Discrete Event Modeling And Simulation A Practitioners Approach Computational Analysis Synthesis And Design Of Dynamic Systems

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Building a Better Delivery System

A Tribute to the 60th Birthday of Bernard P. Zeigler

The Java Simulation Handbook

Theory of Modeling and Simulation: Discrete Event & Iterative System Computational Foundations, Third Edition, continues the legacy of this authoritative and complete theoretical work. It is ideal for graduate and PhD students and working engineers interested in posing and solving problems using the tools of logico-mathematical modeling and computer simulation. Continuing its emphasis on the integration of discrete event and continuous modeling approaches, the work focuses light on DEVS and its potential to support the co-existence and interoperation of multiple formalisms in model components. New sections in this updated edition include discussions on important new extensions to theory, including chapter-length coverage of iterative system specification and DEVS and their fundamental importance, closure under coupling for iteratively specified systems, existence, uniqueness, non-deterministic conditions, and temporal progressiveness (legitimacy). Presents a 40% revised and expanded new edition of this classic book with many important post-2000 extensions to core theory Provides a streamlined introduction to Discrete Event System Specification

(DEVS) formalism for modeling and simulation Packages all the "need-to-know" information on DEVS formalism in one place Expanded to include an online ancillary package, including numerous examples of theory and implementation in DEVS-based software, student solutions and instructors manual

Discrete Event Modeling and Simulation Technologies

Modeling and Simulation have become endeavors central to all disciplines of science and engineering. They are used in the analysis of physical systems where they help us gain a better understanding of the functioning of our physical world. They are also important to the design of new engineering systems where they enable us to predict the behavior of a system before it is ever actually built. Modeling and simulation are the only techniques available that allow us to analyze arbitrarily non-linear systems accurately and under varying experimental conditions. Continuous System Modeling introduces the student to an important subclass of these techniques. They deal with the analysis of systems described through a set of ordinary or partial differential equations or through a set of difference equations. This volume introduces concepts of modeling physical systems through a set of differential and/or difference equations. The purpose is twofold: it enhances the scientific understanding of our physical world by codifying (organizing) knowledge about this world, and it supports engineering design by allowing us to assess the consequences of a particular design alternative before it is actually built. This text has a flavor of the mathematical discipline of dynamical systems, and is strongly oriented towards Newtonian physical science.

Computer Simulation and Modelling

Model Engineering for Simulation provides a systematic introduction to the implementation of generic, normalized and quantifiable modeling and simulation using DEVS formalism. It describes key technologies relating to model lifecycle management, including model description languages, complexity analysis, model management, service-oriented model composition, quantitative measurement of model credibility, and model validation and verification. The book clearly demonstrates how to construct computationally efficient, object-oriented simulations of DEVS models on parallel and distributed environments. Guides systems and control engineers in the practical creation and delivery of simulation models using DEVS formalism Provides practical methods to improve credibility of models and manage the model lifecycle Helps readers gain an overall understanding of model lifecycle management and analysis Supported by an online ancillary package that includes an instructors and student solutions manual

Use Cases of Discrete Event Simulation

This book features state-of-the-art contributions in mathematical, experimental and numerical simulations in engineering sciences. The contributions in this book, which comprise twelve chapters, are organized in six sections spanning mechanical, aerospace, electrical, electronic, computer, materials, geotechnical and chemical engineering. Topics include metal micro-forming, compressible reactive flows, radio frequency circuits, barrier infrared detectors, fiber Bragg and

long-period fiber gratings, semiconductor modelling, many-core architecture computers, laser processing of materials, alloy phase decomposition, nanofluids, geo-materials and rheo-kinetics. Contributors are from Europe, China, Mexico, Malaysia and Iran. The chapters feature many sophisticated approaches including Monte Carlo simulation, FLUENT and ABAQUS computational modelling, discrete element modelling and partitioned frequency-time methods. The book will be of interest to researchers and also consultants engaged in many areas of engineering simulation.

Modeling and Control of Discrete-event Dynamic Systems

Offers comprehensive coverage of discrete-event simulation, emphasizing and describing the procedures used in operations research - methodology, generation and testing of random numbers, collection and analysis of input data, verification of simulation models and analysis of output data.

