

Design of Dependable Computing Systems

Jean-Claude Geffroy and Gilles Motet

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Design Of Dependable Computing Systems

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Design Of Dependable Computing Systems:

Design of Dependable Computing Systems J.C. Geffroy,G. Motet,2013-03-09 This book analyzes the causes of failures in computing systems their consequences as well as the existing solutions to manage them The domain is tackled in a progressive and educational manner with two objectives 1 The mastering of the basics of dependability domain at system level that is to say independently of the technology used hardware or software and of the domain of application 2 The understanding of the fundamental techniques available to prevent to remove to tolerate and to forecast faults in hardware and software technologies The first objective leads to the presentation of the general problem the fault models and degradation mechanisms which are at the origin of the failures and finally the methods and techniques which permit the faults to be prevented removed or tolerated This study concerns logical systems in general independently of the hardware and software technologies put in place This knowledge is indispensable for two reasons A large part of a product s development is independent of the technological means expression of requirements specification and most of the design stage Very often the development team does not possess this basic knowledge hence the dependability requirements are considered uniquely during the technological implementation Such an approach is expensive and inefficient Indeed the removal of a preliminary design fault can be very difficult if possible if this fault is detected during the product s final testing

Design of Dependable Computing Systems J. C. Geffroy,Gilles Motet,2014-01-15 **Dependable Computing Systems**
Hassan B. Diab,Albert Y. Zomaya,2005-10-05 A team of recognized experts leads the way to dependable computing systems With computers and networks pervading every aspect of daily life there is an ever growing demand for dependability In this unique resource researchers and organizations will find the tools needed to identify and engage state of the art approaches used for the specification design and assessment of dependable computer systems The first part of the book addresses models and paradigms of dependable computing and the second part deals with enabling technologies and applications Tough issues in creating dependable computing systems are also tackled including Verification techniques Model based evaluation Adjudication and data fusion Robust communications primitives Fault tolerance Middleware Grid security Dependability in IBM mainframes Embedded software Real time systems Each chapter of this contributed work has been authored by a recognized expert This is an excellent textbook for graduate and advanced undergraduate students in electrical engineering computer engineering and computer science as well as a must have reference that will help engineers programmers and technologists develop systems that are secure and reliable *Dependable Computing* Ravishankar K. Iyer,Zbigniew T. Kalbarczyk,Nithin M. Nakka,2024-04-18 Dependable Computing Covering dependability from software and hardware perspectives Dependable Computing Design and Assessment looks at both the software and hardware aspects of dependability This book Provides an in depth examination of dependability fault tolerance topics Describes dependability taxonomy and briefly contrasts classical techniques with their modern counterparts or extensions Walks up the system stack

from the hardware logic via operating systems up to software applications with respect to how they are hardened for dependability. Describes the use of measurement based analysis of computing systems. Illustrates technology through real life applications. Discusses security attacks and unique dependability requirements for emerging applications e.g. smart electric power grids and cloud computing. Finally using critical societal applications such as autonomous vehicles, large scale clouds and engineering solutions for healthcare, the book illustrates the emerging challenges faced in making artificial intelligence AI and its applications dependable and trustworthy. This book is suitable for those studying in the fields of computer engineering and computer science. Professionals who are working within the new reality to ensure dependable computing will find helpful information to support their efforts. With the support of practical case studies and use cases from both academia and real world deployments, the book provides a journey of developments that include the impact of artificial intelligence and machine learning on this ever growing field. This book offers a single compendium that spans the myriad areas in which dependability has been applied, providing theoretical concepts and applied knowledge with content that will excite a beginner and rigor that will satisfy an expert. Accompanying the book is an online repository of problem sets and solutions as well as slides for instructors that span the chapters of the book.

[Predictably Dependable Computing Systems](#) Brian

Randell, Jean-Claude Laprie, Hermann Kopetz, Bev Littlewood, 2013-11-11 **Workshop A. Digital Systems Design.**

Workshop B. Dependable Computing Systems European Association for Microprocessing and

Microprogramming, EUROMICRO, 1998 *Foundations of Dependable Computing* Gary M. Koob, Clifford G. Lau, 2013-04-17

