

Fault Injection Techniques and Tools for Embedded Systems Reliability Evaluation

Edited by

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Kluwer Academic Publishers

Fault Injection Techniques And Tools For Embedded Systems Reliability Evaluation

**James J. Park, Vincenzo Loia, Gangman
Yi, Yunsick Sung**



Fault Injection Techniques And Tools For Embedded Systems Reliability Evaluation:

Fault Injection Techniques and Tools for Embedded Systems Reliability Evaluation Alfredo Benso, Paolo Prinetto (ed.), 2003-10-31 Our society is faced with an increasing dependence on computing systems not only in high tech consumer applications but also in areas e g air and railway traffic control nuclear plant control aircraft and car control where a failure can be critical for the safety of human beings Unfortunately it is accepted that large digital systems cannot be fault free Some faults may be attributed to inaccuracy during the development while others can come from external causes such as environmental stress Radiations electromagnetic interference and power glitches are some of the most common causes of transient faults As a consequence the past years have seen a growing interest in methods for studying the behaviour of computer based systems when faults occur and several approaches have been proposed to evaluate the dependability properties of a computer based system Fault Injection i e the artificial injection of faults into a computer system in order to study its behaviour emerged as a viable solution and has been deeply investigated by both academia and industry Different techniques have been proposed and some of them practically experimented **Fault Injection Techniques and Tools for Embedded Systems Reliability Evaluation** intends to be a comprehensive guide to Fault Injection techniques used to evaluate the dependability of a digital system The description and the critical analysis of different Fault Injection techniques and tools will be authored by key scientists in the field of system dependability and fault tolerance

Fault Injection Techniques and Tools for Embedded Systems Reliability Evaluation Alfredo Benso, Paolo Prinetto, 2005-12-15 Fault Injection Techniques and Tools for Embedded Systems Reliability Evaluation intends to be a comprehensive guide to Fault Injection techniques used to evaluate the dependability of a digital system The description and the critical analysis of different Fault Injection techniques and tools will be authored by key scientists in the field of system dependability and fault tolerance

Computer Safety, Reliability, and Security Floor Koornneef, Coen van Gulijk, 2015-09-15 This book constitutes the refereed proceedings of the 34th International Conference on Computer Safety Reliability and Security SAFECOMP 2015 held in Delft The Netherlands in September 2014 The 32 revised full papers presented together with 3 invited talks were carefully reviewed and selected from 104 submissions The papers are organized in topical sections on flight systems automotive embedded systems automotive software error detection medical safety cases medical systems architecture and testing safety cases security attacks cyber security and integration and programming and compiling

Handbook of Research on Embedded Systems Design Bagnato, Alessandra, Indrusiak, Leandro Soares, Quadri, Imran Rafiq, Rossi, Matteo, 2014-06-30 As real time and integrated systems become increasingly sophisticated issues related to development life cycles non recurring engineering costs and poor synergy between development teams will arise The Handbook of Research on Embedded Systems Design provides insights from the computer science community on integrated systems research projects taking place in the European region This premier references work takes a look at the diverse range of design

principles covered by these projects from specification at high abstraction levels using standards such as UML and related profiles to intermediate design phases This work will be invaluable to designers of embedded software academicians students practitioners professionals and researchers working in the computer science industry

Certifications of Critical Systems - The CECRIS Experience Andrea Bondavalli, Francesco Brancati, 2022-09-01 In recent years a considerable amount of effort has been devoted both in industry and academia to the development validation and verification of critical systems i e those systems whose malfunctions or failures reach a critical level both in terms of risks to human life as well as having a large economic impact Certifications of Critical Systems The CECRIS Experience documents the main insights on Cost Effective Verification and Validation processes that were gained during work in the European Research Project CECRIS acronym for Certification of Critical Systems The objective of the research was to tackle the challenges of certification by focusing on those aspects that turn out to be more difficult important for current and future critical systems industry the effective use of methodologies processes and tools The CECRIS project took a step forward in the growing field of development verification and validation and certification of critical systems It focused on the more difficult important aspects of critical system development verification and validation and certification process Starting from both the scientific and industrial state of the art methodologies for system development and the impact of their usage on the verification and validation and certification of critical systems the project aimed at developing strategies and techniques supported by automatic or semi automatic tools and methods for these activities setting guidelines to support engineers during the planning of the verification and validation phases

