Reliability Of Computer Systems And Networks Fault Tolerance Analysis And Design

Railway Safety, Reliability, and Security: Technologies and Systems EngineeringPractical System ReliabilityCross-Layer Reliability of Computing SystemsDependability: Basic Concepts and TerminologyGuide to Reliable Internet Services and ApplicationsStochastic Models in Reliability, Network Security and System SafetyReliability in Computer System DesignSystems EngineeringSystem Software ReliabilityDesign for ReliabilityReliability of Computer Systems and NetworksSecurity, Privacy and Reliability in Computer Communications and NetworksReliability of Computer Systems and NetworksComputing System ReliabilityComputer Safety, Reliability, and SecurityJustifying the Dependability of Computer-based SystemsReliability Modeling With Computer And Maintenance ApplicationsReliable Distributed SystemsAccuracy and Reliability in Scientific ComputingReliability Engineering for Electronic DesignBeyond RedundancyComputer Systems ReliabilityBuilding Secure and Reliable Network ApplicationsDesign and Analysis of Reliable and Fault-Tolerant Computer SystemsSite Reliability EngineeringReliability of Computer and Control SystemsPerformance and Reliability Analysis of Computer SystemsSoftware Reliability MethodsSystems Reliability and Usability for EngineersReliability in ComputingProbability and Statistics with Reliability, Queuing, and Computer Science ApplicationsMultistate System Reliability with DependenciesReliability and Availability of Cloud ComputingAchieving Safety and Reliability with Computer SystemsRecent Advancements in Software Reliability AssuranceAssessing the Reliability of Computer-Processed DataReliable Computer SystemsPrinciples of Computer System DesignAdvances in System Reliability EngineeringComputer System Reliability

Railway Safety, Reliability, and Security: Technologies and Systems Engineering

Performance and Reliability Analysis of Computer Systems: An Example-Based Approach Using the SHARPE Software Package provides a variety of probabilistic, discrete-state models used to assess the reliability and performance of computer and communication systems. The models included are combinatorial reliability models (reliability block diagrams, fault trees and reliability graphs), directed, acyclic task precedence graphs, Markov and semi-Markov models (including Markov reward models), product-form queueing networks and generalized stochastic Petri nets. A practical approach to system modeling is followed; all of the examples described are solved and analyzed using the SHARPE tool. In structuring the book, the authors have been careful to provide the reader with a methodological approach to analytical modeling techniques. These techniques are not seen as alternatives but rather as an integral part of a single process of assessment which, by hierarchically combining results from different kinds of models, makes it possible to use state-space methods for those parts of a system that require them and non-state-space methods for the more well-behaved parts of the system. The SHARPE (Symbolic Hierarchical Automated Reliability and Performance Evaluator) package is the `toolchest' that allows the authors to

specify stochastic models easily and solve them quickly, adopting model hierarchies and very efficient solution techniques. All the models described in the book are specified and solved using the SHARPE language; its syntax is described and the source code of almost all the examples discussed is provided. Audience: Suitable for use in advanced level courses covering reliability and performance of computer and communications systems and by researchers and practicing engineers whose work involves modeling of system performance and reliability.

Practical System Reliability

Reliability has always been a major concern in designing computing systems. However, the increasing complexity of such systems has led to a situation where efforts for assuring reliability have become extremely costly, both for the design of solutions for the mitigation of possible faults, and for the reliability assessment of such techniques. Cross-layer reliability is fast becoming the preferred solution. In a cross-layer resilient system, physical and circuit level techniques can mitigate low-level faults. Hardware redundancy can be used to manage errors at the hardware architecture layer. Eventually, software implemented error detection and correction mechanisms can manage those errors that escaped the lower layers of the stack. This book presents state-of-the-art solutions for increasing the resilience of computing systems, both at single levels of abstraction and multi-layers. The book begins by addressing design techniques to improve the resilience of computing systems, covering the logic layer, the architectural layer and the software layer. The second part of the book focuses on cross-layer resilience, including coverage of physical stress, reliability assessment approaches, fault injection at the ISA level, analytical modelling for cross-later resiliency, and stochastic methods. Cross-Layer Reliability of Computing Systems is a valuable resource for researchers, postgraduate students and professional computer architects focusing on the dependability of computing systems.

