

Solution Discrete Event System Simulation 4th Edition Jerry Banks

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

Presents the findings of experts and practitioners from the major soft-computing themes Provides an overview of the theory and applications of IMS systems The Area of Intelligence in manufacturing has generated a considerable amount of interest occasionally verging on controversy, both in the research community and in the industrial sector. This proceedings looks at the broad manufacturing domain dealing with both technical and organizational issues, intelligent control is only part, albeit important, of optimal integration and control of intelligent techniques. The importance of creating a synergy of efforts aiming at efficient employment of intelligence in global technological development for manufacturing was recognized by the international IMS (Intelligent manufacturing Systems) Initiative and is discussed in this proceedings volume.

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.

Modeling Discrete-Event Systems with GPeNSIM describes the design and applications of General Purpose Petri Net Simulator (GPeNSIM), which is a software tool for modeling, simulation, and performance analysis of discrete-event systems. The brief explains the principles of modelling discrete-event systems, as well as the design and applications of GPeNSIM. It is based on the author's lectures that were given on "modeling, simulation, and performance analysis of discrete event systems". The brief uses GPeNSIM to enable the efficient modeling of complex and large-scale discrete-event systems. GPeNSIM, which is based on MATLAB®, is designed to allow easy integration of Petri net models with a vast number of toolboxes that are available on the MATLAB®. The book offers an approach for developing models that can interact with the external environment; this will help readers to solve problems in industrial diverse fields. These problems include: airport capacity evaluation for aviation authorities; finding bottlenecks in supply chains; scheduling drilling operations in the oil and gas industry; and optimal scheduling of jobs in grid computing. This brief is of interest to researchers working on the modeling, simulation and performance evaluation of discrete-event systems, as it shows them the design and applications of an efficient modeling package. Since the book also explains the basic principles of modeling discrete-event systems in a step-by-step manner, it is also of interest to final-year undergraduate and postgraduate students.

Discrete Event Systems: Modeling and Control

Modeling Discrete-Event Systems with GPeNSIM

Encyclopedia of Social Networks

International Workshop on Discrete Event Systems

Numerical Solution of Markov Chains

This unique textbook comprehensively introduces 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 queueing theory, discrete-event simulation, and concurrent estimation techniques. Topics and features: detailed treatment of automata and language theory in the context of discrete event systems, including application to state estimation and diagnosis comprehensive coverage of centralized and decentralized supervisory control of partially-observed systems timed models, including timed automata and hybrid automata stochastic models for discrete event systems and controlled Markov chains discrete event simulation an introduction to stochastic hybrid systems sensitivity analysis and optimization of discrete event and hybrid systems new in the third edition: opacity properties, enhanced coverage of supervisory control, overview of latest software tools This proven textbook is essential to advanced-level students and researchers in a variety of disciplines where the study of discrete event systems is relevant: control, communications, computer engineering, computer science, manufacturing engineering, transportation networks, operations research, and industrial engineering. Christos G. Cassandras is Distinguished Professor of Engineering, Professor of Systems Engineering, and Professor of Electrical and Computer Engineering at Boston University. Stéphane Laforest is Professor of Electrical Engineering and Computer Science at the University of Michigan, Ann Arbor.

This book provides a clear, understandable, and motivated account on the subject that spans both conventional and modern materials about discrete event systems, material that, up to now, has been presented in the literature in different fields, such as the graph theory, the probability theory, the automata's theory, and the queueing theory. The book gives a complete introduction to the discrete-event system theory and simultaneously applies the theory to practical problems. The book gives students of computer sciences, system sciences, and of electrical engineering, a clear, unambiguous, and relevant account of discrete-event systems. Numerous illustrations are included for better understanding. Problems as well as their solutions are included in each chapter. It can be used as a basic introduction for undergraduate and graduate students. Although it is logically self-contained, it presupposes the mathematical maturity acquired by students with two years of calculus.

Discrete Event System Simulation is ideal for junior- and senior-level simulation courses in engineering, business, or computer science. It is also a useful reference for professionals in operations research, management science, industrial engineering, and information 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.benn.net/, including simulation source code for download, additional exercises and solutions, web links and errata.

