

Fault Tolerant And Fault Testable Hardware

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Fault-Diagnosis Systems Fault-Tolerant Real-Time Systems Proceedings of the ...
Annual ACM-SIAM Symposium on Discrete Algorithms Fault Tolerant Architectures
for Cryptography and Hardware Security Diagnosis and Fault-tolerant Control Volume 2
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the production of a new version of any book is a daunting task as many authors will recognise in the field of computer science the task is made even more daunting by the speed with which the subject and its supporting technology move forward since the publication of the first edition of this book in 1981 much research has been conducted and many papers have been written on the subject of fault tolerance our aim then was to present for the first time the principles of fault tolerance together with current practice to illustrate those principles we believe that the principles have so far stood the test of time and are as appropriate today as they were in 1981 much work on the practical applications of fault tolerance has been undertaken and techniques have been developed for ever more complex situations such as those required for distributed systems nevertheless the basic principles remain the same

fault tolerant computing has evolved into a broad discipline one that encompasses all aspects of reliable computer design diverse areas of fault tolerant study range from failure mechanisms in integrated circuits to the design of robust software fault tolerant computing is driven by a number of key factors including ultra high reliability reduced life cycle costs and long life applications this book is intended to be both introductory and suitable for advanced level graduates chapters can be selected in various combinations to provide courses with different orientations

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

fault tolerant control aims at a graceful degradation of the behaviour of automated systems in case of faults it satisfies the industrial demand for enhanced availability and safety in contrast to traditional reactions to faults that bring about sudden shutdowns and loss of availability the book presents effective model based analysis and design methods for fault diagnosis and fault tolerant control architectural and structural models are used to analyse the propagation of the fault through the process to test the fault detectability and to find the redundancies in the process that can be used to ensure fault tolerance design methods for diagnostic systems and fault tolerant controllers are presented for processes that are described by analytical models by discrete event models or that can be dealt with as quantised systems five case studies on pilot processes show the applicability of the presented methods the theoretical results are illustrated by two running examples used throughout the book the second edition includes new material about reconfigurable control diagnosis of nonlinear systems and remote diagnosis the application examples are extended by a steering by wire system and the air path of a diesel engine both of which include experimental results the bibliographical notes at the end of all chapters have been updated the chapters end with exercises to be used in lectures

software patterns have revolutionized the way developer s and architects think about how software is designed built and documented this new title in wiley s prestigious series in

software design patterns presents proven techniques to achieve patterns for fault tolerant software this is a key reference for experts seeking to select a technique appropriate for a given system readers are guided from concepts and terminology through common principles and methods to advanced techniques and practices in the development of software systems references will provide access points to the key literature including descriptions of exemplar applications of each technique organized into a collection of software techniques specific techniques can be easily found with sufficient detail to allow appropriate choices for the system being designed

fault tolerant control aims at a gradual shutdown response in automated systems when faults occur it satisfies the industrial demand for enhanced availability and safety in contrast to traditional reactions to faults which bring about sudden shutdowns and loss of availability the book presents effective model based analysis and design methods for fault diagnosis and fault tolerant control architectural and structural models are used to analyse the propagation of the fault through the process to test the fault detectability and to find the redundancies in the process that can be used to ensure fault tolerance it also introduces design methods suitable for diagnostic systems and fault tolerant controllers for continuous processes that are described by analytical models of discrete event systems represented by automata the book is suitable for engineering students engineers in industry and researchers who wish to get an overview of the variety of approaches to process diagnosis and fault tolerant control the authors have extensive teaching experience with graduate and phd students as well as with industrial experts parts of this book have been used in courses for this audience the authors give a comprehensive introduction to the main ideas of diagnosis and fault tolerant control and present some of their most recent research achievements obtained together with their research groups in a close cooperation with european research projects the third edition resulted from a major re structuring and re writing of the former edition which has been used for a decade by numerous research groups new material includes distributed diagnosis of continuous and discrete event systems methods for reconfigurability analysis and extensions of the structural methods towards fault tolerant control the bibliographical notes at the end of all chapters have been up dated the chapters end with exercises to be used in lectures