Cross-Layer Reliability of Computing Systems

This book addresses the needs of electronic design engineers, reliability engineers, and their respective managers, stressing a pragmatic viewpoint rather than a vigorous mathematical presentation.

Dependability: Basic Concepts and Terminology

Explains fault tolerance in clear terms, with concrete examples drawn from real-world settings Highly practical focus aimed at building "mission-critical" networked applications that remain secure

Guide to Reliable Internet Services and Applications

Stochastic Models in Reliability, Network Security and System Safety

Multistate System Reliability with Dependencies explains how to select a model of

load sharing that best describes the impact of changes in reliability states of components. This is mainly achieved via a generalization of two-state system reliability analysis, where equal load sharing and local load sharing rules are commonly used. The material covers basic concepts of traditional reliability theory, including the concept of probability, failures, series and parallel systems, k-out-of-n systems, and more. It features cutting-edge theorems on the reliability analysis of multistate systems that take into account component degradation and dependencies between subsystems and components in subsystems. Other themes addressed include renewable systems and the availability analysis of multistate systems. Combining results of the reliability analysis of multistate systems with dependent components and the results of the classical renewal theory, the availability analysis of multistate systems under the assumption of imperfect renovation is also provided. Provides a thorough introduction to, and review of, recent research developments across multistate systems and systems with component dependencies Comprehensively addresses various manifestations of the load sharing system at component and system level, including models to describe them Explains how to evaluate the reliability and risk of systems with load-sharing effects

Reliability in Computer System Design

Covering both the theoretical and practical aspects of fault-tolerant mobile systems, and fault tolerance and analysis, this book tackles the current issues of reliability-based optimization of computer networks, fault-tolerant mobile systems, and fault tolerance and reliability of high speed and hierarchical networks. The book is divided into six parts to facilitate coverage of the material by course instructors and computer systems professionals. The sequence of chapters in each part ensures the gradual coverage of issues from the basics to the most recent developments. A useful set of references, including electronic sources, is listed at the end of each chapter. Contents:Fundamental Concepts in Fault Tolerance and Reliability AnalysisFault Modeling, Simulation and DiagnosisError Control and Self-Checking CircuitsFault Tolerance in Multiprocessor SystemsFault-Tolerant Routing in Multi-Computer NetworksFault Tolerance and Reliability in Hierarchical Interconnection NetworksFault Tolerance and Reliability of Computer NetworksFault Tolerance in High Speed Switching NetworksFault Tolerance in Distributed and Mobile Computing SystemsFault Tolerance in Mobile NetworksReliability and Yield Enhancement of VLSI/WSI CircuitsDesign of fault-tolerant Processor ArraysAlgorithm-Based Fault ToleranceSystem Level Diagnosis ISystem Level Diagnosis IIFault Tolerance and Reliability of RAID SystemsHigh Availability in Computer Systems Readership: Computer engineers, computer scientists, information scientists, graduate and senior undergraduate students in information science and computer engineering. Keywords:Fault Tolerance;Reliability;Availability;Fault Modeling;Fault Diagnosis;Network ReliabilityKey Features:Comprehensive coverage of issues in fault tolerance and reliability analysisSimple treatment of difficult issues via examples with figures, tables and graphs

