Code Reverse Engineering

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Mastering Reverse Engineering Penguin Random House LLC (No Starch)
If you want to master the art and science of reverse engineering code with IDA Pro for security R&D or software debugging, this is the book for you. Highly organized and sophisticated criminal entities are constantly developing more complex, obfuscated, and armored viruses, worms, Trojans, and botnets. IDA Pro ' s interactive interface and programmable development language provide you with complete control over code disassembly and debugging. This is the only book which focuses exclusively on the world ' s most powerful and popular took for reverse engineering code. *Reverse Engineer REAL Hostile Code To follow along with this chapter, you must download a file called !DANGER!INFECTEDMALWARE!DANGER!... ' nuff said. *Portable Executable (PE) and Executable and Linking Formats (ELF) Understand the physical layout of PE and ELF files, and analyze the components that are essential to reverse engineering. *Break Hostile Code Armor and Write your own Exploits Understand execution flow, trace functions, recover hard coded passwords, find vulnerable functions, backtrace execution, and craft a buffer overflow. *Master Debugging Debug in IDA Pro, use a debugger while reverse engineering, perform heap and stack access modification, and use other debuggers. *Stop Anti-Reversing Anti-reversing, like reverse engineering or coding in assembly, is an art form. The trick of course is to try to stop the person reversing the application. Find out how! *Track a Protocol through a Binary and Recover its Message Structure Trace execution flow from a read event, determine the structure of a protocol, determine if the protocol has any undocumented messages, and use IDA Pro to determine the functions that process a particular message. *Develop IDA Scripts and Plug-ins Learn the basics of IDA scripting and syntax, and write IDC scripts and plug-ins to automate even the most complex tasks.

Assembly to Open Source Code Matching for Reverse Engineering and Malware Analysis Springer Science & Business Media
Attacks take place everyday with computers connected to the internet, because of worms, viruses or due to vulnerable software. These attacks result in a loss of millions of dollars to businesses across the world. Identifying Malicious Code through Reverse Engineering provides information on reverse engineering and concepts that can be used to identify the malicious patterns in vulnerable software. The malicious patterns are used to develop signatures to prevent vulnerability and block worms or viruses. This book also includes the latest exploits through various case studies. Identifying Malicious Code through Reverse Engineering is designed for professionals composed of practitioners and researchers writing signatures to prevent virus and software vulnerabilities. This book is also suitable for advanced-level students in computer science and engineering studying information security, as a secondary textbook or reference.

Beyond the Code BoD – Books on Demand
Implement reverse engineering techniques to analyze software, exploit software targets, and defend against security threats like malware and viruses. Key FeaturesAnalyze and improvise software and hardware with real-world examplesLearn advanced debugging and patching techniques with tools such as IDA Pro, x86dbg, and Radare2.Explore modern security techniques to identify, exploit, and avoid cyber threatsBook Description If you want to analyze software in order to exploit its weaknesses and strengthen its defenses, then you should explore reverse engineering. Reverse Engineering is a hackerfriendly tool used to expose security flaws and questionable privacy practices.In this book, you will learn how to analyse software even without having access to its source code or design documents. You will start off by learning the low-level language used to communicate with the computer and then move on to covering reverse engineering techniques. Next, you will explore analysis techniques using real-world tools such as IDA Pro and x86dbg. As you progress through the chapters, you will walk through use cases encountered in reverse engineering, such as encryption and compression, used to obfuscate code, and how to to identify and overcome anti-debugging and anti-analysis tricks. Lastly, you will learn how to analyse other types of files that contain code. By the end of this book, you will have the confidence to perform reverse engineering. What you will learnLearn core reverse engineeringIdentify and extract malware componentsExplore the tools used for reverse engineeringRun programs under non-native operating systemsUnderstand binary obfuscation techniquesIdentify and analyze anti-debugging and anti-analysis tricksWho this book is for If you are a security engineer or analyst or a system programmer and want to use reverse engineering to improve your software and hardware, this is the book for you. You will also find this book useful if you are a developer who wants to explore and learn reverse engineering. Having some programming/shell scripting knowledge is an added advantage.