Discrete Event Simulation for Health Technology Assessment

The increased computational power and software tools available to engineers have increased the use and dependence on modeling and computer simulation throughout the design process. These tools have given engineers the capability of designing highly complex systems and computer architectures that were previously unthinkable. Every complex design project, from integrated circuits, to aerospace vehicles, to industrial manufacturing processes requires these new methods. This book fulfills the essential need of system and control engineers at all levels in understanding modeling and simulation. This book, written as a true text/reference has become a standard sr./graduate level course in all EE departments worldwide and all professionals in this area are required to update their skills. The book provides a rigorous mathematical foundation for modeling and computer simulation. It provides a comprehensive framework for modeling and simulation integrating the various simulation approaches. It covers model formulation, simulation model execution, and the model building process with its key activities model abstraction and model simplification, as well as the organization of model libraries. Emphasis of the book is in particular in integrating discrete event and continuous modeling approaches as well as a new approach for discrete event simulation of continuous processes. The book also discusses simulation execution on parallel and distributed machines and concepts for simulation model realization based on the High Level Architecture (HLA) standard of the Department of Defense. Presents a working foundation necessary for compliance with High Level Architecture (HLA) standards Provides a comprehensive framework for continuous and discrete event modeling and simulation Explores the mathematical foundation of simulation modeling Discusses system morphisms for model abstraction and simplification Presents a new approach to discrete event simulation of continuous processes Includes parallel and distributed simulation of discrete event models Presents a concept to achieve simulator interoperability in the form of the DEVS-Bus

Introduction to Discrete Event Systems

Modeling and Simulation of Computer Networks and Systems: Methodologies and Applications introduces you to a broad array of modeling and simulation issues related to computer networks and systems. It focuses on the theories, tools, applications and uses of modeling and simulation in order to effectively optimize networks. It describes methodologies for modeling and simulation of new generations of wireless and mobiles networks and cloud and grid computing systems. Drawing upon years of practical experience and using numerous examples and illustrative applications recognized experts in both academia and industry, discuss: Important and emerging topics in computer networks and systems including but not limited to; modeling, simulation, analysis and security of wireless and mobiles networks especially as they relate to next generation wireless networks Methodologies, strategies and tools, and strategies needed to build computer networks and systems modeling and simulation from the bottom up Different network performance metrics including, mobility, congestion, quality of service, security and more Modeling and Simulation of Computer Networks and Systems is a must have resource for network architects, engineers and researchers who want to gain insight into optimizing network performance through the use of modeling and simulation. Discusses important and emerging topics in computer networks and Systems including but not limited to; modeling, simulation, analysis and security of wireless and mobiles networks especially as they relate to next generation wireless networks Provides the necessary methodologies, strategies and tools needed to build computer networks and systems modeling and simulation from the bottom up Includes comprehensive review and evaluation of simulation tools and methodologies and different network performance metrics including mobility, congestion, quality of service, security and more

Discrete-event System Simulation

This book gives detailed coverage of all the various aspects of modelling and simulation including the concept of systems. The emphasis is on digital computer simulation of discrete systems, although both analogue and digital simulation of continuous and discrete systems are discussed.

Introduction to Discrete Event Simulation and Agent-based Modeling

"This is an excellent and well-written text on discrete event simulation with a focus on applications in Operations Research. There is substantial attention to programming, output analysis, pseudo-random number generation and modelling and these sections are quite thorough. Methods are provided for generating pseudo-random numbers (including combining such streams) and for generating random numbers from most standard statistical distributions." --ISI Short Book Reviews, 22:2, August 2002

Principles of Discrete Event Simulation

This guide demonstrates how virtual build and test can be supported by the Discrete Event Systems Specification (DEVS) simulation modeling formalism, and the System Entity Structure (SES) simulation model ontology. The book examines a

wide variety of Systems of Systems (SoS) problems, ranging from cloud computing systems to biological systems in agricultural food crops. Features: includes numerous exercises, examples and case studies throughout the text; presents a step-by-step introduction to DEVS concepts, encouraging hands-on practice to building sophisticated SoS models; illustrates virtual build and test for a variety of SoS applications using both commercial and open source DEVS simulation environments; introduces an approach based on activity concepts intrinsic to DEVS-based system design, that integrates both energy and information processing requirements; describes co-design modeling concepts and methods to capture separate and integrated software and hardware systems.

