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Introduction. 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 queueing theory, discrete-event ...

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10 Introduction to Discrete-Event Simulation 557 10.1 INTRODUCTION557 10.2 THE EVENT SCHEDULING SCHEME558 10.2.1 Simulation of a Simple Queueing System561 10.3 THE PROCESS-ORIENTED SIMULATION SCHEME573 10.4 DISCRETE-EVENT SIMULATION LANGUAGES574

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Introduction to Discrete Event Systems is written as a textbook for courses at the senior undergraduate level or the first-year graduate level. It will be of interest to students in a variety of disciplines where the study of discrete event systems is relevant: control, communications, computer engineering, computer science, manufacturing engineering, operations research, and industrial engineering.

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A discrete-event simulation models the operation of a system as a sequence of events in time. Each event occurs at a particular instant in time and marks a change of state in the system. Between consecutive events, no change in the system is assumed to occur; thus the simulation time can directly jump to the occurrence time of the next event, which is called next-event time progression. In addition to next-event time progression, there is also an alternative approach, called fixed-increment time

[Discrete-event simulation - Wikipedia](#)

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Abstract In our study of dynamic systems, our first goal is to obtain a model. For our purposes, a model consists of mathematical equations

which describe the behavior of a system. For example, in Chap. 5 we developed the set of equations (5.7)–(5.12) which describe how the state of a DES evolves as a result of event occurrences over time.

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Introduction to Discrete Event Systems: Cassandras ...

In discrete systems, the changes in the system state are discontinuous and each change in the state of the system is called an event. The model used in a discrete system simulation has a set of numbers to represent the state of the system, called as a state descriptor.

Discrete System Simulation - Tutorialspoint

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A substantial portion of this book is a revised version of *Discrete Event Systems: Modeling and Performance Analysis* (1993), which was written by the first author and received the 1999 Harold Chestnut Prize, awarded by the International Federation of Automatic Control (IFAC) for best control engineering textbook. This new expanded book is a comprehensive introduction to the field of discrete event systems, emphasizing breadth of coverage and accessibility of the material to readers with different backgrounds. Its key feature is the emphasis placed on a unified modeling framework that transcends specific application areas and allows linking of the following topics in a coherent manner: language and automata theory, supervisory control, Petri net theory, (max,+) algebra, Markov chains and queueing theory, discrete-event simulation, perturbation analysis, and concurrent estimation techniques. *Introduction to Discrete Event Systems* will be of interest to advanced-level students in a variety of disciplines where the study of discrete event systems is relevant: control, communications, computer engineering, computer science, manufacturing engineering, operations research, and industrial engineering.

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Its key feature is the emphasis placed on a unified modeling framework that transcends specific application areas and allows linking of the following topics in a coherent manner: language and automata theory, supervisory control, Petri net theory, (max,+) algebra, Markov chains and queueing theory, discrete-event simulation, perturbation analysis, and concurrent estimation techniques. Until now, these topics had been treated in separate books or in the research literature only."--BOOK JACKET.

Control of Discrete-event Systems provides a survey of the most important topics in the discrete-event systems theory with particular focus on finite-state automata, Petri nets and max-plus algebra. Coverage ranges from introductory material on the basic notions and definitions of discrete-event systems to more recent results. Special attention is given to results on supervisory control, state estimation and fault diagnosis of both centralized and distributed/decentralized systems developed in the framework of the Distributed Supervisory Control of Large Plants (DISC) project. Later parts of the text are devoted to the study of congested systems through fluidization, an over approximation allowing a much more efficient study of observation and control problems of timed Petri nets. Finally, the max-plus algebraic approach to the analysis and control of choice-free systems is also considered. *Control of Discrete-event Systems* provides an introduction to discrete-event systems for readers that are not familiar with this class of systems, but also provides an introduction to research problems and open issues of current interest to readers already familiar with them. Most of the material in this book has been presented during a Ph.D. school held in Cagliari, Italy, in June 2011.

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.

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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.

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.

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