

PERFORMANCE MODELING FOR COMPUTER ARCHITECTS

C. M. Krishna



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Performance Modeling For Computer Architects Systems

C. M. Krishna



Performance Modeling For Computer Architects Systems:

Performance Modeling for Computer Architects C. M. Krishna, 1995-10-14 As computers become more complex the number and complexity of the tasks facing the computer architect have increased Computer performance often depends in complex way on the design parameters and intuition that must be supplemented by performance studies to enhance design productivity This book introduces computer architects to computer system performance models and shows how they are relatively simple inexpensive to implement and sufficiently accurate for most purposes It discusses the development of performance models based on queuing theory and probability The text also shows how they are used to provide quick approximate calculations to indicate basic performance tradeoffs and narrow the range of parameters to consider when determining system configurations It illustrates how performance models can demonstrate how a memory system is to be configured what the cache structure should be and what incremental changes in cache size can have on the miss rate A particularly deep knowledge of probability theory or any other mathematical field to understand the papers in this volume is not required *Computer Architecture Performance Evaluation Methods* Lieven Eeckhout, 2010-09-09 Performance evaluation is at the foundation of computer architecture research and development Contemporary microprocessors are so complex that architects cannot design systems based on intuition and simple models only Adequate performance evaluation methods are absolutely crucial to steer the research and development process in the right direction However rigorous performance evaluation is non trivial as there are multiple aspects to performance evaluation such as picking workloads selecting an appropriate modeling or simulation approach running the model and interpreting the results using meaningful metrics Each of these aspects is equally important and a performance evaluation method that lacks rigor in any of these crucial aspects may lead to inaccurate performance data and may drive research and development in a wrong direction The goal of this book is to present an overview of the current state of the art in computer architecture performance evaluation with a special emphasis on methods for exploring processor architectures The book focuses on fundamental concepts and ideas for obtaining accurate performance data The book covers various topics in performance evaluation ranging from performance metrics to workload selection to various modeling approaches including mechanistic and empirical modeling And because simulation is by far the most prevalent modeling technique more than half the book s content is devoted to simulation The book provides an overview of the simulation techniques in the computer designer s toolbox followed by various simulation acceleration techniques including sampled simulation statistical simulation parallel simulation and hardware accelerated simulation Table of Contents Introduction Performance Metrics Workload Design Analytical Performance Modeling Simulation Sampled Simulation Statistical Simulation Parallel Simulation and Hardware Acceleration Concluding Remarks *Computer Architecture Performance Evaluation Methods* Lieven Eeckhout, 2022-05-31 Performance evaluation is at the foundation of computer architecture research and development Contemporary microprocessors are so

complex that architects cannot design systems based on intuition and simple models only Adequate performance evaluation methods are absolutely crucial to steer the research and development process in the right direction However rigorous performance evaluation is non trivial as there are multiple aspects to performance evaluation such as picking workloads selecting an appropriate modeling or simulation approach running the model and interpreting the results using meaningful metrics Each of these aspects is equally important and a performance evaluation method that lacks rigor in any of these crucial aspects may lead to inaccurate performance data and may drive research and development in a wrong direction The goal of this book is to present an overview of the current state of the art in computer architecture performance evaluation with a special emphasis on methods for exploring processor architectures The book focuses on fundamental concepts and ideas for obtaining accurate performance data The book covers various topics in performance evaluation ranging from performance metrics to workload selection to various modeling approaches including mechanistic and empirical modeling And because simulation is by far the most prevalent modeling technique more than half the book s content is devoted to simulation The book provides an overview of the simulation techniques in the computer designer s toolbox followed by various simulation acceleration techniques including sampled simulation statistical simulation parallel simulation and hardware accelerated simulation Table of Contents Introduction Performance Metrics Workload Design Analytical Performance Modeling Simulation Sampled Simulation Statistical Simulation Parallel Simulation and Hardware Acceleration Concluding Remarks

