

PERFORMANCE MODELING FOR COMPUTER ARCHITECTS

C. M. Krishna



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Performance Modeling For Computer Architects

C. M. Krishna



Performance Modeling For Computer Architects:

Performance modeling for computer architects C. M. Krishna,1995 **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 [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 *Performance modeling in parallel computer architecture design* ,1997 **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.

Analytical Performance Modeling for Computer Systems, Third Edition Y.C. Tay, 2022-06-01

This book is an introduction to analytical performance modeling for computer systems, i.e., writing equations to describe their performance behavior. It is accessible to readers who have taken college-level courses in calculus and probability, networking, and operating systems. This is not a training manual for becoming an expert performance analyst. Rather, the objective is to help the reader construct simple models for analyzing and understanding the systems that they are interested in. Describing a complicated system abstractly with mathematical equations requires a careful choice of assumptions and approximations. They make the model tractable, but they must not remove essential characteristics of the system nor introduce spurious properties. To help the reader understand the choices and their implications, this book discusses the analytical models for 40 research papers. These papers cover a broad range of topics: GPUs and disks, routers and crawling databases, and multimedia worms and wireless multicore and cloud security and energy, etc. An appendix provides many questions for readers to exercise their understanding of the models in these 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

Parallel Computer Architecture David Culler, Jaswinder Pal Singh, Anoop Gupta, 1999 This book outlines a set of issues that are critical to all of parallel architecture communication latency communication bandwidth and coordination of cooperative work across modern designs It describes the set of techniques available in hardware and in software to address each issues and explore how the various techniques interact

Advanced Computer Architecture Junjie Wu, Haibo Chen, Xingwei Wang, 2014-07-21 This book constitutes the refereed proceedings of the 10th Annual Conference on Advanced Computer Architecture ACA 2014 held in Shenyang China in August 2014 The 19 revised full papers presented were carefully reviewed and selected from 115 submissions The papers are organized in topical sections on processors and circuits high performance computing GPUs and accelerators cloud and data centers energy and reliability intelligence computing and mobile computing

Computer Performance Modeling Alexandre Brandwajn, Thomas Begin, 2025-04-29 This compendium gives an overview of computer performance modelling techniques and an in depth explanation of their principles and practical applications The book emphasizes selected approximation methods for complex systems including recent advances in multi server models The useful reference text benefits professionals researchers academics and graduate students in the fields of computer engineering operations research and mathematical modeling

NBS Special Publication, 1968 *Publications of the National Bureau of Standards* United States. National Bureau of Standards, 1982 Publications of the National Institute of Standards and Technology ... Catalog National Institute of Standards and Technology (U.S.), 1983

Computer Architecture Michael J. Flynn, 1995 Computer Architecture Software Engineering

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

Computer Architecture and Implementation Harvey G. Cragon, 2000-02-13 This textbook provides a clear and concise introduction to computer architecture and implementation Two important themes are interwoven throughout the book The first is an overview of the

major concepts and design philosophies of computer architecture and organization The second is the early introduction and use of analytic modeling of computer performance A unique feature of the book is that memory systems are discussed before processor implementations The book contains many worked examples and over 130 homework exercises It is an ideal textbook for a one semester undergraduate course in computer architecture and implementation *Publications* United States. National Bureau of Standards,1981 Publications of the National Bureau of Standards ... Catalog United States. National Bureau of Standards,1980

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

Modeling Techniques and Tools for Computer Performance Evaluation Ramon Puigjaner,Dominique Potier,2012-12-06

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