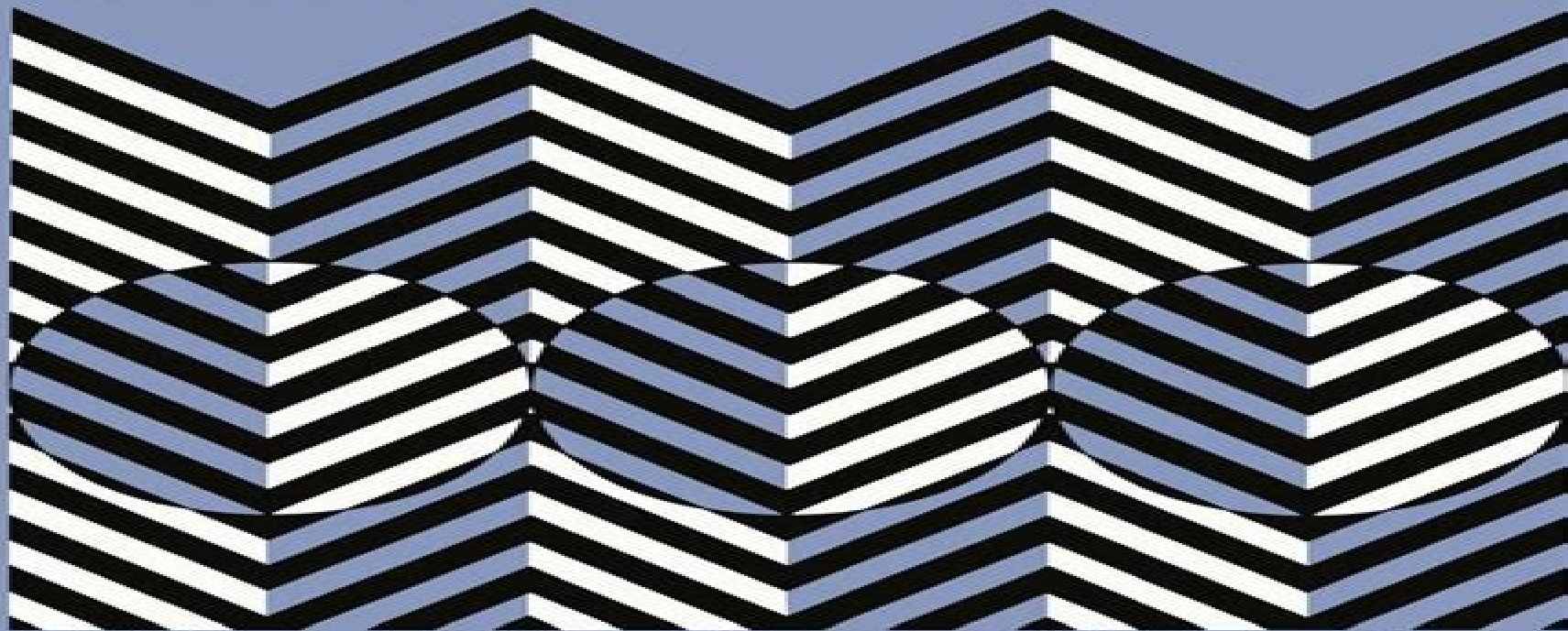


# SOFTWARE PERFORMABILITY: FROM CONCEPTS TO APPLICATIONS

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Ann T. Tai  
John F. Meyer  
Algirdas Avižienis



K L U W E R   A C A D E M I C   P U B L I S H E R S

# Software Performability From Concepts To Applications

**Wolfgang Guggemos**



## **Software Performability From Concepts To Applications:**

Software Performability: From Concepts to Applications Ann T. Tai, John F. Meyer, Algirdas Avizienis, 2012-12-06

