Malware Analysis For Beginners

HARTMAN FELIPE

Malware Analysis Techniques Learning Malware Analysis
Every day approximately three-hundred thousand to four-hundred thousand new malware are registered, many of them being adware and variants of previously known malware. Anti-virus companies and researchers cannot deal with such a deluge of malware – to analyze and build patches. The only way to scale the efforts is to build algorithms to enable machines to analyze malware and classify and cluster them to such a level of granularity that it will enable humans (or machines) to gain critical insights about them and build solutions that are specific enough to detect and thwart existing malware and generic-enough to thwart future variants.

Advances in Malware and Data-Driven Network Security comprehensively covers data-driven malware security with an emphasis on using statistical, machine learning, and AI as well as the current trends in ML/statistical approaches to detecting, clustering, and classification of cyber-threats. Providing information on advances in malware and data-driven network security as well as future research directions, it is ideal for graduate students, academicians, faculty members, scientists, software developers, security analysts, computer engineers, programmers, IT specialists, and researchers who are seeking to learn and carry out research in the area of malware and data-driven network security.
Dr. Faustus Springer Nature
The International Symposium on Distributed Computing and Artificial Intelligence 2011 (DCAI 2011) is a stimulating and productive forum where the scientific community can work towards future cooperation on Distributed Computing and Artificial Intelligence areas. This conference is the forum in which to present application of innovative techniques to complex problems. Artificial intelligence is changing our society. Its application in distributed environments, such as internet, electronic commerce, environment monitoring, mobile communications, wireless devices, distributed computing, to cite some, is continuously increasing, becoming an element of high added value with social and economic potential, both industry, life quality and research. These technologies are changing constantly as a result of the large research and technical effort being undertaken in universities, companies. The exchange of ideas between scientists and technicians from both academic and

industry is essential to facilitate the development of systems that meet the demands of today's society. This edition of DCAI brings together past experience, current work and promising future trends associated with distributed computing, artificial intelligence and their application to provide efficient solutions to real problems. This symposium is organized by the Bioinformatics, Intelligent System and Educational Technology Research Group (http://bisite.usal.es/) of the University of Salamanca. The present edition has been held in Salamanca, Spain, from 6 to 8 April 2011.

Malware Analysis and Detection Engineering Packt Publishing Ltd

A comprehensive guide to the threats facing Apple computers and the foundational knowledge needed to become a proficient Mac malware analyst. Defenders must fully understand how malicious software works if they hope to stay ahead of the increasingly sophisticated threats facing Apple products today. The Art of Mac Malware: The Guide to Analyzing Malicious Software is a comprehensive handbook to cracking open these malicious programs and seeing what’s inside. Discover the secrets of nation state backdoors, destructive ransomware, and subversive cryptocurrency miners as you uncover their infection methods, persistence strategies, and insidious capabilities. Then work with and extend foundational reverse-engineering tools to extract and decrypt embedded strings, unpack protected Mach-O malware, and even reconstruct binary code. Next, using a debugger, you’ll execute the malware, instruction by instruction, to discover exactly how it operates. In the book’s final section, you’ll put these lessons into practice by analyzing a complex Mac malware specimen on your own. You’ll learn to: Recognize common infections vectors, persistence mechanisms, and payloads leveraged by Mac malware Triage unknown samples in order to quickly classify them as benign or malicious Work with static analysis tools, including disassemblers, in order to study malicious scripts and compiled binaries Leverage dynamical analysis tools, such as monitoring tools and debuggers, to gain further insight into sophisticated threats Quickly identify and bypass anti-analysis techniques aimed at thwarting your analysis attempts A former NSA hacker and current leader in the field of macOS threat analysis, Patrick Wardle uses real-world examples pulled from his original research. The Art of Mac Malware: The Guide to Analyzing Malicious Software is the definitive resource to battling these ever more prevalent and insidious Apple-focused threats.