From Code to Requirements Specification, Reverse Engineering Using a Formal Approach John Wiley & Sons
Object-Oriented Reengineering Patterns collects and distills successful techniques in planning a reengineering project, reverse-engineering, problem detection, migration strategies and software redesign. This book is made available under the Creative Commons Attribution-ShareAlike 3.0 license. You can either download the PDF for free, or you can buy a softcover copy from lulu.com. Additional material is available from the book's web page at http://scg.unibe.ch/oorp

Reverse Engineering Code with IDA Pro Apress
Reverse Engineering Code with IDA ProElsevier

Evolution of Object-oriented Methods from the Reverse Engineering of Programming Code No Starch Press
No source code? No problem. With IDA Pro, the interactive disassembler, you live in a source code-optional world. IDA can automatically analyze the millions of opcodes that make up an executable and present you with a disassembly. But at that point, your work is just beginning. With The IDA Pro Book, you'll learn how to turn that mountain of mnemonics into something you can actually use. Hailed by the creator of IDA Pro as "profound, comprehensive, and accurate," the second edition of The IDA Pro Book covers everything from the very first steps to advanced automation techniques. You'll find complete coverage of IDA's new Qt-based user interface, as well as increased coverage of the IDA debugger, the Bochs debugger, and IDA scripting (especially using IDAPython). But because humans are still smarter than computers, you'll even learn how to use IDA's latest interactive and scriptable interfaces to your advantage. Save time and effort as you learn to: –Navigate, comment, and modify disassembly –Identify known library routines, so you can focus your analysis on other areas of the code –Use code graphing to quickly make sense of cross references and function calls –Extend IDA to support new processors and filetypes using the SDK –Explore popular plug-ins that make writing IDA scripts easier, allow collaborative reverse engineering, and much more –Use IDA's built-in debugger to tackle hostile and obfuscated code Whether you're analyzing malware, conducting vulnerability research, or reverse engineering software, a mastery of IDA is crucial to your success. Take your skills to the next level with this 2nd edition of The IDA Pro Book.

Reverse Engineering of Object Oriented Code Pearson Education India
A guide to using the Ghidra software reverse engineering tool suite. The result of more than a decade of research and development within the NSA, the Ghidra platform was developed to address some of the agency's most challenging reverse-engineering problems. With the open-source release of this formerly restricted tool suite, one of the world's most capable disassemblers and intuitive decompilers is now in the hands of cybersecurity defenders everywhere -- and The Ghidra Book is the one and only guide you need to master it. In addition to discussing RE techniques useful in analyzing software and malware of all kinds, the book thoroughly introduces Ghidra's components, features, and unique capacity for group collaboration. You'll learn how to: • Navigate a disassembly • Use Ghidra's built-in decompiler to expedite analysis • Analyze obfuscated binaries • Extend Ghidra to recognize new data types • Build new Ghidra analyzers and loaders • Add support for new processors and instruction sets • Script Ghidra tasks to automate workflows • Set up and use a collaborative reverse engineering environment Designed for beginner and advanced users alike, The Ghidra Book will effectively prepare you to meet the needs and challenges of RE, so you can analyze files like a pro.

Decompiling Android No Starch Press
Learn to find software bugs faster and discover how other developers have solved similar problems. For intermediate to advanced iOS/macOS developers already familiar with either Swift or Objective-C who want to take their debugging skills to the next level, this book includes topics such as: LLDB and its subcommands and options; low-level components used to extract information from a program; LLDB's Python module; and DTrace and how to write D scripts.

Identifying Malicious Code Through Reverse Engineering Oxford University Press
Malware analysis is big business, and attacks can cost a company dearly. When malware breaches your defenses, you need to act quickly to cure current infections and prevent future ones from occurring. For those who want to stay ahead of the latest malware, Practical Malware Analysis will teach you the tools and techniques used by professional analysts. With this book as your guide, you'll be able to safely analyze, debug, and disassemble any malicious software that comes your way. You'll learn how to: –Set up a safe virtual environment to analyze malware –Quickly extract network signatures and host-based indicators –Use key analysis tools like IDA Pro, OllyDbg, and WinDbg –Overcome malware tricks like obfuscation, anti-disassembly, anti-debugging, and anti-virtual machine techniques –Use your newfound knowledge of Windows internals for malware analysis –Develop a methodology for unpacking malware and get practical experience with five of the most popular packers –Analyze special cases of malware with shellcode, C++, and 64-bit code Hands-on labs throughout the book challenge you to practice and synthesize your skills as you dissect real malware samples, and pages of detailed dissections offer an over-the-shoulder look at how the pros do it. You'll learn how to crack open malware to see how it really works, determine what damage it has done, thoroughly clean your network, and ensure that the malware never comes back. Malware analysis is a cat-and-mouse game with rules that are constantly changing, so make sure you have the fundamentals. Whether you're tasked with securing one network or a thousand networks, or you're making a living as a malware analyst, you'll find what you need to succeed in Practical Malware Analysis.