Computers are currently used in a variety of critical applications including systems for nuclear reactor control flight control both aircraft and spacecraft and air traffic control Moreover experience has shown that the dependability of such systems is particularly sensitive to that of its software components both the system software of the embedded computers and the application software they support Software Performability From Concepts to Applications addresses the construction and solution of analytic performability models for critical application software The book includes a review of general performability concepts along with notions which are peculiar to software performability Since fault tolerance is widely recognized as a viable means for improving the dependability of computer system beyond what can be achieved by fault prevention the examples considered are fault tolerant software systems that incorporate particular methods of design diversity and fault recovery Software Performability From Concepts to Applications will be of direct benefit to both practitioners and researchers in the area of performance and dependability evaluation fault tolerant computing and dependable systems for critical applications For practitioners it supplies a basis for defining combined performance dependability criteria in the form of objective functions that can be used to enhance the performability performance dependability of existing software designs For those with research interests in model based evaluation the book provides an analytic framework and a variety of performability modeling examples in an application context of recognized importance The material contained in this book will both stimulate future research on related topics and for teaching purposes serve as a reference text in courses on computer system evaluation fault tolerant computing and dependable high

performance computer systems      Software Performability Ann T. Tai, 1995      **Software Fault Tolerance Techniques and Implementation** Laura L. Pulum, 2001 Look to this innovative resource for the most comprehensive coverage of software fault tolerance techniques available in a single volume It offers you a thorough understanding of the operation of critical software fault tolerance techniques and guides you through their design operation and performance You get an in depth discussion on the advantages and disadvantages of specific techniques so you can decide which ones are best suited for your work The book examines key programming techniques such as assertions checkpointing and atomic actions and provides design tips and models to assist in the development of critical fault tolerant software that helps ensure dependable performance From software reliability recovery and redundancy to design and data diverse software fault tolerance techniques this practical reference provides detailed insight into techniques that can improve the overall dependability of your software      Software Performance and Scalability Henry H. Liu, 2011-09-20 Praise from the Reviewers The practicality of the subject in a real world situation distinguishes this book from others available on the market Professor Behrouz Far University of Calgary This book could replace the computer organization texts now in use that every CS and CpE student

must take It is much needed well written and thoughtful Professor Larry Bernstein Stevens Institute of Technology A distinctive educational text on software performance and scalability This is the first book to take a quantitative approach to the subject of software performance and scalability It brings together three unique perspectives to demonstrate how your products can be optimized and tuned for the best possible performance and scalability The Basics introduces the computer hardware and software architectures that predetermine the performance and scalability of a software product as well as the principles of measuring the performance and scalability of a software product Queuing Theory helps you learn the performance laws and queuing models for interpreting the underlying physics behind software performance and scalability supplemented with ready to apply techniques for improving the performance and scalability of a software system API Profiling shows you how to design more efficient algorithms and achieve optimized performance and scalability aided by adopting an API profiling framework perfBasic built on the concept of a performance map for drilling down performance root causes at the API level Software Performance and Scalability gives you a specialized skill set that will enable you to design and build performance into your products with immediate measurable improvements Complemented with real world case studies it is an indispensable resource for software developers quality and performance assurance engineers architects and managers It is an ideal text for university courses related to computer and software performance evaluation and can also be used to supplement a course in computer organization or in queuing theory for upper division and graduate computer science students

**Stochastic Models for Fault Tolerance** Katinka Wolter, 2010-06-17 As modern society relies on the fault free operation of complex computing systems system fault tolerance has become an indispensable requirement Therefore we need mechanisms that guarantee correct service in cases where system components fail be they software or hardware elements Redundancy patterns are commonly used for either redundancy in space or redundancy in time Wolter's book details methods of redundancy in time that need to be issued at the right moment In particular she addresses the so called timeout selection problem i e the question of choosing the right time for different fault tolerance mechanisms like restart rejuvenation and checkpointing Restart indicates the pure system restart rejuvenation denotes the restart of the operating environment of a task and checkpointing includes saving the system state periodically and reinitializing the system at the most recent checkpoint upon failure of the system Her presentation includes a brief introduction to the methods their detailed stochastic description and also aspects of their efficient implementation in real world systems The book is targeted at researchers and graduate students in system dependability stochastic modeling and software reliability Readers will find here an up to date overview of the key theoretical results making this the only comprehensive text on stochastic models for restart related problems

**1998 IEEE Workshop on Application-Specific Software Engineering and Technology** IEEE Computer Society, 1998 These conference papers on software engineering and technology include coverage of telecommunications software engineering embedded systems and languages and databases

