



Distributed Real-Time Systems



Testability Of Distributed Real Time Systems

David Baud



Testability Of Distributed Real Time Systems:

The Testability of Distributed Real-Time Systems Werner Schütz, 2007-07-23 BY H KOPETZ A real time computer system must provide the intended service in two dimensions the functional value dimension and the temporal dimension The verification of a real time system implementation is thus necessarily more complex than the verification of a non real time system which has to be checked in the value dimension only Since the formal verification techniques of temporal properties have not yet matured to the point where these techniques can be used in practical system development systematic design and testing are the only alternatives for the development of dependable real time systems At present up to and more than fifty percent of the development effort of complex real time computer systems is spent on testing The test activities are thus a significant cost element in any real time system project The attack on this cost element has to proceed from two fronts the design for testability and the development of a systematic test methodology supported by an appropriate tool set This book covers both of these topics

Real-Time and Distributed Real-Time Systems Amitava Gupta, Anil Kumar Chandra, Peter Luksch, 2016-04-27 Digital computers have revolutionized computation and transformed how computers are used to control systems in real life giving birth to real time systems Furthermore massive developments in the communications domain have made it possible for real time systems to perform coordinated actions over communication interfaces resulting in the evolution

Real-Time Systems Albert M. K. Cheng, 2003-03-13 Test und Validierung spielen bei Echtzeitsystemen eine zentrale Rolle Auf die Spezifikationen die der Hersteller angibt muss sich der Kunde hier in besonders hohem Maße verlassen können Bisher sind zu diesem Thema nur Artikelsammlungen erschienen Jetzt liegt endlich ein Buch vor das sich für Fachleute und Studenten gleichermaßen eignet und dem Leser einen umfassenden Überblick über die verschiedenen existierenden Ansätze verschafft Vor und Nachteile jedes Verfahrens werden ausführlich beschrieben das erleichtert die Methodenwahl in der Praxis Der Autor ist nicht nur ein anerkannter Experte auf seinem Gebiet sondern genießt auch einen hervorragenden pädagogischen Ruf

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227 11 1 The Scheduling Problem 228 11 2 The Adversary Argument 229 11 3 Dynamic Scheduling 231 x TABLE OF CONTENTS 11 4 Static Scheduling 237 Points to Remember 240 Bibliographic Notes 242 Review Questions and Problems 242 Chapter 12 Validation 245 Overview 245 12 1 Building a Convincing Safety Case 246 12 2 Formal Methods 248 12 3 Testing

Active, Real-Time, and Temporal Database Systems Sten F. Andler, Jörgen Hansson, 2003-06-26 Database systems of the next generation are likely to be inherently very complex due to the diversity of requirements placed on them. Incorporating active real time and temporal virtues in one database system is an arduous effort but is also a commendable one. This book presents the proceedings of the Second International Workshop on Active Real Time and Temporal Database Systems ARTDB 97 held in Como Milan in September 1997. The aim of the workshop was to bring researchers together from the active and real time research communities and to examine the current state of the art in active real time and temporal database systems. This book offers a collection of papers presented at the ARTDB 97 workshop. The papers, many of them representing proficient and tenable results, illuminate the feasibility of building database systems supporting reactive behavior while enforcing timeliness and predictability. The book contains nine papers carefully reviewed and accepted by the program committee, three invited papers written by prominent researchers in the field, and two summaries of the panel discussions held at the workshop. The program committee received seventeen submissions, where each submission was reviewed by at least three program committee members. The two panel sessions focused on predictability issues and on practical experience of active real time and temporal database systems. The ARTDB 97 workshop was held in cooperation with the IEEE Technical Committees on Real Time Systems and Complexity in Computing and the ACM Special Interest Group on Manipulation of Data.

Design and Analysis of Distributed Embedded Systems Bernd Kleinjohann, K.H. (Kane) Kim, Lisa Kleinjohann, Achim Rettberg, 2013-04-17 Design and Analysis of Distributed Embedded Systems is organized similar to the conference. Chapters 1 and 2 deal with specification methods and their analysis, while Chapter 6 concentrates on timing and performance analysis. Chapter 3 describes approaches to system verification at different levels of abstraction. Chapter 4 deals with fault tolerance and detection. Middleware and software reuse aspects are treated in Chapter 5. Chapters 7 and 8 concentrate on the distribution-related topics such as partitioning, scheduling, and communication. The book closes with a chapter on design methods and frameworks.

