# Network Security Through Data Analysis
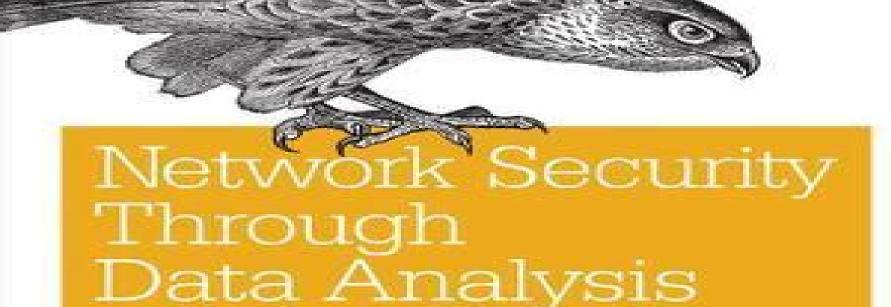
BUILDING SITUATIONAL AWARENESS:
1 MILLION LOG RECORDS AT A TIME

Michael Collins

# Network Security Through Data Analysis Building Situational Awareness Michael Collins

**Mike O'Leary**

**Network Security Through Data Analysis Building Situational Awareness Michael Collins:**

*Network Security Through Data Analysis* Michael S Collins,Michael Collins,2014-02-10 In this practical guide security researcher Michael Collins shows you several techniques and tools for collecting and analyzing network traffic datasets You ll understand how your network is used and what actions are necessary to protect and improve it Divided into three sections this book examines the process of collecting and organizing data various tools for analysis and several different analytic scenarios and techniques **Network Security Through Data Analysis** Michael Collins,2017-09-08 Traditional intrusion detection and logfile analysis are no longer enough to protect today s complex networks In the updated second edition of this practical guide security researcher Michael Collins shows InfoSec personnel the latest techniques and tools for collecting and analyzing network traffic datasets You ll understand how your network is used and what actions are necessary to harden and defend the systems within it In three sections this book examines the process of collecting and organizing data various tools for analysis and several different analytic scenarios and techniques New chapters focus on active monitoring and traffic manipulation insider threat detection data mining regression and machine learning and other topics You ll learn how to Use sensors to collect network service host and active domain data Work with the SiLK toolset Python and other tools and techniques for manipulating data you collect Detect unusual phenomena through exploratory data analysis EDA using visualization and mathematical techniques Analyze text data traffic behavior and communications mistakes Identify significant structures in your network with graph analysis Examine insider threat data and acquire threat intelligence Map your network and identify significant hosts within it Work with operations to develop defenses and analysis techniques

*Essential Cybersecurity Science* Josiah Dykstra,2015-12-08 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 *Network Security Through Data Analysis* Michael Collins,2014 **Situational Awareness in Computer Network Defense: Principles, Methods and Applications** Onwubiko, Cyril,Owens,

Thomas,2012-01-31 This book provides academia and organizations insights into practical and applied solutions frameworks technologies and implementations for situational awareness in computer networks Provided by publisher **Guide to Vulnerability Analysis for Computer Networks and Systems** Simon Parkinson,Andrew Crampton,Richard Hill,2018-09-04 This professional guide and reference examines the challenges of assessing security vulnerabilities in computing infrastructure Various aspects of vulnerability assessment are covered in detail including recent advancements in reducing the requirement for expert knowledge through novel applications of artificial intelligence The work also offers a series of case studies on how to develop and perform vulnerability assessment techniques using start of the art intelligent mechanisms Topics and features provides tutorial activities and thought provoking questions in each chapter together with numerous case studies introduces the fundamentals of vulnerability assessment and reviews the state of the art of research in this area discusses vulnerability assessment frameworks including frameworks for industrial control and cloud systems examines a range of applications that make use of artificial intelligence to enhance the vulnerability assessment processes presents visualisation techniques that can be used to assist the vulnerability assessment process In addition to serving the needs of security practitioners and researchers this accessible volume is also ideal for students and instructors seeking a primer on artificial intelligence for vulnerability assessment or a supplementary text for courses on computer security networking and artificial intelligence Network Security Monitoring Frederick a Middlebush Professor of History Robert Collins,Robert Collins,2017-10-17 This book is a guide on network security monitoring The author begins by explaining some of the basics of computer networking and the basic tools which can be used for monitoring a computer network The process of capturing and analyzing the packets of a network is discussed in detail This is a good technique which can help network security experts identify anomalies or malicious attacks on the packets transmitted over a network You are also guided on how to monitor the network traffic for the Heartbleed bug which is very vulnerable to network attackers Session data is very essential for network security monitoring The author guides you on how to use the session data so as to monitor the security of your network The various techniques which can be used for network intrusion detection and prevention are explored You are also guided on how to use the Security Onion to monitor the security of your network The various tools which can help in network security monitoring are discussed The following topics are discussed in this book Network Monitoring Basics Packet Analysis Detecting the Heartbleed Bug Session Data Application Layer Metadata URL Search Intrusion Detection and Prevention Security Onion Network Security For Dummies Chey Cobb,2011-05-09 A hands on do it yourself guide to securing and auditing a network CNN is reporting that a vicious new virus is wreaking havoc on the world s computer networks Somebody s hacked one of your favorite Web sites and stolen thousands of credit card numbers The FBI just released a new report on computer crime that s got you shaking in your boots The experts will tell you that keeping your network safe from the cyber wolves howling after your assets is complicated expensive and best left to them But the truth is

