Intrusion Detection Prevention System using SNORT

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ABSTRACT
Living in the age of information, each and every action result in some form of data creation. According to statistics, over 300 thousand tweets and over 4 million Facebook posts are being generated per minute. Knowing the fact that more users and more data require more security. In the modern era, security and reliability have become the major concerns for an individual or an organization. In this paper, various terminologies, techniques and methodologies related to Intrusion Detection and Prevention System (IDPS) have been discussed. This paper provides different approaches on implementation of IDPS that is based on in-depth study of various research endeavors. It majorly deals with the concept of Intrusion Detection System using Snort which is a popular tool for network security. It is widely accepted by corporate sectors in order to secure their organization's network. The paper gives a fair knowledge of Snort, about its purpose, the modes it associated with, its implementations and the applications. Review has been made on the basis of the studies and research done in the literature section.

Keywords
Intrusion Detection System; Intrusion Prevention System; Snort.

1. INTRODUCTION
Since the digital age is taken over, our lives have been encoded into digital clouds and stored on hard drives. Protecting this data has become the number one priority in ensuring privacy and security. IDPS is just another tool that when used properly will ensure that attacks are mitigated quickly. In fact, a network with a firewall and no IDPS is just as high security prison with no guards on Patrol. The major significance of IDPS are because of these two reasons, i.e. data protection & data privacy.

2. IDS/IPS
In general term, an intrusion can be said as an unauthorized access to someone's property or area, but when it comes to computer science, it is an act to compromise the basic computer network security goals viz. confidentiality, integrity, and privacy. Intrusion Detection is the process of monitoring the events occurring in a computer system or network and analyzing them for signs of possible incidents of threats and violations of computer security practices, acceptable use policies or standard security policies.

Intrusion Detection System (IDS) detects the presence of intrusion in the network. It is designed to monitor the events occurring in a computer system or network and responds to events with signs of possible incidents of violations of security policies. On the other hand, Intrusion Prevention System (IPS), is the network security systems or technology that is capable of not only detecting the intrusion activities but also take required counter measures to prevent them.

3. TYPES OF TECHNOLOGIES
There are many types of IDPS technologies. For the purposes of this document, they are divided into the following four groups based on the type of events that they monitor and the ways in which they are deployed.

3.1 Network based IDPS
A network-based intrusion detection system monitors and examines the network traffic for any suspicious activity or threats in the network. It reads the packets flowing in the network and searches for any malicious activity by identifying suspicious pattern in the packets. If any threat is discovered, then based upon the threat the system will take actions such as notifying administrators about it.

3.2 Wireless based IDPS
Wireless based Intrusion Detection Prevention System analyzes the traffic of wireless network by analyzing wireless protocol activities and take appropriate actions. It detects unauthorized wireless local area network in use. It cannot identify suspicious activity in the application layer, transport layer and protocol activities. It is deployed in a particular range where the organization can monitor the wireless network.

3.3 Network Behavior Analysis
NBA examines network traffic to identify threats which generate unusual traffic flows such as DDoS (Distributed Denial of Service) attack, malwares (e.g. worms, backdoors), and policy violations. These systems are deployed for monitoring the flow on an organization's internal network, sometimes it is used to monitor organization's networks and external network.

3.4 Host based IDPS
HIDPS monitors characteristics of a single host and identifies intrusions within that host by monitoring host's file system, file access, system calls or network events. It can prevent system level attacks and can detect attacks which NIDPS cannot. The hosts load can be distributed over the network. It can even analyze activities that are transferred in end-to-end encrypted communications.

4. METHODOLOGIES OF IDPS
To detect and prevent any intrusions, there are a lot of methodologies which IDPS uses. These methodologies are used as per the requirement of the system.

4.1 Anomaly based Methodology
These types of attack are used for detecting the unknown attacks i.e. it detects behavior that is not known before. No rules are needed to be written for this methodology. It detects malicious traffic based on normal network traffic pattern. The disadvantage of such method is that it generates high false alarm rate.