Foundations of Dependable Computing System Implementation explores the system infrastructure needed to support the various paradigms of Dependable Applications. Approaches to implementing support mechanisms and to incorporating additional appropriate levels of fault detection and fault tolerance at the processor network and operating system level are presented. A primary concern at these levels is balancing cost and performance against coverage and overall dependability. As these chapters demonstrate, low overhead practical solutions are attainable and not necessarily incompatible with performance considerations. The section on innovative compiler support in particular demonstrates how the benefits of application specificity may be obtained while reducing hardware cost and run time overhead. A companion to this volume published by Kluwer subtitled *Models and Frameworks for Dependable Systems* presents two comprehensive frameworks for reasoning about system dependability, thereby establishing a context for understanding the roles played by specific approaches presented in this book's two companion volumes. It then explores the range of models and analysis methods necessary to design, validate and analyze dependable systems. Another companion to this book published by Kluwer subtitled *Paradigms for Dependable Applications* presents a variety of specific approaches to achieving dependability at the application level. Driven by the higher level fault models of *Models and Frameworks for Dependable Systems* and built on the lower level abstractions implemented in a third companion book subtitled *System Implementation*, these approaches

demonstrate how dependability may be tuned to the requirements of an application the fault environment and the characteristics of the target platform Three classes of paradigms are considered protocol based paradigms for distributed applications algorithm based paradigms for parallel applications and approaches to exploiting application semantics in embedded real time control systems Physical Fault Injection for Validation of Dependable Computing Systems and a Fault-tolerant Computer Design for Safety Critical Missions Ulf Gunneflo,Chalmers University of Technology. School of Electrical and Computer Engineering,Chalmers tekniska högskola. Sektionen för Elektro- och Datorteknik,1990 Machine Learning Systems Shanshan Liu,Pedro Reviriego,Zhen Gao,Fabrizio Lombardi,2026-05-25 This book addresses the technological contributions and developments of advanced hardware for Machine Learning ML computing systems The authors discuss state of the art progress in this area and related topics as well as reporting on their application to diverse fields This is achieved by chapters covering the entire spectrum of research activities to include design and applications with a focus on high performance and dependable operation The entire hardware stack from circuit to architecture up to the system level is discussed in detail The book will cover innovative material as well as tutorials reviews and surveys of current theoretical experimental results design methodologies and applications over a wide spectrum of scope for an enlarged readership so to include engineers as well as scientists Discusses a wide range of topics for Machine Learning based computer systems Covers design and application for the entire hardware stack with a focus on high performance and dependability Includes innovative material as well as tutorials reviews and surveys of current theoretical experimental results

Foundations of Dependable Computing Gary M. Koob,Clifford G. Lau,2007-11-23 *Foundations of Dependable Computing Paradigms for Dependable Applications* presents a variety of specific approaches to achieving dependability at the application level Driven by the higher level fault models of *Models and Frameworks for Dependable Systems* and built on the lower level abstractions implemented in a third companion book subtitled *System Implementation* these approaches demonstrate how dependability may be tuned to the requirements of an application the fault environment and the characteristics of the target platform Three classes of paradigms are considered protocol based paradigms for distributed applications algorithm based paradigms for parallel applications and approaches to exploiting application semantics in embedded real time control systems The companion volume subtitled *Models and Frameworks for Dependable Systems* presents two comprehensive frameworks for reasoning about system dependability thereby establishing a context for understanding the roles played by specific approaches presented in this book s two companion volumes It then explores the range of models and analysis methods necessary to design validate and analyze dependable systems Another companion book published by Kluwer subtitled *System Implementation* explores the system infrastructure needed to support the various paradigms of *Paradigms for Dependable Applications* Approaches to implementing support mechanisms and to incorporating additional appropriate levels of fault detection and fault tolerance at the processor network and operating system level are

presented A primary concern at these levels is balancing cost and performance against coverage and overall dependability As these chapters demonstrate low overhead practical solutions are attainable and not necessarily incompatible with performance considerations The section on innovative compiler support in particular demonstrates how the benefits of application specificity may be obtained while reducing hardware cost and run time overhead

The Evolution of Fault-Tolerant Computing A. Avizienis, H. Kopetz, J.C. Laprie, 2012-12-06 For the editors of this book as well as for many other researchers in the area of fault tolerant computing Dr William Caswell Carter is one of the key figures in the formation and development of this important field We felt that the IFIP Working Group 10.4 at Baden Austria in June 1986 which coincided with an important step in Bill's career was an appropriate occasion to honor Bill's contributions and achievements by organizing a one day Symposium on the Evolution of Fault Tolerant Computing in the honor of William C Carter The Symposium held on June 30 1986 brought together a group of eminent scientists from all over the world to discuss the evolution the state of the art and the future perspectives of the field of fault tolerant computing Historic developments in academia and industry were presented by individuals who themselves have actively been involved in bringing them about The Symposium proved to be a unique historic event and these Proceedings which contain the final versions of the papers presented at Baden are an authentic reference document