Reverse Engineering Springer Science & Business Media
As a Java developer, you may find yourself in a situation where you have to maintain someone else's code or use a third-party's library for your own application without documentation of the original source code. Rather than spend hours feeling like you want to bang your head against the wall, turn to "Covert Java: Techniques for Decompiling, Patching, and Reverse Engineering." These techniques will show you how to better understand and work with third-party applications. Each chapter focuses on a technique to solve a specific problem, such as obfuscation in code or scalability vulnerabilities, outlining the issue and demonstrating possible solutions. Summaries at the end of each chapter will help you double check that you understood the crucial points of each lesson. You will also be able to download all code examples and sample applications for future reference from the publisher's website. Let "Covert Java" help you crack open mysterious codes!

Reverse Engineering Encapsulated Components from Legacy Code No Starch Press
Beginning with a basic primer on reverse engineering-including computer internals, operating systems, and assembly language-and then discussing the various applications of reverse engineering, this book provides readers with practical, in-depth techniques for software reverse engineering. The book is broken into two parts, the first deals with security-related reverse engineering and the second explores the more practical aspects of reverse engineering. In addition, the author explains how to reverse engineer a third-party software library to improve interfacing and how to reverse engineer a competitor's software to build a better product. * The first popular book to show how software reverse engineering can help defend against security threats, speed up development, and unlock the secrets of competitive products * Helps developers plug security holes by demonstrating how hackers exploit reverse engineering techniques to crack copy-protection schemes and identify software targets for viruses and other malware * Offers a primer on advanced reverse-engineering, delving into "disassembly"-code-level reverse engineering-and explaining how to decipher assembly language

Reverse Engineering of a Library System 1st Edition Elsevier
This book answers two central questions: firstly, is it at all possible to verify electronic equipment procured from untrusted vendors? Secondly, can I build trust into my products in such a way that I support verification by untrusting customers? In separate chapters the book takes readers through the state of the art in fields of computer science that can shed light on these questions. In a concluding chapter it discusses realistic ways forward. In discussions on cyber security, there is a tacit assumption that the manufacturer of equipment will collaborate with the user of the equipment to stop third-party wrongdoers. The Snowden files and recent deliberations on the use of Chinese equipment in the critical infrastructures of western countries have changed this. The discourse in both cases revolves around what malevolent manufacturers can do to harm their own customers, and the importance of the matter is on par with questions of national security.This book is of great interest to ICT and security professionals who need a clear understanding of the two questions posed in the subtitle, and to decision-makers in industry, national bodies and nation states. This work was published by Saint Philip Street Press pursuant to a Creative Commons license permitting commercial use. All rights not granted by the work's license are retained by the author or authors.

Security Warrior Packt Publishing Ltd
More practical less theory KEY FEATURES ? In-depth practical demonstration with multiple

examples of reverse engineering concepts. ? Provides a step-by-step approach to reverse engineering, including assembly instructions. ? Helps security researchers to crack application code and logic using reverse engineering open source tools. ? Reverse engineering strategies for simple-to-complex applications like Wannacry ransomware and Windows calculator. DESCRIPTION The book ‘Implementing Reverse Engineering’ begins with a step-by-step explanation of the fundamentals of reverse engineering. You will learn how to use reverse engineering to find bugs and hacks in real-world applications. This book is divided into three sections. The first section is an exploration of the reverse engineering process. The second section explains reverse engineering of applications, and the third section is a collection of real-world use-cases with solutions. The first section introduces the basic concepts of a computing system and the data building blocks of the computing system. This section also includes open-source tools such as CFF Explorer, Ghidra, Cutter, and x32dbg. The second section goes over various reverse engineering practicals on various applications to give users hands-on experience. In the third section, reverse engineering of Wannacry ransomware, a well-known Windows application, and various exercises are demonstrated step by step. In a very detailed and step-by-step manner, you will practice and understand different assembly instructions, types of code calling conventions, assembly patterns of applications with the printf function, pointers, array, structure, scanf, strcpy function, decision, and loop control structures. You will learn how to use open-source tools for reverse engineering such as portable executable editors, disassemblers, and debuggers. WHAT YOU WILL LEARN ? Understand different code calling conventions like CDECL, STDCALL, and FASTCALL with practical illustrations. ? Analyze and break WannaCry ransomware using Ghidra. ? Using Cutter, reconstruct application logic from the assembly code. ? Hack the Windows calculator to modify its behavior. WHO THIS BOOK IS FOR This book is for cybersecurity researchers, bug bounty hunters, software developers, software testers, and software quality assurance experts who want to perform reverse engineering for advanced security from attacks. Interested readers can also be from high schools or universities (with a Computer Science background). Basic programming knowledge is helpful but not required. TABLE OF CONTENTS 1. Impact of Reverse Engineering 2. Understanding Architecture of x86 machines 3. Up and Running with Reverse Engineering tools 4. Walkthrough on Assembly Instructions 5. Types of Code Calling Conventions 6. Reverse Engineering Pattern of Basic Code 7. Reverse Engineering Pattern of the printf() Program 8. Reverse Engineering Pattern of the Pointer Program 9. Reverse Engineering Pattern of the Decision Control Structure 10. Reverse Engineering Pattern of the Loop Control Structure 11. Array Code Pattern in Reverse Engineering 12. Structure Code Pattern in Reverse Engineering 13. Scanf Program Pattern in Reverse Engineering 14. strcpy Program Pattern in Reverse Engineering 15. Simple Interest Code Pattern in Reverse Engineering 16. Breaking Wannacry Ransomware with Reverse Engineering 17. Generate Pseudo Code from the Binary File 18. Fun with Windows Calculator Using Reverse Engineering

