

## Fundamentals Of Performance Modeling

Over the last century, medicine has come out of the black bag and emerged as one of the most dynamic and advanced fields of development in science and technology. Today, biomedical engineering plays a critical role in patient diagnosis, care, and rehabilitation. As such, the field encompasses a wide range of disciplines, from biology and physiology

Fundamentals of Building Performance Simulation pares the theory and practice of a multi-disciplinary field to the essentials for classroom learning and real-world applications. Authored by a veteran educator and researcher, this textbook equips graduate students and emerging and established professionals in engineering and architecture to predict and optimize buildings' energy use. It employs an innovative pedagogical approach, introducing new concepts and skills through previously mastered ones and deepening understanding of familiar themes by means of new material. Covering topics from indoor airflow to the effects of the weather, the book's 19 chapters empower learners to: Understand the models and assumptions underlying popular BPS tools Compare models, simulations, and modelling tools and make appropriate selections Recognize the effects of modelling choices and input data on simulation predictions And more. Each subject is introduced without reference to particular modelling tools, while practice problems at the end of each chapter provide hands-on experience with the tools of the reader's choice. Curated reading lists orient beginners in a vast, cross-disciplinary literature, and the critical thinking skills stressed throughout prepare them to make contributions of their own. Fundamentals of Building Performance Simulation provides a much-needed resource for new and aspiring members of the building science community.

This revised and updated Second Edition presents a practical introduction to operating systems and illustrates these principles through a hands-on approach using accompanying simulation models developed in Java and C++. This text is appropriate for upper-level undergraduate courses in computer science. Case studies throughout the text feature the implementation of Java and C++ simulation models, giving students a thorough look at both the theoretical and the practical concepts discussed in modern OS courses. This pedagogical approach is designed to present a clearer, more practical look at OS concepts, techniques, and methods without sacrificing the theoretical rigor that is necessary at this level. It is an ideal choice for those interested in gaining comprehensive, hands-on experience using the modern techniques and methods necessary for working with these complex systems. Every new printed copy is accompanied with a CD-ROM containing simulations (eBook version does not include CD-ROM). New material added to the Second Edition: - Chapter 11 (Security) has been revised to include the most up-to-date information - Chapter 12 (Firewalls and Network Security) has been updated to include material on middleware that allows applications on separate machines to communicate (e.g. RMI, COM+, and Object

Broker) - Includes a new chapter dedicated to Virtual Machines - Provides introductions to various types of scams - Updated to include information on Windows 7 and Mac OS X throughout the text - Contains new material on basic hardware architecture that operating systems depend on - Includes new material on handling multi-core CPUs  
Instructor Resources: -Answers to the end of chapter questions -PowerPoint Lecture Outlines

This accessible book aims to collect in a single volume the essentials of stochastic networks. Stochastic networks have become widely used as a basic model of many physical systems in a diverse range of fields. Written by leading authors in the field, this book is meant to be used as a reference or supplementary reading by practitioners in operations research, computer systems, communications networks, production planning, and logistics. Statistical performance evaluation has assumed an increasing amount of importance as we seek to design more and more sophisticated communication and information processing systems. The ability to predict a proposed system's performance without actually having to construct it is an extremely cost effective design tool. This book is meant to be a first year graduate level introduction to the field of statistical performance evaluation. As such, it covers queueing theory (chapters 1-4) and stochastic Petri networks (chapter 5). There is a short appendix at the end of the book which reviews basic probability theory. At Stony Brook, this material would be covered in the second half of a two course sequence (the first half is a computer networks course using a text such as Schwartz's Telecommunications Networks). Students seem to be encouraged to pursue the analytical material of this book if they first have some idea of the potential applications. I am grateful to B.L. Bodnar, J. Blake, J.S. Emer, M. Garrett, W. Hagen, Y.C. Jenq, M. Karol, J.F. Kurose, S.-Q. Li, A.C. Liu, J. McKenna, H.T. Mouftah and W.G. Nichols, I.Y. Wang, the IEEE and Digital Equipment Corporation for allowing previously published material to appear in this book.