NBS Special Publication ,1968 **Publications** United States. National Bureau of Standards,1976 *Publications of the National Bureau of Standards* United States. National Bureau of Standards,1982
Publications of the National Bureau of Standards ... Catalog United States. National Bureau of Standards,1975
Publications of the National Institute of Standards and Technology ... Catalog National Institute of Standards and Technology (U.S.),1981 *Performance Evaluation and Benchmarking* Lizy Kurian John,Lieven Eeckhout,2018-10-03

Computer and microprocessor architectures are advancing at an astounding pace However increasing demands on performance coupled with a wide variety of specialized operating environments act to slow this pace by complicating the performance evaluation process Carefully balancing efficiency and accuracy is key to avoid slowdowns and such a balance can be achieved with an in depth understanding of the available evaluation methodologies Performance Evaluation and Benchmarking outlines a variety of evaluation methods and benchmark suites considering their strengths weaknesses and when each is appropriate to use Following a general overview of important performance analysis techniques the book surveys contemporary benchmark suites for specific areas such as Java embedded systems CPUs and Web servers Subsequent chapters explain how to choose appropriate averages for reporting metrics and provide a detailed treatment of statistical methods including a summary of statistics how to apply statistical sampling for simulation how to apply SimPoint and a comprehensive overview of statistical simulation The discussion then turns to benchmark subsetting methodologies

and the fundamentals of analytical modeling including queuing models and Petri nets Three chapters devoted to hardware performance counters conclude the book Supplying abundant illustrations examples and case studies Performance Evaluation and Benchmarking offers a firm foundation in evaluation methods along with up to date techniques that are necessary to develop next generation architectures

Practical Performance Modeling Khalid Begain, Gunter Bolch, Helmut Herold, 2012-12-06 Practical Performance Modeling Application of the MOSEL Language introduces the new and powerful performance and reliability modeling language MOSEL Modeling Specification and Evaluation Language developed at the University of Erlangen Germany MOSEL facilitates the performance and reliability modeling of a computer communication manufacturing or workflow management system in a very intuitive and simple way The core of MOSEL consists of constructs to specify the possible states and state transitions of the system under consideration This specification is very compact and easy to understand With additional constructs the interesting performance or reliability measures and graphical representations can be specified With some experience it is possible to write down the MOSEL description of a system immediately only by knowing the behavior of the system under study There are no restrictions unlike models using for example queueing networks Petri nets or fault trees MOSEL fulfills all the requirements for a universal modeling language It is high level system oriented and usable It is open and can be integrated with many tools By providing compilers which translate descriptions specified in MOSEL into the tool specific languages all previously implemented tools with their different methods and algorithms including simulation can be used Practical Performance Modeling Application of the MOSEL Language provides an easy to understand but nevertheless complete introduction to system modeling using MOSEL and illustrates how easily MOSEL can be used for modeling real life examples from the fields of computer communication and manufacturing systems Practical Performance Modeling Application of the MOSEL Language will be of interest to professionals and students in the fields of performance and reliability modeling in computer science communication and manufacturing It is also well suited as a textbook for university courses covering performance and reliability modeling with practical applications

Workload Modeling for Computer Systems Performance Evaluation Dror G.

Feitelson, 2015-03-23 Reliable performance evaluations require the use of representative workloads This is no easy task since modern computer systems and their workloads are complex with many interrelated attributes and complicated structures Experts often use sophisticated mathematics to analyze and describe workload models making these models difficult for practitioners to grasp This book aims to close this gap by emphasizing the intuition and the reasoning behind the definitions and derivations related to the workload models It provides numerous examples from real production systems with hundreds of graphs Using this book readers will be able to analyze collected workload data and clean it if necessary derive statistical models that include skewed marginal distributions and correlations and consider the need for generative models and feedback from the system The descriptive statistics techniques covered are also useful for other domains