Theory of Modeling and Simulation

This textbook presents a practical introduction to the fundamental aspects of modelling and simulation. It provides the necessary foundations both for those wishing to learn about this methodology and also for those who have a need to apply it in their work. Illustrative examples are drawn from projects formulated within the domains of both DEDS and CTDS. Features: presents a project-oriented perspective; describes an activity-based conceptual modelling framework (ABCmod) for DEDS; includes a new chapter that presents a novel world view, the Activity-Object world view, which eases the translation of a conceptual model specification in the ABCmod framework into a simulation program; contains numerous illustrative examples, useful algorithms, exercises and projects; includes a primer on probability, a concise guide to the GPSS programming environment and an overview of relevant MATLAB features in the appendices; provides supplementary software and teaching support material at an associated website.

Parallel Computing Technologies

Researches and developers of simulation models state that the Java program ming language presents a unique and significant opportunity for important changes in the way we develop simulation models today. The most important characteristics of the Java language that are advantageous for simulation are its multi-threading capabilities, its facilities for executing programs across the Web, and its graphics facilities. It is feasible to develop compatible and reusable simulation components that will facilitate the construction of newer and more complex models. This is possible with Java development environments. Another important trend that begun very recently is web-based simulation, i.e., and the execution of simulation models using Internet browser software. This book introduces the application of the Java programming language in discrete-event simulation. In addition, the fundamental concepts and prac tical simulation techniques for modeling different types of systems to study their general behavior and their performance are introduced. The approaches applied are the process interaction approach to discrete-event simulation and object-oriented modeling. Java is used as the implementation language and UML as the modeling language. The first offers several advantages compared to C++, the most important being: thread handling, graphical user interfaces (QUI) and Web computing. The second language, UML (Unified Modeling Language) is the standard notation used today for modeling systems as a collection of classes, class relationships, objects, and object behavior.

Discrete-event Simulation

This book aims to clarify exactly how simulation studies can be carried out in the system theory paradigm, while providing a realistically complete coverage of (discrete event) simulation in its more traditional aspects. It focuses on the subclass of predictive, generative and dynamic system models.

XIV Mediterranean Conference on Medical and Biological Engineering and Computing 2016

This volume introduces computational and mathematical techniques for modeling, simulating, and analyzing the performance of various systems. Helps readers gain a better understanding of how systems operate and respond to change by: 1) helping them begin to model, simulate, and analyze simple-but-representative systems as soon as possible; and 2) whenever possible, encouraging the experimental exploration and self-discovery of theoretical results before their formal presentation. Features an approachable writing style that emphasizes concepts and insight without sacrificing rigor. Provides C software as source code for running simulations developed in the book, eliminating the need for readers to do all their programming from scratch. Emphasizes an algorithmic approach throughout. A useful reference for industrial engineers.

Stochastic Discrete Event Systems

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.

Modeling and Simulation of Computer Networks and Systems

This volume presents the proceedings of Medicon 2016, held in Paphos, Cyprus. Medicon 2016 is the XIV in the series of regional meetings of the International Federation of Medical and Biological Engineering (IFMBE) in the Mediterranean. The goal of Medicon 2016 is to provide updated information on the state of the art on Medical and Biological Engineering and Computing under the main theme "Systems Medicine for the Delivery of Better Healthcare Services". Medical and Biological Engineering and Computing cover complementary disciplines that hold great promise for the advancement of research and development in complex medical and biological systems. Research and development in these areas are impacting the science and technology by advancing fundamental concepts in translational medicine, by helping us understand human physiology and function at multiple levels, by improving tools and techniques for the detection, prevention and treatment of disease. Medicon 2016 provides a common platform for the cross fertilization of ideas, and to help shape knowledge and scientific achievements by bridging complementary disciplines into an interactive and attractive forum under the special theme of the conference that is Systems Medicine for the Delivery of Better Healthcare Services. The programme consists of some 290 invited and submitted papers on new developments around the Conference theme, presented in 3 plenary sessions, 29 parallel scientific sessions and 12 special sessions.

Modeling and Simulation Fundamentals

In a joint effort between the National Academy of Engineering and the Institute of Medicine, this books attempts to bridge the knowledge/awareness divide separating health care professionals from their potential partners in systems engineering and related disciplines. The goal of this partnership is to transform the U.S. health care sector from an underperforming conglomerate of independent entities (individual practitioners, small group practices, clinics, hospitals, pharmacies, community health centers et. al.) into a high performance "system" in which every participating unit recognizes its dependence and influence on every other unit. By providing both a framework and action plan for a systems approach to health care delivery based on a partnership between engineers and health care professionals, Building a Better Delivery System describes opportunities and challenges to harness the power of systems-engineering tools, information technologies and complementary knowledge in social sciences, cognitive sciences and business/management to advance the U.S. health care system.