Computer Safety, Reliability, and Security Andrea Bondavalli, Felicita Di Giandomenico, 2014-09-03 This book constitutes the refereed proceedings of the 33rd International Conference on Computer Safety Reliability and Security SAFECOMP 2014 held in Florence Italy in September 2014 The 20 revised full papers presented together with 3 practical experience reports were carefully reviewed and selected from 85 submissions The papers are organized in topical sections on fault injection techniques verification and validation techniques automotive systems coverage models and mitigation techniques assurance cases and arguments system analysis security and trust notations languages for safety related aspects safety and security

Reconfigurable Field Programmable Gate Arrays for Mission-Critical Applications Niccolò Battezzati, Luca Sterpone, Massimo Violante, 2010-11-09 Embedded systems applications that are either mission or safety critical usually entail low to mid production volumes require the rapid development of specific tasks which are typically computing intensive and are cost bounded The adoption of re configurable FPGAs in such application domains is constrained to the availability of suitable techniques to guarantee the dependability requirements entailed by critical applications This book describes the challenges faced by designers when implementing a mission or safety critical application using re configurable FPGAs and it details various techniques to overcome these challenges In addition to an overview of the key concepts of re configurable FPGAs it provides a theoretical description of the

failure modes that can cause incorrect operation of reconfigurable FPGA based electronic systems It also outlines analysis techniques that can be used to forecast such failures and covers the theory behind solutions to mitigate fault effects This book also reviews current technologies available for building reconfigurable FPGAs specifically SRAM based technology and Flash based technology For each technology introduced theoretical concepts presented are applied to real cases Design techniques and tools are presented to develop critical applications using commercial off the shelf devices such as Xilinx Virtex FPGAs and Actel ProASIC FPGAs Alternative techniques based on radiation hardened FPGAs such as Xilinx SIRF and Atmel ATF280 are also presented This publication is an invaluable reference for anyone interested in understanding the technologies of reconfigurable FPGAs as well as designers developing critical applications based on these technologies

Advances in Dependability Engineering of Complex Systems Wojciech Zamojski, Jacek Mazurkiewicz, Jarosław Sugier, Tomasz Walkowiak, Janusz Kacprzyk, 2017-05-29 This book gathers the proceedings of the 2017 DepCoS RELCOMEX an annual conference series that has been organized by the Department of Computer Engineering at the Faculty of Electronics Wrocław University of Science and Technology since 2006 Its mission is to continue the heritage of the other two cycles of events the RELCOMEX conferences 1977 89 and Microcomputer Schools 1985 95 so this year we can celebrate the 40th anniversary of its origins In contrast to those preceding series which were focused on conventional reliability analysis the goal of DepCoS is to promote a more comprehensive approach to system performability which is now commonly called dependability This innovative research area provides answers to the latest challenges in reliability evaluation for contemporary complex systems Its novelty is based on a multi disciplinary approach to system theory technology and maintenance of systems operating in real environments Dependability analyses concentrate on the efficient completion of tasks services and jobs by a system considered as a combination of technical information and human assets in contrast to classical reliability which is generally limited to the analysis of technical resources and associated components and structures The selection of papers for this volume illustrates the diversity of topics that need to be considered from mathematical models and design methodologies through software engineering and data security issues to practical engineering problems in technical systems In addition this edition of the conference hosted the 7th CrISS DESSERT Workshop which was devoted to the analysis and assurance of safety and cyber security in critical infrastructure and computer systems

Advances in Computers, 2012-04-05 Since its first volume in 1960 Advances in Computers has presented detailed coverage of innovations in computer hardware software theory design and applications It has also provided contributors with a medium in which they can explore their subjects in greater depth and breadth than journal articles usually allow As a result many articles have become standard references that continue to be of significant lasting value in this rapidly expanding field In depth surveys and tutorials on new computer technology Well known authors and researchers in the field Extensive bibliographies with most chapters Many of the volumes are devoted to single themes or subfields of computer science