Predictably Dependable Computing Systems Brian Randell, Jean-Claude Laprie, Hermann Kopetz, Bev Littlewood, 2013-11-11

Distributed Computer Control Systems 1995 A.E.K. Sahraoui, J.A. de la Puente, 2014-05-23 The series of IFAC Workshops on distributed computer control systems DCCS provide the opportunity for leading researchers and practitioners in the field to discuss and evaluate recent advances and current issues in theory, applications, and technology of DCCS. DCCS 95, the 13th IFAC workshop in the series, was held in Toulouse, Blagnac, France. The topics covered at this meeting included the role of real time in DCCS specifications, scheduling methods for DCCS real time distributed operating systems and databases, and industrial applications and experience with DCCS.

Design

Guidelines for a Monitoring Environment Concerning Distributed Real-time Systems Aida Omerovic, 2004 While the dependability requirements of distributed real time systems are expanding there is currently no framework for defining and mapping these requirements into the system design and operation A method of controlling and achieving the dependability level is real time monitoring which measures the degree of requirements fulfilment relates it to the pre defined measurable system level expectations and dynamically adapts the system based on quality metrics risk analysis cost evaluation control theory neural networks data acquisition and system knowledge management The book deduces a framework to reveal define quantify measure analyse design implement test monitor and enhance dependability functional and non functional requirements of a distributed system with real time constraints It is presented how the framework can be applied throughout all life cycle stages under varying constraints and with maximised cost effectiveness An overview of the tools and methodologies applicable has been given and an integrated and generalised architecture for ensuring continuous fulfilment of system requirements proposed The framework provides a multilevel specification mechanism to establish the preservation of system requirements This ensures the correct functioning of system through adaptations at run time Among the benefits are controlled access and coordinated resource sharing in accordance with service level agreement policies multi stakeholder interest preservation transparency with respect to location naming performance etc achievement of quality of service on demand decentralisation seamless integration of resources and applications as well as increased predictability

READERSHIP The intended audience is broad real time and distributed systems scientists and developers software engineers students quality assurance managers contractors users service providers and all those searching for an alternative approach to handling and ensuring automated control of fulfilment of system requirements Moreover those needing a handbook on contract negotiations and a method of tracing operational results back into system requirements of long lived projects with high dependability and integrity demands

Advanced Distributed Systems Felix F. Ramos, 2005-09-15 This book constitutes the thoroughly refereed post proceedings of the Fifth International School and Symposium on Advanced Distributed Systems ISSADS 2005 held in Guadalajara Mexico in January 2005 The 50 revised full papers presented were carefully reviewed and selected from over 100 submissions The papers are organized in topical sections on database systems distributed and parallel algorithms real time distributed systems cooperative information systems fault tolerance information retrieval modeling and simulation wireless networks and mobile computing artificial life and multi agent systems

Introduction to Software Testing Paul Ammann, Jeff Offutt, 2008-01-28 Extensively class tested this textbook takes an innovative approach to software testing it defines testing as the process of applying a few well defined general purpose test criteria to a structure or model of the software It incorporates the latest innovations in testing including techniques to test modern types of software such as OO web applications and embedded software The book contains numerous examples throughout An instructor s solution manual PowerPoint slides sample syllabi additional examples and updates testing tools

for students and example software programs in Java are available on an extensive website ESEC '91 Alfonso Fuggetta,1991-10-09 The third European Software Engineering Conference follows ESEC 87 and ESEC 89 This series of conferences was set up by the European societies with the aim of providing an international forum for researchers developers and users of software engineering technology The need for a meeting point to discuss new results and useful experiences was clear from the large amount of high quality European software engineering research in recent years stimulated for example through major European research programmes The 22 papers in these proceedings were selected from 133 papers submitted from 26 different countries They cover a fairly broad range of themes such as formal methods and practical experiences with them special techniques for real time systems software evolution and re engineering software engineering environments and software metrics Invited papers by well known experts address further important areas perspectives on configuration management software factories user interfacedesign computer security and technology transfer

