Fundamentals Of Cryptology A Professional Reference And Interactive Tutorial The Springer International Series In Engineering And Computer Science

Cryptography is one of the most active areas in current mathematics research and applications. This book focuses on cryptography along with two related areas: the study of probabilistic proof systems, and the theory of computational pseudorandomness. Following a common theme that explores the interplay between randomness and computation, the important notions in each field are covered, as well as novel ideas and insights.

After two decades of research and development, elliptic curve cryptography now has widespread exposure and acceptance. Industry, banking, and government standards are in place to facilitate extensive deployment of this efficient public-key mechanism. Anchored by a comprehensive treatment of the practical aspects of elliptic curve cryptography (ECC), this guide explains the basic mathematics, describes state-of-the-art implementation methods, and presents standardized protocols for public-key encryption, digital signatures, and key establishment. In addition, the book addresses some issues that arise in software and hardware implementation, as well as side-channel attacks and countermeasures. Readers receive the theoretical fundamentals as an underpinning for a wealth of practical and accessible knowledge about efficient application. Features & Benefits: * Breadth of coverage and unified, integrated approach to elliptic curve cryptosystems * Describes important industry and government protocols, such as the FIPS 186-2 standard from the U.S. National Institute for Standards and Technology * Provides full exposition on techniques for efficiently implementing finite-field and elliptic curve arithmetic * Distills complex mathematics and algorithms for easy understanding * Includes useful literature references, a list of algorithms, and appendices on sample parameters, ECC standards, and software tools This comprehensive, highly focused reference is a useful and indispensable resource for practitioners, professionals, or researchers in computer science, computer engineering, network design, and network data security.

This book discusses the role of human personality in the study of behavioral cybersecurity for non-specialists. Since the introduction and proliferation of the Internet, cybersecurity maintenance issues have grown exponentially. The importance of behavioral cybersecurity has recently been amplified by current events, such as misinformation and cyber-attacks related to election interference in the United States and internationally. More recently, similar issues have occurred in the context of the COVID-19 pandemic. The book presents profiling approaches, offers case studies of major cybersecurity events and provides analysis of password attacks and defenses. Discussing psychological methods used to assess behavioral cybersecurity, alongside risk management, the book also describes game theory and its applications, explores the role of cryptology and steganography in attack and defense scenarios and brings the reader up to date with current research into motivation and attacker/defender personality traits. Written for practitioners in the field, alongside nonspecialists with little prior knowledge of cybersecurity, computer science, or psychology, the book will be of interest to all who need to protect their computing environment from cyber-attacks. The book also provides source materials for courses in this growing area of behavioral cybersecurity.

Beginning with an introduction to cryptography, Hardware Security: Design, Threats, and Safeguards explains the underlying mathematical principles needed to design complex cryptographic algorithms. It then presents efficient cryptographic algorithm implementation methods, along with state-of-the-art research and strategies for the design of very large scale integrated (VLSI) circuits and symmetric cryptosystems, complete with examples of Advanced Encryption Standard (AES) ciphers, asymmetric ciphers, and elliptic curve cryptography (ECC). Gain a Comprehensive Understanding of Hardware Security—from Fundamentals to Practical Applications Since most implementations of standard cryptographic algorithms leak information that can be exploited by adversaries to gather knowledge about secret encryption keys, Hardware Security: Design, Threats, and Safeguards: Details algorithmic- and circuit-level countermeasures for attacks based on power, timing, fault, cache, and scan chain analysis Describes hardware intellectual property piracy and protection techniques at different levels of abstraction based on watermarking Discusses hardware obfuscation and physically unclonable functions (PUFs), as well as Trojan modeling, taxonomy, detection, and prevention Design for Security and Meet Real-Time Requirements If you consider security as critical a metric for integrated circuits (ICs) as power, area, and performance, you'll embrace the design-for-security methodology of Hardware Security: Design, Threats, and Safeguards.