Discrete-Event Simulation

Foundations of Multi-Paradigm Modelling for Cyber-Physical Systems

A software engineer's guide to model design in C. Kevin Watkins clarifies the concepts of simulation modelling and discrete event simulation. He explores important simulation techniques such as random numbers generation, sampling, variance reduction, and analysis. Provides all the code for a library of C simulation

routines.

Discrete Event Modeling and Simulation Technologies

This open access book coherently gathers well-founded information on the fundamentals of and formalisms for modelling cyber-physical systems (CPS). Highlighting the cross-disciplinary nature of CPS modelling, it also serves as a bridge for anyone entering CPS from related areas of computer science or engineering. Truly complex, engineered systems -- known as cyber-physical systems -- that integrate physical, software, and network aspects are now on the rise. However, there is no unifying theory nor systematic design methods, techniques or tools for these systems. Individual (mechanical, electrical, network or software) engineering disciplines only offer partial solutions. A technique known as Multi-Paradigm Modelling has recently emerged suggesting to model every part and aspect of a system explicitly, at the most appropriate level(s) of abstraction, using the most appropriate modelling formalism(s), and then weaving the results together to form a representation of the system. If properly applied, it enables, among other global aspects, performance analysis, exhaustive simulation, and verification. This book is the first systematic attempt to bring together these formalisms for anyone starting in the field of CPS who seeks solid modelling foundations and a comprehensive introduction to the distinct existing techniques that are multi-paradigmatic. Though chiefly intended for master and post-graduate level students in computer science and engineering, it can also be used as a reference text for practitioners.

Discrete Event Simulation in C

Introduction to Discrete Event Systems is a comprehensive introduction to the field of discrete event systems, offering a breadth of coverage that makes the material accessible to readers of varied backgrounds. The book emphasizes a unified modeling framework that transcends specific application areas, linking the following topics in a coherent manner: language and automata theory, supervisory control, Petri net theory, Markov chains and queuing theory, discrete-event simulation, and concurrent estimation techniques. This edition includes recent research results pertaining to the diagnosis of discrete event systems, decentralized supervisory control, and interval-based timed automata and hybrid automata models.

Modeling and Simulation of Discrete Event Systems

Over the last decades Discrete Event Simulation has conquered many different application areas. This trend is, on the one hand, driven by an ever wider use of this technology in different fields of science and on the other hand by an incredibly creative use of available software programs through dedicated experts. This book contains articles from scientists and experts from 10 countries. They illuminate the width of application of this technology and the quality of problems solved using Discrete Event Simulation. Practical applications of simulation dominate in the present book. The book is aimed to researchers and students who deal in their work with Discrete Event Simulation and which want to inform them about current

applications. By focusing on discrete event simulation, this book can also serve as an inspiration source for practitioners for solving specific problems during their work. Decision makers who deal with the question of the introduction of discrete event simulation for planning support and optimization this book provides a contribution to the orientation, what specific problems could be solved with the help of Discrete Event Simulation within the organization.

Theory of Modeling and Simulation

During the 1990s the computing industry has witnessed many advances in mobile and enterprise computing. Many of these advances have been made possible by developments in the areas such as modeling, simulation, and artificial intelligence. Within the different areas of enterprise computing - such as manufacturing, health organisation, and commerce - the need for a disciplined, multifaceted, and unified approach to modeling and simulation has become essential. This new book provides a forum for scientists, academics, and professionals to present their latest research findings from the various fields: artificial intelligence, collaborative/distributed computing, modeling, and simulation.

Conceptual Modeling for Discrete-Event Simulation

Discrete event simulation and agent-based modeling are increasingly recognized as critical for diagnosing and solving process issues in complex systems. Introduction to Discrete Event Simulation and Agent-based Modeling covers the techniques needed for success in all phases of simulation projects. These include: • Definition – The reader will learn how to plan a project and communicate using a charter. • Input analysis – The reader will discover how to determine defensible sample sizes for all needed data collections. They will also learn how to fit distributions to that data. • Simulation – The reader will understand how simulation controllers work, the Monte Carlo (MC) theory behind them, modern verification and validation, and ways to speed up simulation using variation reduction techniques and other methods. • Output analysis – The reader will be able to establish simultaneous intervals on key responses and apply selection and ranking, design of experiments (DOE), and black box optimization to develop defensible improvement recommendations. • Decision support – Methods to inspire creative alternatives are presented, including lean production. Also, over one hundred solved problems are provided and two full case studies, including one on voting machines that received international attention. Introduction to Discrete Event Simulation and Agent-based Modeling demonstrates how simulation can facilitate improvements on the job and in local communities. It allows readers to competently apply technology considered key in many industries and branches of government. It is suitable for undergraduate and graduate students, as well as researchers and other professionals.