An introduction to vehicle dynamics and the fundamentals of mathematical modeling  
Fundamentals of Vehicle Dynamics and Modeling is a student-focused textbook providing an introduction to vehicle dynamics, and covers the fundamentals of vehicle model development. It illustrates the process for construction of a mathematical model through the application of the equations of motion. The text describes techniques for solution of the model, and demonstrates how to conduct an analysis and interpret the results. A significant portion of the book is devoted to the classical linear dynamic models, and provides a foundation for understanding and predicting vehicle behaviour as a consequence of the design parameters. Modeling the pneumatic tire is also covered, along with methods for solving the suspension kinematics problem, and prediction of acceleration and braking performance. The book introduces the concept of multibody dynamics as applied to vehicles and provides insight into how large and high fidelity models can be constructed. It includes the

development of a method suitable for computer implementation, which can automatically generate and solve the linear equations of motion for large complex models. Key features: ? Accompanied by a website hosting MATLAB® code. ? Supported by the Global Education Delivery channels. Fundamentals of Vehicle Dynamics and Modeling is an ideal textbook for senior undergraduate and graduate courses on vehicle dynamics.

Concurrent Engineering Techniques and Applications reviews advances in concurrent engineering techniques and applications. An in-depth treatment of the quantitative and economic aspects of concurrent engineering is presented, with emphasis on techniques for measuring the performances of concurrent engineering and for comparing its economic effectiveness with that of traditional engineering. Open systems software standards in concurrent engineering are also discussed. Comprised of 12 chapters, this volume begins with an introduction to techniques for measuring the performances of concurrent engineering and for comparing its economic effectiveness with that of traditional engineering. The next chapter deals with open systems software standards and how to use open systems products effectively in concurrent engineering. The discussion then turns to concurrent product design and manufacturing; the essential issues involved in design-decision support in concurrent/simultaneous engineering; design for manufacturing and assembly and concurrent engineering in electro-optical systems; and the use of visualization in concurrent engineering. The use of multimedia presentation techniques and technology in the concurrent engineering process is also considered, along with techniques in technical documentation. This monograph will be useful to students, academicians, practicing professionals, and research workers.

Fundamentals of Performance Modeling Prentice Hall  
Fundamentals of Building Performance Simulation Routledge

Fundamentals of Performance Improvement is a substantially new version of the down-to-earth, how-to guide designed to help business leaders, practitioners, and students understand the science and art of performance technology and successfully implement organizational and societal change. Using the Performance Improvement / Human Performance Technology (HPT) model, the expert authors explain step-by-step how to spot performance indicators, analyze problems, identify underlying causes, describe desired results, and create workable solutions. "It does not matter what function you align yourself to in your organization, this book allows you to tap into the secrets that drive organizational success. Several books work to define what is performance improvement and performance technology. This one also provides insights into the Why? And How?" —Cedric T. Coco, CPT, SVP, Learning and Organizational Effectiveness, Lowe's Companies "Fundamentals of Performance Improvement is full of practical models and tools for improving the world by partnering with customers, clients, constituents, and colleagues. It provides a path forward for successful transformation and performance improvement at personal, group and collective levels. It is a must read for leaders and consultants seeking to advance opportunities in new and emerging situations." —Diana Whitney, PhD, president, Corporation for Positive Change "If you have an interest in performance improvement, this is simply the best available book on the topic. It addresses the science and craft as well as the intricacies of how to improve workplace performance. Van

Tiem, Moseley, and Dessinger have incorporated into this work the best available research on the Certified Performance Technology (CPT) standards and process." —James A. Pershing, Ph.D., CPT, professor emeritus, Workplace Learning and Performance Improvement, Indiana University "Its international flavor, with practitioner comments and examples drawn from across the world, enhances its appeal as more and more professionals operate in an increasingly global context." —Daljit Singh, Asia Pacific Director of Talent Management, Baker & McKenzie, Sydney, Australia This book includes premium content that can be accessed from our Web site when you register at [www.pfeiffer.com/go/vantiem](http://www.pfeiffer.com/go/vantiem) using the password professional.