Systems Engineering

The overwhelming majority of a software system’s lifespan is spent in use, not in

design or implementation. So, why does conventional wisdom insist that software engineers focus primarily on the design and development of large-scale computing systems? In this collection of essays and articles, key members of Google's Site Reliability Team explain how and why their commitment to the entire lifecycle has enabled the company to successfully build, deploy, monitor, and maintain some of the largest software systems in the world. You'll learn the principles and practices that enable Google engineers to make systems more scalable, reliable, and efficient—lessons directly applicable to your organization. This book is divided into four sections: Introduction—Learn what site reliability engineering is and why it differs from conventional IT industry practices Principles—Examine the patterns, behaviors, and areas of concern that influence the work of a site reliability engineer (SRE) Practices—Understand the theory and practice of an SRE's day-to-day work: building and operating large distributed computing systems Management—Explore Google's best practices for training, communication, and meetings that your organization can use

System Software Reliability

A holistic approach to service reliability and availability of cloud computing Reliability and Availability of Cloud Computing provides IS/IT system and solution architects, developers, and engineers with the knowledge needed to assess the impact of virtualization and cloud computing on service reliability and availability. It reveals how to select the most appropriate design for reliability diligence to assure that user expectations are met. Organized in three parts (basics, risk analysis, and recommendations), this resource is accessible to readers of diverse backgrounds and experience levels. Numerous examples and more than 100 figures throughout the book help readers visualize problems to better understand the topic—and the authors present risks and options in bulleted lists that can be applied directly to specific applications/problems. Special features of this book include: Rigorous analysis of the reliability and availability risks that are inherent in cloud computing Simple formulas that explain the quantitative aspects of reliability and availability Enlightening discussions of the ways in which virtualized applications and cloud deployments differ from traditional system implementations and deployments Specific recommendations for developing reliable virtualized applications and cloud-based solutions Reliability and Availability of Cloud Computing is the guide for IS/IT staff in business, government, academia, and non-governmental organizations who are moving their applications to the cloud. It is also an important reference for professionals in technical sales, product management, and quality management, as well as software and quality engineers looking to broaden their expertise.

Design for Reliability

This book constitutes the refereed proceedings of five workshops co-located with SAFECOMP 2017, the 36th International Conference on Computer Safety, Reliability, and Security, held in Trento, Italy, in September 2017. The 38 revised full papers presented together with 5 introductory papers to each workshop, and three invited papers, were carefully reviewed and selected from 49 submissions. This year's workshops are: ASSURE 2017 – Assurance Cases for Software-Intensive Systems; DECSoS 2017 – ERCIM/EWICS/ARTEMIS Dependable Embedded and Cyber-

Physical Systems and Systems-of-Systems; SASSUR 2017 – Next Generation of System Assurance Approaches for Safety-Critical Systems; TIPS 2017 – Timing Performance in Safety Engineering; TELERISE 2017 Technical and legal Aspects of Data Privacy and Security.

Reliability of Computer Systems and Networks

Enhance your hardware/software reliability Enhancement of system reliability has been a major concern of computer users and designers ¦ and this major revision of the 1982 classic meets users' continuing need for practical information on this pressing topic. Included are case studies of reliable systems from manufacturers such as Tandem, Stratus, IBM, and Digital, as well as coverage of special systems such as the Galileo Orbiter fault protection system and AT&T telephone switching processors.

Security, Privacy and Reliability in Computer Communications and Networks

With computers becoming embedded as controllers in everything from network servers to the routing of subway schedules to NASA missions, there is a critical need to ensure that systems continue to function even when a component fails. In this book, bestselling author Martin Shooman draws on his expertise in reliability engineering and software engineering to provide a complete and authoritative look at fault tolerant computing. He clearly explains all fundamentals, including how to use redundant elements in system design to ensure the reliability of computer systems and networks. Market: Systems and Networking Engineers, Computer Programmers, IT Professionals.

