Code Reverse Engineering

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Assembly to Open Source Code Matching for Reverse Engineering and Malware Analysis Addison-Wesley Professional Offers instructions for using Visio 2007, a software package for creating business diagrams and technical drawings. **Reverse Engineering Encapsulated Components from Legacy Code** Pearson Education India The book is logically divided into 5 main categories with each category representing a major skill set required by most security professionals:

1. Coding – The ability to program and script is quickly becoming a mainstream requirement for just about everyone in the security industry. This section covers the basics in coding complemented with a slue of programming tips and tricks in C/C++, Java, Perl and NASL. 2. Sockets – The technology that allows programs and scripts to communicate over a network is sockets. Even though the theory remains the same – communication over TCP and UDP, sockets are implemented differently in nearly ever language. 3. Shellcode – Shellcode, commonly defined as bytecode converted from Assembly, is utilized to execute commands on remote systems via direct memory access. 4. Porting – Due to the differences between operating platforms and language implementations on those platforms, it is a common practice to modify an original body of code to work on a different platforms. This technique is known as porting and is incredible useful in the real world environments since it allows you to not “recreate the wheel. 5. Coding Tools – The culmination of the previous four sections, coding tools brings all of the techniques that you have learned to the forefront. With the background technologies and techniques you will now be able to code quick utilities that will not only make you more

productive, they will arm you with an extremely valuable skill that will remain with you as long as you make the proper time and effort dedications. *Contains never before seen chapters on writing and automating exploits on windows systems with all-new exploits. *Perform zero-day exploit forensics by reverse engineering malicious code. *Provides working code and scripts in all of the most common programming languages for readers to use TODAY to defend their networks.

Reverse Engineering John Wiley & Sons
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.

Mastering Reverse Engineering Penguin Random House LLC (No Starch)

CD-ROM contains cross-referenced code.

Security Warrior Sams Publishing

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.

Object-oriented Reengineering Patterns Reverse Engineering Code with IDA Pro Mobile software development is evolving rapidly. Software development includes computer programing, documenting, testing and bug fixing processes. These processes need a detail understanding of the application logic which often requires reverse-engineering their artifacts. My thesis identifies and addresses the following three problems in mobile software development, specifically in program understanding and reverse-engineering for mobile application development. (1) There is no graphical on-phone debugger. (2) The second problem is that mobile software programmers have to manually re-implement the conceptual screen drawings or sketches of graphical artists in code, which is cumbersome and expensive. (3) Companies try to ”go mobile” (by developing mobile apps). To do that understanding the high level business of their current legacy software systems is

necessary but challenging. To address these three challenges, this dissertation introduces the following three innovations. (1) GROPG is the first graphical on-phone debugger. GROPG makes debugging mobile apps more convenient and productive than existing textbased on-phone debuggers. (2) REMAUI is a mobile digital screenshot and sketch reverse-engineering tool. REMAUI makes developing mobile user interface code easier. (3) RengLaDom is a legacy application reverse-engineering tool. RengLaDom can infer domain concepts from legacy source code. Specifically, (1) debugging mobile phone applications is hard, as current debugging techniques either require multiple computing devices or do not support graphical debugging. To address this problem we present GROPG, the first graphical on-phone debugger. We implement GROPG for Android and perform a preliminary evaluation on third-party applications. Our experiments suggest that GROPG can lower the overall debugging time of a comparable text-based on-phone debugger by up to 2/3. (2) Second, when developing the user interface code of a mobile application, a big gap exists between the sketches and digital conceptual drawings of graphic artists and working user interface code. Currently, programmers bridge this gap manually, by re-implementing the sketches and drawings in code, which is cumbersome and expensive. To bridge this gap, this dissertation introduces the first technique to automatically reverse engineer mobile application user interfaces from UI sketches, digital conceptual drawings, or screenshots (REMAUI). In our experiments on third party inputs, REMAUI's inferred runtime user interface hierarchies closely resembled the user interface runtime UI hierarchies of the applications that produced REMAUI's inputs. Further, the resulting screenshots closely resembled REMAUI's inputs and overall runtime was