**The Software Developer's**

**Handbook: Mastering Core Skills and Advanced Practices** Adam Jones, 2025-01-13 The Software Developer's Handbook Mastering Core Skills and Advanced Practices is the ultimate resource for those aiming to excel in both the foundational aspects and the sophisticated practices of modern software development Tailored for both budding developers and seasoned professionals this handbook delves into an extensive range of crucial topics From the systematic processes of the Software Development Lifecycle SDLC to the tactical use of Version Control Systems and from the intricate principles of Software Architecture to the innovative integration of Artificial Intelligence every critical facet is explored Each chapter is thoughtfully crafted to offer comprehensive insights into the best practices tools and methodologies that empower readers to create robust high quality software Whether you're exploring the subtleties of Design Patterns fine tuning performance or reinforcing your projects against security threats this book provides the guidance necessary to enhance your software development skills More than just a collection of information The Software Developer's Handbook serves as a blueprint for ongoing professional development in the ever evolving landscape of software development It is an essential resource for any developer eager to adapt excel and lead in crafting cutting edge high performance software solutions

**Automated Experiments for Deriving Performance-relevant Properties of Software Execution Environments** Hauck, Michael, 2014-02-11 The software execution environment can play a crucial role when analyzing the performance of a software system In this book a novel approach for the automated detection of performance relevant properties of the execution environment is presented The properties are detected using predefined experiments and integrated into performance prediction tools The approach is applied to experiments for detecting different CPU OS and virtualization properties and validated in different case studies

*Software Performance Engineering* Alon Rotem, 2025-05-28 DESCRIPTION This book introduces the concept of Software Performance Engineering throughout the development process Software performance yields from a wide range of factors from hardware through coding standards runtime frameworks design patterns quality assurance and testing and system architectural patterns to name a few This book takes a holistic view of the entire software development lifecycle learning each of its phases to understand the technologies techniques and tools available and how we can use them to improve the behavior and performance of our system Technical hands on chapters introduce tools and libraries showing practical examples of how to set them up and use them with ease while theoretical chapters include comprehensive information and deep explanations of a broad selection of concepts all accompanied by relevant charts screenshots and code samples Key sections cover performance monitoring design using tools like OpenTelemetry detailed code profiling techniques and best practices for performance testing and test data management You will also learn about the performance benchmarking types KPIs metrics analysis and behavioral correlation Upon completing this book you will possess the practical skills to proactively integrate performance into every development stage diagnose complex issues and manage system performance effectively post production Code snippets are mainly written in Python as

the book focuses on current technologies delving into concepts of cloud computing design patterns and best practices in order to learn how to optimize the entire software delivery process end to end **WHAT YOU WILL LEARN** Define performance requirements metrics and KPIs Useful design patterns and bad practices to avoid Utilize cloud services for performance Tools for optimizing code and testing Live telemetry monitoring measuring dashboarding and predicting **WHO THIS BOOK IS FOR** This book is for performance engineers software developers QA engineers and solution architects aiming to identify bottlenecks and optimize application performance Readers will benefit from prior knowledge of distributed systems microservices and basic non functional engineering concepts **TABLE OF CONTENTS** 1 Introduction to Performance Engineering 2 Performance Driven Development 3 Non functional Requirements Definition and Tracking 4 Workload Modeling and Projection 5 High Performance Design Patterns 6 Performance Antipatterns 7 Performance in the Clouds 8 Designing Performance Monitoring 9 Tools and Techniques for Code Profiling 10 Performance Testing Checklist to Best Practices 11 Test Data Management 12 Performance Benchmarking 13 Golden Signals KPI Metrics and Tools 14 Performance Behavioral Correlation 15 Post Production Management     System Performance Evaluation Erol

Gelenbe,2000-03-24 Throughout successive generations of information technology the importance of the performance evaluation of software computer architectures and computer networks endures For example the performance issues of transaction processing systems and redundant arrays of independent disks replace the virtual memory and input output problems of the 70s     **Functional Software Size Measurement Methodology with Effort Estimation and Performance Indication** Jasveer Singh,2017-04-11 Presents a new effective methodology in software size measurement Software size measurement is an extremely important and highly specialized aspect of the software life cycle It is used for determining the effort and cost estimations for project planning purposes of a software project s execution and or for other costing charging and productivity analysis purposes Many software projects exceed their allocated budget limits because the methodologies currently available lack accuracy The new software size measurement methodology presented in this book offers a complete procedure that overcomes the deficiencies of the current methodologies allowing businesses to estimate the size and required effort correctly for all their software projects developed in high level languages The Functional Software Size Measurement Methodology with Effort Estimation and Performance Indication FSSM allows for projects to be completed within the defined budget limits by obtaining accurate estimations The methodology provides comprehensive and precise measurements of the complete software whereby factual software size determination development effort estimation and performance indications are obtained The approach is elaborate effective and accurate for software size measurement and development effort estimation avoiding inaccurate project planning of software projects Key features Pinpoints one of the major originating root causes of erroneous planning by disclosing hidden errors made in software size measurement and consequently in effort estimates and project planning All the major relevant and important aspects of software size