anybody with a working knowledge of networks and computers can do just about everything necessary to defend their network against most security threats Network Security For Dummies arms you with quick easy low cost solutions to all your network security concerns Whether your network consists of one computer with a high speed Internet connection or hundreds of workstations distributed across dozens of locations you ll find what you need to confidently Identify your network s security weaknesses Install an intrusion detection system Use simple economical techniques to secure your data Defend against viruses Keep hackers at bay Plug security holes in individual applications Build a secure network from scratch Leading national expert Chey Cobb fills you in on the basics of data security and he explains more complex options you can use to keep your network safe as your grow your business Among other things you ll explore Developing risk assessments and security plans Choosing controls without breaking the bank Anti virus software firewalls intrusion detection systems and access controls Addressing Unix Windows and Mac security issues Patching holes in email databases Windows Media Player NetMeeting AOL Instant Messenger and other individual applications Securing a wireless network E Commerce security Incident response and disaster recovery Whether you run a storefront tax preparing business or you re the network administrator at a multinational accounting giant your computer assets are your business Let Network Security For Dummies provide you with proven strategies and techniques for keeping your precious assets safe    Applied Network Security Monitoring Chris Sanders,Jason Smith,2013-11-26 Applied Network Security Monitoring is the essential guide to becoming an NSM analyst from the ground up This book takes a fundamental approach to NSM complete with dozens of real world examples that teach you the key concepts of NSM Network security monitoring is based on the principle that prevention eventually fails In the current threat landscape no matter how much you try motivated attackers will eventually find their way into your network At that point it is your ability to detect and respond to that intrusion that can be the difference between a small incident and a major disaster The book follows the three stages of the NSM cycle collection detection and analysis As you progress through each section you will have access to insights from seasoned NSM professionals while being introduced to relevant practical scenarios complete with sample data If you ve never performed NSM analysis Applied Network Security Monitoring will give you an adequate grasp on the core concepts needed to become an effective analyst If you are already a practicing analyst this book will allow you to grow your analytic technique to make you more effective at your job Discusses the proper methods for data collection and teaches you how to become a skilled NSM analyst Provides thorough hands on coverage of Snort Suricata Bro IDS SiLK and Argus Loaded with practical examples containing real PCAP files you can replay and uses Security Onion for all its lab examples Companion website includes up to date blogs from the authors about the latest developments in NSM    *Data Analysis For Network Cyber-security* Niall M Adams,Nicholas A Heard,2014-04-04 There is increasing pressure to protect computer networks against unauthorized intrusion and some work in this area is concerned with engineering systems that are robust to attack However no system can be made invulnerable

Data Analysis for Network Cyber Security focuses on monitoring and analyzing network traffic data with the intention of preventing or quickly identifying malicious activity Such work involves the intersection of statistics data mining and computer science Fundamentally network traffic is relational embodying a link between devices As such graph analysis approaches are a natural candidate However such methods do not scale well to the demands of real problems and the critical aspect of the timing of communications events is not accounted for in these approaches This book gathers papers from leading researchers to provide both background to the problems and a description of cutting edge methodology The contributors are from diverse institutions and areas of expertise and were brought together at a workshop held at the University of Bristol in March 2013 to address the issues of network cyber security The workshop was supported by the Heilbronn Institute for Mathematical Research **The Cyber Security Network Guide** Fiedelholtz,2020-11-11 This book presents a unique step by step approach for monitoring detecting analyzing and mitigating complex network cyber threats It includes updated processes in response to asymmetric threats as well as descriptions of the current tools to mitigate cyber threats Featuring comprehensive computer science material relating to a complete network baseline with the characterization hardware and software configuration the book also identifies potential emerging cyber threats and the vulnerabilities of the network architecture to provide students with a guide to responding to threats The book is intended for undergraduate and graduate college students who are unfamiliar with the cyber paradigm and processes in responding to attacks Build Your Own Security Lab Michael Gregg,2010-08-13 If your job is to design or implement IT security solutions or if you re studying for any security certification this is the how to guide you ve been looking for Here s how to assess your needs gather the tools and create a controlled environment in which you can experiment test and develop the solutions that work With liberal examples from real world scenarios it tells you exactly how to implement a strategy to secure your systems now and in the future Note CD ROM DVD and other supplementary materials are not included as part of eBook file **The Practice of Network Security Monitoring** Richard Bejtlich,2013-07-15 Network security is not simply about building impenetrable walls determined attackers will eventually overcome traditional defenses The most effective computer security strategies integrate network security monitoring NSM the collection and analysis of data to help you detect and respond to intrusions In The Practice of Network Security Monitoring Mandiant CSO Richard Bejtlich shows you how to use NSM to add a robust layer of protection around your networks no prior experience required To help you avoid costly and inflexible solutions he teaches you how to deploy build and run an NSM operation using open source software and vendor neutral tools You ll learn how to Determine where to deploy NSM platforms and size them for the monitored networks Deploy stand alone or distributed NSM installations Use command line and graphical packet analysis tools and NSM consoles Interpret network evidence from server side and client side intrusions Integrate threat intelligence into NSM software to identify sophisticated adversaries There s no foolproof way to keep attackers out of your network But when they get in you ll