Sockets, Shellcode, Porting, and Coding: Reverse Engineering Exploits and Tool Coding for Security Professionals Springer

Decompiling Android looks at the the reason why Android apps can be decompiled to recover their source code, what it means to Android developers and how you can protect your code from prying eyes. This is also a good way to see how good and bad Android apps are constructed and how to learn from them in building your own apps. This is becoming an increasingly important topic as the Android marketplace grows and developers are unwittingly releasing the apps with lots of back doors allowing people to potentially obtain credit card information and database logins to back-end systems, as they don’t realize how easy it is to decompile their Android code. In depth examination of the Java and Android class file structures Tools and techniques for decompiling Android apps Tools and techniques for protecting your Android apps

Reverse Engineering Software Code in Java to Show Method Level Dependencies No Starch Press

The process of reverse engineering has proven infinitely useful for analyzing Original Equipment Manufacturer (OEM) components to duplicate or repair them, or simply improve on their design. A guidebook to the rapid-fire changes in this area, Reverse Engineering: Technology of Reinvention introduces the fundamental principles, advanced methodologies, and other essential aspects of reverse engineering. The book’s primary objective is twofold: to advance the technology of reinvention through reverse engineering and to improve the competitiveness of commercial parts in the aftermarket. Assembling and synergizing material from several different fields, this book prepares readers with the skills, knowledge, and abilities required to successfully apply reverse engineering in diverse fields ranging from aerospace, automotive, and medical device industries to academic research, accident investigation, and legal and forensic analyses. With this mission of preparation in mind, the author offers real-world examples to: Enrich readers’ understanding of reverse engineering processes, empowering them with alternative options regarding part production Explain the latest technologies, practices, specifications, and regulations in reverse engineering Enable readers to judge if a "duplicated or repaired" part will meet the design functionality of the OEM part This book sets itself apart by covering seven key subjects: geometric measurement, part evaluation, materials identification, manufacturing process verification, data analysis, system compatibility, and intelligent property protection. Helpful in making new, compatible products that are cheaper than others on the market, the author provides the tools to uncover or clarify features of commercial products that were either previously unknown, misunderstood, or not used in the most effective way.

Advanced Apple Debugging & Reverse Engineering Springer Science & Business Media

Maintenance Problem and Solution: Problem: Maintenance`s very expensive . Solution: Re-engineering by reverse engineering from code to diagrams for doing model transformation to restructuring a system then forward engineering from diagrams to code for doing code refactoring to restructuring a system .

Reverse Engineering Springer Science & Business Media

Reverse engineering encompasses a wide spectrum of activities aimed at extracting information on the function, structure, and behavior of man-made or natural artifacts. Increases in data sources, processing power, and improved data mining and processing algorithms have opened new fields of application for reverse engineering. In this book, we present twelve applications of reverse engineering in the software engineering, shape engineering, and medical and life sciences application domains. The book can serve as a guideline to practitioners in the above fields to the state-of-the-art in reverse engineering techniques, tools, and use-cases, as well as an overview of open challenges for reverse engineering researchers.