Proof techniques in cryptography are very difficult to understand, even for students or researchers who major in cryptography. In addition, in contrast to the excessive emphases on the security proofs of the cryptographic schemes, practical aspects of them have received comparatively less attention. This book addresses these two issues by providing detailed, structured proofs and demonstrating examples, applications and implementations of the schemes, so that students and practitioners may obtain a practical view of the schemes. Seong Oun Hwang is a professor in the Department of Computer Engineering and director of Artificial Intelligence Security Research Center, Gachon University, Korea. He received the Ph.D. degree in computer science from the Korea Advanced Institute of Science and Technology (KAIST), Korea. His research interests include cryptography, cybersecurity, networks, and machine learning. Intae Kim is an associate research fellow at the Institute of Cybersecurity and Cryptology, University of Wollongong, Australia. He received the Ph.D. degree in electronics and computer engineering from Hongik University, Korea. His research interests include cryptography, cybersecurity, and networks. Wai Kong Lee is an assistant professor in UTAR (University Tunku Abdul Rahman), Malaysia. He received the Ph.D. degree in engineering from UTAR, Malaysia. In between 2009 – 2012, he served as an R&D engineer in several multinational companies including Agilent Technologies (now known as Keysight) in Malaysia. His research

interests include cryptography engineering, GPU computing, numerical algorithms, Internet of Things (IoT) and energy harvesting.

Gain the skills and knowledge needed to create effective data security systems This book updates readers with all the tools, techniques, and concepts needed to understand and implement data security systems. It presents a wide range of topics for a thorough understanding of the factors that affect the efficiency of secrecy, authentication, and digital signature schema. Most importantly, readers gain hands-on experience in cryptanalysis and learn how to create effective cryptographic systems. The author contributed to the design and analysis of the Data Encryption Standard (DES), a widely used symmetric-key encryption algorithm. His recommendations are based on firsthand experience of what does and does not work. Thorough in its coverage, the book starts with a discussion of the history of cryptography, including a description of the basic encryption systems and many of the cipher systems used in the twentieth century. The author then discusses the theory of symmetric- and public-key cryptography. Readers not only discover what cryptography can do to protect sensitive data, but also learn the practical limitations of the technology. The book ends with two chapters that explore a wide range of cryptography applications. Three basic types of chapters are featured to facilitate learning: Chapters that develop technical skills Chapters that describe a cryptosystem and present a method of analysis Chapters that describe a cryptosystem, present a method of analysis, and provide problems to test your grasp of the material and your ability to implement practical solutions With consumers becoming increasingly wary of identity theft and companies struggling to develop safe, secure systems, this book is essential reading for professionals in e-commerce and information technology. Written by a professor who teaches cryptography, it is also ideal for students.

Nigel Smartâ¬"s Cryptography provides the rigorous detail required for advanced cryptographic studies, yet approaches the subject matter in an accessible style in order to gently guide new students through difficult mathematical topics.

Group theoretic problems have propelled scientific achievements across a wide range of fields, including mathematics, physics, chemistry, and the life sciences. Many cryptographic constructions exploit the computational hardness of group theoretical problems, and the area is viewed as a potential source of quantum-resilient cryptographic primitives

This book discusses the current technologies of cryptography using DNA computing. Various chapters of the book will discuss the basic concepts of cryptography, steganography, basic concepts of DNA and DNA computing, approaches of DNA computing in cryptography, security attacks, practical implementaion of DNA computing, applications of DNA computing in the cloud computing environment, applications of DNA computing for big data, etc. It provides a judicious mix of concepts, solved examples and real life case studies.