Reliability of Computer Systems and Networks

Principles of Computer System Design is the first textbook to take a principles-based approach to the computer system design. It identifies, examines, and illustrates fundamental concepts in computer system design that are common across operating systems, networks, database systems, distributed systems, programming languages, software engineering, security, fault tolerance, and architecture. Through carefully analyzed case studies from each of these disciplines, it demonstrates how to apply these concepts to tackle practical system design problems. To support the focus on design, the text identifies and explains abstractions that have proven successful in practice such as remote procedure call, client/service organization, file systems, data integrity, consistency, and authenticated messages. Most computer systems are built using a handful of such abstractions. The text describes how these abstractions are implemented, demonstrates how they are used in different systems, and prepares the reader to apply them in future designs. The book is recommended for junior and senior undergraduate students in Operating Systems, Distributed Systems, Distributed Operating Systems and/or Computer Systems Design courses; and professional computer systems designers. Features: Concepts of computer system design guided by fundamental principles. Cross-cutting approach that identifies abstractions common to networking, operating systems, transaction systems,

distributed systems, architecture, and software engineering. Case studies that make the abstractions real: naming (DNS and the URL); file systems (the UNIX file system); clients and services (NFS); virtualization (virtual machines); scheduling (disk arms); security (TLS). Numerous pseudocode fragments that provide concrete examples of abstract concepts. Extensive support. The authors and MIT OpenCourseWare provide on-line, free of charge, open educational resources, including additional chapters, course syllabi, board layouts and slides, lecture videos, and an archive of lecture schedules, class assignments, and design projects.

Computing System Reliability

Computer software reliability has never been so important. Computers are used in areas as diverse as air traffic control, nuclear reactors, real-time military, industrial process control, security system control, biometric scan-systems, automotive, mechanical and safety control, and hospital patient monitoring systems. Many of these applications require critical functionality as software applications increase in size and complexity. This book is an introduction to software reliability engineering and a survey of the state-of-the-art techniques, methodologies and tools used to assess the reliability of software and combined software-hardware systems. Current research results are reported and future directions are signposted. This text will interest: graduate students as a course textbook introducing reliability engineering software; reliability engineers as a broad, up-to-date survey of the field; and researchers and lecturers in universities and research institutions as a one-volume reference.

Computer Safety, Reliability, and Security

Learn how to model, predict, and manage system reliability/availability throughout the development life cycle Written by a panel of authors with a wealth of industry experience, the methods and concepts presented here give readers a solid understanding of modeling and managing system and software availability and reliability through the development of real applications and products. The modeling and prediction techniques and tools are customer-focused and data-driven, and are also aligned with industry standards (Telcordia, TL 9000, ISO, etc.). Readers will get a clear understanding about what real-world reliability and availability mean through step-by-step discussions of: System availability Conceptual model of reliability and availability Why availability varies between customers Modeling availability Estimating parameters and availability from field data Estimating input parameters from laboratory data Estimating input parameters in the architecture/design stage Prediction accuracy Connecting the dots This book can be used by system architects, engineers, and developers to better understand and manage the reliability/availability of their products; quality engineers to grasp how software and hardware quality relate to system availability; and engineering students as part of a short course on system availability and software reliability.

Justifying the Dependability of Computer-based Systems

Perspectives in Computing, Vol. 19: Reliability in Computing: The Role of Interval Methods in Scientific Computing presents a survey of the role of interval methods in reliable scientific computing, including vector arithmetic, language description, convergence, and algorithms. The selection takes a look at arithmetic for vector processors, FORTRAN-SC, and reliable expression evaluation in PASCAL-SC. Discussions focus on interval arithmetic, optimal scalar product, matrix and vector arithmetic, transformation of arithmetic expressions, development of FORTRAN-SC, and language description with examples. The text then examines floating-point standards, algorithms for verified inclusions, applications of differentiation arithmetic, and interval acceleration of convergence. The book ponders on solving systems of linear interval equations, interval least squares, existence of solutions and iterations for nonlinear equations, and interval methods for algebraic equations. Topics include interval methods for single equations, diagnosing collinearity, interval linear equations, effects of nonlinearity, and bounding the solutions. The publication is a valuable source of data for computer science experts and researchers interested in the role of interval methods in reliable scientific computing.