Advanced Malware Analysis McGraw Hill Professional

If you’re involved in cybersecurity as a software developer, forensic investigator, or network administrator, this practical guide shows you how to apply the scientific method when assessing techniques for protecting your information systems. You’ll learn how to conduct scientific experiments on everyday tools and procedures, whether you’re evaluating corporate security systems, testing your own security product, or looking for bugs in a mobile game. Once author Josiah Dykstra gets you up to speed on the scientific method, he helps you focus on standalone, domain-specific topics, such as cryptography, malware analysis, and system security engineering. The latter chapters include practical case studies that demonstrate how to use available tools to conduct domain-specific scientific experiments. Learn the steps necessary to conduct scientific experiments in cybersecurity Explore fuzzing to test how your software handles various inputs Measure the performance of the Snort intrusion detection system Locate malicious “needles in a haystack” in your network and IT environment Evaluate cryptography design and application in IoT products Conduct an experiment to identify relationships between similar malware binaries Understand system-level security requirements for enterprise networks and web services

Malware Analyst's Cookbook and DVD John Wiley & Sons

A computer forensics "how-to" for fighting malicious code and analyzing incidents With our ever-increasing reliance on computers comes an ever-growing risk of malware. Security professionals will find plenty of solutions in this book to the problems posed by viruses, Trojan horses, worms, spyware, rootkits, adware, and other invasive software. Written by well-known malware experts, this guide reveals solutions to numerous problems and includes a DVD of custom programs and tools that illustrate the concepts, enhancing your skills. Security professionals face a constant battle against malicious software; this practical manual will improve your analytical capabilities and provide dozens of valuable and innovative solutions Covers classifying malware, packing and unpacking, dynamic malware analysis, decoding and decrypting, rootkit detection, memory forensics, open source malware research, and much more Includes generous amounts of source code in C, Python, and Perl to extend your favorite tools or build new ones, and custom programs on the DVD to demonstrate the solutions Malware Analyst's Cookbook is indispensible to IT security administrators, incident responders, forensic analysts, and malware researchers.

The Ghidra Book John Wiley & Sons

While forensic analysis has proven to be a valuable investigative tool in the field of computer security, utilizing anti-forensic technology makes it possible to maintain a covert operational foothold for extended periods, even in a high-security environment. Adopting an approach that favors full disclosure, the updated Second Edition of The Rootkit Arsenal presents the most accessible, timely, and complete coverage of forensic countermeasures. This book covers more topics, in greater depth, than any other currently available. In doing so the author forges through the murky back alleys of the Internet, shedding light on material that has traditionally been poorly documented, partially documented, or intentionally undocumented. The range of topics presented includes how to: -Evade post-mortem analysis -Frustrate attempts to reverse engineer your command & control modules -Defeat live incident response -Undermine the process of memory analysis -Modify subsystem internals to feed misinformation to the outside -Entrench your code in fortified regions of execution -Design and implement covert channels -Unearth new avenues of attack

Malware Analysis Using Artificial Intelligence and Deep Learning Jones & Bartlett Publishers

Discover how the internals of malware work and how you can analyze and detect it. You will learn not only how to analyze and reverse malware, but also how to classify and categorize it, giving you insight into the intent of the malware. Malware Analysis and Detection Engineering is a one-stop guide to malware analysis that simplifies the topic by teaching you undocumented tricks used by analysts in the industry. You will be able to extend your expertise to analyze and reverse the challenges that malicious software throws at you. The book starts with an introduction to malware analysis and reverse engineering to provide insight on the different types of malware and also the terminology used in the anti-malware industry. You will know how to set up an isolated lab environment to safely execute and analyze malware. You will learn about malware packing,

code injection, and process hollowing plus how to analyze, reverse, classify, and categorize malware using static and dynamic tools. You will be able to automate your malware analysis process by exploring detection tools to modify and trace malware programs, including sandboxes, IDS/IPS, anti-virus, and Windows binary instrumentation. The book provides comprehensive content in combination with hands-on exercises to help you dig into the details of malware dissection, giving you the confidence to tackle malware that enters your environment. What You Will Learn Analyze, dissect, reverse engineer, and classify malware Effectively handle malware with custom packers and compilers Unpack complex malware to locate vital malware components and decipher their intent Use various static and dynamic malware analysis tools Leverage the internals of various detection engineering tools to improve your workflow Write Snort rules and learn to use them with Suricata IDS Who This Book Is For Security professionals, malware analysts, SOC analysts, incident responders, detection engineers, reverse engineers, and network security engineers "This book is a beast! If you're looking to master the ever-widening field of malware analysis, look no further. This is the definitive guide for you." Pedram Amini, CTO Inquest; Founder OpenRCE.org and ZeroDayInitiative

Gray Hat Hacking: The Ethical Hacker's Handbook, Fifth Edition Springer Science & Business Media

One of the glories of Elizabethan drama: Marlowe's powerful retelling of the story of the learned German doctor who sells his soul to the devil in exchange for knowledge and power. Footnotes.