This book provides a comprehensive introduction to blockchain and distributed ledger technology. Intended as an applied guide for hands-on practitioners, the book includes detailed examples and in-depth explanations of how to build and run a blockchain from scratch. Through its conceptual background and hands-on exercises, this book allows students, teachers and crypto enthusiasts to launch their first blockchain while assuming prior knowledge of the underlying technology. How do I build a blockchain? How do I mint a cryptocurrency? How do I write a smart contract? How do I launch an initial coin offering (ICO)? These are some of questions this book answers. Starting by outlining the beginnings and development of early cryptocurrencies, it provides the conceptual foundations required to engineer secure software that interacts with both public and private ledgers. The topics covered include consensus algorithms, mining and decentralization, and many more. "This is a one-of-a-kind book on Blockchain technology. The authors achieved the perfect balance between the breadth of topics and the depth of technical discussion. But the real gem is the set of carefully curated hands-on exercises that guide the reader through the process of building a Blockchain right from Chapter 1." Volodymyr Babich, Professor of Operations and Information Management, McDonough School of Business, Georgetown University "An excellent introduction of DLT technology for a non-technical audience. The book is replete with examples and exercises, which greatly facilitate the learning of the underlying processes of blockchain technology for all, from students to entrepreneurs." Serguei Netessine, Dhirubhai Ambani Professor of Innovation and Entrepreneurship, The Wharton School, University of Pennsylvania "Whether you want to start from scratch or deepen your blockchain knowledge about the latest developments, this book is an essential reference. Through clear explanations and practical code examples, the authors take you on a progressive journey to discover the technology foundations and build your own blockchain. From an operations perspective, you can learn the principles behind the distributed ledger technology relevant for transitioning towards blockchain-enabled supply chains. Reading this book, you'll get inspired, be able to assess the applicability of blockchain to supply chain operations, and learn from best practices recognized in real-world examples." Ralf W. Seifert, Professor of Technology and Operations Management at EPFL and Professor of Operations Management at IMD

This book offers ideas to help improve digital technologies and increase their efficiency during implementation and application for researchers and practitioners. The outstanding position of the book among others is that it dwells with cyber-physical systems' progress and proposes ideas and finding around digital tools and technologies and their application. A distinguished contribution is in presenting results on Digital Twins development and application, enhancing approaches of communication and information transferring between cyber-physical systems connected within the Internet of things platforms, computer linguistic as a part of cyber-physical systems, intelligent cybersecurity and computer vision systems. The target audience of this book also includes practitioners and experts, as well as state authorities and representatives of manufacturing and industry who are interested in creating and implementing of cyber-physical systems in framework of digitalization projects. .

User identification and authentication are essential parts of information security. Users must authenticate as they access their computer systems at work or at home every day. Yet do users understand how and why they are actually being authenticated, the security level of the authentication mechanism that they are using, and the potential impacts o

Effective security rules and procedures do not exist for their own sake-they are put in place to protect critical assets, thereby supporting overall business objectives. Recognizing security as a business enabler is the first step in building a successful program. Information Security Fundamentals allows future security professionals to gain a solid understanding of the foundations of the field and the entire range of issues that practitioners must address. This book enables students to understand the key elements that comprise a successful information security program

and eventually apply these concepts to their own efforts. The book examines the elements of computer security, employee roles and responsibilities, and common threats. It examines the need for management controls, policies and procedures, and risk analysis, and also presents a comprehensive list of tasks and objectives that make up a typical information protection program. The volume discusses organizationwide policies and their documentation, and legal and business requirements. It explains policy format, focusing on global, topic-specific, and application-specific policies. Following a review of asset classification, the book explores access control, the components of physical security, and the foundations and processes of risk analysis and risk management. Information Security Fundamentals concludes by describing business continuity planning, including preventive controls, recovery strategies, and ways to conduct a business impact analysis.

Cryptography, as done in this century, is heavily mathematical. But it also has roots in what is computationally feasible. This unique textbook text balances the theorems of mathematics against the feasibility of computation. Cryptography is something one actually "does", not a mathematical game one proves theorems about. There is deep math; there are some theorems that must be proved; and there is a need to recognize the brilliant work done by those who focus on theory. But at the level of an undergraduate course, the emphasis should be first on knowing and understanding the algorithms and how to implement them, and also to be aware that the algorithms must be implemented carefully to avoid the "easy" ways to break the cryptography. This text covers the algorithmic foundations and is complemented by core mathematics and arithmetic.

Here's easy-to-understand book that introduces you to fundamental network security concepts, principles, and terms, while providing you with practical techniques that you can apply on the job. It helps you identify the best type of intrusion detection system for your environment, develop organizational guidelines for passwords, set general computer security policies, and perform a security review and risk assessment .