Foundations

of Software and System Performance Engineering André B. Bondi, 2015 The absence of clearly written performance requirements is the cause of much confusion and bad software architectures this book's coverage of performance requirements engineering and domain specific performance metrics at every stage of the software process addresses the problem Application of the principles in this book will considerably mitigate the risks that performance pose to the success of a software system and lead to a better quality product with wider acceptance *High Performance Computing Systems. Performance Modeling, Benchmarking, and Simulation* Stephen Jarvis, Steven Wright, Simon Hammond, 2017-12-22 This book constitutes the refereed proceedings papers from the 8th International Workshop on Performance Modeling Benchmarking and Simulation of High Performance Computing Systems PMBS 2017 held in Denver Colorado USA in November 2017 The 10 full papers and 3 short papers included in this volume were carefully reviewed and selected from 36 submissions They were organized in topical sections named performance evaluation and analysis performance modeling and simulation and short papers

Advanced Computer Performance Modeling and Simulation Kallol Bagchi, Jean Walrand, George Zobrist, 2024-12-06 Addresses the major issues involved in computer design and architectures Dealing primarily with theory tools and techniques as related to advanced computer systems it provides tutorials and surveys and relates new important research results Each chapter provides background information describes and analyzes important work done in the field and provides important direction to the reader on future work and further readings The topics covered include hierarchical design schemes parallel and distributed modeling and simulation parallel simulation tools and techniques theoretical models for formal and performance modeling and performance evaluation techniques **High Performance Computing Systems. Performance Modeling, Benchmarking and Simulation** Stephen A. Jarvis, Steven A. Wright, Simon D. Hammond, 2014-09-30 This book constitutes the refereed proceedings of the 4th International Workshop PMBS 2013 in Denver CO USA in November 2013 The 14 papers presented in this volume were carefully reviewed and selected from 37 submissions The selected articles broadly cover topics on massively parallel and high performance simulations modeling and simulation model development and analysis performance optimization power estimation and optimization high performance computing reliability performance analysis and network simulations **Scientific and Technical Aerospace Reports**, 1988-04

Readings in Computer Architecture Mark D. Hill, Gurindar S. Sohi, 2000 Offering a carefully reviewed selection of over 50 papers illustrating the breadth and depth of computer architecture this text includes insightful introductions to guide readers through the primary sources *Processor and System-on-Chip Simulation* Rainer Leupers, Olivier Temam, 2010-09-15 Simulation of computer architectures has made rapid progress recently The primary application areas are hardware software performance estimation and optimization as well as functional and timing verification Recent innovative technologies such as retargetable simulator generation dynamic binary translation or sampling simulation have enabled widespread use of processor and system on chip SoC simulation tools in the semiconductor and

embedded system industries Simultaneously processor and SoC simulation is still a very active research area e g what amounts to higher simulation speed flexibility and accuracy speed trade offs This book presents and discusses the principle technologies and state of the art in high level hardware architecture simulation both at the processor and the system on chip level

Performance modeling for computer architects C. M. Krishna,1995 Performance Evaluation of Computer and Communication Systems Lorenzo Donatiello,Randolph Nelson,1993-09-15 This volume contains the complete set of tutorial papers presented at the 16th IFIP International Federation for Information Processing Working Group 7 3 International Symposium on Computer Performance Modelling Measurement and Evaluation and a number of tutorial papers presented at the 1993 ACM Association for Computing Machinery Special Interest Group METRICS Conference on Measurement and Modeling of Computer Systems The principal goal of the volume is to present an overview of recent results in the field of modeling and performance evaluation of computer and communication systems The wide diversity of applications and methodologies included in the tutorials attests to the breadth and richness of current research in the area of performance modeling The tutorials may serve to introduce a reader to an unfamiliar research area to unify material already known or simply to illustrate the diversity of research in the field The extensive bibliographies guide readers to additional sources for further reading

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