This textbook provides an introduction to common methods of performance modeling and analysis of communication systems. These methods form the basis of traffic engineering, teletraffic theory, and analytical system dimensioning. The fundamentals of probability theory, stochastic processes, Markov processes, and embedded Markov chains are presented. Basic queueing models are described with applications in communication networks. Advanced methods are presented that have been frequently used in recent practice, especially discrete-time analysis algorithms, or which go beyond classical performance measures such as Quality of Experience or energy efficiency. Recent examples of modern communication networks include Software Defined Networking and the Internet of Things. Throughout the book, illustrative examples are used to provide practical experience in performance modeling and analysis. Target group: The book is aimed at students and scientists in computer science and technical computer science, operations research, electrical engineering and economics.

The progress of science and technology has placed Queueing Theory among the most popular disciplines in applied mathematics, operations research, and engineering. Although queueing has been on the scientific market since the beginning of this century, it is still rapidly expanding by capturing new areas in technology. *Advances in Queueing* provides a comprehensive overview of problems in this enormous area of science and focuses on the most significant methods recently developed. Written by a team of 24 eminent scientists, the book examines stochastic, analytic, and generic methods such as approximations, estimates and bounds, and simulation. The first chapter presents an overview of classical queueing methods from the birth of queues to the seventies. It also contains the most comprehensive bibliography of books on queueing and telecommunications to date. Each of the following chapters surveys recent methods applied to classes of queueing systems and networks followed by a discussion of open problems and future research directions. *Advances in Queueing* is a practical reference that allows the reader quick access to the latest methods.

*Advances* the understanding of management methods, information technology, and their joint application in business processes.

This book introduces the fundamental concepts and practical simulation techniques for modeling different aspects of operating systems to study their general behavior and their performance. The approaches applied are object-oriented modeling and process interaction approach to discrete-event simulation. The book depends on the basic modeling concepts and is more specialized than my previous book: *Practical Process Simulation with Object-Oriented Techniques and C++*, published by Artech House, Boston 1999. For a more detailed description see the Web location: <http://science.kennesaw.edu/~jgarrido/mybook.html>. Most other books on performance modeling use only analytical approaches, and very few apply these concepts to the study of operating systems. Thus, the unique feature of the book is that it concentrates on design aspects of operating systems using practical simulation techniques. In addition, the book illustrates the dynamic behavior of different aspects of operating systems using the various simulation models, with a general hands-on approach.

*Fundamentals of Performance Improvement*, 3rd Edition *Fundamentals of Performance Improvement* is a substantially new version of the down-to-earth, how-to guide designed to help business leaders, practitioners, and students understand the science and art of

performance technology and successfully implement organizational and societal change. Using the Performance Improvement / Human Performance Technology (HPT) model, the expert authors explain step-by-step how to spot performance indicators, analyze problems, identify underlying causes, describe desired results, and create workable solutions. “It does not matter what function you align yourself to in your organization, this book allows you to tap into the secrets that drive organizational success. Several books work to define what is performance improvement and performance technology. This one also provides insights into the Why? And How?” —CEDRIC T. COCO, CPT, SVP, Learning and Organizational Effectiveness, Lowe’s Companies “Fundamentals of Performance Improvement is full of practical models and tools for improving the world by partnering with customers, clients, constituents, and colleagues. It provides a path forward for successful transformation and performance improvement at personal, group and collective levels. It is a must read for leaders and consultants seeking to advance opportunities in new and emerging situations.” —DIANA WHITNEY, PhD, president, Corporation for Positive Change “If you have an interest in performance improvement, this is simply the best available book on the topic. It addresses the science and craft as well as the intricacies of how to improve workplace performance. Van Tiem, Moseley, and Dessinger have incorporated into this work the best available research on the Certified Performance Technology (CPT) standards and process.” —JAMES A. PERSHING, Ph.D., CPT, professor emeritus, Workplace Learning and Performance Improvement, Indiana University “Its international flavor, with practitioner comments and examples drawn from across the world, enhances its appeal as more and more professionals operate in an increasingly global context.” —DALJIT SINGH, Asia Pacific Director of Talent Management, Baker & McKenzie, Sydney, Australia