This monograph on Security in Computing Systems: Challenges, Approaches and Solutions aims at introducing, surveying and assessing the fundamentals of se- rity with respect to computing. Here, "computing" refers to all activities which individuals or groups directly or indirectly perform by means of computing s- tems, i. e. , by means of computers and networks of them built on telecommuni- tion. We all are such individuals, whether enthusiastic or just bowed to the inevitable. So, as part of the "information society", we are challenged to maintain our values, to pursue our goals and to enforce our interests, by consciously desi- ing a "global information infrastructure" on a large scale as well as by approp- ately configuring our personal computers on a small scale. As a result, we hope to achieve secure computing: Roughly speaking, computer-assisted activities of in- viduals and computer-mediated cooperation between individuals should happen as required by each party involved, and nothing else which might be harmful to any party should occur. The notion of security circumscribes many aspects, ranging from human qua- ties to technical enforcement. First of all, in considering the explicit security requirements of users, administrators and other persons concerned, we hope that usually all persons will follow the stated rules, but we also have to face the pos- bility that some persons might deviate from the wanted behavior, whether ac- dently or maliciously.

Cryptography is concerned with the conceptualization, definition, and construction of computing systems that address security concerns. The design of cryptographic systems must be based on firm foundations. Building on the basic tools presented in the first volume, this second volume of Foundations of Cryptography contains a rigorous and systematic treatment of three basic applications: Encryption, Signatures, and General Cryptographic Protocols. It is suitable for use in a graduate course on cryptography and as a reference book for experts. The author assumes basic familiarity with the design and analysis of algorithms; some knowledge of complexity theory and probability is also useful. Also available: Volume I: Basic Tools 0-521-79172-3 Hardback $75.00 C

Cryptography, in particular public-key cryptography, has emerged in the last 20 years as an important discipline that is not only the subject of an enormous amount of research, but provides the foundation for information security in many applications. Standards are emerging to meet the demands for cryptographic protection in most areas of data communications. Public-key cryptographic techniques are now in widespread use, especially in the financial services industry, in the public sector, and by individuals for their personal privacy, such as in electronic mail. This Handbook will serve as a valuable reference for the novice as well as for the expert who needs a wider scope of coverage within the area of cryptography. It is a necessary and timely guide for professionals who practice the art of cryptography. The Handbook of Applied Cryptography provides a treatment that is multifunctional: It serves as an introduction to the more practical aspects of both conventional and public-key cryptography It is a valuable source of the latest techniques and algorithms for the serious practitioner It provides an integrated treatment of the field, while still presenting each major topic as a self-contained unit It provides a mathematical treatment to accompany practical discussions It contains enough abstraction to be a valuable reference for theoreticians while containing enough detail to actually allow implementation of the algorithms discussed Now in its third printing, this is the definitive cryptography reference that the novice as well as experienced developers, designers, researchers, engineers, computer scientists, and mathematicians alike will use.

Tutorial in style, this volume provides a comprehensive survey of the state-of-the-art of the entire field of computer security. It first covers the threats to computer systems; then discusses all the models, techniques, and mechanisms designed to thwart those threats as well as known methods of exploiting vulnerabilities.

The protection of sensitive information against unauthorized access or fraudulent changes has been of prime concern throughout the centuries. Modern communication techniques, using computers connected through networks, make all data even more vulnerable for these threats. Also, new issues have come up that were not relevant before, e. g. how to add a (digital) signature to an electronic document in such a way that the signer can not deny later on that the document was signed by him/her. Cryptology addresses the above issues. It is at the foundation of all information security. The techniques employed to this end have become increasingly mathematical of nature. This book serves as an introduction to modern cryptographic methods. After a brief survey of classical cryptosystems, it concentrates on three main areas. First of all, stream ciphers and block

ciphers are discussed. These systems have extremely fast implementations, but sender and receiver have to share a secret key. Public key cryptosystems (the second main area) make it possible to protect data without a prearranged key. Their security is based on intractable mathematical problems, like the factorization of large numbers. The remaining chapters cover a variety of topics, such as zero-knowledge proofs, secret sharing schemes and authentication codes. Two appendices explain all mathematical prerequisites in great detail. One is on elementary number theory (Euclid's Algorithm, the Chinese Remainder Theorem, quadratic residues, inversion formulas, and continued fractions). The other appendix gives a thorough introduction to finite fields and their algebraic structure.