measurement are taken into consideration and clearly presented to the reader Functional Software Size Measurement Methodology with Effort Estimation and Performance Indication is a vital reference for software professionals and Master level students in software engineering For further information and materials relating to this book such as FSSM 1 0 Calculations Template for Results Tables and Graphs containing Calculations and Results Tables Graphs for the Mini FSSM Example please visit the following two accompanying websites <http://booksupport.wiley.com> [www.fssm-software.com](http://www.fssm-software.com)

**Performance Engineering** Reiner Dumke, Claus Rautenstrauch, Andreas Schmietendorf, Andre Scholz, 2003-06-29

Initially computer systems performance analyses were carried out primarily because of limited resources Due to ever increasing functional complexity of computational systems and user requirements performance engineering continues to play a major role in software development This book assesses the state of the art in performance engineering Besides revised chapters drawn from two workshops on performance engineering held in 2000 additional chapters were solicited in order to provide complete coverage of all relevant aspects The first part is devoted to the relation between software engineering and performance engineering the second part focuses on the use of models measures and tools finally case studies with regard to concrete technologies are presented Researchers professional software engineers and advanced students interested in performance analysis will find this book an indispensable source of information and reference Integration of Performance Management into the Application Lifecycle Eduard Tudenhöfner, 2011-09-15 Inhaltsangabe Introduction Despite the widespread recognition that performance is important to the success of a project many software products fail to respond fast enough to user requests or to handle a certain amount of parallel business transactions This is because nowadays projects are result oriented where the focus is on functionality to be implemented Such projects do not pay high attention to application performance because it still does not have the particular importance that unit testing for example has Moreover today's development models usually consider performance management only in a limited way within their lifecycle and often follow what is known as the fix it later approach The fix it later approach concentrates on software correctness and defers performance considerations to the integration testing phase where additional hardware is added or a system is tuned when performance issues are detected The problem of neglecting performance management is that performance issues often do not emerge until an application is put into production where it is likely to suffer the consequences of a performance failure The consequences of performance failures can be increased operational costs increased development and hardware costs and damaged customer relations If severe performance issues are discovered during production it may be too expensive to redesign a system or even impossible to add additional hardware in order to meet performance objectives Such projects are likely to be canceled and their costs will be unrecoverable To avoid such situations performance management should be integrated into an application's lifecycle from the beginning This means that performance objectives have to be defined early within a project and continually verified as an application evolves Having performance management integrated from the

beginning allows to reduce overall project risk and costs because performance issues can be spotted and corrected early in the lifecycle and even before end users are affected Furthermore an application is extensively tested for its ability of reaching performance objectives before it is deployed to a production environment and exposed to real users NovaTec GmbH is a company providing IT services in the area of consulting project management software engineering application architectures provisioning performance management and process engineering The competences of NovaTec are logically grouped in **Multicore Software Engineering, Performance and Tools** Victor Pankratius, Michael Philippsen, 2012-05-28 This book constitutes the refereed proceedings of the International Conference on Multiscore Software Engineering Performance and Tools MSEPT 2012 held in Prague in May June 2012 The 9 revised papers 4 of which are short papers were carefully reviewed and selected from 24 submissions The papers address new work on optimization of multicore software program analysis and automatic parallelization They also provide new perspectives on programming models as well as on applications of multicore systems **DSP for Embedded and Real-Time Systems** Robert Oshana, 2012-10-11 This Expert Guide gives you the techniques and technologies in digital signal processing DSP to optimally design and implement your embedded system Written by experts with a solutions focus this encyclopedic reference gives you an indispensable aid to tackling the day to day problems you face in using DSP to develop embedded systems With this book you will learn A range of development techniques for developing DSP code Valuable tips and tricks for optimizing DSP software for maximum performance The various options available for constructing DSP systems from numerous software components The tools available for developing DSP applications Numerous practical guidelines from experts with wide and lengthy experience of DSP application development Features Several areas of research being done in advanced DSP technology Industry case studies on DSP systems development DSP for Embedded and Real Time Systems is the reference for both the beginner and experienced covering most aspects of using today s DSP techniques and technologies for designing and implementing an optimal embedded system The only complete reference which explains all aspects of using DSP in embedded systems development making it a rich resource for every day use Covers all aspects of using today s DSP techniques and technologies for designing and implementing an optimal embedded system Enables the engineer to find solutions to all the problems they will face when using DSP *Configurable Software Performance Completions through Higher-Order Model Transformations* Happe, Lucia, 2014-11-26 Chillies is a novel approach for variable model transformations closing the gap between abstract architecture models used for performance prediction and required low level details We enable variability of transformations using chain of generators based on the Higher Order Transformation HOT HOTs target different goals such as template instantiation or transformation composition In addition we discuss state dependent behavior in prediction models and quality of model transformations **Performance Benchmarking of Application Monitoring Frameworks** Jan Waller, 2014-12-19 Application level monitoring of continuously operating