Reliability Modeling With Computer And Maintenance Applications

System reliability, availability and robustness are often not well understood by system architects, engineers and developers. They often don't understand what drives customer's availability expectations, how to frame verifiable availability/robustness requirements, how to manage and budget availability/robustness, how to methodically architect and design systems that meet robustness requirements, and so on. The book takes a very pragmatic approach of framing reliability and robustness as a functional aspect of a system so that architects, designers, developers and testers can address it as a concrete, functional attribute of a system, rather than an abstract, non-functional notion.

Reliable Distributed Systems

Engineering systems are an important element of world economy. Each year billions of dollars are spent to develop, manufacture, operate, and maintain various types of engineering systems about the globe. The reliability and usability of these systems have become important because of their increasing complexity, sophistication, and non-specialist users. Global competition and other factors are forcing manufacturers to produce highly reliable and usable engineering systems. Along with examples and solutions, this book integrates engineering systems reliability and usability into a single volume for those individuals that directly or indirectly are concerned with these areas.

Accuracy and Reliability in Scientific Computing

An oft-repeated adage among telecommunication providers goes, “There are ve things that matter: reliability, reliability, reliability, time to market, and cost. If you can’t do all ve, at least do the rst three. ” Yet, designing and operating reliable networks and services is a Herculean task. Building truly reliable components is

unacceptably expensive, forcing us to c- struct reliable systems out of unreliable components. The resulting systems are inherently complex, consisting of many different kinds of components running a variety of different protocols that interact in subtle ways. Inter-networkssuch as the Internet span multiple regions of administrative control, from campus and cor- rate networks to Internet Service Providers, making good end-to-end performance a shared responsibility borne by sometimes uncooperative parties. Moreover, these networks consist not only of routers, but also lower-layer devices such as optical switches and higher-layer components such as rewalls and proxies. And, these components are highly con gurable, leaving ample room for operator error and buggy software. As if that were not dif cult enough, end users understandably care about the performance of their higher-level applications, which has a complicated relationship with the behavior of the underlying network. Despite these challenges, researchers and practitioners alike have made trem- dous strides in improving the reliability of modern networks and services.

Reliability Engineering for Electronic Design

An accessible introduction to probability, stochastic processes, and statistics for computer science and engineering applications Second edition now also available in Paperback. This updated and revised edition of the popular classic first edition relates fundamental concepts in probability and statistics to the computer sciences and engineering. The author uses Markov chains and other statistical tools to illustrate processes in reliability of computer systems and networks, fault tolerance, and performance. This edition features an entirely new section on stochastic Petri nets—as well as new sections on system availability modeling, wireless system modeling, numerical solution techniques for Markov chains, and software reliability modeling, among other subjects. Extensive revisions take new developments in solution techniques and applications into account and bring this work totally up to date. It includes more than 200 worked examples and self-study exercises for each section. Probability and Statistics with Reliability, Queuing and Computer Science Applications, Second Edition offers a comprehensive introduction to probability, stochastic processes, and statistics for students of computer science, electrical and computer engineering, and applied mathematics. Its wealth of practical examples and up-to-date information makes it an excellent resource for practitioners as well. An Instructor's Manual presenting detailed solutions to all the problems in the book is available from the Wiley editorial department.

Beyond Redundancy

While geographic redundancy can obviously be a huge benefit for disaster recovery, it is far less obvious what benefit is feasible and likely for more typical non-catastrophic hardware, software, and human failures. Georedundancy and Service Availability provides both a theoretical and practical treatment of the feasible and likely benefits of geographic redundancy for both service availability and service reliability. The text provides network/system planners, IS/IT operations folks, system architects, system engineers, developers, testers, and other industry practitioners with a general discussion about the capital expense/operating expense tradeoff that frames system redundancy and georedundancy.