Dynamic Models and Discrete Event Simulation

For junior- and senior-level simulation courses in engineering, business, or computer science. While most books on simulation focus on particular software tools, Discrete Event System Simulation examines the principles of modeling and

analysis that translate to all such tools. This language-independent text explains the basic aspects of the technology, including the proper collection and analysis of data, the use of analytic techniques, verification and validation of models, and designing simulation experiments. It offers an up-to-date treatment of simulation of manufacturing and material handling systems, computer systems, and computer networks. Students and instructors will find a variety of resources at the associated website, www.bcnn.net/, including simulation source code for download, additional exercises and solutions, web links and errata.

Model Engineering for Simulation

Discover How to Apply DES to Problems Encountered in HTA Discrete event simulation (DES) has traditionally been used in the engineering and operations research fields. The use of DES to inform decisions about health technologies is still in its infancy. Written by specialists at the forefront of this area, Discrete Event Simulation for Health Technology Assessment is the first book to make all the central concepts of DES relevant for health technology assessment (HTA). Accessible to beginners, the book requires no prerequisites and describes the concepts with as little jargon as possible. The book first covers the essential concepts and their implementation. It next provides a fully worked out example using both a widely available spreadsheet program (Microsoft Excel) and a popular specialized simulation package (Arena). It then presents approaches to analyze the simulations, including the treatment of uncertainty; tackles the development of the required equations; explains the techniques to verify that the models are as efficient as possible; and explores the indispensable topic of validation. The book also covers a variety of non-essential yet handy topics, such as the animation of a simulation and extensions of DES, and incorporates a real case study involving screening strategies for breast cancer surveillance. This book guides you in leveraging DES in your assessments of health technologies. After reading the chapters in sequence, you will be able to construct a realistic model designed to help in the assessment of a new health technology.

Modelling and Simulation

Discrete-event dynamic systems (DEDs) permeate our world. They are of great importance in modern manufacturing processes, transportation and various forms of computer and communications networking. This book begins with the mathematical basics required for the study of DEDs and moves on to present various tools used in their modeling and control. Industrial examples illustrate the concepts and methods discussed, making this book an invaluable aid for students embarking on further courses in control, manufacturing engineering or computer studies.

Discrete-Event Modeling and Simulation

Collecting the work of the foremost scientists in the field, Discrete-Event Modeling and Simulation: Theory and Applications presents the state of the art in modeling discrete-event systems using the discrete-event system specification (DEVS) approach. It introduces the latest advances, recent extensions of formal

techniques, and real-world examples of various applications. The book covers many topics that pertain to several layers of the modeling and simulation architecture. It discusses DEVS model development support and the interaction of DEVS with other methodologies. It describes different forms of simulation supported by DEVS, the use of real-time DEVS simulation, the relationship between DEVS and graph transformation, the influence of DEVS variants on simulation performance, and interoperability and composability with emphasis on DEVS standardization. The text also examines extensions to DEVS, new formalisms, and abstractions of DEVS models as well as the theory and analysis behind real-world system identification and control. To support the generation and search of optimal models of a system, a framework is developed based on the system entity structure and its transformation to DEVS simulation models. In addition, the book explores numerous interesting examples that illustrate the use of DEVS to build successful applications, including optical network-on-chip, construction/building design, process control, workflow systems, and environmental models. A one-stop resource on advances in DEVS theory, applications, and methodology, this volume offers a sampling of the best research in the area, a broad picture of the DEVS landscape, and trend-setting applications enabled by the DEVS approach. It provides the basis for future research discoveries and encourages the development of new applications.