software systems provides insights into their dynamic behavior helping to maintain their performance and availability during runtime. Such monitoring may cause a significant runtime overhead to the monitored system depending on the number and location of used instrumentation probes. In order to improve a system's instrumentation and to reduce the caused monitoring overhead, it is necessary to know the performance impact of each probe. While many monitoring frameworks are claiming to have minimal impact on the performance, these claims are often not backed up with a detailed performance evaluation determining the actual cost of monitoring. Benchmarks can be used as an effective and affordable way for these evaluations. However, no benchmark specifically targeting the overhead of monitoring itself exists. Furthermore, no established benchmark engineering methodology exists that provides guidelines for the design, execution, and analysis of benchmarks. This thesis introduces a benchmark approach to measure the performance overhead of application level monitoring frameworks. The core contributions of this approach are: 1. a definition of common causes of monitoring overhead, 2. a general benchmark engineering methodology, 3. the MooBench micro benchmark to measure and quantify causes of monitoring overhead, and 4. detailed performance evaluations of three different application level monitoring frameworks. Extensive experiments demonstrate the feasibility and practicality of the approach and validate the benchmark results. The developed benchmark is available as open source software, and the results of all experiments are available for download to facilitate further validation and replication of the results.

*Open Source Technology: Concepts, Methodologies, Tools, and Applications* Management Association, Information Resources, 2014-11-30. The pervasiveness of and universal access to modern Information and Communication Technologies has enabled a popular new paradigm in the dissemination of information and ideas. Now, instead of relying on a finite number of content providers to control the flow of information, users can generate and disseminate their own content for a wider audience. *Open Source Technology: Concepts, Methodologies, Tools, and Applications* investigates examples and methodologies in user-generated and freely accessible content available through electronic and online media. With applications in education, government, entertainment, and more, the technologies explored in these volumes will provide a comprehensive reference for web designers, software developers, and practitioners in a wide variety of fields and disciplines.

**High Performance Scientific and Engineering Computing** Laurence Tianruo Yang, Yi Pan, 2013-04-17. *High Performance Scientific and Engineering Computing: Hardware Software Support* contains selected chapters on hardware software support for high performance scientific and engineering computing from prestigious workshops in the fields such as PACT, SHPSEC, IPDPS, PDSECA, and ICPP, HPSECA. This edited volume is basically divided into six main sections which include invited material from prominent researchers around the world. We believe all of these contributed chapters and topics not only provide novel ideas, new results, and state-of-the-art techniques in this field but also stimulate future research activities in the area of high performance computing for science and engineering applications. *High Performance Scientific and Engineering Computing: Hardware Software Support* is designed for a professional audience composed of

researchers and practitioners in industry This book is also suitable as a secondary text for graduate level students in computer science and engineering