Dependable Computing for Critical Applications Algirdas Avizienis, Jean-Claude Laprie, 2012-12-06 The International Working Conference on Dependable Computing for Critical Applications was the first conference organized by IFIP Working Group 10.4 Dependable Computing and Fault Tolerance in cooperation with the Technical Committee on Fault Tolerant Computing of the IEEE Computer Society and the Technical Committee 7 on Systems Reliability Safety and Security of EWICS The rationale for the Working Conference is best expressed by the aims of WG 10.4 Increasingly individuals and organizations are developing or procuring sophisticated computing systems on whose services they need to place great reliance In differing circumstances the focus will be on differing properties of such services e.g. continuity performance real time response ability to avoid catastrophic failures prevention of deliberate privacy intrusions The notion of dependability defined as that property of a computing system which allows reliance to be justifiably placed on the service it delivers enables these various concerns to be subsumed within a single conceptual framework Dependability thus includes as special cases such attributes as reliability availability safety security The Working Group is aimed at identifying and integrating approaches methods and techniques for specifying designing building assessing validating operating and maintaining computer systems which should exhibit some or all of these attributes The concept of WG 10.4 was formulated during the IFIP Working Conference on Reliable Computing and Fault Tolerance on September 27-29 1979 in London England held in conjunction with the Europ IFIP 79 Conference Profs A Avizienis UCLA Los Angeles USA and A

Fundamentals of Dependable Computing for Software Engineers John Knight, 2012-01-12 Fundamentals of Dependable Computing for Software Engineers presents the essential elements of

computer system dependability The book describes a comprehensive dependability engineering process and explains the roles of software and software engineers in computer system dependability Readers will learn Why dependability matters What it means for a system to be dependable How to build a dependable software system How to assess whether a software system is adequately dependable The author focuses on the actions needed to reduce the rate of failure to an acceptable level covering material essential for engineers developing systems with extreme consequences of failure such as safety critical systems security critical systems and critical infrastructure systems The text explores the systems engineering aspects of dependability and provides a framework for engineers to reason and make decisions about software and its dependability It also offers a comprehensive approach to achieve software dependability and includes a bibliography of the most relevant literature Emphasizing the software engineering elements of dependability this book helps software and computer engineers in fields requiring ultra high levels of dependability such as avionics medical devices automotive electronics weapon systems and advanced information systems construct software systems that are dependable and within budget and time constraints

Foundations of Dependable Computing Gary M. Koob, Clifford G. Lau, 2007-07-23 Foundations of Dependable Computing Models and Frameworks for Dependable Systems presents two comprehensive frameworks for reasoning about system dependability thereby establishing a context for understanding the roles played by specific approaches presented in this book s two companion volumes It then explores the range of models and analysis methods necessary to design validate and analyze dependable systems A companion to this book published by Kluwer subtitled Paradigms for Dependable Applications presents a variety of specific approaches to achieving dependability at the application level Driven by the higher level fault models of Models and Frameworks for Dependable Systems and built on the lower level abstractions implemented in a third companion book subtitled System Implementation these approaches demonstrate how dependability may be tuned to the requirements of an application the fault environment and the characteristics of the target platform Three classes of paradigms are considered protocol based paradigms for distributed applications algorithm based paradigms for parallel applications and approaches to exploiting application semantics in embedded real time control systems Another companion book published by Kluwer subtitled System Implementation explores the system infrastructure needed to support the various paradigms of Paradigms for Dependable Applications Approaches to implementing support mechanisms and to incorporating additional appropriate levels of fault detection and fault tolerance at the processor network and operating system level are presented A primary concern at these levels is balancing cost and performance against coverage and overall dependability As these chapters demonstrate low overhead practical solutions are attainable and not necessarily incompatible with performance considerations The section on innovative compiler support in particular demonstrates how the benefits of application specificity may be obtained while reducing hardware cost and run time overhead **Proceedings EUROMICRO** (24, 1998, Västerås), 1998 **Fault-Tolerant Systems** Israel Koren, C. Mani Krishna, 2010-07-19 Fault Tolerant Systems is the first

book on fault tolerance design with a systems approach to both hardware and software No other text on the market takes this approach nor offers the comprehensive and up to date treatment that Koren and Krishna provide This book incorporates case studies that highlight six different computer systems with fault tolerance techniques implemented in their design A complete ancillary package is available to lecturers including online solutions manual for instructors and PowerPoint slides Students designers and architects of high performance processors will value this comprehensive overview of the field The first book on fault tolerance design with a systems approach Comprehensive coverage of both hardware and software fault tolerance as well as information and time redundancy Incorporated case studies highlight six different computer systems with fault tolerance techniques implemented in their design Available to lecturers is a complete ancillary package including online solutions manual for instructors and PowerPoint slides