Practical Malware Analysis Addison-Wesley Professional

At its core, information security deals with the secure and accurate transfer of information. While information security has long been important, it was, perhaps, brought more clearly into mainstream focus with the so-called “Y2K” issue. Te Y2K scare was the fear that c- puter networks and the systems that are controlled or operated by sofware would fail with the turn of the millennium, since their clocks could lose synchronization by not recognizing a number (instruction) with three zeros. A positive outcome of this scare was the creation of several Computer Emergency Response Teams (CERTs) around the world that now work - operatively to exchange expertise and information, and to coordinate in case major problems should arise in the modern IT environment. Te terrorist attacks of 11 September 2001 raised security concerns to a new level. Te - ternational community responded on at least two fronts; one front being the transfer of reliable information via secure networks and the other being the collection of information about - tential terrorists. As a sign of this new emphasis on security, since 2001, all major academic publishers have started technical journals focused on security, and every major communi- tions conference (for example, Globecom and ICC) has organized workshops and sessions on security issues. In addition, the IEEE has created a technical committee on Communication and Information Security. Te ?rst editor was intimately involved with security for the Athens Olympic Games of 2004.

Implementing Reverse Engineering John Wiley & Sons

The process of software reverse engineering and malware analysis often comprise a combination of static and dynamic analyses. The successful outcome of each step is tightly coupled with the functionalities of the tools and skills of the reverse engineer. Even though automated tools are available for dynamic analysis, the static analysis process is a fastidious and time-consuming task as it requires manual work and strong expertise in assembly coding. In order to enhance and accelerate the reverse engineering process, we introduce a new dimension known as clone-based analysis. Recently, binary clone matching has been studied with a focus on detecting assembly (binary) clones. An alternative approach in clone analysis, which is studied in the present research, is concerned with assembly to source code matching. There are two major advantages in considering this extra dimension. The first advantage is to avoid dealing with low-level assembly code in situations where the corresponding high-level code is available. The other advantage is to prevent reverse engineering parts of the software that have been analyzed before. The clone-based analysis can be helpful in significantly reducing the required time and improving the accuracy of static analysis. In this research, we elaborate a framework for assembly to open-source code matching. Two types of analyses are provided by the framework, namely online and offline. The online analysis process triggers queries to online source code repositories based on extracted features from the functions at the assembly level. The result is the matched set of references to the open-source project files with similar features. Moreover, the offline analysis assigns functionality tags and provides in-depth information regarding the potential functionality of a portion of the assembly file. It reports on function stack frames, prototypes, arguments, variables, return values and low-level system calls. Besides, the offline analysis is based on a built-in dictionary of common user-level and kernel-level API functions that are used by malware to interact with the operating system. These functions are called for performing tasks such as file I/O, network communications, registry modification, and service manipulation. The offline analysis process has been expanded through an incremental learning mechanism which results in an improved detection of crypto-related functions in the disassembly. The other developed extension is a customized local code repository which performs automated source code parsing, feature extraction, and dataset generation for code matching. We apply the framework in several reverse engineering and malware analysis scenarios. Also, we show that the underlying tools and techniques are effective in providing additional insights into the functionality, inner workings, and components of the target binaries.

Tools for Program Understanding and Reverse-engineering of Mobile Applications "O'Reilly Media, Inc."

When it comes to network security, many users and administrators are running scared, and justifiably so. The sophistication of attacks against computer systems increases with each new Internet worm.What's the worst an attacker can do to you? You'd better find out, right? That's what Security Warrior teaches you. Based on the principle that the only way to defend yourself is to understand your attacker in depth, Security Warrior reveals how your systems can be attacked. Covering everything from reverse engineering to SQL attacks, and including topics like social engineering, antiforensics, and common attacks against UNIX and Windows systems, this book teaches you to know your enemy and how to be prepared to do battle.Security Warrior places particular emphasis on reverse engineering. RE is a fundamental skill for the administrator, who must be aware of all kinds of malware that can be installed on his machines -- trojaned binaries, "spyware" that looks innocuous but that sends private data back to its creator, and more. This is the only book to discuss reverse engineering for Linux or Windows CE. It's also the only book that shows you how SQL injection works, enabling you to inspect your database and web applications for vulnerability.Security Warrior is the most comprehensive and up-to-date book covering the art of computer war: attacks against computer systems and their defenses. It's often scary, and never comforting. If you're on the front lines, defending your site against attackers, you need this book. On your shelf--and in your hands.