Architecture and Design of Distributed Embedded Systems Bernd Kleinjohann,2013-04-18 Due to the decreasing production costs of IT systems applications that had to be realised as expensive PCBs formerly can now be realised as a system on chip Furthermore low cost broadband communication media for wide area communication as well as for the realisation of local distributed systems are available Typically the market requires IT systems that realise a set of specific features for the end user in a given environment so called embedded systems Some examples for such embedded systems are control systems in cars airplanes houses or plants information and communication devices like digital TV mobile phones or autonomous systems like service or edutainment robots For the design of embedded systems the designer has to tackle three major aspects The application itself including the man machine interface The target architecture of the system including all functional and non functional constraints and the design methodology including modelling specification synthesis test and validation The last two points are a major focus of this book This book documents the high quality approaches and results that were presented at the International Workshop on Distributed and Parallel Embedded Systems DIPES 2000 which was sponsored by the International Federation for Information Processing IFIP and organised by IFIP working groups WG10 3 WG10 4 and WG10 5 The workshop took place on October 18 19 2000 in Schlo Eringerfeld near Paderborn Germany Architecture and Design of Distributed Embedded Systems is organised similar to the workshop Chapters 1 and 4 Methodology I and II deal with different modelling and specification paradigms and the corresponding design methodologies Generic system architectures for different classes of embedded systems are presented in Chapter 2 In Chapter 3 several design environments for the support of specific design methodologies are presented Problems concerning test and validation are discussed in Chapter 5 The last two chapters include distribution and communication aspects Chapter 6 and synthesis techniques for embedded systems Chapter 7 This book is essential reading for computer science researchers and application developers

Distributed Computer Control Systems 1994 J.A. De La Puente,M.G. Rodd,2014-05-23

One of the most important issues in the development of distributed computer control systems is the ability to build software and hardware which is both reliable and time deterministic this is an area where control engineering and computer science naturally meet This publication brings together the latest key papers on research and development in this field allowing cross fertilization between the two engineering disciplines involved and allowing both academics and industrial practitioners to find new insights and learn from each other's views

Testing of Communicating Systems Gyula Csopaki, Margit Dibuz, Katalin Tarnay, 2013-03-14 Testing of Communicating Systems presents the latest worldwide results in both the theory and practice of the testing of communicating systems This volume provides a forum that brings together the substantial volume of research on the testing of communicating systems ranging from conference testing through interoperability testing to performance and QoS testing The following topics are discussed in detail Types of testing Phases of the testing process Classes of systems to be tested and Theory and practice of testing LIST This book contains the selected proceedings of the 12th International Workshop on the Testing of Communicating Systems formerly the International Workshop on Protocol Test Systems sponsored by the International Federation for Information Processing IFIP and held in Budapest Hungary in September 1999 The book contains not only interesting research on testing different communication technologies from telecom and datacom systems to distributed systems but also presents reports on the application of these results in industry Testing of Communicating Systems will be essential reading for engineers IT managers and research personnel working in computer science and telecommunications

Real-time Computing Systems and Applications, 1999 Annotation The 47 regular papers and 25 short papers from the December 1999 conference are divided under the following headings databases scheduling software and systems communications formal methods multimedia and architecture architecture fault tolerance real time requirements resource management and O S and design spec Topics include value driven multi class overload management scheduling periodic task systems to minimize output jitter formal description of real time systems using SDL a Matlab toolbox for real time and control systems co design reliability analysis of real time controllers with dual modular temporal redundancy and real time synchronization between hard and soft tasks in RT Linux No subject index Annotation copyrighted by Book News Inc Portland OR