4.2 Signature based Methodology
This methodology is used to detect unknown attacks which are already predefined in the form of signature and are saved. When a data is sent to the network, it first goes to the server where the server scans it for malicious content. It compares the network packet from the database of signature which is

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Science of Cyber Security Jun Zhao,Weizhi Meng,2025-03-03 This book constitutes the refereed proceedings of the 6th International Conference on Science of Cyber Security SciSec 2024 held in Copenhagen Denmark during August 14 16 2024 The 25 full papers presented here were carefully selected and reviewed from 79 submissions These papers focus on the recent research trends and challenges in the emerging field of Cyber Security Intrusion Detection & Prevention Carl Endorf,Eugene Schultz,Jim Mellander,2004 This volume covers the most popular intrusion detection tools including Internet Security Systems Black ICE and RealSecurity Cisco Systems Secure IDS and Entercept Computer Associates eTrust and the open source tool Snort **Network and System Security** Joseph K. Liu,Xinyi Huang,2019-12-10 This book constitutes the proceedings of the 13th International Conference on Network and System Security NSS 2019 held in Sapporo Japan in December 2019 The 36 full papers and 7 short papers presented together with 4 invited papers in this book were carefully reviewed and selected from 89 initial submissions The papers cover a wide range of topics in the field including authentication access control availability integrity privacy confidentiality dependability and sustainability of computer networks and systems *Open Source Software for Digital Forensics* Ewa Huebner,Stefano Zanero,2010-01-27 Open Source Software for Digital Forensics is the first book dedicated to the use of FLOSS Free Libre Open Source Software in computer forensics It presents the motivations for using FLOSS applications as tools for collection preservation and analysis of digital evidence in computer and network forensics It also covers extensively several forensic FLOSS tools their origins and evolution Open Source Software for Digital Forensics is based on the OSSCoNF workshop which was held in Milan Italy September 2008 at the World Computing Congress co located with OSS 2008 This edited volume is a collection of contributions from researchers and practitioners world wide Open Source Software for Digital Forensics is designed for advanced level students and researchers in computer science as a secondary text and reference book Computer programmers software developers and digital forensics professionals will also find this book to be a valuable asset

Illumination of Artificial Intelligence in Cybersecurity and Forensics Sanjay Misra,Chamundeswari Arumugam,2022-02-08 This book covers a variety of topics that span from industry to academics hybrid AI model for IDS in IoT intelligent authentication framework for IoMT mobile devices for extracting bioelectrical signals security audit in terms of vulnerability analysis to protect the electronic medical records in healthcare system using AI classification using CNN a multi face recognition attendance system with anti spoofing capability challenges in face morphing attack detection a dimensionality reduction and feature level fusion technique for morphing attack detection MAD systems findings and discussion on AI assisted forensics challenges and open issues in the application of AI in forensics a terrorist computational model that uses Baum Welch optimization to improve the intelligence and predictive accuracy of the activities of criminal elements a novel method for detecting security violations in IDSs graphical based city block distance algorithm method for E

payment systems image encryption and AI methods in ransomware mitigation and detection It assists the reader in exploring new research areas wherein AI can be applied to offer solutions through the contribution from researchers and academia