Discrete Event Simulation

The PaCT-2009 (Parallel Computing Technologies) conference was a four-day eventheld in Novosibirsk. This was the tenth internationalconference to be held in the PaCT series. The conferences are held in Russia every odd year. The ?rst conference, PaCT 1991, was held in Novosibirsk (Academgorodok), September 7–11, 1991. The next PaCT conferences were held in Obninsk (near Moscow), August 30 to September 4, 1993; in St. Petersburg, September 12–15, 1995; in Yaroslavl, September 9–12, 1997; in Pushkin (near St. Petersburg), September 6–10, 1999; in Academgorodok (Novosibirsk), September 3–7, 2001; in Nizhni Novgorod, September 15–19, 2003; in Krasnoyarsk, September 5–9, 2005; in Pereslavl-Zalessky, September 3–7, 2007. Since 1995 all the PaCT Proceedings have been published by Springer in the LNCS series. PaCT-2009 was jointly organized by the Institute of Computational Mathematics and Mathematical Geophysics of the Russian Academy of Sciences (RAS) and the State University of Novosibirsk. The purpose of the conference was to bring together scientists working on theory, architecture, software, hardware and the solution of lar- scale problems in order to provide integrated discussions on parallel computing technologies. The conference attracted about 100 participants from around the world. Authors from 17 countries submitted 72 papers. Of those submitted, 34 were selected for the conference as regular papers; there were also 2 invited - pers. In addition there were a number of posters presented. All the papers were internationallyreviewedby at leastthree referees. A demo sessionwasorganized for the participants.

Discrete-event System Simulation

Computer modeling and simulation (M&S) allows engineers to study and analyze complex systems. Discrete-event system (DES)-M&S is used in modern

management, industrial engineering, computer science, and the military. As computer speeds and memory capacity increase, so DES-M&S tools become more powerful and more widely used in solving real-life problems. Based on over 20 years of evolution within a classroom environment, as well as on decades-long experience in developing simulation-based solutions for high-tech industries, Modeling and Simulation of Discrete-Event Systems is the only book on DES-M&S in which all the major DES modeling formalisms – activity-based, process-oriented, state-based, and event-based – are covered in a unified manner: A well-defined procedure for building a formal model in the form of event graph, ACD, or state graph Diverse types of modeling templates and examples that can be used as building blocks for a complex, real-life model A systematic, easy-to-follow procedure combined with sample C# codes for developing simulators in various modeling formalisms Simple tutorials as well as sample model files for using popular off-the-shelf simulators such as SIGMA®, ACE®, and Arena® Up-to-date research results as well as research issues and directions in DES-M&S Modeling and Simulation of Discrete-Event Systems is an ideal textbook for undergraduate and graduate students of simulation/industrial engineering and computer science, as well as for simulation practitioners and researchers.

Guide to Modeling and Simulation of Systems of Systems

This second edition describes the fundamentals of modelling and simulation of continuous-time, discrete time, discrete-event and large-scale systems. Coverage new to this edition includes: a chapter on non-linear systems analysis and modelling, complementing the treatment of of continuous-time and discrete-time systems and a chapter on the computer animation and visualization of dynamical systems motion.

Object-Oriented Discrete-Event Simulation with Java

Discrete Event Simulation is a process-oriented text/reference that utilizes an eleven-step model to represent the simulation process from problem formulation to implementation and documentation. The book presents the necessary level of detail required to fully develop a model that produces meaningful results and considers the tools necessary to interpret those results. Sufficient background information is provided so that the underlying concepts of simulation are understood. Major topics covered in Discrete Event Simulation include probability and distributional theory, statistical estimation and inference, the generation of random variates, verification and validation techniques, time management methods, experimental design, and programming language considerations. The book also examines distributed simulation and issues related to distributing the physical process over a network of tightly coupled processors. Topics covered in this area include deadlock, synchronization, rollback, event management, and communication processes. Fully worked examples and numerous practical exercises have been drawn from the engineering disciplines and computer science, although they have been structured so that they will be useful as well to other disciplines such as economics, business administration, and management science. The presentation of techniques and methods in Discrete Event Simulation make it an ideal text/reference for all practitioners of discrete event simulation.