IT policies are set in place to streamline the preparation and development of information communication technologies in a particular setting. IT Policy and Ethics: Concepts, Methodologies, Tools, and Applications is a comprehensive collection of research on the features of modern organizations in order to advance the understanding of IT standards. This is an essential reference source for researchers, scholars, policymakers, and IT managers as well as organizations interested in carrying out research in IT policies.

For every opportunity presented by the information age, there is an opening to invade the privacy and threaten the security of the nation, U.S. businesses, and citizens in their private lives. The more information that is transmitted in computer-readable form, the more vulnerable we become to automated spying. It's been estimated that some 10 billion words of computer-readable data can be searched for as little as $1. Rival companies can glean proprietary secrets . . . anti-U.S. terrorists can research targets . . . network hackers can do anything from charging purchases on someone else's credit card to accessing military installations. With patience and persistence, numerous pieces of data can be assembled into a revealing mosaic. Cryptography's Role in Securing the Information Society addresses the urgent need for a strong national policy on cryptography that promotes and encourages the widespread use of this powerful tool for protecting of the information interests of individuals, businesses, and the nation as a whole, while respecting legitimate national needs of law enforcement and intelligence for national security and foreign policy purposes. This book presents a comprehensive examination of cryptography--the representation of messages in code--and its transformation from a national security tool to a key component of the global information superhighway. The committee enlarges the scope of policy options and offers specific conclusions and recommendations for decision makers. Cryptography's Role in Securing the Information Society explores how all of us are affected by information security issues: private companies and businesses; law enforcement and other agencies; people in their private lives. This volume takes a realistic look at what cryptography can and cannot do and how its development has been shaped by the forces of supply and demand. How can a business ensure that employees use encryption to protect proprietary data but not to conceal illegal actions? Is encryption of voice traffic a serious threat to legitimate law enforcement wiretaps? What is the systemic threat to the nation's information infrastructure? These and other thought-provoking questions are explored. Cryptography's Role in Securing the Information Society provides a detailed review of the Escrowed Encryption Standard (known informally as the Clipper chip proposal), a federal cryptography standard for telephony promulgated in 1994 that raised nationwide controversy over its "Big Brother" implications. The committee examines the strategy of export control over cryptography: although this tool has been used for years in support of national security, it is increasingly criticized by the vendors who are subject to federal export regulation. The book also examines other less well known but nevertheless critical issues in national cryptography policy such as digital telephony and the interplay between international and national issues. The themes of Cryptography's Role in Securing the Information Society are illustrated throughout with many examples -- some alarming and all instructive -- from the worlds of government and business as well as the international network of hackers. This book will be of critical importance to everyone concerned about electronic security: policymakers, regulators, attorneys, security officials, law enforcement agents, business leaders, information managers, program developers, privacy advocates, and Internet users.

Cryptography has proven to be one of the most contentious areas in modern society. For some, it protects the rights of individuals to privacy and security. For others, it puts up barriers against the protection of our society. This book aims to develop a deep understanding of cryptography and provide understanding of how privacy, identity provision, and integrity can be enhanced with the usage of encryption. The book has many novel features including: full provision of web-based material on almost every topic covered; provision of additional on-line material such as videos, source code, and labs; and coverage of emerging areas such as Blockchain, Light-weight Cryptography, and Zero-knowledge Proofs. Key areas covered include: Fundamentals of Encryption, Public Key Encryption, Symmetric Key Encryption, Hashing Methods, Key Exchange Methods, Digital Certificates and Authentication, Tunneling, Crypto Cracking, Light-weight Cryptography, Blockchain, and Zero-knowledge Proofs. This book provides extensive support through the associated website of: http://asecuritysite.com/encryption