Advances in

Computer Science and Ubiquitous Computing James J. Park, Vincenzo Loia, Gangman Yi, Yunsick Sung, 2017-12-19 This book presents the combined proceedings of the 12th KIPS International Conference on Ubiquitous Information Technologies and Applications CUTE 2017 and the 9th International Conference on Computer Science and its Applications CSA2017 both held in Taichung Taiwan December 18 20 2017 The aim of these two meetings was to promote discussion and interaction among academics researchers and professionals in the field of ubiquitous computing technologies These proceedings reflect the state of the art in the development of computational methods involving theory algorithms numerical simulation error and uncertainty analysis and novel applications of new processing techniques in engineering science and other disciplines related to ubiquitous computing

James J Jong Hyuk Park received Ph D degrees in Graduate School of Information Security from Korea University Korea and Graduate School of Human Sciences from Waseda University Japan From December 2002 to July 2007 Dr Park had been a research scientist of R D Institute Hanwha S C Co Ltd Korea From September 2007 to August 2009 He had been a professor at the Department of Computer Science and Engineering Kyungnam University Korea He is now a professor at the Department of Computer Science and Engineering and Department of Interdisciplinary Bio IT Materials Seoul National University of Science and Technology SeoulTech Korea Dr Park has published about 200 research papers in international journals and conferences He has been serving as chair program committee or organizing committee chair for many international conferences and workshops He is a steering chair of international conferences MUE FutureTech CSA CUTE UCAWSN World IT Congress Jeju He is editor in chief of Human centric Computing and Information Sciences HCIS by Springer The Journal of Information Processing Systems JIPS by KIPS and Journal of Convergence JoC by KIPS CSWRG He is Associate Editor Editor of 14 international journals including JoS JNCA SCN CJ and so on In addition he has been serving as a Guest Editor for international journals by some publishers Springer Elsevier John Wiley Oxford Univ press Emerald Inderscience MDPI He got the best paper awards from ISA 08 and ITCS 11 conferences and the outstanding leadership awards from IEEE HPCC 09 ICA3PP 10 IEE ISPA 11 PDCAT 11 IEEE AINA 15 Furthermore he got the outstanding research awards from the SeoulTech 2014 His research interests include IoT Human centric Ubiquitous Computing Information Security Digital Forensics Vehicular Cloud Computing Multimedia Computing etc He is a member of the IEEE IEEE Computer Society KIPS and KMMS

Vincenzo Loia BS 85 MS 87 PhD 89 is Full Professor of Computer Science His research interests include Intelligent Agents Ambient intelligence Computational Intelligence Currently he is Founder Editor in chief of Ambient Intelligence and Humanized Computing and Co Editor in Chief of Softcomputing Springer Verlag He is Chair of the Task Forces Intelligent Agents and Ambient Intelligence IEEE CIS ETTC He has been Chair the Emergent Technical Committe Emergent Technology IEEE CIS Society and Vice Chair of Intelligent Systems Applications Technical Committee He has been author of more than 200 scientific works Editor co editor of 4 Books 64 journal papers 25 book chapters and 100 conference papers He is Senior member of the IEEE Associate Editor of IEEE Transactions on Industrial Informatics and

Associate Editor of IEEE Transactions on Systems Man and Cybernetics Systems Many times reviewers for national and international projects Dr Loia is active in the research domain of agents ambient intelligence computational intelligence smartgrids distributed platform for enrich added value Gangman Yi in Computer Sciences at Texas A M University USA in 2007 and doctorate in Computer Sciences at Texas A M University USA in 2011 In May 2011 he joined System S W group in Samsung Electronics Suwon Korea He joined the Department of Computer Science Engineering Gangneung Wonju National University Korea since March 2012 Dr Yi has been researched in an interdisciplinary field of researches His research focuses especially on the development of computational methods to improve understanding of biological systems and its big data Dr Yi actively serves as a managing editor and reviewer for international journals and chair of international conferences and workshops Yunsick Sung received his B S degree in division of electrical and computer engineering from Pusan National University Busan Korea in 2004 his M S degree in computer engineering from Dongguk University Seoul Korea in 2006 and his Ph D degree in game engineering from Dongguk University Seoul Korea in 2012 He was employed as a member of the researcher at Samsung Electronics between 2006 and 2009 He was the plural professor at Shinheung College in 2009 and at Dongguk University in 2010 His main research interests are many topics in brain computer Interface programming by demonstration ubiquitous computing and reinforcement learning His Journal Service Experiences is Associate Editor at Human centric Computing and Information Sciences Springer 2015 Current Radiation Effects in Semiconductors Krzysztof Iniewski, 2018-09-03 Space applications nuclear physics military operations medical imaging and especially electronics modern silicon processing are obvious fields in which radiation damage can have serious consequences i e degradation of MOS devices and circuits Zeroing in on vital aspects of this broad and complex topic Radiation Effects in Semiconductors addresses the ever growing need for a clear understanding of radiation effects on semiconductor devices and circuits to combat potential damage it can cause Features a chapter authored by renowned radiation authority Lawrence T Clark on Radiation Hardened by Design SRAM Strategies for TID and SEE Mitigation This book analyzes the radiation problem focusing on the most important aspects required for comprehending the degrading effects observed in semiconductor devices circuits and systems when they are irradiated It explores how radiation interacts with solid materials providing a detailed analysis of three ways this occurs Photoelectric effect Compton effect and creation of electron positron pairs The author explains that the probability of these three effects occurring depends on the energy of the incident photon and the atomic number of the target The book also discusses the effects that photons can have on matter in terms of ionization effects and nuclear displacement Written for post graduate researchers semiconductor engineers and nuclear and space engineers with some electronics background this carefully constructed reference explains how ionizing radiation is creating damage in semiconducting devices and circuits and systems and how that damage can be avoided in areas such as military space missions nuclear applications plasma damage and X ray based techniques It features top notch international

