much RAM	293
Turn Off Keep-Alive	293
Use Memcached	294
Use Memcached Often	294
Join the Conversation	294
What's Next?	294

PART 3 ■ ■ ■ **Appendixes**

■ APPENDIX A Case Studies	297
Cast of Characters	297
Why Django?	299
Getting Started	299
Porting Existing Code	300
How Did It Go?	300
Team Structure	302
Deployment	303
■ APPENDIX B Model Definition Reference	305
Fields	305
Field Name Restrictions	305
AutoField	306
BooleanField	306
CharField	306
CommaSeparatedIntegerField	306
DateField	306
DateTimeField	307
EmailField	307
FileField	307
FilePathField	308
FloatField	308
ImageField	309
IntegerField	309
IPAddressField	309
NullBooleanField	309
PhoneNumberField	309
PositiveIntegerField	309

PositiveSmallIntegerField	309
SlugField	309
SmallIntegerField	310
TextField	310
TimeField	310
URLField	310
USStateField	310
XMLField	310
Universal Field Options	310
null	310
blank	311
choices	311
db_column	312
db_index	312
default	312
editable	312
help_text	312
primary_key	312
radio_admin	312
unique	313
unique_for_date	313
unique_for_month	313
unique_for_year	313
verbose_name	313
Relationships	314
Many-to-One Relationships	314
Many-to-Many Relationships	316
Model Metadata Options	317
db_table	317
db_tablespace	318
get_latest_by	318
order_with_respect_to	318
ordering	318
permissions	319
unique_together	319
verbose_name	320
verbose_name_plural	320
Managers	320
Manager Names	320
Custom Managers	321

Model Methods	323
__str__	324
get_absolute_url	324
Executing Custom SQL	325
Overriding Default Model Methods	326
Admin Options	326
date_hierarchy	326
fields	327
js	328
list_display	328
list_display_links	330
list_filter	330
list_per_page	331
list_select_related	331
ordering	331
save_as	331
save_on_top	331
search_fields	332
APPENDIX C Database API Reference	333
Creating Objects	334
What Happens When You Save?	334
Autoincrementing Primary Keys	334
Saving Changes to Objects	335
Retrieving Objects	336
Caching and QuerySets	337
Filtering Objects	337
Chaining Filters	338
Limiting QuerySets	339
Query Methods That Return New QuerySets	339
QuerySet Methods That Do Not Return QuerySets	343
Field Lookups	346
exact	346
iexact	347
contains	347
icontains	347
gt, gte, lt, and lte	348
in	348
startswith	348

istartswith	348
endswith and iendwith	348
range	348
year, month, and day	349
isnull	349
search	349
The pk Lookup Shortcut	349
Complex Lookups with Q Objects	350
Related Objects	351
Lookups That Span Relationships	351
Foreign Key Relationships	352
“Reverse” Foreign Key Relationships	352
Many-to-Many Relationships	354
Queries over Related Objects	355
Deleting Objects	355
Extra Instance Methods	356
get_FOO_display()	356
get_next_by_FOO(**kwargs) and get_previous_by_FOO(**kwargs)	356
get_FOO_filename()	357
get_FOO_url()	357
get_FOO_size()	357
save_FOO_file(filename, raw_contents)	357
get_FOO_height() and get_FOO_width()	357
Shortcuts	357
get_object_or_404()	357
get_list_or_404()	358
Falling Back to Raw SQL	358
APPENDIX D Generic View Reference	359
Common Arguments to Generic Views	359
“Simple” Generic Views	360
Rendering a Template	360
Redirecting to Another URL	360
List/Detail Generic Views	361
Lists of Objects	361
Detail Views	363
Date-Based Generic Views	365
Archive Index	365
Year Archives	367

Month Archives	368
Week Archives	370
Day Archives	371
Archive for Today	372
Date-Based Detail Pages	373
Create/Update/Delete Generic Views	375
Create Object View	375
Update Object View	377
Delete Object View	378
APPENDIX E Settings	379
What's a Settings File?	379
Default Settings	380
Seeing Which Settings You've Changed	380
Using Settings in Python Code	380
Altering Settings at Runtime	380
Security	381
Creating Your Own Settings	381
Designating the Settings: DJANGO_SETTINGS_MODULE	381
The django-admin.py Utility	381
On the Server (mod_python)	382
Using Settings Without Setting DJANGO_SETTINGS_MODULE	382
Custom Default Settings	383
Either configure() or DJANGO_SETTINGS_MODULE Is Required	383
Available Settings	383
ABSOLUTE_URL_OVERRIDES	383
ADMIN_FOR	384
ADMIN_MEDIA_PREFIX	384
ADMINS	384
ALLOWED_INCLUDE_ROOTS	384
APPEND_SLASH	384
CACHE_BACKEND	385
CACHE_MIDDLEWARE_KEY_PREFIX	385
DATABASE_ENGINE	385
DATABASE_HOST	385
DATABASE_NAME	385
DATABASE_OPTIONS	385
DATABASE_PASSWORD	385
DATABASE_PORT	386