Computer Systems Reliability

The aim of this book is to provide a platform to academicians, practitioners, and researchers to understand current and future trends in software reliability growth modeling. Emphasis will be on qualitative work relevant to the theme with particular importance given to mathematical modeling for software reliability and various methods and applications of multi attributed decision making in governing the software performance. Presents software quality and security models Offers reliability analysis, assurance techniques for software systems Covers methodologies, tools, and practical applications of software reliability modeling and testing resources Includes robust reliability design techniques, diagnostic, and decision support Discusses stochastic modelling for software systems

Building Secure and Reliable Network Applications

The safe operation of computer systems, in both their software and hardware continues to be a key issue in many real time applications, when people, environment, investment or goodwill can be at risk. Such applications include the monitoring and control of high energy processes, of nuclear and chemical plants, of factory automation, of transportation systems, or funds transfer and of communication and information systems. This book represents the proceedings of the 1987 Safety and Reliability Society Symposium held in Altrincham, UK, 11-12 November 1987. It is thus part of the series of proceedings for Society Events, which in previous years have not addressed the topic of the Safety and Reliability of Computer Systems. The book is also part of another series of reports, and is closely related to the Elsevier Book "Safety and Reliability of Programmable Electronic Systems" which I edited in 1986, and the series of workshops known as SAFECOMP held in 1979, 1982, 1983, 1985, 1986 which are referenced in some of the papers. The structure of the book represents the structure of the Symposium itself. The session titles, and the papers as selected represent the current practice in many industries. The trend is towards more industrial usage of Formal Methods, and tools to support these methods, whilst continuing to make best use of Software Engineering, Safety and Reliability Assessment, and accumulated experience.

Design and Analysis of Reliable and Fault-Tolerant Computer Systems

This book is dedicated to Jinhua Cao on the occasion of his 80th birthday. Jinhua Cao is one of the most famous reliability theorists. His main contributions include: published over 100 influential scientific papers; published an interesting reliability book in Chinese in 1986, which has greatly influenced the reliability of education, academic research and engineering applications in China; initiated and organized Reliability Professional Society of China (the first part of Operations Research Society of China) since 1981. The high admiration that Professor Cao enjoys in the reliability community all over the world was witnessed by the enthusiastic response of each contributor in this book. The contributors are leading researchers with diverse research perspectives. The research areas of the book iclude a broad range of topics related to reliability models, queueing theory, manufacturing

systems, supply chain finance, risk management, Markov decision processes, blockchain and so forth. The book consists of a brief Preface describing the main achievements of Professor Cao; followed by congratulations from Professors Way Kuo and Wei Wayne Li, and by Operations Research Society of China, and Reliability Professional Society of China; and further followed by 25 articles roughly grouped together. Most of the articles are written in a style understandable to a wide audience. This book is useful to anyone interested in recent developments in reliability, network security, system safety, and their stochastic modeling and analysis.

Site Reliability Engineering

The development of Reliability and Maintenance theory and applications has become major concerns of engineers and managers engaged in order to design and product systems that are highly reliable. This book aims to cover the ongoing research topics in computer system, reliability analysis, reliability applications and maintenance policies, so as to provide awareness for those who engage systems design, being students, technicians, or research engineers, as a reference guidebook.

Reliability of Computer and Control Systems

A substantial amount of research has been conducted on consecutive k-out-of-n and related reliability systems over the past four decades. These systems have been used to model various engineering systems such as the microwave stations of telecoms network, oil pipeline systems, and vacuum systems in an electron accelerator. As such, studies of reliability properties of consecutive k-out-of-n structures have attracted significant attention from both theoretical and practical approaches. In the modern era of technology, the redundancies are employed in the various industrial systems to prevent them from failure/sudden failure or to recover from failures. This book is meant to provide knowledge and help engineers and academicians in understanding reliability engineering by using k-out-of-n structures. The material is also targeted at postgraduate or senior undergraduate students pursuing reliability engineering.