Discrete-Event Modeling and Simulation

Modeling and Simulation in Engineering Sciences

Bringing together an international group of researchers involved in military, business, and health modeling and simulation, Conceptual Modeling for Discrete-Event Simulation presents a comprehensive view of the current state of the art in the field. The book addresses a host of issues, including: What is a conceptual model? How is conceptual modeling performed in general and in specific modeling domains? What is the role of established approaches in conceptual modeling? Each of the book's six parts focuses on a different aspect of conceptual modeling for simulation. The first section discusses the purpose and requirements of a conceptual model. The next set of chapters provides frameworks and tools for conceptual modeling. The book then describes the use of soft systems methodology for model structuring as well as the application of software engineering methods and tools for model specification. After illustrating how conceptual modeling is adopted in the military and semiconductor manufacturing, the book concludes with a discussion on future research directions. This volume offers a broad, multifaceted account of the field by presenting diverse perspectives on what conceptual modeling entails. It also provides a basis upon which these perspectives can be compared.

Simulation of Industrial Systems

The book presents a collection of MATLAB-based chapters of various engineering background. Instead of giving exhausting amount of technical details, authors were rather advised to explain relations of their problems to actual MATLAB concepts. So, whenever possible, download links to functioning MATLAB codes were added and a potential reader can do own testing. Authors are typically scientists with interests in modeling in MATLAB. Chapters include image and signal processing, mechanics and dynamics, models and data identification in biology, fuzzy logic, discrete event systems and data acquisition systems.

Systems Modeling and Computer Simulation

This text presents the basic concepts of discrete event simulation using ExtendSim 8. The book can be used as either a desk reference or as a textbook for a course in discrete event simulation. This book is intended to be a blend of theory and application, presenting just enough theory to understand how to build a model, designs a simulation experiment, and analyze the results. Most of the text is devoted to building models with ExtendSim 8, starting with a simple single-server queue and culminating with a transportation depot for package transfer and delivery. I have built all the models contained in this book with ExtendSim 8 LT, which limits the number of modeling blocks, but otherwise has the required ExtendSim 8 capabilities. Each chapter contains practical exercises and problems at the end of the chapters. ExtendSim 8 LT is not included in this book. Students may obtain ExtendSim 8 LT from Imagine That, Inc.

Applications from Engineering with MATLAB Concepts

In any production environment, discrete event simulation is a powerful tool for the analysis, planning, and operating of a manufacturing facility. Operations managers can use simulation to improve their production systems by eliminating bottlenecks, reducing cycle time and cost, and increasing capacity utilization. Offering a hands-on tutorial on how to model traditional applications to optimize production operations, Simulation of Industrial Systems: Discrete Event Simulation Using Excel/VBA— · Introduces the Design Environment for Event Driven Simulation (DEEDS), an original simulator, which facilitates the modeling of complex situations using four (self-contained) nodes: source, queue, facility, and delay. · Demonstrates how to use discrete event simulation as a powerful tool for the analysis, planning, design, and operation of diverse production systems · Shows how to model application areas such as facilities layout, material handling, inventory control, scheduling, maintenance, quality control, and supply chain logistics · Integrates the design of experiments and optimization techniques for improving production systems With the comprehensive instruction provided within these pages, in combination with the flexibility of the DEEDS program environment, operations managers will be able to harness the power of discrete event simulation to streamline their production environments. The authors have created a website with a variety of teaching aids that professors will be able to access

Continuous System Modeling

Stochastic discrete-event systems (SDES) capture the randomness in choices due to activity delays and the probabilities of decisions. This book delivers a comprehensive overview on modeling with a quantitative evaluation of SDES. It presents an abstract model class for SDES as a pivotal unifying result and details important model classes. The book also includes nontrivial examples to explain real-world applications of SDES.

Discrete Event Simulation Using ExtendSim 8

Complex artificial dynamic systems require advanced modeling techniques that can accommodate their asynchronous, concurrent, and highly non-linear nature. Discrete Event systems Specification (DEVS) provides a formal framework for hierarchical construction of discrete-event models in a modular manner, allowing for model re-use and reduced development time. Discrete Event Modeling and Simulation presents a practical approach focused on the creation of discrete-event applications. The book introduces the CD++ tool, an open-source framework that enables the simulation of discrete-event models. After setting up the basic theory of DEVS and Cell-DEVS, the author focuses on how to use the CD++ tool to define a variety of models in biology, physics, chemistry, and artificial systems. They also demonstrate how to map different modeling techniques, such as Finite State Machines and VHDL, to DEVS. The in-depth coverage elaborates on the creation of simulation software for DEVS models and the 3D visualization environments associated with these tools. A much-needed practical approach to creating discrete-event applications, this book offers world-class instruction on the field's most

useful modeling tools.

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