below one minute. (3) Finally, a promising approach to understanding the business functions implemented by a large-scale legacy application is to reverse engineer the full application code with all its complications into a high-level abstraction such as a design document that can focus exclusively on important domain concepts. Although much progress has been made, we encountered the following two problems. (a) Existing techniques often cannot distinguish between code that carries interesting domain concepts and code that merely provides low-level implementation services. (b) For an evaluation, given that design documents are typically not maintained throughout program development, how can we judge if the domain model inferred by a given technique is of a high quality? We address these problems by re-examining the notion of domain models in object-oriented development and encoding our understanding in a novel lightweight reverse engineering technique that pinpoints those program classes that likely carry domain concepts. We implement our techniques in a RengLaDom prototype tool for Java and compare how close our inferred domain models are to existing domain models. Given the lack of traditional domain models, we propose to use for such evaluation existing object-relational data persistence mappings (ORM), which map program classes to a relational database schema. The original application engineers carefully designed such mappings, consider them valuable, and maintain them as part of the application. After manually removing such OR mappings from open-source applications, our RengLaDom technique was able to reverse engineer domain models that are much closer to the original ORM domain models than the models produced by competing approaches, regardless of the particular ORM

framework used. Additional experiments indicate that RengLaDom's ability to infer better domain models extends to a variety of non-ORM applications.

Advanced Apple Debugging & Reverse Engineering
Springer Science & Business Media
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.

Reverse Engineering of Object Oriented Code "O'Reilly Media, Inc."

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 **Reverse Engineering** John Wiley & Sons Detect potentials bugs in your code or program and develop your own tools using the Ghidra reverse engineering framework developed by the NSA project Key FeaturesMake the most of Ghidra on different platforms such as Linux, Windows, and macOSLeverage a variety of plug-ins and extensions to perform disassembly, assembly, decompilation, and scriptingDiscover how you can meet your cybersecurity needs by creating custom patches and toolsBook Description Ghidra, an open source software reverse engineering (SRE) framework created by the NSA research directorate, enables users to analyze compiled code on any platform, whether Linux, Windows, or macOS. This book is a starting point for developers interested in leveraging Ghidra to create patches and extend tool capabilities to meet their cybersecurity needs. You'll begin by installing Ghidra and exploring its features, and gradually learn how to automate reverse engineering tasks using Ghidra plug-ins. You'll then see how to set up an environment to perform malware analysis using Ghidra and how to use it in the headless mode. As you progress, you'll use Ghidra scripting to automate the task of identifying vulnerabilities in executable binaries. The book also covers advanced topics such as developing Ghidra plug-ins, developing your own GUI, incorporating new process architectures if needed, and contributing to the Ghidra project. By

the end of this Ghidra book, you'll have developed the skills you need to harness the power of Ghidra for analyzing and avoiding potential vulnerabilities in code and networks. What you will learnGet to grips with using Ghidra's features, plug-ins, and extensionsUnderstand how you can contribute to GhidraFocus on reverse engineering malware and perform binary auditingAutomate reverse engineering tasks with Ghidra plug-insBecome well-versed with developing your own Ghidra extensions, scripts, and featuresAutomate the task of looking for vulnerabilities in executable binaries using Ghidra scriptingFind out how to use Ghidra in the headless modeWho this book is for This SRE book is for developers, software engineers, or any IT professional with some understanding of cybersecurity essentials. Prior knowledge of Java or Python, along with experience in programming or developing applications, is required before getting started with this book.

Reverse Engineering Code with IDA Pro Springer Science & Business Media

Describes how to design object-oriented code and accompanying algorithms that can be reverse engineered for greater flexibility in future code maintenance and alteration. Provides essential object-oriented concepts and programming methods for software engineers and researchers.

Reversing Elsevier

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.

Evolution of Object-oriented Methods from the Reverse Engineering of Programming Code

Springer

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

Sockets, Shellcode, Porting, and Coding: Reverse Engineering Exploits and Tool Coding for Security Professionals Packt Publishing Ltd

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 communications 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.

Ghidra Software Reverse Engineering for Beginners No Starch Press

Reverse Engineering Code with IDA ProElsevier

Beyond the Code Elsevier

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.

Tools for Program Understanding and Reverse-engineering of Mobile Applications Springer Science & Business Media

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.

Code Reading No Starch Press

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. *From Code to Requirements Specification, Reverse Engineering Using a Formal Approach* Lulu.com 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. **Microsoft Office Visio 2007 Inside Out** Springer Science & Business Media 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.

BoD – Books on Demand

Provides step-by-step instructions on basic hacking techniques and reverse engineering skills along with information on Xbox security, hardware, and software.