Performance and Reliability Analysis of Computer Systems

Recent Advances in System Reliability Engineering describes and evaluates the latest tools, techniques, strategies, and methods in this topic for a variety of applications. Special emphasis is put on simulation and modelling technology which is growing in influence in industry, and presents challenges as well as opportunities to reliability and systems engineers. Several manufacturing engineering applications are addressed, making this a particularly valuable reference for readers in that sector. Contains comprehensive discussions on state-of-the-art tools, techniques, and strategies from industry Connects the latest academic research to applications in industry including system reliability, safety assessment, and preventive maintenance Gives an in-depth analysis of the benefits and applications of modelling and simulation to reliability

Software Reliability Methods

Future communication networks aim to build an intelligent and efficient living environment by connecting a variety of heterogeneous networks to fulfill complicated tasks. These communication networks bring significant challenges in building secure and reliable communication networks to address the numerous threat and privacy concerns. New research technologies are essential to preserve privacy, prevent attacks, and achieve the requisite reliability. Security, Privacy and Reliability in Computer Communications and Networks studies and presents recent advances reflecting the state-of-the-art research achievements in novel cryptographic algorithm design, intrusion detection, privacy preserving techniques and reliable routing protocols. Technical topics discussed in the book include: Vulnerabilities and Intrusion DetectionCryptographic Algorithms and EvaluationPrivacy Reliable Routing Protocols This book is ideal for personnel in computer communication and networking industries as well as academic staff and collegial, master, Ph.D. students in computer science, computer engineering, cyber security, information insurance and telecommunication systems.

Systems Reliability and Usability for Engineers

Human errors, as well as deliberate sabotage, pose a considerable danger to passengers riding on the modern railways and have created disastrous consequences. To protect civilians against both intentional and unintentional threats, rail transportation has become increasingly automated. Railway Safety, Reliability, and Security: Technologies and Systems Engineering provides engineering students and professionals with a collection of state-of-the-art methodological and technological notions to support the development and certification of □real-time safety-critical□ railway control systems, as well as the protection of rail transportation infrastructures.

Reliability in Computing

This book presents current methods for dealing with software reliability, illustrating the advantages and disadvantages of each method. The description of the techniques is intended for a non-expert audience with some minimal technical background. It also describes some advanced techniques, aimed at researchers and practitioners in software engineering. This reference will serve as an introduction to formal methods and techniques and will be a source for learning about various ways to enhance software reliability. Various projects and exercises give readers hands-on experience with the various formal methods and tools.

Probability and Statistics with Reliability, Queuing, and Computer Science Applications

With computers becoming embedded as controllers in everything fromnetwork servers to the routing of subway schedules to NASAmissions, there is a critical need to ensure that systems continueto function even when a component fails. In this book, bestsellingauthor Martin Shooman draws on his expertise in reliabilityengineering and software engineering to provide a complete

andauthoritative look at fault tolerant computing. He clearly explainsall fundamentals, including how to use redundant elements in systemdesign to ensure the reliability of computer systems andnetworks. Market: Systems and Networking Engineers, Computer Programmers, ITProfessionals.

Multistate System Reliability with Dependencies

Computing systems are of growing importance because of their wide use in many areas including those in safety-critical systems. This book describes the basic models and approaches to the reliability analysis of such systems. An extensive review is provided and models are categorized into different types. Some Markov models are extended to the analysis of some specific computing systems such as combined software and hardware, imperfect debugging processes, failure correlation, multi-state systems, heterogeneous subsystems, etc. One of the aims of the presentation is that based on the sound analysis and simplicity of the approaches, the use of Markov models can be better implemented in the computing system reliability.

Reliability and Availability of Cloud Computing

Safety is a paradoxical system property. It remains immaterial, intangible and invisible until a failure, an accident or a catastrophy occurs and, too late, reveals its absence. And yet, a system cannot be relied upon unless its safety can be explained, demonstrated and certified. The practical and difficult questions which motivate this study concern the evidence and the arguments needed to justify the safety of a computer based system, or more generally its dependability. Dependability is a broad concept integrating properties such as safety, reliability, availability, maintainability and other related characteristics of the behaviour of a system in operation. How can we give the users the assurance that the system enjoys the required dependability? How should evidence be presented to certification bodies or regulatory authorities? What best practices should be applied? How should we decide whether there is enough evidence to justify the release of the system? To help answer these daunting questions, a method and a framework are proposed for the justification of the dependability of a computer-based system. The approach specifically aims at dealing with the difficulties raised by the validation of software. Hence, it should be of wide applicability despite being mainly based on the experience of assessing Nuclear Power Plant instrumentation and control systems important to safety. To be viable, a method must rest on a sound theoretical background.