experts in industry and academia who address emerging detector technologies circuit design techniques new materials and innovative system approaches

VLSI-SoC 2023: Innovations for Trustworthy Artificial Intelligence Ibrahim (Abe) M. Elfadel, Lutfi Albasha, 2024-12-28 This book contains revised and extended versions of a selection of papers presented at the 31st IFIP WG 10.5 IEEE International Conference on the theme of VLSI SoC Innovations for Trustworthy Artificial Intelligence VLSI SoC 2023 held in Sharjah United Arab Emirates during October 16-18, 2023. The 15 full papers included in this volume were carefully revised and expanded from 77 papers submitted to the conference. This edited volume has been organized into four parts: architectures, accelerators, resiliency and robustness, and security and privacy, and is representing cutting edge research at the forefront of VLSI technology.

Dependable Computer Systems Wojciech Zamojski, Janusz Kacprzyk, Jacek Mazurkiewicz, Jarosław Sugier, Tomasz Walkowiak, 2011-05-13 Dependability analysis is the recent approach to performance evaluation of contemporary systems which tries to cope with new challenges that are brought with their unprecedented complexity, size and diversity. Especially in case of computer systems and networks such evaluation must be based on multidisciplinary approach to theory, technology and maintenance of systems which operate in real and very often unfriendly environments. As opposed to classic reliability which focuses mainly on technical aspects of system functioning, dependability studies investigate the systems as multifaceted and sophisticated amalgamations of technical information and also human resources. This monograph presents selected new developments in such areas of dependability research as mathematical models, evaluation of software, probabilistic assessment, methodologies, tools and technologies. Intelligent and soft computing methods help to resolve fundamental problems of dependability analysis which are caused by the fact that in contemporary computer systems it is often difficult to find a relation between system elements and system events, the relation between reasons and results, and it is even more difficult to define strict mathematical models with analytical relationships between such phenomena.

Dependable Computing - EDCC 2005 Mario Dal Cin, Mohamed Kaâniche, András Pataricza, 2005-03-31 It is always a special honor to chair the European Dependable Computing Conference (EDCC). EDCC has become one of the well established conferences in the field of dependability in the European research area. Budapest was selected as the host of this conference due to its traditions in organizing international scientific events and its traditional role of serving as a meeting point between East and West. EDCC 5 was the fifth in the series of these high quality scientific conferences. In addition to the overall significance of such a pan-European event, this year's conference was a special one due to historic reasons. The roots of EDCC date back to the moment when the Iron Curtain fell. Originally, two groups of scientists from different European countries in Western and Eastern Europe who were active in research and education related to dependability created a joint forum in order to merge their communities as early as in 1989. This trend has continued up to today. This year's conference was the first one where the overwhelming majority of the research groups belong to the family of European nations united in the European Union. During the past 16 years we observed that the same roots in all the

professional cultural and scientific senses led to a seamless integration of these research communities previously separated artificially for a long time EDCC has become one of the main European platforms to exchange new search ideas in the field of dependability