Fundamentals of Surgical Simulation explains in detail, from a behavioural science/human factors perspective, why modern image guided medicine such as surgery, interventional cardiology and interventional radiology are difficult to learn and practice. Medicine is currently at a tipping point in terms of how physicians in procedural based medicine are trained. Fundamentals of Surgical Simulation helps drive this change and is a valuable resource for medical trainers and trainees alike. For trainers, this book gives explicit theoretical and applied information on how this new training paradigm works thus allowing them to tailor the application of simulation training to their program, no matter where in the world they work. For the trainee, it allows them to see and understand the rules of this new training paradigm thus allowing them to optimize their approach to training and reaching proficiency in as efficient a manner as possible. For the simulation researcher, engineer and medical profession Fundamentals of Surgical Simulation poses some difficult questions that require urgent unambiguous and agreed answers.

When used appropriately, building performance simulation has the potential to reduce the environmental impact of the built environment, to improve indoor quality and productivity, as well as to facilitate future innovation and technological progress in construction. Since publication of the first edition of Building Performance Simulation for Design and Operation, the discussion has shifted from a focus on software features to a new agenda, which centres on the effectiveness of building performance simulation in building life cycle processes. This new edition provides a unique and comprehensive overview of building performance simulation for the complete building life cycle from conception to demolition, and from a single building to district level. It contains new chapters on building information modelling, occupant behaviour modelling, urban physics modelling, urban building energy modelling and renewable energy systems modelling. This new edition keeps the same chapter structure throughout including learning objectives, chapter summaries and assignments. Moreover, the book:

- Provides unique insights into the techniques of building performance modelling and simulation and their application to performance-based design and operation of buildings and the systems which

service them. • Provides readers with the essential concepts of computational support of performance-based design and operation. • Provides examples of how to use building simulation techniques for practical design, management and operation, their limitations and future direction. It is primarily intended for building and systems designers and operators, and postgraduate architectural, environmental or mechanical engineering students.

This book presents analysis techniques for quantifying and projecting every element of your e-business site's performance and planning for the capacity you need.

This monograph presents a concise mathematical approach for modeling and analyzing the performance of communication networks with the aim of introducing an appropriate mathematical framework for modeling and analysis as well as understanding the phenomenon of statistical multiplexing. The models, techniques, and results presented form the core of traffic engineering methods used to design, control and allocate resources in communication networks. The novelty of the monograph is the fresh approach and insights provided by a sample-path methodology for queueing models that highlights the important ideas of Palm distributions associated with traffic models and their role in computing performance measures. The monograph also covers stochastic network theory including Markovian networks. Recent results on network utility optimization and connections to stochastic insensitivity are discussed. Also presented are ideas of large buffer, and many sources asymptotics that play an important role in understanding statistical multiplexing. In particular, the important concept of effective bandwidths as mappings from queueing level phenomena to loss network models is clearly presented along with a detailed discussion of accurate approximations for large networks. Table of Contents: Introduction to Traffic Models and Analysis / Queues and Performance Analysis / Loss Models for Networks / Stochastic Networks and Insensitivity / Statistical Multiplexing An insightful presentation of the key concepts, paradigms, and applications of modeling and simulation Modeling and simulation has become an integral part of research and development across many fields of study, having evolved from a tool to a discipline in less than two decades. Modeling and Simulation

Fundamentals offers a comprehensive and authoritative treatment of the topic and includes definitions, paradigms, and applications to equip readers with the skills needed to work successfully as developers and users of modeling and simulation. Featuring contributions written by leading experts in the field, the book's fluid presentation builds from topic to topic and provides the foundation and theoretical underpinnings of modeling and simulation. First, an introduction to the topic is presented, including related terminology, examples of model development, and various domains of modeling and simulation. Subsequent chapters develop the necessary mathematical background needed to understand modeling and simulation topics, model types, and the importance of visualization. In addition, Monte Carlo simulation, continuous simulation, and discrete event simulation are thoroughly discussed, all of which are significant to a complete

understanding of modeling and simulation. The book also features chapters that outline sophisticated methodologies, verification and validation, and the importance of interoperability. A related FTP site features color representations of the book's numerous figures. Modeling and Simulation Fundamentals encompasses a comprehensive study of the discipline and is an excellent book for modeling and simulation courses at the upper-undergraduate and graduate levels. It is also a valuable reference for researchers and practitioners in the fields of computational statistics, engineering, and computer science who use statistical modeling techniques.