Designing a HIPAA-Compliant Security Operations Center Eric C. Thompson,2020-02-25 Develop a comprehensive plan for building a HIPAA compliant security operations center designed to detect and respond to an increasing number of healthcare data breaches and events Using risk analysis assessment and management data combined with knowledge of cybersecurity program maturity this book gives you the tools you need to operationalize threat intelligence vulnerability management security monitoring and incident response processes to effectively meet the challenges presented by healthcare s current threats Healthcare entities are bombarded with data Threat intelligence feeds news updates and messages come rapidly and in many forms such as email podcasts and more New vulnerabilities are found every day in applications operating systems and databases while older vulnerabilities remain exploitable Add in the number of dashboards alerts and data points each information security tool provides and security teams find themselves swimming in oceans of data and unsure where to focus their energy There is an urgent need to have a cohesive plan in place to cut through the noise and face these threats Cybersecurity operations do not require expensive tools or large capital investments There are ways to capture the necessary data Teams protecting data and supporting HIPAA compliance can do this All that s required is a plan which author Eric Thompson provides in this book What You Will Learn Know what threat intelligence is and how you can make it useful Understand how effective vulnerability management extends beyond the risk scores provided by vendors Develop continuous monitoring on a budget Ensure that incident response is appropriate Help healthcare organizations comply with HIPAA Who This Book Is For Cybersecurity privacy and compliance professionals working for organizations responsible for creating maintaining storing and protecting patient information *Trusted Computing and Information Security* Huanguo Zhang,Bo Zhao,Fei Yan,2019-01-08 This book constitutes the refereed proceedings of the Chinese Conference on Trusted Computing and Information Security CTCIS 2018 held in Wuhan China in October 2018 The 24 revised full papers presented were carefully reviewed and selected from 73 submissions The papers are centered around cryptography systems security trusted computing information security and network security **International Joint Conferences** Héctor Quintián,Emilio Corchado,Alicia Troncoso Lora,Hilde Pérez García,Esteban Jove,José Luis Calvo Rolle,Francisco Javier Martínez de Pisón,Pablo García Bringas,Francisco Martínez Álvarez,Álvaro Herrero Cosío,Paolo Fosci,2024-11-15 This volume of Lecture Notes in Networks and Systems contains accepted papers presented at the 17th International Conference on Computational Intelligence in Security for Information Systems CISIS 2024 and the 15th International Conference on EUropean Transnational Education ICEUTE 2024 which were held in the beautiful city of Salamanca Spain in October 2024 The aim of the CISIS 2024 conference is to offer a meeting opportunity for academic and industry related researchers belonging to the various vast communities of Computational Intelligence Information Security and Data Mining The need for intelligent

flexible behavior by large complex systems especially in mission critical domains is intended to be the catalyst and the aggregation stimulus for the overall event After peer review the CISIS 2024 International Program Committee selected 24 papers for publication in these conference proceedings In this edition one special session was organized Artificial Intelligence for Protecting the Internet of Things The aim of ICEUTE 2024 conference is to offer a stimulating and fruitful meeting point for people working on transnational education within Europe It provides an exciting forum for presenting and discussing the latest works and advances in transnational education within European countries In the case of ICEUTE 2024 the International Program Committee selected nine papers which are also published in these conference proceedings The selection of papers was extremely rigorous to maintain the high quality of the conferences We deeply appreciate the hard work and dedication of the members of the Program Committees during the reviewing process Their contributions are integral to the creation of a high standard conference the CISIS and ICEUTE conferences would not exist without their help

Introduction to Security and Network Forensics William J. Buchanan,2011-06-06 Keeping up with the latest developments in cyber security requires ongoing commitment but without a firm foundation in the principles of computer security and digital forensics those tasked with safeguarding private information can get lost in a turbulent and shifting sea Providing such a foundation Introduction to Security and Network Forensics covers the basic principles of intrusion detection systems encryption and authentication as well as the key academic principles related to digital forensics Starting with an overview of general security concepts it addresses hashing digital certificates enhanced software security and network security The text introduces the concepts of risk threat analysis and network forensics and includes online access to an abundance of ancillary materials including labs Cisco challenges test questions and web based videos The author provides readers with access to a complete set of simulators for routers switches wireless access points Cisco Aironet 1200 PIX ASA firewalls Version 6 x 7 x and 8 x Wireless LAN Controllers WLC Wireless ADUs ASDMs SDMs Juniper and much more including More than 3 700 unique Cisco challenges and 48 000 Cisco Configuration Challenge Elements 60 000 test questions including for Certified Ethical Hacking and CISSP 350 router labs 180 switch labs 160 PIX ASA labs and 80 Wireless labs Rounding out coverage with a look into more advanced topics including data hiding obfuscation web infrastructures and cloud and grid computing this book provides the fundamental understanding in computer security and digital forensics required to develop and implement effective safeguards against ever evolving cyber security threats Along with this the text includes a range of online lectures and related material available at http asecuritybook com Model Driven Engineering Languages and Systems Gregor Engels,Bill Opdyke,Douglas C. Schmidt,Frank Weil,2007-09-12 This book constitutes the refereed proceedings of the 10th International Conference on Model Driven Engineering Languages and Systems formerly the UML series of conferences MODELS 2007 held in Nashville USA September 30 October 5 2007 The 45 revised full papers were carefully reviewed and selected from 158 initial submissions The papers are organized in topical