Achieving Safety and Reliability with Computer Systems

Recent Advancements in Software Reliability Assurance

Computer systems have become an important element of the world economy, with billions of dollars spent each year on development, manufacture, operation, and maintenance. Combining coverage of computer system reliability, safety, usability, and other related topics into a single volume, Computer System Reliability: Safety

and Usability eliminates the need to consult many different and diverse sources in the hunt for the information required to design better computer systems. After presenting introductory aspects of computer system reliability such as safety, usability-related facts and figures, terms and definitions, and sources for obtaining useful information on computer system reliability, safety, and usability, the book: Reviews mathematical concepts considered useful to understanding subsequent chapters Presents various introductory aspects of reliability, safety, and usability and computer system reliability basics Covers software reliability assessment and improvement methods Discusses important aspects of software quality and human error and software bugs in computer systems Highlights software safety and Internet reliability Details important aspects of software usability including the need for considering usability during the software development phase, software usability engineering process, software usability inspection methods, software usability test methods, and guidelines for conducting software usability testing Elucidates web usability facts and figures, common design errors, web page design, tools for evaluating web usability, and questions to evaluate website message communication effectiveness Examines important aspects of computer system life cycle costing Written by systems reliability expert B.S. Dhillon, the book is accessible to all levels of readership, making it useful to beginners and seasoned professionals alike. Reflecting practical trends in computer engineering especially in the area of software, Dhillon emphasizes the importance of usability in software systems and expands reliability to web usability and management. It provides methods for designing systems with increased reliability, safety, and usability.

Assessing the Reliability of Computer-Processed Data

This book investigates some of the difficulties related to scientific computing, describing how these can be overcome.

Reliable Computer Systems

Computer-processed data (CPD) from outside sources are often central to audit reports. Because assessing CPD requires more technical tests, it may seem that such data are subject to a higher standard of testing than other evidence. This is not the case. For ex., we apply the same tests of sufficiency and appropriateness that we apply to other types of evidence, but in assessing CPD, we focus on one test in the evidence standard -- appropriateness -- which includes validity and reliability, which in turn includes the completeness and accuracy of the data. This guide provides a flexible, risk-based framework for data reliability assessments that can be geared to the circumstances of each audit. Illus. This is a print on demand edition of an important, hard-to-find report.

Principles of Computer System Design

The importance of the reliability of the computer control system can be easily appreciated in the context of life-critical applications such as hazardous chemical plants, nuclear reactors, military systems, intensive care units, and aerospace systems. It is imperative that designers should demonstrably verify and validate the reliability and fault-tolerant behaviour of real time computer control systems.

Beginning with a brief introduction to Reliability Theory, this book presents a state-of-the-art methodology for the design of reliable computer control systems, detailing methods for failure analysis to identify critical failures, systematic procedures for fault monitor design using control-theoretic techniques, and strategies for the design of fault-tolerant computer systems. Various concepts, tools and techniques from such diverse areas as computer science, automatic control, reliability theory, and process systems engineering, are collected and presented in a self-contained manner.

Advances in System Reliability Engineering

This volume covers wide areas of interest such as life cycle costing, microcomputers, common-cause failures and space computers. Every effort is made to present difficult material with the aid of an example along with its solution. The material covered is summarized at the end of each chapter. The information is written in a format that allows readers to learn and better understand the philosophy of reliability in computer system design. At the same time, it tests their comprehension through listed exercises.

Computer System Reliability