This book aims at providing a view of the current trends in the development of research on Synthesis and Control of Discrete Event Systems. Papers col lected in this volume are based on a selection of talks given in June and July 2001 at two independent meetings: the Workshop on Synthesis of Concurrent Systems, held in Newcastle upon Tyne as a satellite event of ICATPN/ICACSD and organized by Ph. Doronau and L. Lavagno, and the Symposium on the Supervisory Control of Discrete Event Systems (SCODES), held in Paris as a satellite event of CAV and organized by B. Caillaud and X. Xie. Synthesis is a generic term that covers all procedures aiming to construct from specifications given as input objects matching these specifications. The ories and applications of synthesis have been studied and developed for long in connection with logics, programming, automata, discrete event systems, and hardware circuits. Logics and programming are outside the scope of this book, whose focus is on Discrete Event Systems and Supervisory Control. The stress today in this field is on a better applicability of theories and algorithms to practical systems design. Coping with decentralization or distribution and caring for an efficient realization of the synthesized systems or controllers are of the utmost importance in areas so diverse as the supervision of embedded or man ufacturing systems, or the implementation of protocols in software or in hard ware.

Use Cases of Discrete Event Simulation

Discrete-event System Simulation

Discrete Event Systems, Manufacturing Systems, and Communication Networks

Modeling and Performance Analysis

Design Methods of Control Systems

Perturbation Analysis, Ordinal Optimization, and Beyond

These Proceedings contain a selection of papers presented at the first IFAC Symposium on Design Methods of Control Systems. The volume contains three plenary papers and 97 technical papers, the latter classified under 15 section headings, as listed in the contents.

Discrete Event Systems: Analysis and Control is the proceedings of WODES2000 (the 5th Workshop on Discrete Event Systems, held in Ghent, Belgium, on August 21-23, 2000). This book provides a survey of the current state of the art in the field of modeling, analysis and control synthesis of discrete event systems, lecture notes for a mini course on sensitivity analysis for performance evaluation of timed discrete event systems, and 48 carefully selected papers covering all areas of discrete event systems and the most important applications domains. Topics include automata theory and supervisory control (12); Petri net based models for discrete event systems, and their control synthesis (11); (max,+) and timed automata models (9); applications papers related to scheduling, failure detection, and implementation of supervisory controllers (7); formal description of PLCs (6); and finally, stochastic models of discrete event systems (3).

This book attempts to bring together selected recent advances, tools, application and new ideas in manufacturing systems. Manufacturing system comprise of equipment, products, people, information, control and support functions for the competitive development to satisfy market needs. It provides a comprehensive collection of papers on the latest fundamental and applied industrial research. The book will be of great interest to those involved in manufacturing engineering, systems and management and those involved in manufacturing research.

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 Modeling and Simulation

WODES'96 19-21 August 1996 : John McIntyre Centre, Pollock Halls, University of Edinburgh, UK.

An Introduction

Intelligent Manufacturing Systems 2003

Introduction to Discrete Event Systems

To perform computer simulation successfully, two rather different sets of skills are required. One of these relates to programming: a simulation program should do what its author intends and do it efficiently. The other is concerned with the collection and analysis of data: statistical tools have to be used in order to obtain with a minimum of effort, accurate and reliable estimates for the desired performance measures. Dr Mitrani covers both of these aspects of the simulation method. The important topics of point and interval estimation, simulation efficiency and the analysis of simulation experiments are discussed in detail. This book, first published in 1982, will be useful to both undergraduate and postgraduate students taking courses on simulation in departments of computer science, operations research and statistics in universities and polytechnics. It will be of benefit also to practitioners in the field.

This book provides a basic treatment of discrete-event simulation, including the proper collection and analysis of data, the use of analytic techniques, verification and validation of models, and designing simulation experiments.Contains up-to-date treatment of simulation of manufacturing and material handling systems. Includes numerous solved examples. Offers an integrated website. Explains how to interpret simulation software output.For those interested in learning more about discrete-event simulation.

Process Modelling and Model Analysis describes the use of models in process engineering. Process engineering is all about manufacturing—of just about anything! To manage processing and manufacturing systematically, the engineer has to bring together many different techniques and analyses of the interaction between various aspects of the process. For example, process engineers would apply models to perform feasibility analyses of novel process designs, assess environmental impact, and detect potential hazards or accidents. To manage complex systems and enable process design, the behavior of systems is reduced to simple mathematical forms. This book provides a systematic approach to the mathematical development of process models and explains how to analyze those models. Additionally, there is a comprehensive bibliography for further reading, a question and answer section, and an accompanying Web site developed by the authors with additional data and exercises. Introduces a structured modeling methodology emphasizing the importance of the modeling goal and including key steps such as model verification, calibration, and validation Focuses on novel and advanced modeling techniques such as discrete, hybrid, hierarchical, and empirical modeling Illustrates the notions, tools, and techniques of process modeling with examples and advances applications

It also introduces, Generalized Petri Nets, Generalized Principles, Simulation Software, Statistical models in simulation, Queueing models, Random-number generation, Random-variate generation, Input modeling, Verification and validation of simulation models, Output analysis for a single model, Comparison and evaluation of alternative system designs.

