MODELING MICROPROCESSOR PERFORMANCE

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Modeling Microprocessor Performance

Alex Orailoglu,Marc Reichenbach,Matthias Jung

Modeling Microprocessor Performance:

Modeling Microprocessor Performance Bibiche Geuskens,Kenneth Rose,2012-12-06 Modeling Microprocessor Performance focuses on the development of a design and evaluation tool named RIPE Rensselaer Interconnect Performance Estimator This tool analyzes the impact on wireability clock frequency power dissipation and the reliability of single chip CMOS microprocessors as a function of interconnect device circuit design and architectural parameters It can accurately predict the overall performance of existing microprocessor systems For the three major microprocessor architectures DEC PowerPC and Intel the results have shown agreement within 10% on key parameters The models cover a broad range of issues that relate to the implementation and performance of single chip CMOS microprocessors The book contains a detailed discussion of the various models and the underlying assumptions based on actual design practices As such RIPE and its models provide an insightful tool into single chip microprocessor design and its performance aspects At the same time it provides design and process engineers with the capability to model evaluate compare and optimize single chip microprocessor systems using advanced technology and design techniques at an early design stage without costly and time consuming implementation RIPE and its models demonstrate the factors which must be considered when estimating tradeoffs in device and interconnect technology and architecture design on microprocessor performance 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 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 Computer Engineering and Technology Weixia Xu,Liquan Xiao,Jinwen Li,Chengyi Zhang,Zhenzhen Zhu,2016-12-08 This book constitutes the refereed proceedings of the 20th CCF Conference on Computer Engineering and Technology NCCET 2016 held in Xi an China in August 2016 The 21 full papers presented were carefully reviewed and selected from 120 submissions They are organized in topical sections on processor architecture application specific processors computer application and software optimization technology on the horizon **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 Performance Evaluation and**

Benchmarking David Kaeli,2009-01-20 This book constitutes the proceedings of the SPEC Benchmark Workshop 2009 held in Austin Texas USA on January 25th 2009 The 9 papers presented were carefully selected and reviewed for inclusion in the book The result is a collection of high quality papers discussing current issues in the area of benchmarking research and technology The topics covered are benchmark suites CPU benchmarking power thermal benchmarking and modeling and sampling techniques Single and Multi-CPU Performance Modeling for Embedded Systems Trevor Conrad Meyerowitz,2008 *High Performance Computing and Communications* Ronald Perrott,2007-09-17 This book constitutes the refereed proceedings of the Third International Conference on High Performance Computing and Communications HPCC 2007 held in Houston USA September 26 28 2007 The 75 revised full papers presented were carefully reviewed and selected from 272 submissions The papers address all current issues of parallel and distributed systems and high performance computing and communication as there are networking protocols routing and algorithms languages and compilers for HPC parallel and distributed architectures and algorithms embedded systems wireless mobile and pervasive computing Web services and internet computing peer to peer computing grid and cluster computing reliability fault tolerance and security performance evaluation and measurement tools and environments for software development distributed systems and applications database applications and data mining biological molecular computing collaborative and cooperative environments and programming interfaces for parallel systems Realizing Complex Integrated Systems Anthony P. Ambler,John W. Sheppard,2025-02-20 The creation of complex integrated systems is in itself complex It requires immense planning and a large team of people with diverse backgrounds based in dispersed geographical locations and countries supposedly working to a coordinated schedule and cost The systems engineering task is not new but recent scales most definitely are The world is now capable of designing and manufacturing systems whose complexity was not considered possible 10 years ago While many are trained to think in terms of a complete system where everything is designed and produced by a single project team today such systems involve integrating subsystems and components which are also complex that have been developed by other project teams Inevitably this introduces additional complexities involving elements out of the direct control of the project but which are essential to its overall success In addition to traditional systems engineering topics of hardware and software design testability and manufacturability there are wider issues to be contemplated project planning communication language an issue for international teams units of measure imperial vs metric used across members of the team supply chains pandemics military action and natural disasters legal issues based on place of production and sale the ethics associated with target use and the threat of cyberattack This book is the first attempt to bring many of these issues together to highlight the complexities that need to be considered in modern system design It is neither exhaustive nor comprehensive but it gives pointers to the topics for the reader to follow up on in more detail