From the exciting history of its development in ancient times to the present day, Introduction to Cryptography with Mathematical Foundations and Computer Implementations provides a focused tour of the central concepts of cryptography. Rather than present an encyclopedic treatment of topics in cryptography, it delineates cryptographic concepts in chronological order, developing the mathematics as needed. Written in an engaging yet rigorous style, each chapter introduces important concepts with clear definitions and theorems. Numerous examples explain key points while figures and tables help illustrate more difficult or subtle concepts. Each chapter is punctuated with "Exercises for the Reader;" complete solutions for these are included in an appendix. Carefully crafted exercise sets are also provided at the end of each chapter, and detailed solutions to most odd-numbered exercises can be found in a designated appendix. The computer implementation section at the end of every chapter guides students through the process of writing their own programs. A supporting website provides an extensive set of sample programs as well as downloadable platform-independent applet pages for some core programs

and algorithms. As the reliance on cryptography by business, government, and industry continues and new technologies for transferring data become available, cryptography plays a permanent, important role in day-to-day operations. This self-contained sophomore-level text traces the evolution of the field, from its origins through present-day cryptosystems, including public key cryptography and elliptic curve cryptography.

Identity Based Encryption (IBE) is a type of public key encryption and has been intensely researched in the past decade. Identity-Based Encryption summarizes the available research for IBE and the main ideas that would enable users to pursue further work in this area. This book will also cover a brief background on Elliptic Curves and Pairings, security against chosen Cipher text Attacks, standards and more. Advanced-level students in computer science and mathematics who specialize in cryptology, and the general community of researchers in the area of cryptology and data security will find Identity-Based Encryption a useful book. Practitioners and engineers who work with real-world IBE schemes and need a proper understanding of the basic IBE techniques, will also find this book a valuable asset.

This self-contained introduction to modern cryptography emphasizes the mathematics behind the theory of public key cryptosystems and digital signature schemes. The book focuses on these key topics while developing the mathematical tools needed for the construction and security analysis of diverse cryptosystems. Only basic linear algebra is required of the reader; techniques from algebra, number theory, and probability are introduced and developed as required. This text provides an ideal introduction for mathematics and computer science students to the mathematical foundations of modern cryptography. The book includes an extensive bibliography and index; supplementary materials are available online. The book covers a variety of topics that are considered central to mathematical cryptography. Key topics include: classical cryptographic constructions, such as Diffie–Hellmann key exchange, discrete logarithm-based cryptosystems, the RSA cryptosystem, and digital signatures; fundamental mathematical tools for cryptography, including primality testing, factorization algorithms, probability theory, information theory, and collision algorithms; an in-depth treatment of important cryptographic innovations, such as elliptic curves, elliptic curve and pairing-based cryptography, lattices, lattice-based cryptography, and the NTRU cryptosystem. The second edition of An Introduction to Mathematical Cryptography includes a significant revision of the material on digital signatures, including an earlier introduction to RSA, Elgamal, and DSA signatures, and new material on lattice-based signatures and rejection sampling. Many sections have been rewritten or expanded for clarity, especially in the chapters on information theory, elliptic curves, and lattices, and the chapter of additional topics has been expanded to include sections on digital cash and homomorphic encryption. Numerous new exercises have been included.

Continuing a bestselling tradition, An Introduction to Cryptography, Second Edition provides a solid foundation in cryptographic concepts that features all of the requisite background material on number theory and algorithmic complexity as well as a historical look at the field. With numerous additions and restructured material, this edition