Theory Of Technology David Clarke, The history of technology is often troubled by good ideas that do not for one reason or another take off right away sometimes for millennia Sometimes technology comes to a standstill and sometimes it even reverses itself Thus unlike science which seems to proceed at a reasonable and calm rate the progress of technology is difficult to theorize about While in science many developments are predictable to a certain extent and this predictability may at times direct or stymie science's progress as with stem cell research and cloning technological advances such as the Internet are often sudden and unpredictable and therefore frightening In Theory of Technology David Clarke brings together nine authors who try to understand technology from a variety of viewpoints Rias van Wyk in Technology parses the concept into many angles including its anatomy taxonomy and evolution Karol Pelc in Knowledge Mapping discusses tracking the evolution of the emerging discipline of technology management Jon Beard in Management of Technology pursues a similar mapping endeavor but looks to the patterns of the literature of technology management Thomas Clarke in Unique Features of an R D Work Environment and Research Scientists and Engineers takes the reader on a tour of how people of technology present unique challenges to not just management but whole organizations Richard Howey in Understanding Software Technology places enterprise software into a meaningful pattern of technology management Fred Foldvary and Daniel Klein in The Half Life of Policy Rationales discuss how new technology affects old policy issues John Cogan in Some Philosophical Thoughts on the Nature of Technology maintains that our Aristotelian search for the essence of technology is doomed And Peter Bond in The Biology of Technology establishes a basis for the development of a socio biological approach to understanding the phenomena of technological society and technical change Theory of Technology is an important book It recognizes the near impossibility of forecasting technological progress or of planning the trajectory that a new technology may take It goes beyond other studies in showing how understanding of the nature of technology itself is the necessary first step in removing levels of uncertainty from charting those trajectories as they impact our daily lives Paul Ceruzzi curator Aerospace Electronics and Computing National Air and Space Museum Smithsonian Institution Unstuffy Theory of Technology is a sheltered workshop for the atheoretical in technology studies Russell Maulitz Department of Family Community and Preventive Medicine Drexel University College of Medicine Technology is one of those words whose meaning and importance we intuitively know but have trouble defining and fully understanding Technology is becoming ever more ubiquitous in our lives and economies and harnessing it in predictable ways ever more important Theory of Technology goes a long way toward building a framework of analysis and perspective to overcome these limitations and thus toward helping us bring order to our thinking and our ability to employ in orderly ways one of the keys to contemporary life Thomas J Duesterberg President and CEO Manufacturers Theory of Technology is an excellent and challenging introduction to the field also for the uninitiated It offers a history of the discipline of its attempts to better understand the

nature of technology from among others philosophical and biological perspectives and discusses the management of technology and its policy consequences In also analyzing the semantics of technology theory and practice a brave enterprise in these days of fads and fashions in wordings and phrases it not only seeks the self discipline that is needed to support the scientific status of the field but may indeed help increase actual influence on technology practice and policy Marie Louise Bemelmans Videc professor of public administration Radboud University Nijmegen The Netherlands David Clarke s new book about the Theory of Technology is the most comprehensive multifaceted and challenging treatment of the subject to date It also makes a very interesting read Instead of looking at technology from the perspective of just one author Mr Clarke has chosen to ask some of the most respected and provocative experts in the field to look at technology from a variety of major angles that nicely and completely encircle and illuminate the subject I don t think there is an aspect of modern technology that isn t covered in an entertaining and informative fashion My profession as a patent attorney puts me in direct daily contact with the practical aspects of all new technologies Mr Clarke s well organized and enjoyable book has helped me appreciate the bigger context of my work It will stay on the bookshelf in my office in the company of just a handful of other books that give me a better understanding about the world in which we live R C Woodbridge Princeton NJ Technology is one of those words whose meaning and importance we intuitively know but have trouble defining and fully understanding Technology is becoming ever more ubiquitous in our lives and economies and harnessing it in predictable ways ever more important Theory of Technology goes a long way toward building a framework of analysis and perspective to overcome these limitations and thus toward helping us bring order to our thinking and our ability to employ in orderly ways one of the keys to contemporary life Thomas J Duesterberg President and CEO Manufacturers Alliance MAPI David Clarke professor emeritus at Southern Illinois University has degrees in philosophy architecture management science and urban design His is the editor of Technology and Terrorism published by Transaction as well as the editor of the Transaction journal Knowledge Technology Policy

Fuel your quest for knowledge with Authored by is thought-provoking masterpiece, Explore **Software Performability From Concepts To Applications** . This educational ebook, conveniently sized in PDF ( Download in PDF: \*), is a gateway to personal growth and intellectual stimulation. Immerse yourself in the enriching content curated to cater to every eager mind. Download now and embark on a learning journey that promises to expand your horizons. .

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