Simulation of manufacturing and material handling systems. Simulation of computer systems.

Discrete Event Systems

Analysis and Control

Modeling and Partially Coordinated Diagnosis of Asynchronous Discrete-Event Systems

Autonomous and cooperative control of networked discrete-event systems

with Petri Nets and Other Tools

Manufacturing System

This work presents a novel approach to modeling, analysis and diagnosis of coupled mechatronical systems with partially autonomous behavior and asynchronous state transitions. The systems under consideration are assumed to have the following properties: The internal interactions are immeasurable but reliable and the measurements relevant for diagnosis are given as a sequence of events. Asynchronous networks of input/output automata (I/O-automata) are developed to cope with partial coupling between components and to reduce the computational complexity of the diagnostic algorithms. I/O-automata are used to model those components. Their measurable inputs and outputs are modeled as control signals. Interconnection signals are used to model the internal dependencies among the components. They are linked via an interaction block to one another. The criterion known from synchronous networks of I/O-automata is extended to ensure the well-posedness of this modeling formalism. To check for partially autonomous behavior, two types of autonomy are introduced and discussed: Structural autonomy and state-dependent autonomy. To carry out the diagnosis, three different information structures are investigated: Centralized, decentralized and partially coordinated. The centralized approach yields the ideal diagnostic result, but reduction of the computational complexity by using online composition is rather small. Further reduction of the computational complexity is accomplished by decentralized diagnosis. It yields only in the case of state-dependent autonomy a complete and sound diagnostic result. In general, the lack of soundness arises. Both, obtaining an ideal diagnostic result and reducing the computational complexity, is obtained by the partially coordinated diagnostic algorithm.

This IMA Volume in Mathematics and its Applications DISCRETE EVENT SYSTEMS, MANUFACTURING SYSTEMS AND COMMUNICATION NETWORKS is based on the proceedings of a workshop that was an integral part of the 1992-93 IMA program on "Control Theory. " The study of discrete event dynamical systems (DEDS) has become rapidly popular among researchers in systems and control, in communication networks, in manufacturing, and in distributed computing. This development has created problems for re searchers and potential "consumers" of the research. The first problem is the veritable Babel of languages, formalisms, and approaches, which makes it very difficult to determine the commonalities and distinctions among the competing schools of approaches. The second, related, problem arises from the different traditions, paradigms, values, and experience that scholars bring to their study of DEEDS, depending on whether they come from control, com munication, computer science, or mathematical logic. As a result, intellectual exchange among scholars becomes compromised by unexplained assumptions. The purpose of the Workshop was to promote exchange among scholars representing some of the major "schools" of thought in DEDS with the hope that (1) greater clarity will be achieved thereby, and (2) cross-fertilization will lead to more fruitful questions. We thank P. R. Kumar and P. P. Varaiya for organizing the workshop and editing the proceedings. We also take this opportunity to thank the National Science Foundation and the Army Research Office, whose financial support made the workshop possible. A vner Friedman Willard Miller, Jr.

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. The full text downloaded to your computer With eBooks you can: search for key concepts, words and phrases make highlights and notes as you study share your notes with friends eBooks are downloaded to your computer and accessible either offline through the Bookshelf (available as a free download), available online and also via the iPad and Android apps. Upon purchase, you'll gain instant access to this eBook. Time limit The eBooks products do not have an expiry date. You will continue to access your digital ebook products whilst you have your Bookshelf installed.

Papers presented at a workshop held January 1990 (location unspecified) cover just about all aspects of solving Markov models numerically. There are papers on matrix generation techniques and generalized stochastic Petri nets; the computation of stationary distributions, including

aggregation/disagg

Theory of Modeling and Simulation

Introduction to Discrete Event Simulation and Agent-based Modeling

Handbook of Research on Discrete Event Simulation Environments: Technologies and Applications

Pearson New International Edition

Synthesis and Control of Discrete Event Systems

Selected Papers from the IFAC Symposium, Zurich, Switzerland, 4 - 6 September 1991

Request a FREE 30-day online trial to this title at www.sagepub.com/freetrial This two-volume encyclopedia provides a thorough introduction to the wide-ranging, fast-developing field of social networking, a much-needed resource at a time when new social networks or "communities" seem to spring up on the internet every day. Social networks, or groupings of individuals tied by one or more social or disease transmission to the "old boy" network or overlapping circles of friends, have been in existence for longer than services such as Facebook or YouTube: analysis of these networks emphasizes the relationships within the network. This reference resource offers comprehensive coverage of the theory and research within the social sciences that has sprung from the analysis of such groups and approximately 350 signed entries, along with approximately 40 media clips, organized alphabetically and offering cross-references and suggestions for further readings; this encyclopedia opens with a thematic Reader's Guide in the front that groups related entries by topics. A Chronology offers the reader historical perspective on the study of social networks. This two-volume reference work is

fields related to social networks

Proceedings of the European Control Conference 1993, Groningen, Netherlands, June 28 - July 1, 1993

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 techniques.