DATABASE_USER	386
DATE_FORMAT	386
DATETIME_FORMAT	386
DEBUG	386
DEFAULT_CHARSET	386
DEFAULT_CONTENT_TYPE	387
DEFAULT_FROM_EMAIL	387
DISALLOWED_USER_AGENTS	387
EMAIL_HOST	387
EMAIL_HOST_PASSWORD	387
EMAIL_HOST_USER	387
EMAIL_PORT	387
EMAIL_SUBJECT_PREFIX	388
FIXTURE_DIRS	388
IGNORABLE_404_ENDS	388
IGNORABLE_404_STARTS	388
INSTALLED_APPS	388
INTERNAL_IPS	388
JING_PATH	388
LANGUAGE_CODE	389
LANGUAGES	389
MANAGERS	389
MEDIA_ROOT	389
MEDIA_URL	390
MIDDLEWARE_CLASSES	390
MONTH_DAY_FORMAT	390
PREPEND_WWW	390
PROFANITIES_LIST	390
ROOT_URLCONF	390
SECRET_KEY	391
SEND_BROKEN_LINK_EMAILS	391
SERIALIZATION_MODULES	391
SERVER_EMAIL	391
SESSION_COOKIE_AGE	391
SESSION_COOKIE_DOMAIN	391
SESSION_COOKIE_NAME	391
SESSION_COOKIE_SECURE	392
SESSION_EXPIRE_AT_BROWSER_CLOSE	392
SESSION_SAVE_EVERY_REQUEST	392
SITE_ID	392
TEMPLATE_CONTEXT_PROCESSORS	392

TEMPLATE_DEBUG	392
TEMPLATE_DIRS	393
TEMPLATE_LOADERS	393
TEMPLATE_STRING_IF_INVALID	393
TEST_RUNNER	393
TEST_DATABASE_NAME	393
TIME_FORMAT	393
TIME_ZONE	393
URL_VALIDATOR_USER_AGENT	394
USE_ETAGS	394
USE_I18N	394
YEAR_MONTH_FORMAT	394
APPENDIX F Built-in Template Tags and Filters	395
Built-in Tag Reference	395
block	395
comment	395
cycle	395
debug	396
extends	396
filter	396
firstof	396
for	397
if	397
ifchanged	399
ifequal	399
ifnotequal	399
include	400
load	400
now	400
regroup	402
spaceless	403
ssi	403
templatetag	403
url	404
widthratio	404
Built-in Filter Reference	405
add	405
addslashes	405
capfirst	405

center	405
cut	405
date	406
default	406
default_if_none	406
dictsort	406
dictsortreversed	406
divisibleby	406
escape	407
filesizeformat	407
first	407
fix_ampersands	407
floatformat	407
get_digit	408
join	408
length	408
length_is	408
linebreaks	409
linebreaksbr	409
linenumbers	409
ljust	409
lower	409
make_list	409
phone2numeric	410
pluralize	410
pprint	410
random	410
removetags	410
rjust	411
slice	411
slugify	411
stringformat	411
striptags	411
time	411
timesince	412
timeuntil	412
title	412
truncatewords	412
truncatewords_html	412
unordered_list	413
upper	413

urlencode	413
urlize	413
urlizetrunc	414
wordcount	414
wordwrap	414
yesno	414
APPENDIX G The django-admin Utility	415
Usage	415
Available Actions	416
adminindex [appname appname ...]	416
createcachetable [tablename]	416
dbshell	416
diffsettings	416
dumpdata [appname appname ...]	417
flush	417
inspectdb	417
loaddata [fixture fixture ...]	417
reset [appname appname ...]	419
runfcgi [option]	419
runserver [optional port number, or ipaddr:port]	419
shell	420
sql [appname appname ...]	420
sqlall [appname appname ...]	420
sqlclear [appname appname ...]	420
sqlcustom [appname appname ...]	420
sqlindexes [appname appname ...]	420
sqlreset [appname appname ...]	420
sqlsequencereset [appname appname ...]	421
startapp [appname]	421
startproject [projectname]	421
syncdb	421
test	421
validate	421
Available Option	421
--settings	421
--pythonpath	422
--format	422
--help	422
--indent	422

--noinput	422
--noreload	422
--version	423
--verbosity	423
--adminmedia	423
■ APPENDIX H Request and Response Objects	425
HttpRequest	425
QueryDict Objects	427
A Complete Example	428
HttpResponse	429
Construction HttpResponses	429
Setting Headers	429
HttpResponse Subclasses	430
Returning Errors	430
Customizing the 404 (Page Not Found) View	431
Customizing the 500 (Server Error) View	432
■ INDEX	433