sections Second International Conference on Computer Networks and Communication Technologies S. Smys,Tomonobu Senjyu,Pavel Lafata,2020-01-21 This book presents new communication and networking technologies an area that has gained significant research attention from both academia and industry in recent years It also discusses the development of more intelligent and efficient communication technologies which are an essential part of current day to day life and reports on recent innovations in technologies architectures and standards relating to these technologies The book includes research that spans a wide range of communication and networking technologies including wireless sensor networks big data Internet of Things optical and telecommunication networks artificial intelligence cryptography next generation networks cloud computing and natural language processing Moreover it focuses on novel solutions in the context of communication and networking challenges such as optimization algorithms network interoperability scalable network clustering multicasting and fault tolerant techniques network authentication mechanisms and predictive analytics **Agents and Data Mining Interaction** Longbing Cao,Ana L.C. Bazzan,Andreas L. Symeonidis,Vladimir Gorodetsky,Gerhard Weiss,Philip S. Yu,2011-12-18 This book constitutes the thoroughly refereed post workshop proceedings of the 7th International Workshop on Agents and Data Mining Interaction ADMI 2011 held in Taipei Taiwan in May 2011 in conjunction with AAMAS 2011 the 10th International Joint Conference on Autonomous Agents and Multiagent Systems The 11 revised full papers presented were carefully reviewed and selected from 24 submissions The papers are organized in topical sections on agents for data mining data mining for agents and agent mining applications **International Conference on Information Technology and Communication Systems** Gherabi Noreddine,Janusz Kacprzyk,2017-12-01 This book reports on advanced methods and theories in two related fields of research Information Technology and Communication Systems It provides professors scientists PhD students and engineers with a readily available guide to various approaches in Engineering Science The book is divided into two major sections the first of which covers Information Technology topics including E Learning E Government egov Data Mining Text Mining Ontologies Semantic Similarity Databases Multimedia Information Processing and Applications The second section addresses Communication Systems topics including Systems Wireless and Network Computing Software Security and Monitoring Modern Antennas and Smart Grids The book gathers contributions presented at the International Conference on Information Technology and Communication Systems ITCS 2017 held at the National School of Applied Sciences of Khouribga Hassan 1st University Morocco on March 28 29 2017 This event was organized with the objective of bringing together researchers developers and practitioners from academia and industry working in all areas of Information Technology and Communication Systems It not only highlights new methods but also promotes collaborations between different communities working on related topics Security in Cyber-Physical Systems Ali Ismail Awad,Steven Furnell,Marcin Paprzycki,Sudhir Kumar Sharma,2021-03-05 This book is a relevant reference for any readers interested in the security aspects of Cyber Physical Systems and particularly useful for those looking to keep informed on the latest

advances in this dynamic area Cyber Physical Systems CPSs are characterized by the intrinsic combination of software and physical components Inherent elements often include wired or wireless data communication sensor devices real time operation and automated control of physical elements Typical examples of associated application areas include industrial control systems smart grids autonomous vehicles and avionics medial monitoring and robotics The incarnation of the CPSs can therefore range from considering individual Internet of Things devices through to large scale infrastructures Presented across ten chapters authored by international researchers in the field from both academia and industry this book offers a series of high quality contributions that collectively address and analyze the state of the art in the security of Cyber Physical Systems and related technologies The chapters themselves include an effective mix of theory and applied content supporting an understanding of the underlying security issues in the CPSs domain alongside related coverage of the technological advances and solutions proposed to address them The chapters comprising the later portion of the book are specifically focused upon a series of case examples evidencing how the protection concepts can translate into practical application