This is a graduate level textbook that covers the fundamental topics in queuing theory. The book has a broad coverage of methods to calculate important probabilities, and gives attention to proving the general theorems. It includes many recent topics, such as server-vacation models, diffusion approximations and optimal operating policies, and more about bulk-arrival and bulk-service models than other general texts. \* Current, clear and comprehensive coverage \* A wealth of interesting and relevant examples and exercises to reinforce concepts \* Reference lists provided after each chapter for further investigation

Traditionally, models and methods for the analysis of the functional correctness of reactive systems, and those for the analysis of their performance (and dependability) aspects, have been studied by different research communities. This has resulted in the development of successful, but distinct and largely unrelated modeling and analysis techniques for both domains. In many modern systems, however, the difference between their functional features and their performance properties has become blurred, as relevant functionalities become inextricably linked to performance aspects, e.g. isochronous data transfer for live video transmission. During the last decade, this trend has motivated an increased interest in combining insights and results from the field of formal methods – traditionally focused on functionality – with techniques for performance modeling and analysis. Prominent examples of this cross-fertilization are extensions of process algebra and Petri nets that allow for the automatic generation of performance models, the use of formal proof techniques to assess the correctness of randomized algorithms, and extensions of model checking techniques to analyze performance requirements automatically. We believe that these developments mark the beginning of a new paradigm for the modeling and analysis of systems in which qualitative and quantitative aspects are studied from an integrated perspective. We are convinced that the further work towards the realization of this goal will be a growing source of inspiration and progress for both communities.

We will occasionally footnote a portion of text with a "\*\*", to indicate Notes on the that this portion can be initially bypassed. The reasons for bypassing a Text portion of the text include: the subject is a special topic that will not be referenced later, the material can be skipped on first reading, or the level of mathematics is higher than the rest of the text. In cases where a topic is self-contained, we opt to collect the material into an appendix that can be read by students at their leisure.

The material in the text cannot be fully assimilated until one makes it Notes on "their own" by applying the material to specific problems. Self-discovery Problems is the best teacher and although they are no substitute for an inquiring mind, problems that explore the subject from different viewpoints can often help the student to think about the material in a uniquely personal way. With this in mind, we have made problems an integral part of this work and have attempted to make them interesting as well as informative.

Queueing analysis is a vital tool used in the evaluation of system performance. Applications of queueing analysis cover a wide spectrum from bank automated teller machines to transportation and communications data networks. Fully revised, this second edition of a popular book contains the significant addition of a new chapter on Flow & Congestion Control and a section on Network Calculus among other new sections that have been added to remaining chapters. An introductory text, Queueing Modelling Fundamentals focuses on queueing modelling techniques and applications of data networks, examining the underlying principles of isolated queueing systems. This book introduces the complex queueing theory in simple language/proofs to enable the reader to quickly pick up an overview to queueing theory without utilizing the diverse necessary mathematical tools. It incorporates a rich set of worked examples on its applications to communication networks. Features include: Fully revised and updated edition with significant new chapter on Flow and Congestion Control as well as a new section on Network Calculus A comprehensive text which highlights both the theoretical models and their applications through a rich set of worked examples, examples of applications to data networks and performance curves Provides an insight into the underlying queuing principles and features step-by-step derivation of queueing results Written by experienced Professors in the field Queueing Modelling Fundamentals is an introductory text for undergraduate or entry-level post-graduate students who are taking courses on network performance analysis as well as those practicing network administrators who want to understand the essentials of network operations. The detailed step-by-step derivation of queueing results also makes it an excellent text for professional engineers.