High Performance Computing Constantine Polychronopoulos,Kazuki Joe,Akira Fukuda,Shinji Tomita,1999-05-12 This

book constitutes the refereed proceedings of the Second International Symposium on High Performance Computing ISHPC 99 held in Kyoto Japan in May 1999 The 23 revised full papers presented were carefully selected from a total of 61 submissions Also included are the abstracts of several invited talks and 12 reviewed short papers corresponding to the poster presentations given at the symposium The papers address many current issues in high performance computing and communication regarding hardware and network architectures as well as regarding software and theoretical foundations also advanced applications are studied in a variety of fields including modeling visualisation and computational science

Advances in Computers Marvin Zelkowitz,2004-05-26 Advances in Computers covers new developments in computer technology Most chapters present an overview of a current subfield within computer science with many citations and often include new developments in the field by the authors of the individual chapters Topics include hardware software theoretical underpinnings of computing and novel applications of computers This current volume emphasizes architectural issues in the design of new hardware and software system An architectural design evaluation process is described that allows developers to make sure that their source programs adhere to the architectural design of the specifications This greatly aids in the maintenance of the system Telecommunications issues are covered from the impact of new technology to security of wireless systems Quantum computing an exciting development that may greatly increase the speed of present computers is described The book series is a valuable addition to university courses that emphasize the topics under discussion in that particular volume as well as belonging on the bookshelf of industrial practitioners who need to implement many of the technologies that are described In depth surveys and tutorials on new computer technology Well known authors and researchers in the field Extensive bibliographies with most chapters All chapters discuss aspects of architectural design of new hardware and software Quantum computing is an exciting new prospect for future machine design *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 **The Computer Engineering Handbook** Vojin G. Oklobdzija,2001-12-26 There is arguably no field in greater need of a comprehensive handbook than computer engineering The unparalleled rate of technological advancement the explosion of computer applications and the now in progress migration to a wireless world have made it difficult for engineers to keep up with all the developments in specialties outside their own References published only a few years ago are now sorely out of date The Computer Engineering Handbook changes all of that Under the leadership of Vojin

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themes can be divided into the broad categories of hardware software algorithms and applications for parallel computing The objective of Euro Par is to provide a forum within which to promote the dev opment of parallel computing both as an industrial technique and an academic discipline extending the frontier of both the state of the art and the state of the practice This is particularlyimportant at a time when parallel computing is dergoing strong and sustained development and experiencing real industrial take up The main audience for and participants of Euro Par are seen as researchers in academic departments government laboratories and industrial organisations Euro Par s objective is to become the primarychoice of such professionals for the presentation of new results in their speci c areas Euro Par is also interested in applications that demonstrate the e ectiveness of the main Euro Par themes Euro Par now has its own Internet domain with a permanent Web site where the historyof the conference series is described http www euro par org The Euro Par conference series is sponsored bythe Association of Computer Machineryand the International Federation of Information Processing

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 *Embedded Computer Systems: Architectures, Modeling, and Simulation* Alex Orailoglu,Marc Reichenbach,Matthias Jung,2022-08-13 This book constitutes the proceedings of the 22st International Conference on Embedded Computer Systems Architectures Modeling and Simulation SAMOS 2021 which took place in July 2022 in Samos Greece The 21 full papers presented in this volume were carefully reviewed and selected from 44 submissions The papers are organized in topics as follows High level synthesis memory systems processor architecture embedded software systems and beyond deep learning optimization extra functional property estimation innovative architectures and tools for security european research projects on digital systems services and platforms **Deterministic and Stochastic Approaches in Computer Modeling and Simulation** Romansky, Radi Petrov,Hinov, Nikolay Lyuboslavov,2023-10-09 In the field of computer modeling and simulation academic scholars face a pressing challenge how to navigate the complex landscape of both deterministic and stochastic approaches to modeling This multifaceted arena demands a unified organizational framework a comprehensive guide that can seamlessly bridge the gap between theory and practical application Without such a resource scholars may struggle to harness the full potential of computer modeling leaving critical questions unanswered and innovative solutions undiscovered Deterministic and Stochastic Approaches in

Computer Modeling and Simulation serves as the definitive solution to the complex problem scholars encounter By presenting a comprehensive and unified organizational approach this book empowers academics to conquer the challenges of computer modeling with confidence It not only provides a classification of modeling methods but also offers a formalized step by step approach to conducting model investigations starting from defining objectives to analyzing experimental results For academic scholars seeking a holistic understanding of computer modeling this book is the ultimate solution It caters to the diverse needs of scholars by addressing both deterministic and stochastic approaches Through its structured chapters it guides readers from the very basics of computer systems investigation to advanced topics like stochastic analytical modeling and statistical modeling

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