BLACK HAT PYTHON 2nd Edition

Python Programming for Hackers and Pentesters

by Justin Seitz and Tim Arnold



San Francisco

BLACK HAT PYTHON, 2ND EDITION. Copyright © 2021 by Justin Seitz and Tim Arnold.

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: 978-1-7185-0112-6 (print) ISBN-13: 978-1-7185-0113-3 (ebook)

Publisher: William Pollock
Executive Editor: Barbara Yien
Production Editor: Dapinder Dosanjh
Developmental Editor: Frances Saux
Cover Illustration: Garry Booth
Interior Design: Octopod Studios
Technical Reviewer: Cliff Janzen

Copyeditor: Bart Reed

Compositor: Jeff Lytle, Happenstance Type-O-Rama

Proofreader: Sharon Wilkey

For information on book distributors or translations, please contact No Starch Press, Inc. directly:

No Starch Press, Inc.

245 8th Street, San Francisco, CA 94103 phone: 1-415-863-9900; info@nostarch.com

www.nostarch.com

Library of Congress Control Number: 2014953241

No Starch Press and the No Starch Press logo are registered trademarks of No Starch Press, Inc. Other product and company names mentioned herein may be the trademarks of their respective owners. Rather than use a trademark symbol with every occurrence of a trademarked name, we are using the names only in an editorial fashion and to the benefit of the trademark owner, with no intention of infringement of the trademark.

The information in this book is distributed on an "As Is" basis, without warranty. While every precaution has been taken in the preparation of this work, neither the authors nor No Starch Press, Inc. 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 it.

To my beautiful wife, Clare. I love you. —Justin

About the Authors

Justin Seitz is a renowned cybersecurity and open source intelligence practitioner and the co-founder of Dark River Systems Inc., a Canadian security and intelligence company. His work has been featured in *Popular Science*, *Motherboard*, and *Forbes*. Justin has authored two books on developing hacking tools. He created the AutomatingOSINT.com training platform and Hunchly, an open source intelligence collection tool for investigators. Justin is also a contributor to the citizen journalism site Bellingcat, a member of the International Criminal Court's Technical Advisory Board, and a Fellow at the Center for Advanced Defense Studies in Washington, DC.

Tim Arnold is currently a professional Python programmer and statistician. He spent much of his early career at North Carolina State University as a respected international speaker and educator. Among his accomplishments, he has ensured that educational tools are accessible to underserved communities worldwide, including making mathematical documentation accessible to the blind.

For the past many years, Tim has worked at SAS Institute as a principal software developer, designing and implementing a publishing system for technical and mathematical documentation. He has served on the board of the Raleigh ISSA and as a consultant to board of the International Statistical Institute. He enjoys working as an independent educator, making infosec and Python concepts available to new users and elevating those with more advanced skills. Tim lives in North Carolina with his wife, Treva, and a villainous cockatiel named Sidney. You can find him on Twitter at @jtimarnold.

About the Technical Reviewer

Since the early days of Commodore PET and VIC-20, technology has been a constant companion to **Cliff Janzen**—and sometimes an obsession! Cliff spends a majority of his workday managing and mentoring a great team of security professionals, striving to stay technically relevant by tackling everything from security policy reviews and penetration testing to incident response. He feels lucky to have a career that is also his favorite hobby and a wife who supports him. He is grateful to Justin for including him on the first edition of this wonderful book and to Tim for leading him to finally make the move to Python 3. And special thanks to the fine people at No Starch Press.

BRIEF CONTENTS

Foreword
Prefacexvii
Acknowledgments
Chapter 1: Setting Up Your Python Environment1
Chapter 2: Basic Networking Tools
Chapter 3: Writing a Sniffer
Chapter 4: Owning the Network with Scapy53
Chapter 5: Web Hackery
Chapter 6: Extending Burp Proxy93
Chapter 7: GitHub Command and Control
Chapter 8: Common Trojaning Tasks on Windows
Chapter 9: Fun with Exfiltration
Chapter 10: Windows Privilege Escalation
Chapter 11: Offensive Forensics
Index 185

CONTENTS IN DETAIL

FOREWORD	ΧV
PREFACE	XVII
ACKNOWLEDGMENTS	XIX
1 SETTING UP YOUR PYTHON ENVIRONMENT	1
nstalling Kali Linux. Setting Up Python 3	3 5
2 BASIC NETWORKING TOOLS	9
Python Networking in a Paragraph ICP Client JDP Client ICP Server Replacing Netcat Kicking the Tires Building a TCP Proxy Kicking the Tires SSH with Paramiko. Kicking the Tires SSH Tunneling Kicking the Tires Kicking the Tires	10 11 12 13 17 19 24 26 30 30
3 WRITING A SNIFFER	35
Building a UDP Host Discovery Tool Packet Sniffing on Windows and Linux Kicking the Tires Decoding the IP Layer The ctypes Module The struct Module Writing the IP Decoder Kicking the Tires Decoding ICMP Kicking the Tires	36 38 39 41 43 45 46

4	
OWNING THE NETWORK WITH SCAPY	53
Stealing Email Credentials	
Kicking the Tires	
ARP Cache Poisoning with Scapy	
Kicking the Tires	
Kicking the Tires	
5	
WEB HACKERY	7 1
Using Web Libraries	. 72
The urllib2 Library for Python 2.x	
The urllib Library for Python 3.x	
The requests Library	. 74
The lxml and BeautifulSoup Packages	
Mapping Open Source Web App Installations	
Mapping the WordPress Framework	
Kicking the Tires	
Brute-Forcing Directories and File Locations	
Kicking the Tires	
Brute-Forcing HTML Form Authentication	
Kicking the Tires	. 90
6	
EXTENDING BURP PROXY	93
Setting Up	. 94
Burp Fuzzing	
Kicking the Tires	
Using Bing for Burp	
Kicking the Tires	
Turning Website Content into Password Gold	
Nicking the tires	113
7	
GITHUB COMMAND AND CONTROL	11 <i>7</i>
Setting Up a GitHub Account	118
Creating Modules	119
Configuring the Trojan	
Building a GitHub-Aware Trojan	
Hacking Python's import Functionality	
Kicking the Tires	1 Z 4

8 COMMON TROJANING TASKS ON WINDOWS	127
Keylogging for Fun and Keystrokes	
Kicking the Tires	
Taking Screenshots	
Pythonic Shellcode Execution	
Kicking the Tires	
Sandbox Detection	. 135
9	
FUN WITH EXFILTRATION	139
Encrypting and Decrypting Files	
Email Exfiltration	
File Transfer Exfiltration	
Exfiltration via a Web Server	
Putting It All Together	
Kicking the Tires	. 150
10	
WINDOWS PRIVILEGE ESCALATION	153
Installing the Prerequisites	. 154
Creating the Vulnerable BlackHat Service	. 154
Creating a Process Monitor	
Process Monitoring with WMI	. 157
Kicking the Tires	
Windows Token Privileges	
Winning the Race	
Kicking the Tires	
Code Injection	
Kicking the Tires	. 166
11	
OFFENSIVE FORENSICS	169
Installation	. 170
General Reconnaissance	. 171
User Reconnaissance	. 173
Vulnerability Reconnaissance	. 176
The volshell Interface	
Custom Volatility Plug-Ins	
Kicking the Tires	
Onward!	. 184
INDEX	185