Computer Vision Systems James Crowley,Justus Piater,Markus Vincze,Lucas Paletta,2003-07-01 This book constitutes the refereed proceedings of the Third International Conference on Computer Vision Systems ICVS 2003 held in Graz Austria in April 2003 The 51 revised full papers presented were carefully reviewed and selected from 109 submissions The papers are organized in topical sections on cognitive vision philosophical issues in cognitive vision cognitive vision and applications computer vision architectures performance evaluation implementation methods architecture and classical computer vision and video annotation

Responsive Computer Systems Hermann Kopetz,Yoshiaki Kakuda,2012-12-06 For the second time the International Workshop on Responsive Computer Systems has brought together a group of international experts from the fields of real time computing distributed computing and fault tolerant systems The two day workshop met at the splendid facilities at the KDD Research and Development Laboratories at Kamifukuoka Saitama in Japan on October 1 and 2 1992 The program included a keynote address a panel discussion and in addition to the opening and closing session six sessions of submitted presentations The keynote address The Concepts and Technologies of Dependable and Real time Computer Systems for Shinkansen Train Control covered the architecture of the computer control system behind a very responsive i e timely and reliable transport system the Shinkansen Train It has been fascinating to listen to the operational experience with a large fault tolerant computer application What are the Key Paradigms in the Integration of Timeliness and Reliability was the topic of the lively panel discussion Once again the pros and cons of the time triggered versus the event triggered paradigm in the design of a real time systems were discussed The eighteen submitted presentations covered diverse topics about important issues in the design of responsive systems and a session on progress reports about leading edge research projects Lively discussions characterized both days of the meeting This volume contains the revised presentations that incorporate some of the discussions that occurred during the meeting

Dependable Computing for Critical Applications 4 Flaviu Cristian,Gerard LeLann,Teresa Lunt,2012-12-06 This volume contains the articles presented at the Fourth International FIP Working Conference on Dependable Computing for Critical Applications held in San Diego California on January 4 6 1994 In keeping with the previous three conferences held in August

1989 at Santa Barbara USA in February 1991 at Tucson USA and in September 1992 at Mondello Italy the conference was concerned with an important basic question can we rely on computer systems for critical applications This conference like its predecessors addressed various aspects of dependability a broad term defined as the degree of trust that may justifiably be placed in a system s reliability availability safety security and performance Because of its broad scope a main goal was to contribute to a unified understanding and integration of these concepts The Program Committee selected 21 papers for presentation from a total of 95 submissions at a September meeting in Menlo Park California The resulting program represents a broad spectrum of interests with papers from universities corporations and government agencies in eight countries The selection process was greatly facilitated by the diligent work of the program committee members for which we are most grateful As a Working Conference the program was designed to promote the exchange of ideas by extensive discussions All paper sessions ended with a 30 minute discussion period on the topics covered by the session In addition three panel sessions have been organized

Dependable Computing for Critical Applications 2 John F. Meyer, Richard D. Schlichting, 2012-12-06 This volume contains the papers presented at the Second International Working Conference on Dependable Computing for Critical Applications sponsored by IFIP Working Group IOA and held in Tucson Arizona on February 18 20 1991 In keeping with the first such conference on this topic which took place at the University of California Santa Barbara in 1989 this meeting was likewise concerned with an important basic question Can we rely on Computers In more precise terms it addressed various aspects of computer system dependability a broad concept defined as the trustworthiness of computer service such that reliance can justifiably be placed on this service Given that this term includes attributes such as reliability availability safety and security it is our hope that these papers will contribute to further integration of these ideas in the context of critical applications The program consisted of 20 papers and three panel sessions The papers were selected from a total of 61 submissions at a November 1990 meeting of the Program Committee in Ann Arbor Michigan We were very fortunate to have a broad spectrum of interests represented with papers in the final program coming from seven different countries representing work at universities corporations and government agencies The process was greatly facilitated by the diligent work of the Program Committee and the quality of reviews provided by outside referees In addition to the paper presentations there were three panel sessions organized to examine particular topics in detail

Unveiling the Magic of Words: A Report on "**Design Of Dependable Computing Systems**"

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