This book describes methods to improve software performance and safety using advanced mathematical and computational analytics. The main focus is laid on the increase of software reliability by preventive and predictive maintenance with efficient usage of modern testing resources. The editors collect contributions from international researchers in the field.

This book constitutes the proceedings of the International Symposium on Multimedia Communications and Video Coding (ISMVC95) held October 11 - 13, 1995, at the Polytechnic University in Brooklyn, New York. This Symposium was organized under the auspices of the New York State funded Center for Advanced Technology in Telecommunications (CATT), in cooperation with the Communications Society and the Signal Processing Society of the Institute of Electrical and Electronic Engineers (IEEE).

In preparing this book, we have summarized the topics presented in various sessions of the Symposium, including the keynote addresses, the Service Provider and Vendor Session, the Panel Discussion, as well as the twelve Technical Sessions. This summary is presented in the Introduction. 'Full papers submitted by the presenters are organized into eleven chapters, divided into three parts. Part I focuses on systems issues in multimedia communications. Part II concentrates on video coding algorithms. Part III discusses the interplay between video coding and network control for video delivery over various channels.

This book presents fundamental modeling tools, queueing theory, and discrete event simulation for evaluating computer-based systems. Assuming some familiarity with modeling concepts and Excel, the text is an excellent resource for those who need to learn the basics of discrete simulation and for those who wish to use discrete event simulation to model computer-based systems. The authors focus on practical applications, but also provide an overview of the required background theory.

Fundamentals of Human Performance and Training was developed to help researchers and practitioners select measures to be used in the evaluation of human performance and helps them seek better, more efficient and effective ways to close performance gaps in this global economy. The book is bursting with innovative ideas that will help readers create powerful solutions in their organization, their country, their region and their continent. Fundamentals of Human Performance and Training should be of value to anyone interested in matching the right solutions to the right problems, addressing causes by providing a range of solutions to improve human performance in any organizations in the global economy. The volume provides foundational chapters for the field and human performance to guide development or improvement of HR management strategies, training and management, which will prove to be dynamic, efficient, responsive to changes encompassing organizations, and grounded in vision and excellence. Critical issues facing organizations today include how to build intellectual capital, establish and maintain a highperformance workplace, enhance profitability, and encourage productivity. These needs require practitioners to go beyond a competencybased approach to training. From the theory of andragogy to the practical examples and recommendations provided by our highly respected authors, human capital developers and managers will be equipped with knowledge and skills to identify, solve and anticipate human performance problems in their respective organizations. Nonmanagers will also benefit from the book through identifying and solving day to day human performance problems because these problems are applicable to their work. Finally, for researchers, administrators and students who are looking forward to improving their research skills, our authors provide exemplary scholarly work in terms of how to conduct meaningful research in the area of human performance and training. Also, such a volume rich in identifying and seizing human performance improvement opportunities will help prepare our students to enter and excel in the real world of work.

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.

This open access book comprehensively covers the fundamentals of clinical data science, focusing on data collection, modelling and clinical applications. Topics covered in the first section on data collection include: data sources, data at scale (big data), data stewardship (FAIR data) and related privacy concerns. Aspects of predictive modelling using techniques such as classification, regression or clustering, and prediction model validation will be covered in the second section. The third section covers aspects of (mobile) clinical decision support systems, operational excellence and value-based healthcare. *Fundamentals of Clinical Data Science* is an essential resource for healthcare professionals and IT consultants intending to develop and refine their skills in personalized medicine, using solutions based on large datasets from electronic health records or telemonitoring programmes. The book's promise is “no math, no code” and will explain the topics in a style that is optimized for a healthcare audience. A concise and clear guide to the concepts and applications of wireless sensor networks, ideal for students, practitioners and researchers.

*Object Oriented Simulation* will qualify as a valuable resource to students and accomplished professionals and researchers alike, as it provides an extensive, yet comprehensible introduction to the basic principles of object-oriented modeling, design and implementation of simulation models. Key features include an introduction to modern commercial graphical simulation and animation software, accessible breakdown of OOSimL language constructs through various programming principles, and extensive tutorial materials ideal for undergraduate classroom use.