be prepared The Practice of Network Security Monitoring will show you how to build a security net to detect contain and control them Attacks are inevitable but losing sensitive data shouldn t be **Building Open Source Network Security Tools** Mike Schiffman,2002-12-03 Learn how to protect your network with this guide to building complete and fully functional network security tools Although open source network security tools come in all shapes and sizes a company will eventually discover that these tools are lacking in some area whether it s additional functionality a specific feature or a narrower scope Written by security expert Mike Schiffman this comprehensive book will show you how to build your own network security tools that meet the needs of your company To accomplish this you ll first learn about the Network Security Tool Paradigm in addition to currently available components including libpcap libnet libnids libsf libdnet and OpenSSL Schiffman offers a detailed discussion of these components helping you gain a better understanding of the native datatypes and exported functions Next you ll find several key techniques that are built from the components as well as easy to parse programming examples The book then ties the model code and concepts together explaining how you can use this information to craft intricate and robust security programs Schiffman provides you with cost effective time saving guidance on how to build customized network security tools using existing components He explores A multilayered model for describing network security tools The ins and outs of several specific security related components How to combine these components into several useful network security techniques Four different classifications for network security tools passive reconnaissance active reconnaissance attack and penetration and defensive How to combine techniques to build customized network security tools The companion Web site contains all of the code from the book Situational Awareness Analysis Tools for Aiding Discovery of Security Events and Patterns ,2005 The goal of the effort was to develop a comprehensive situational awareness analysis tool for discovery of intrusive behavior in information infrastructures and understanding anomalous network traffic The University of Minnesota team has developed a comprehensive multi stage analysis framework which provides tools and analysis methodologies to aid cyber security analysts in improving the quality and productivity of their analyses It consists of several components various Level I sensors and analysis modules for detecting suspicious or anomalous events and activities the output of which are then fed into a multi step Level II analysis system the core of the analysis framework that correlate and fuse Level I sensor data and alerts extract likely attack contexts and produce sequences of attack events to build a plausible attack scenario **Scalable Framework for Cyber Threat Situational Awareness** Poornachandran Prabaharan,2023-05-25 Scalable Framework for Cyber Threat Situational Awareness is a comprehensive and practical guide that explores the development and implementation of a scalable framework for achieving effective cyber threat situational awareness Authored by cybersecurity experts and researchers this book serves as a valuable resource for security professionals analysts and decision makers seeking to enhance their understanding of cyber threats and improve their response capabilities In this book the authors address the critical need for organizations to