The field of discrete event systems has emerged to provide a formal treatment of many of the man-made systems such as manufacturing systems, communica tion networks, automated traffic systems, database management systems, and computer systems that are event-driven, highly complex, and not amenable to the classical treatments based on differential or difference equations. Discrete event systems are modeled by formal languages or, equivalently, by state machines. The field of computer science, control theory, and operations research. Our goal is to bring together in one book the relevant techniques from these fields. This is the first book of this kind, and our hope is that it will be useful to professionals in the area of discrete event systems since most of the material presented has appeared previously only in journals. The book is also designed for a graduate level course in formal language theory and lattice the ory. The only prerequisite is some degree of "mathematical maturity".

Discrete Event Systems 2004 (WODES'04)

Discrete-Event System Simulation

Modeling and Control of Logical Discrete Event Systems

Discrete-event System Theory

Proceedings of a Joint Workshop held in Prague, August 1992

Stochastic Discrete Event Systems

This book concerns the use of dioid algebra as (max, +) algebra to treat the synchronization of tasks expressed by the maximum of the ends of the tasks conditioning the beginning of another task – a criterion of linear programming. A classical example is the departure time of a train which should wait for the arrival of other trains in order to allow for the changover of passengers. The content focuses on the modeling of a class of dynamic systems usually called "discrete event systems" where the timing of the events is crucial. Events are viewed as sudden changes in a process which is, essentially, a man-made system, such as automated manufacturing lines or transportation systems. Its main advantage is its formalism which allows us to clearly describe complex notions and the possibilities to transpore theoretical results between dioids and practical applications.

"This book provides a comprehensive overview of theory and practice in simulation systems focusing on major breakthroughs within the technological arena, with particular concentration on the accelerating principles, concepts and applications"--Provided by publisher.

Research of discrete event systems is strongly motivated by applications in flex ible manufacturing, in traffic control and in concurrent and real-time software verification and design, just to mention a few important areas. Discrete event system theory is a promising and dynamically developing area of both control theory and computer science. Discrete event systems are systems with non-numerically-valued states, inputs, and outputs. The approaches to the modelling and control of these systems can be roughly divided into two groups. The first group is concerned with the automatic design of controllers from formal specifications of logical requirements. This re search owes much to the pioneering work of P. J. Ramadge and W.M. Wonham at the beginning of the eighties. The second group deals with the analysis and op timization of system throughput, waiting time, and other performance measures for discrete event systems. The present book contains selected papers presented at the Joint Workshop on Discrete Event Systems (WODES'92) held in Prague, Czechoslovakia, on Au gust 26-28, 1992 and organized by the Institute of Information Theory and Au tomation of the Czechoslovak Academy of Sciences, Prague, Czechoslovakia, by the Automatic Control Laboratory of the Swiss Federal Institute of Technology (ETH), Zurich, Switzerland, and by the Department of Computing Science of the University of Groningen, Groningen, the Netherlands.

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 simulation tools 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.

European Control Conference 1993

Control of Discrete-Event Systems

Volume 4

Appliance and Research

Technologies and Applications

Discrete Event Systems in Dioid Algebra and Conventional Algebra

This thesis considers the use of dioid algebra as (max, +) algebra to treat the synchronization of tasks expressed by the maximum of the ends of the tasks conditioning the beginning of another task – a criterion of linear programming. A classical example is the departure time of a train which should wait for the arrival of other trains in order to allow for the changover of passengers. The content focuses on the modeling of a class of dynamic systems usually called "discrete event systems" where the timing of the events is crucial. Events are viewed as sudden changes in a process which is, essentially, a man-made system, such as automated manufacturing lines or transportation systems. Its main advantage is its formalism which allows us to clearly describe complex notions and the possibilities to transpore theoretical results between dioids and practical applications.

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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 simulation tools 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.

Identification und Fehlerdiagnose Industrieller Ereignisdiskreter Closed-Loop-Systeme

Voting Systems, Health Care, Military, and Manufacturing

A Proceedings Volume from the 7th IFAC Workshop, Reims, France, 22-24 September 2004

Automata and Petri Net Perspectives

Theory and Applications

Simulation Modelling Practice and Theory