Discover the first unified treatment of today's most essentialinformation technologies— Compressing, Encrypting, andEncoding With identity theft, cybercrime, and digital file sharingproliferating in today's wired world, providing safe and accurateinformation transfers has become a paramount concern. The issuesand problems raised in this endeavor are encompassed within threedisciplines: cryptography, information theory, anderror-correction. As technology continues to develop, these fieldshave converged at a practical level, increasing the need for aunified treatment of these three cornerstones of the informationage. Stressing the interconnections of the disciplines, Cryptography,Information Theory, and Error-Correction offers a complete, yetaccessible account of the technologies shaping the 21st century.This book contains the most up-to-date, detailed, and balancedtreatment available on these subjects. The authors draw on theirexperience both in the classroom and in industry, giving the book'smaterial and presentation a unique real-world orientation. With its reader-friendly style and interdisciplinary emphasis,Cryptography, Information Theory, and Error-Correction serves asboth an admirable teaching text and a tool for self-learning. Thechapter structure allows for anyone with a high school mathematicseducation to gain a strong conceptual understanding, and provideshigher-level students with more mathematically advanced topics. Theauthors clearly map out paths through the book for readers of alllevels to maximize their learning. This book: Is suitable for courses in cryptography, information theory, orerror-correction as well as courses discussing all three areas Provides over 300 example problems with solutions Presents new and exciting algorithms adopted by industry Discusses potential applications in cell biology Details a new characterization of perfect secrecy Features in-depth coverage of linear feedback shift registers(LFSR), a staple of modern computing Follows a layered approach to facilitate discussion, withsummaries followed by more detailed explanations Provides a new perspective on the RSA algorithm Cryptography, Information Theory, and Error-Correction is anexcellent in-depth text for both graduate and undergraduatestudents of mathematics, computer science, and engineering. It isalso an authoritative overview for IT professionals, statisticians,mathematicians, computer scientists, electrical engineers,entrepreneurs, and the generally curious.

Through three editions, Cryptography: Theory and Practice, has been embraced by instructors and students alike. It offers a comprehensive primer for the subject's fundamentals while presenting the most current advances in cryptography. The authors offer comprehensive, in-depth treatment of the methods and protocols that are vital to safeguarding the seemingly infinite and increasing amount of information circulating around the world. Key Features of the Fourth Edition: New chapter on the exciting, emerging new area of post-quantum cryptography (Chapter 9). New high-level, nontechnical overview of the goals and tools of cryptography (Chapter 1). New mathematical appendix that summarizes definitions and main results on number theory and algebra (Appendix A). An expanded treatment of stream ciphers, including common design techniques along with coverage of Trivium. Interesting attacks on cryptosystems, including: padding oracle attack correlation attacks and algebraic attacks on stream ciphers attack on the DUAL-EC

random bit generator that makes use of a trapdoor. A treatment of the sponge construction for hash functions and its use in the new SHA-3 hash standard. Methods of key distribution in sensor networks. The basics of visual cryptography, allowing a secure method to split a secret visual message into pieces (shares) that can later be combined to reconstruct the secret. The fundamental techniques cryptocurrencies, as used in Bitcoin and blockchain. The basics of the new methods employed in messaging protocols such as Signal, including deniability and Diffie-Hellman key ratcheting.

With the prevalence of digital information, IT professionals have encountered new challenges regarding data security. In an effort to address these challenges and offer solutions for securing digital information, new research on cryptology methods is essential. Multidisciplinary Perspectives in Cryptology and Information Security considers an array of multidisciplinary applications and research developments in the field of cryptology and communication security. This publication offers a comprehensive, in-depth analysis of encryption solutions and will be of particular interest to IT professionals, cryptologists, and researchers in the field.

Cryptography is now ubiquitous – moving beyond the traditional environments, such as government communications and banking systems, we see cryptographic techniques realized in Web browsers, e-mail programs, cell phones, manufacturing systems, embedded software, smart buildings, cars, and even medical implants. Today's designers need a comprehensive understanding of applied cryptography. After an introduction to cryptography and data security, the authors explain the main techniques in modern cryptography, with chapters addressing stream ciphers, the Data Encryption Standard (DES) and 3DES, the Advanced Encryption Standard (AES), block ciphers, the RSA cryptosystem, public-key cryptosystems based on the discrete logarithm problem, elliptic-curve cryptography (ECC), digital signatures, hash functions, Message Authentication Codes (MACs), and methods for key establishment, including certificates and public-key infrastructure (PKI). Throughout the book, the authors focus on communicating the essentials and keeping the mathematics to a minimum, and they move quickly from explaining the foundations to describing practical implementations, including recent topics such as lightweight ciphers for RFIDs and mobile devices, and current key-length recommendations. The authors have considerable experience teaching applied cryptography to engineering and computer science students and to professionals, and they make extensive use of examples, problems, and chapter reviews, while the book's website offers slides, projects and links to further resources. This is a suitable textbook for graduate and advanced undergraduate courses and also for self-study by engineers.