establish robust situational awareness capabilities to detect analyze and respond to cyber threats in real time They present a scalable framework that integrates various data sources analysis techniques and visualization tools to provide a holistic view of the evolving threat landscape Key topics covered in this book include Introduction to cyber threat situational awareness The authors provide an overview of the concept of cyber threat situational awareness its importance in modern cybersecurity and the challenges faced in achieving comprehensive awareness in dynamic and complex environments Scalable framework architecture The book presents the architecture of a scalable framework for cyber threat situational awareness It covers the integration of diverse data sources including network logs intrusion detection systems threat intelligence feeds and user behavior data The authors discuss the design principles and components necessary for building a scalable and adaptable framework Data collection and aggregation The authors delve into the process of collecting and aggregating data from various sources within the organization and external feeds They explore techniques for data normalization filtering and enrichment to ensure the availability of high quality data for analysis Threat detection and analysis The book covers advanced analytics techniques and algorithms for detecting and analyzing cyber threats It explores anomaly detection machine learning and behavioral analysis approaches to identify patterns indicators and potential threats within the data Visualization and reporting The authors discuss visualization tools and techniques for presenting cyber threat information in a meaningful and intuitive manner They highlight the importance of visualizing complex data to aid in decision making incident response and collaboration among security teams Incident response and mitigation The book explores strategies for incident response and mitigation based on the insights gained from the cyber threat situational awareness framework It covers incident triage prioritization and response coordination to ensure timely and effective actions against identified threats Scalability and adaptability The authors address the scalability and adaptability considerations of the framework enabling organizations to handle large volumes of data accommodate evolving threats and integrate new data sources and analysis techniques Integration with existing security systems The book provides guidance on integrating the cyber threat situational awareness framework with existing security systems such as security information and event management SIEM platforms intrusion detection systems IDS and security orchestration automation and response SOAR tools Emerging trends and future directions The authors discuss emerging trends and technologies in cyber threat situational awareness including threat intelligence sharing collaborative defense and leveraging artificial intelligence AI and machine learning ML for automated threat analysis **Network Security** Scott C.-H. Huang,David MacCallum,Ding-Zhu Du,2014-09-05 This book provides a reference tool for the increasing number of scientists whose research is more or less involved in network security Coverage includes network design and modeling network management data management security and applications *The Network Security Test Lab* Michael Gregg,2015-08-10 The ultimate hands on guide to IT security and proactivedefense The Network Security Test Lab is a hands on step by stepguide to ultimate IT security implementation Covering the

fullcomplement of malware viruses and other attack technologies thisessential guide walks you through the security assessment andpenetration testing process and provides the set up guidance youneed to build your own security testing lab You ll look inside theactual attacks to decode their methods and learn how to runattacks in an isolated sandbox to better understand how attackerstarget systems and how to build the defenses that stop them You ll be introduced to tools like Wireshark Networkminer Nmap Metasploit and more as you discover techniques for defendingagainst network attacks social networking bugs malware and themost prevalent malicious traffic You also get access to opensource tools demo software and a bootable version of Linux tofacilitate hands on learning and help you implement your newskills Security technology continues to evolve and yet not a week goesby without news of a new security breach or a new exploit beingreleased The Network Security Test Lab is the ultimateguide when you are on the front lines of defense providing themost up to date methods of thwarting would be attackers Get acquainted with your hardware gear and test platform Learn how attackers penetrate existing security systems Detect malicious activity and build effective defenses Investigate and analyze attacks to inform defense strategy The Network Security Test Lab is your complete essentialguide **Network Security with NetFlow and IPFIX** Omar Santos,2016 **Cyber Operations** Mike O'Leary,2019-03-01 Know how to set up defend and attack computer networks with this revised and expanded second edition You will learn to configure your network from the ground up beginning with developing your own private virtual test environment then setting up your own DNS server and AD infrastructure You will continue with more advanced network services web servers and database servers and you will end by building your own web applications servers including WordPress and Joomla Systems from 2011 through 2017 are covered including Windows 7 Windows 8 Windows 10 Windows Server 2012 and Windows Server 2016 as well as a range of Linux distributions including Ubuntu CentOS Mint and OpenSUSE Key defensive techniques are integrated throughout and you will develop situational awareness of your network and build a complete defensive infrastructure including log servers network firewalls web application firewalls and intrusion detection systems Of course you cannot truly understand how to defend a network if you do not know how to attack it so you will attack your test systems in a variety of ways You will learn about Metasploit browser attacks privilege escalation pass the hash attacks malware man in the middle attacks database attacks and web application attacks What You ll Learn Construct a testing laboratory to experiment with software and attack techniques Build realistic networks that include active directory file servers databases web servers and web applications such as WordPress and Joomla Manage networks remotely with tools including PowerShell WMI and WinRM Use offensive tools such as Metasploit Mimikatz Veil Burp Suite and John the Ripper Exploit networks starting from malware and initial intrusion to privilege escalation through password cracking and persistence mechanisms Defend networks by developing operational awareness using auditd and Sysmon to analyze logs and deploying defensive tools such as the Snort intrusion detection system IPFire firewalls and ModSecurity web application firewalls Who This Book Is For This study guide is

intended for everyone involved in or interested in cybersecurity operations e g cybersecurity professionals IT professionals business professionals and students

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**Table of Contents Network Security Through Data Analysis Building Situational Awareness Michael Collins**

1. Understanding the eBook Network Security Through Data Analysis Building Situational Awareness Michael Collins
    - The Rise of Digital Reading Network Security Through Data Analysis Building Situational Awareness Michael Collins
    - Advantages of eBooks Over Traditional Books
2. Identifying Network Security Through Data Analysis Building Situational Awareness Michael Collins
    - Exploring Different Genres
    - Considering Fiction vs. Non-Fiction
    - Determining Your Reading Goals
3. Choosing the Right eBook Platform
    - Popular eBook Platforms
    - Features to Look for in an Network Security Through Data Analysis Building Situational Awareness Michael

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