This book constitutes the thoroughly refereed proceedings of the 5th International Workshop, PMBS 2014 in New Orleans, LA, USA in November 2014. The 12 full and 2 short papers presented in this volume were carefully reviewed and selected from 53 submissions. The papers cover topics on performance benchmarking and optimization; performance analysis and prediction; and power, energy and checkpointing.

The only singular, all-encompassing textbook on state-of-the-art technical performance evaluation *Fundamentals of Performance Evaluation of Computer and Telecommunication Systems* uniquely presents all techniques of performance evaluation of computers systems, communication networks, and telecommunications in a balanced manner. Written by the renowned Professor Mohammad S. Obaidat and his coauthor Professor Nouredine Boudriga, it is also the only resource to treat computer and telecommunication systems as inseparable issues. The authors explain the basic concepts of performance evaluation, applications,

performance evaluation metrics, workload types, benchmarking, and characterization of workload. This is followed by a review of the basics of probability theory, and then, the main techniques for performance evaluation—namely measurement, simulation, and analytic modeling—with case studies and examples. Contains the practical and applicable knowledge necessary for a successful performance evaluation in a balanced approach Reviews measurement tools, benchmark programs, design of experiments, traffic models, basics of queueing theory, and operational and mean value analysis Covers the techniques for validation and verification of simulation as well as random number generation, random variate generation, and testing with examples Features numerous examples and case studies, as well as exercises and problems for use as homework or programming assignments Fundamentals of Performance Evaluation of Computer and Telecommunication Systems is an ideal textbook for graduate students in computer science, electrical engineering, computer engineering, and information sciences, technology, and systems. It is also an excellent reference for practicing engineers and scientists.

Technical performance improvement exhibits exponential trends, but the rates of improvement for the 28 selected technological domains vary from 3 to 65%. Why does performance improve exponentially? Why do the improvement rates vary widely across the domains? This thesis presents a simple theoretical model that provides an explanatory foundation based on two sets of well-known design fundamentals. The first set conceptualizes inventions arising through combinatorial analogical transfer where new operating ideas are created by combining operating ideas from an existing pool of ideas. This inventive process proceeds on a cumulative basis over time and is perpetuated by injection of basic operating ideas through synergistic exchange between science and technology. The combinatorial analogical transfer coupled with exchange between science and technology naturally leads to exponential behavior. These operating ideas are then embedded in domain artifacts to improve technical performance. Interactions in artifacts and scaling of design variables - two domain specific effects from the second set of design fundamentals- modulate this process. Interactions in artifacts influence the ability of the domains to successfully assimilate the operating ideas. Assimilated ideas change design variables in the artifacts to improve their performance. The relative performance improvement depends on the scaling of design variables of the artifacts. Together these two domain parameters can potentially yield a wide variation in performance improvement rates. According to the model, higher domain interaction parameters retard, whereas higher scaling parameters accelerate, performance improvement rates. The model is shown to be consistent with what is known in the technical change literature. An empirical study tests the model's prediction that higher domain interactions retard performance improvement rates of technological domains. A method for extracting domain interactions using a keyword-based text-mining approach on patents is presented. High normalized counts of keywords representing domain interactions are found to be negatively correlated with low performance improvement rates, thus supporting the model positively. The thesis also presents an independent case study on performance improvement of permanent magnetic materials, and tests two regression models, which predict improvement rates using patent data. Performance of magnetic materials follows an exponential, but halting, improvement trend, and predicted rates from the regression models are consistent with prior result for the 28 technological domains.

Handbook of Probabilistic Models carefully examines the application of advanced probabilistic models in conventional engineering fields. In this comprehensive handbook, practitioners, researchers and scientists will find detailed explanations of technical concepts, applications of the proposed methods, and the respective scientific approaches needed to solve the problem. This book provides an interdisciplinary approach that creates advanced probabilistic models for engineering fields, ranging from conventional fields of mechanical engineering and civil