Rough Sets and Intelligent Systems Paradigms Marzena Kryszkiewicz, James F. Peters, Henryk Rybinski, 2007-07-11 This book constitutes the refereed proceedings of the International Conference on Rough Sets and Emerging Intelligent Systems Paradigms held in Warsaw Poland in June 2007 The conference was dedicated to the memory of Professor Zdzislaw Pawlak Seventy three full papers are presented together with two keynote lectures and eleven invited papers Each of these papers was subject to a strict editorial review

Cyber Physical Systems. Model-Based Design Roger Chamberlain, Walid Taha, Martin Törngren, 2019-07-01 This book constitutes the proceedings of the 8th International Workshop on Design Modeling and Evaluation of Cyber Physical Systems CyPhy 2018 and 14th International Workshop on Embedded and Cyber Physical Systems Education WESE 2018 held in conjunction with ESWeek 2018 in Torino Italy in October 2018 The 13 full papers presented together with 1 short paper in this volume were carefully reviewed and selected from 18 submissions The conference presents a wide range of domains including Modeling simulation verification design cyber physical systems embedded systems real time systems safety and reliability

Design and Test Technology for Dependable Systems-on-Chip Ubar, Raimund, Raik, Jaan, Vierhaus, Heinrich Theodor, 2010-12-31 This book covers aspects of system design and efficient modelling and also introduces various fault models and fault mechanisms associated with digital circuits integrated into System on Chip SoC Multi Processor System on Chip MPSoC or Network on Chip NoC

Parallel Processing and Applied Mathematics Roman Wyrzykowski, Jack Dongarra, Konrad Karczewski, Jerzy Wasniewski, 2008-05-29 This book constitutes the thoroughly refereed post conference proceedings of the 7th International Conference on Parallel Processing and Applied Mathematics PPAM 2007 held in Gdansk Poland in September 2007 The 63 revised full papers of the main conference presented together with 85 revised workshop papers were carefully reviewed and selected from over 250 initial submissions The papers are organized in topical sections on parallel distributed architectures and mobile computing numerical algorithms and parallel numerics parallel and distributed non numerical algorithms environments and tools for as well as applications of parallel distributed grid computing evolutionary computing meta heuristics and neural networks The volume proceeds with the outcome of 11 workshops and minisymposia dealing with novel data formats and algorithms for dense linear algebra computations combinatorial tools for parallel sparse matrix computations grid applications and middleware large scale computations on grids models algorithms and methodologies for grid enabled computing environments scheduling for parallel computing language based parallel programming models performance evaluation of parallel applications on large scale systems parallel computational biology high performance computing for engineering applications and the minisymposium on interval analysis

Rough Sets and Current Trends in Computing Marcin Szczuka, Marzena Kryszkiewicz, Richard Jensen, Qinghua Hu, 2010-06-09 This book constitutes the refereed proceedings of the

7th International Conference on Rough Sets and Current Trends in Computing RSCTC 2010 held in Warsaw Poland in June 2010 **Leveraging Applications of Formal Methods, Verification and Validation** Tiziana Margaria, Bernhard Steffen, 2008-11-05 This volume contains the conference proceedings of ISoLA 2008 the Third International Symposium on Leveraging Applications of Formal Methods Verification and Validation which was held in Porto Sani Kassandra Chalkidiki Greece during October 13 15 2008 sponsored by EASST and in cooperation with the IEEE Technical Committee on Complex Systems Following the tradition of its forerunners in 2004 and 2006 in Cyprus and the ISoLA Workshops in Greenbelt USA in 2005 and in Poitiers France in 2007 ISoLA 2008 provided a forum for developers users and researchers to discuss issues related to the adoption and use of rigorous tools and methods for the specification analysis verification certification construction test and maintenance of systems from the point of view of their different application domains Thus the ISoLA series of events serves the purpose of bridging the gap between designers and developers of rigorous tools and users in engineering and in other disciplines and to foster and exploit synergetic relationships among scientists engineers software developers decision makers and other critical thinkers in companies and organizations In particular by providing a venue for the discussion of common problems requirements algorithms methodologies and practices ISoLA aims at supporting researchers in their quest to improve the utility reliability flexibility and efficiency of tools for building systems and users in their search for adequate solutions to their problems

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