Electronic commerce is here to stay. No matter how big the dot-com crisis was or how far the e-entrepreneurs' shares fell in the market, the fact remains that there is still confidence in electronic trading. At least it would appear that investors are confident in e-companies again. However, not only trust of venture capitalists is of importance -- consumers also have to have faith in on-line business. After all, without consumers there is no e-business. Interacting lawyers, technicians and economists are needed to create a trustworthy electronic commerce environment. To achieve this environment, thorough and inter-disciplinary research is required and that is exactly what this book is about. Researchers of the project Enabling Electronic Commerce from the Dutch universities of Tilburg and Eindhoven have chosen a number of e-topics to elaborate on trust from their point of view. This volume makes clear that the various disciplines can and will play a role in developing conditions for trust and thus contribute to a successful electronic market.

The annual International Conference on Global Security, Safety and Sustainability (ICGS3) is an established platform in which security, safety and sustainability issues can be examined from several global perspectives through dialogue between acad- ics, students, government representatives, chief executives, security professionals, and research scientists from the United Kingdom and from around the globe. The three-day conference focused on the challenges of complexity, rapid pace of change and risk/opportunity issues associated with modern products, systems, special events and infrastructures. The importance of adopting systematic and systemic - proaches to the assurance of these systems was emphasized within a special stream focused on strategic frameworks, architectures and human factors. The conference provided an opportunity for systems scientists, assurance researchers, owners, ope- tors and maintainers of large, complex and advanced systems and infrastructures to update their knowledge on the state of best practice in these challenging domains while networking with the leading researchers and solution providers. ICGS3 2010 received paper submissions from more than 17 different countries in all continents. Only 31 papers were selected and were presented as full papers. The program also included a number of keynote lectures by leading researchers, security professionals and government representatives.

This practical guide to modern encryption breaks down the fundamental mathematical concepts at the heart of cryptography without shying away from meaty discussions of how they work. You'll learn about authenticated encryption, secure randomness, hash functions, block ciphers, and public-key techniques such as RSA and elliptic curve cryptography. You'll also learn: - Key concepts in cryptography, such as computational security, attacker models, and forward secrecy - The strengths and limitations of the TLS protocol behind HTTPS secure websites - Quantum computation and post-quantum cryptography - About various vulnerabilities by examining numerous code examples and use cases - How to choose the best algorithm or protocol and ask vendors the right questions Each chapter includes a discussion of common implementation mistakes using real-world examples and details what could go wrong and how to avoid these pitfalls. Whether you're a seasoned practitioner or a beginner looking to dive into the field, Serious Cryptography will provide a complete survey of modern encryption and its applications.

This book discusses the implications of new technologies for a secured society. As such, it reflects the main focus of the International Conference on Ethical Hacking, eHaCon 2018, which is essentially in evaluating the security of computer systems using penetration testing techniques. Showcasing the most outstanding research papers presented at the conference, the book shares new findings on computer network attacks and defenses, commercial security solutions, and hands-on, real-world security experience. The

respective sections include network security, ethical hacking, cryptography, digital forensics, cloud security, information security, mobile communications security, and cyber security.

Introduces aspects on security threats and their countermeasures in both fixed and wireless networks, advising on how countermeasures can provide secure communication infrastructures. Enables the reader to understand the risks of inappropriate network security, what mechanisms and protocols can be deployed to counter these risks, and how these mechanisms and protocols work.

This book constitutes the refereed proceedings of the Second International Conference on Interactive Theorem proving, ITP 2011, held in Berg en Dal, The Netherlands, in August 2011. The 25 revised full papers presented were carefully reviewed and selected from 50 submissions. Among the topics covered are counterexample generation, verification, validation, term rewriting, theorem proving, computability theory, translations from one formalism to another, and cooperation between tools. Several verification case studies were presented, with applications to computational geometry, unification, real analysis, etc.

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