Advances in Computers and Software Engineering: Reviews, Vol. 1 Sergey Y. Yurish, Editor,2018-10-18 Every research and development is started from a state of the art review Such review is one of the most labor and time consuming parts of research especially in high technological areas as computers and software engineering It is strongly necessary to take into account and reflect in the review the current stage of development A researcher must find appropriate references to read it and make a critical analysis to determine what was done well before and what was not solved till now and determine and formulate his future scientific aim and objectives To help researchers save time and taxpayers money we have started to publish Advances in Computers and Software Engineering Reviews open access Book Series The first volume of Advances in Computers and Software Engineering Reviews Book Series contains 6 chapters written by 21 authors from 7 countries Brazil Canada Palestine Slovakia Spain Taiwan and USA Applied Cryptography and Network Security John Ioannidis,2005-05-30 This book constitutes the refereed proceedings of the Third International Conference on Applied Cryptography and Network Security ACNS 2005 held in New York NY USA in June 2005 The 35 revised full papers presented were carefully reviewed and selected from 158 submissions Among the topics covered are authentication key exchange protocols network denial of service digital signatures public key cryptography MACs forensics intrusion detection secure channels identity based encryption network security analysis DES key extraction homomorphic encryption and zero knowledge arguments Information Security Practice and Experience Swee-Huay Heng,Javier Lopez,2019-11-19 This book constitutes the refereed proceedings of the 15th International Conference on Information Security Practice and Experience ISPEC 2019 held in Kuala Lumpur Malaysia in November 2019 The 21 full and 7 short papers presented in this volume were carefully reviewed and selected from 68 submissions They were organized into the following topical sections Cryptography I System and Network Security Security Protocol and Tool Access Control and Authentication Cryptography II Data and User

Privacy Short Paper I and Short Paper II **pfSense 2.x Cookbook** David Zientara,2018-12-17 A practical example driven guide to configuring even the most advanced features of pfSense 2 x Key FeaturesBuild a high availability fault tolerant security system with pfSense 2 xLeverage the latest version of pfSense to secure your cloud environmentA recipe based guide that will help you enhance your on premise and cloud security principlesBook Description pfSense is an open source distribution of the FreeBSD based firewall that provides a platform for flexible and powerful routing and firewalling The versatility of pfSense presents us with a wide array of configuration options which makes determining requirements a little more difficult and a lot more important compared to other offerings pfSense 2 x Cookbook Second Edition starts by providing you with an understanding of how to complete the basic steps needed to render a pfSense firewall operational It starts by showing you how to set up different forms of NAT entries and firewall rules and use aliases and scheduling in firewall rules Moving on you will learn how to implement a captive portal set up in different ways no authentication user manager authentication and RADIUS authentication as well as NTP and SNMP configuration You will then learn how to set up a VPN tunnel with pfSense The book then focuses on setting up traffic shaping with pfSense using either the built in traffic shaping wizard custom floating rules or Snort Toward the end you will set up multiple WAN interfaces load balancing and failover groups and a CARP failover group You will also learn how to bridge interfaces add static routing entries and use dynamic routing protocols via third party packages What you will learnConfigure the essential pfSense services namely DHCP DNS and DDNS Create aliases firewall rules NAT port forward rules and rule schedulesCreate multiple WAN interfaces in load balanced or failover configurationsConfigure firewall redundancy with a CARP firewall failoverConfigure backup restoration and automatic configuration file backupConfigure some services and perform diagnostics with command line utilitiesWho this book is for This book is intended for all levels of network administrators If you are an advanced user of pfSense then you can flip to a particular recipe and quickly accomplish the task at hand if you are new to pfSense on the other hand you can work through the book chapter by chapter and learn all of the features of the system from the ground up **Applied Network Security** Arthur Salmon,Warun Levesque,Michael McLafferty,2017-04-28 Master the art of detecting and averting advanced network security attacks and techniques About This Book Deep dive into the advanced network security attacks and techniques by leveraging tools such as Kali Linux 2 MetaSploit Nmap and Wireshark Become an expert in cracking WiFi passwords penetrating anti virus networks sniffing the network and USB hacks This step by step guide shows you how to confidently and quickly detect vulnerabilities for your network before the hacker does Who This Book Is For This book is for network security professionals cyber security professionals and Pentesters who are well versed with fundamentals of network security and now want to master it So whether you re a cyber security professional hobbyist business manager or student aspiring to becoming an ethical hacker or just want to learn more about the cyber security aspect of the IT industry then this book is definitely for you What You Will Learn Use SET to clone webpages including the login page Understand the concept

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