Malware Detection No Starch Press

This book is a step-by-step, practical tutorial for analyzing and detecting malware and performing digital investigations. This book features clear and concise guidance in an easily accessible format.Cuckoo Malware Analysis is great for anyone who wants to analyze malware through programming, networking, disassembling, forensics, and virtualization. Whether you are new to malware analysis or have some experience, this book will help you get started with Cuckoo Sandbox so you can start analysing malware effectively and efficiently.

Windows Malware Analysis Essentials John Wiley & Sons

A one-of-a-kind guide to setting up a malware research lab, using cutting-edge analysis tools, and reporting the findings

Advanced Malware Analysis is a critical resource for every information security professional's anti-malware arsenal. The proven troubleshooting techniques will give an edge to information security professionals whose job involves detecting, decoding, and reporting on malware. After explaining malware architecture and how it operates, the book describes how to create and configure a state-of-the-art malware research lab and gather samples for analysis. Then, you'll learn how to use dozens of malware analysis tools, organize data, and create metrics-rich reports. A crucial tool for combatting malware—which currently hits each second globally Filled with undocumented methods for customizing dozens of analysis software tools for very specific uses Leads you through a malware blueprint first, then lab setup, and finally analysis and reporting activities Every tool explained in this book is available in every country around the world

Rootkit Arsenal Packt Publishing Ltd

Cutting-edge techniques for finding and fixing critical security flaws Fortify your network and avert digital catastrophe with proven strategies from a team of security experts. Completely updated and featuring 13 new chapters, Gray Hat Hacking, The Ethical Hacker's Handbook, Fifth Edition explains the enemy's current weapons, skills, and tactics and offers field-tested remedies, case studies, and ready-to-try testing labs. Find out how hackers gain access, overtake network devices, script and inject malicious code, and plunder Web applications and browsers. Android-based exploits, reverse engineering techniques, and cyber law are thoroughly covered in this state-of-the-art resource. And the new topic of exploiting the Internet of things is introduced in this edition. •Build and launch spoofing exploits with Ettercap •Induce error conditions and crash software using fuzzers •Use advanced reverse engineering to exploit Windows and Linux software •Bypass Windows Access Control and memory protection schemes •Exploit web applications with Padding Oracle Attacks •Learn the use-after-free technique used in recent zero days •Hijack web browsers with advanced XSS attacks •Understand ransomware and how it takes control of your desktop •Dissect Android malware with JEB and DAD decompilers •Find one-day vulnerabilities with binary diffing •Exploit wireless systems with Software Defined Radios (SDR) •Exploit Internet of things devices •Dissect and exploit embedded devices •Understand bug bounty programs •Deploy next-generation honeypots •Dissect ATM malware and analyze common ATM attacks •Learn the business side of ethical hacking

International Joint Conference CISIS'12-ICEUTE´12-SOCO´12 Special Sessions No Starch Press

Rootkits and Bootkits will teach you how to understand and counter sophisticated, advanced threats buried deep in a machine's boot process or UEFI firmware. With the aid of numerous case studies and professional research from three of the world's leading security experts, you'll trace malware development over time from rootkits like TDL3 to present-day UEFI implants and examine how they infect a system, persist through reboot, and evade security software. As you inspect and dissect real malware, you'll learn: • How Windows boots—including 32-bit, 64-bit, and UEFI mode—and where to find vulnerabilities • The details of boot process security mechanisms like Secure Boot, including an overview of Virtual Secure Mode (VSM) and Device Guard • Reverse engineering and forensic techniques for analyzing real malware, including bootkits like Rovnix/Carberp, Gapz, TDL4, and the infamous rootkits TDL3 and Festi • How to perform static and dynamic analysis using emulation and tools like Bochs and IDA Pro • How to better understand the delivery stage of threats against BIOS and UEFI firmware in order to create detection capabilities • How to use virtualization tools like VMware Workstation to reverse engineer bootkits and the Intel Chipsec tool to dig into forensic analysis Cybercrime syndicates and malicious actors will continue to write ever more persistent and covert attacks, but the game is not lost. Explore the cutting edge of malware analysis with Rootkits and Bootkits. Covers boot processes for Windows 32-bit and 64-bit operating systems.