Parallel and Distributed Processing, 2000

Thermal Issues in Testing of Advanced Systems on Chip Nima Aghaee Ghaleshahi, 2015-09-23 Many cutting edge computer and electronic products are powered by advanced Systems on Chip SoC Advanced SoCs encompass superb performance together with large number of functions This is achieved by efficient integration of huge number of transistors Such very large scale integration is enabled by a core based design paradigm as well as deep submicron and 3D stacked IC technologies These technologies are susceptible to reliability and testing complications caused by thermal issues Three crucial thermal issues related to temperature variations temperature gradients and temperature cycling are addressed in this thesis Existing test scheduling techniques rely on temperature simulations to generate schedules that meet thermal constraints such as overheating

prevention The difference between the simulated temperatures and the actual temperatures is called temperature error This error for past technologies is negligible However advanced SoCs experience large errors due to large process variations Such large errors have costly consequences such as overheating and must be taken care of This thesis presents an adaptive approach to generate test schedules that handle such temperature errors Advanced SoCs manufactured as 3D stacked ICs experience large temperature gradients Temperature gradients accelerate certain early life defect mechanisms These mechanisms can be artificially accelerated using gradient based burn in like operations so that the defects are detected before shipping Moreover temperature gradients exacerbate some delay related defects In order to detect such defects testing must be performed when appropriate temperature gradients are enforced A schedule based technique that enforces the temperature gradients for burn in like operations is proposed in this thesis This technique is further developed to support testing for delay related defects while appropriate gradients are enforced The last thermal issue addressed by this thesis is related to temperature cycling Temperature cycling test procedures are usually applied to safety critical applications to detect cycling related early life failures Such failures affect advanced SoCs particularly through silicon via structures in 3D stacked ICs An efficient schedule based cycling test technique that combines cycling acceleration with testing is proposed in this thesis The proposed technique fits into existing 3D testing procedures and does not require temperature chambers Therefore the overall cycling acceleration and testing cost can be drastically reduced All the proposed techniques have been implemented and evaluated with extensive experiments based on ITC 02 benchmarks as well as a number of 3D stacked ICs Experiments show that the proposed techniques work effectively and reduce the costs in particular the costs related to addressing thermal issues and early life failures We have also developed a fast temperature simulation technique based on a closed form solution for the temperature equations Experiments demonstrate that the proposed simulation technique reduces the schedule generation time by more than half

Software Maintenance - A Management Perspective Phaneendra Nath Vellanky, 2007-10-23 Computer systems play an important role in our society Software drives those systems Massive investments of time and resources are made in developing and implementing these systems Maintenance is inevitable It is hard and costly Considerable resources are required to keep the systems active and dependable We cannot maintain software unless maintainability characters are built into the products and processes There is an urgent need to reinforce software development practices based on quality and reliability principles Though maintenance is a mini development lifecycle it has its own problems Maintenance issues need corresponding tools and techniques to address them Software professionals are key players in maintenance While development is an art and science maintenance is a craft We need to develop maintenance personnel to master this craft Technology impact is very high in systems world today We can no longer conduct business in the way we did before That calls for reengineering systems and software Even reengineered software needs maintenance soon after its implementation We have to take business knowledge procedures and data into the newly

reengineered world Software maintenance people can play an important role in this migration process Software technology is moving into global and distributed networking environments Client server systems and object orientation are on their way Massively parallel processing systems and networking resources are changing database services into corporate data warehouses Software engineering environments rapid application development tools are changing the way we used to develop and maintain software Software maintenance is moving from code maintenance to design maintenance even onto specification maintenance Modifications today are made at specification level regenerating the software components testing and integrating them with the system Eventually software maintenance has to manage the evolution and evolutionary characteristics of software systems Software professionals have to maintain not only the software but the momentum of change in systems and software In this study we observe various issues tools and techniques and the emerging trends in software technology with particular reference to maintenance We are not searching for specific solutions We are identifying issues and finding ways to manage them live with them and control their negative impact

A Practical Approach to Real-time Systems Phillip A. Laplante, 2000 Under the same cover this volume offers both modern and classic papers focusing on real time systems design and analysis Rather than focusing in theoretical observations of real time systems it is intended for the practical professional who is building real real time systems The editor himself the author of a course on real time systems has selected articles to provide a deep exploration of issues raised in his other works In particular emphasis is placed on applying practical but theoretically sound approaches in software engineering rate monotonic design and analysis testing and architecting systems for real time applications

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