Practical Reverse Engineering IGI Global

bull; Real-world tools needed to prevent, detect, and handle malicious code attacks. bull; Computer infection from viruses, worms, Trojan Horses etc., collectively known as malware is a growing cost problem for businesses. bull; Discover how attackers install malware and how you can peer through their schemes to keep systems safe. bull; Bonus malware code analysis laboratory.

Malware Forensics Field Guide for Windows Systems Packt Publishing Ltd

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.

The Art of Memory Forensics CRC Press
The rapid growth and development of Android-based devices has resulted in a wealth of sensitive information on mobile devices that offer minimal malware protection. This has created an immediate need for security professionals that understand how to best approach the subject of Android malware threats and analysis.In Android Malware and Analysis, K

Cyber Threat Intelligence Springer Science & Business Media
Analyzing how hacks are done, so as to stop them in thefuture Reverse engineering is the process of analyzing hardware orsoftware and understanding it, without having access to the sourcecode or design documents. Hackers are able to reverse engineersystems and exploit what they find with scary results. Now the goodguys can use the same tools to thwart these threats. PracticalReverse Engineering goes under the hood of reverse engineeringfor security analysts, security engineers, and system programmers,so they can learn how to use these same processes to stop hackersin their tracks. The book covers x86, x64, and ARM (the first book to cover allthree); Windows kernel-mode code rootkits and drivers; virtualmachine protection techniques; and much more. Best of all, itoffers a systematic approach to the material, with plenty ofhands-on exercises and real-world examples. Offers a systematic approach to understanding reverseengineering, with hands-on exercises and real-world examples Covers x86, x64, and advanced RISC machine (ARM) architecturesas well as deobfuscation and virtual machine protectiontechniques Provides special coverage of Windows kernel-mode code(rootkits/drivers), a topic not often covered elsewhere, andexplains how to analyze drivers step by step Demystifies topics that have a steep learning curve Includes a bonus chapter on reverse engineering tools Practical Reverse Engineering: Using x86, x64, ARM, WindowsKernel, and Reversing Tools provides crucial, up-to-dateguidance for a broad range of IT professionals.

The Art of Mac Malware McGraw Hill Professional
Master the fundamentals of malware analysis for the Windows platform and enhance your anti-malware skill set About This Book Set the baseline towards performing malware analysis on the Windows platform and how to use the tools required to deal with malware Understand how to decipher x86 assembly code from source code inside your favourite development environment A step-by-step based guide that reveals malware analysis from an industry insider and demystifies the process Who This Book Is For This book is best for someone who has prior experience with reverse engineering Windows executables and wants to specialize in malware analysis. The book presents the malware analysis thought process using a show-and-tell approach, and the examples included will give any analyst confidence in how to approach this task on their own the next time around. What You Will Learn Use the positional number system for clear conception of Boolean algebra, that applies to malware research purposes Get introduced to static and dynamic analysis methodologies and build your own malware lab Analyse destructive malware samples from the real world (ITW) from fingerprinting and static/dynamic analysis to the final debrief Understand different modes of linking and how to compile your own libraries from assembly code and integrate the codein your final program Get to know about the various emulators, debuggers and their features, and sandboxes and set them up effectively depending on the required scenario Deal with other malware vectors such as pdf and MS-Office based malware as well as scripts and shellcode In Detail Windows OS is the most used operating system in the world and hence is targeted by malware writers. There are strong ramifications if things go awry. Things will go wrong if they can, and hence we see a salvo of attacks that have continued to disrupt the normal scheme of things in our day to day lives. This book will guide you on how to use essential tools such as debuggers, disassemblers, and sandboxes to dissect malware samples. It will expose your innards and then build a report of their indicators of compromise along with detection rule sets that will enable you to help contain the outbreak when faced with such a situation. We will start with the basics of computing fundamentals such as number systems and Boolean algebra. Further, you'll learn about x86 assembly programming and its integration with high level languages such as C++.You'll understand how to decipher disassembly code obtained from the compiled source code and map it back to its original design goals. By delving into end to end analysis with real-world malware samples to solidify your understanding, you'll sharpen your technique of handling destructive malware binaries and vector mechanisms. You will also be encouraged to consider analysis lab safety measures so that there is no infection in the process. Finally, we'll have a rounded tour of various emulations, sandboxing, and debugging options so that you know what is at your disposal when you need a specific kind of weapon in order to nullify the malware. Style and approach An easy to follow, hands-on guide with descriptions and screenshots that will help you execute effective malicious software investigations and conjure up solutions creatively and confidently.

John Wiley & Sons
This book provides readers with up-to-date research of emerging cyber threats and defensive mechanisms, which are timely and essential. It covers cyber threat intelligence concepts against a range of threat actors and threat tools (i.e. ransomware) in cutting-edge technologies, i.e., Internet of Things (IoT), Cloud computing and mobile devices. This book also provides the technical information on cyber-threat detection methods required for the researcher and digital forensics experts, in order to build intelligent automated systems to fight against advanced cybercrimes. The ever increasing number of cyber-attacks requires the cyber security and forensic specialists to detect, analyze and defend against the cyber threats in almost real-time, and with such a large number of attacks is not possible without deeply perusing the attack features and taking corresponding intelligent defensive actions – this in essence defines cyber threat intelligence notion. However, such intelligence would not be possible without

the aid of artificial intelligence, machine learning and advanced data mining techniques to collect, analyze, and interpret cyber-attack campaigns which is covered in this book. This book will focus on cutting-edge research from both academia and industry, with a particular emphasis on providing wider knowledge of the field, novelty of approaches, combination of tools and so forth to perceive reason, learn and act on a wide range of data collected from different cyber security and forensics solutions. This book introduces the notion of cyber threat intelligence and analytics and presents different attempts in utilizing machine learning and data mining techniques to create threat feeds for a range of consumers. Moreover, this book sheds light on existing and emerging trends in the field which could pave the way for future works. The inter-disciplinary nature of this book, makes it suitable for a wide range of audiences with backgrounds in artificial intelligence, cyber security, forensics, big data and data mining, distributed systems and computer networks. This would include industry professionals, advanced-level students and researchers that work within these related fields.

Malware Analyst's Cookbook and DVD

No Starch Press

Malware Data Science explains how to identify, analyze, and classify large-scale malware using machine learning and data visualization. Security has become a "big data" problem. The growth rate of malware has accelerated to tens of millions of new files per year while our networks generate an ever-larger flood of security-relevant data each day. In order to defend against these advanced attacks, you'll need to know how to think like a data scientist. In Malware Data Science, security data scientist Joshua Saxe introduces machine learning, statistics, social network analysis, and data visualization, and shows you how to apply these methods to malware detection and analysis. You'll learn how to: - Analyze malware using static analysis - Observe malware behavior using dynamic analysis - Identify adversary groups through shared code analysis - Catch 0-day vulnerabilities by building your own machine learning detector - Measure malware detector accuracy - Identify malware campaigns, trends, and relationships through data visualization Whether you're a malware analyst looking to add skills to your existing arsenal, or a data scientist interested in attack detection and threat intelligence, Malware Data Science will help you stay ahead of the curve.

Malware Detection Springer Science & Business Media

Memory forensics provides cutting edge technology to help investigate digital attacks Memory forensics is the art of analyzing computer memory (RAM) to solve digital crimes. As a follow-up to the best seller Malware Analyst's Cookbook, experts in the fields of malware, security, and digital forensics bring you a step-by-step guide to memory forensics—now the most sought after skill in the digital forensics and incident response fields. Beginning with introductory concepts and moving toward the advanced, The Art of Memory Forensics: Detecting Malware and Threats in Windows, Linux, and Mac Memory is based on a five day training course that the authors have presented to hundreds of students. It is the only book on the market that focuses exclusively on memory forensics and how to deploy such techniques properly. Discover memory forensics techniques: How volatile memory analysis improves digital investigations Proper investigative steps for detecting stealth malware and advanced threats How to use free, open source tools for conducting thorough memory forensics Ways to acquire memory from suspect systems in a forensically sound manner The next era of malware and security breaches are more sophisticated and targeted, and the volatile memory of a computer is often overlooked or destroyed as part of the incident response process. The Art of Memory Forensics explains the latest technological innovations in digital forensics to help bridge this gap. It covers the most popular and recently released versions of Windows, Linux, and Mac, including both the 32 and 64-bit editions.