the growing complexity of modern software systems makes it increasingly difficult to ensure the overall dependability of software intensive systems mastering system complexity requires design techniques that support clear thinking and rigorous validation and verification formal design methods together with fault tolerant design techniques help to achieve this therefore there is a clear need for methods that enable rigorous modeling and the development of complex fault tolerant systems this book is an outcome of the workshop on methods models and tools for fault tolerance memot 2007 held in conjunction with the 6th international conference on integrated formal methods ifm 2007 in oxford uk in july 2007 the authors of the best workshop papers were asked to enhance and expand their work and a number of well established researchers working in the area contributed invited chapters in addition from the 15 refereed and revised papers presented 12 are versions reworked from the workshop and 3 papers are invited the articles are organized in four topical sections on formal reasoning about fault tolerant systems and protocols fault tolerance modelling in b fault tolerance in system development process and fault tolerant applications

when architecting dependable systems fault tolerance is required to improve the overall system robustness many studies have been proposed but the solutions are usually commissioned late during the design and implementation phases of the software life cycle e g java and windows nt exception handling thus reducing the error recovery effectiveness since the system design typically models only normal behaviors of the system while ignoring exceptional ones the generated system implementation is unable to handle abnormal events consequently the system may fail in unexpected ways due to some faults researchers have advocated that fault tolerance management during the entire life cycle improves the overall system robustness and that different classes of exceptions must be identified for each identified phase of software development depending on the abstraction level of the software system being modeled this book builds on this trend and investigates how fault tolerance mechanisms can be used when engineering a software system new problems will arise new models are needed at different abstraction levels methodologies for mode driven engineering of such systems must be defined new technologies are required and new validation and verification environments are necessary

this textbook serves as an introduction to fault tolerance intended for upper division undergraduate students graduate level students and practicing engineers in need of an overview of the field readers will develop skills in modeling and evaluating fault tolerant architectures in terms of reliability availability and safety they will gain a thorough understanding of fault tolerant computers including both the theory of how to design and evaluate them and the practical knowledge of achieving fault tolerance in electronic communication and software systems coverage includes fault tolerance techniques through hardware software information and time redundancy the content is designed to be highly accessible including numerous examples and exercises solutions and powerpoint slides are available for instructors

with increasing demands for efficiency and product quality plus progress in the integration of automatic control systems in high cost mechatronic and safety critical processes the field of supervision or monitoring fault detection and fault diagnosis plays an important role the book gives an introduction into advanced methods of fault detection and diagnosis fdd after definitions of important terms it considers the reliability availability safety and systems integrity of technical processes then fault detection methods for single signals without models such as limit and trend checking and with harmonic and stochastic models such as fourier analysis correlation and wavelets are treated this is followed by fault detection with process models using the relationships between signals such as parameter estimation parity equations observers and principal component analysis the treated fault diagnosis methods include classification methods from bayes classification to neural networks with decision trees and inference methods from approximate reasoning with fuzzy logic to hybrid fuzzy neuro systems several practical examples for fault detection and diagnosis of dc motor drives a centrifugal pump automotive suspension and tire demonstrate applications

real time computer systems are very often subject to dependability requirements because of their application areas fly by wire airplane control systems control of power plants industrial process control systems and others are required to continue their function despite faults fault tolerance and real time requirements thus constitute a kind of natural

combination in process control applications systematic fault tolerance is based on redundancy which is used to mask failures of individual components the problem of replica determinism is thereby to ensure that replicated components show consistent behavior in the absence of faults it might seem trivial that given an identical sequence of inputs replicated computer systems will produce consistent outputs unfortunately this is not the case the problem of replica non determinism and the presentation of its possible solutions is the subject of fault tolerant real time systems the problem of replica determinism the field of automotive electronics is an important application area of fault tolerant real time systems systems like anti lock braking engine control active suspension or vehicle dynamics control have demanding real time and fault tolerance requirements these requirements have to be met even in the presence of very limited resources since cost is extremely important because of its interesting properties fault tolerant real time systems gives an introduction to the application area of automotive electronics the requirements of automotive electronics are a topic of discussion in the remainder of this work and are used as a benchmark to evaluate solutions to the problem of replica determinism

this book uses motivating examples and real life attack scenarios to introduce readers to the general concept of fault attacks in cryptography it offers insights into how the fault tolerance theories developed in the book can actually be implemented with a particular focus on a wide spectrum of fault models and practical fault injection techniques ranging from simple low cost techniques to high end equipment based methods it then individually examines fault attack vulnerabilities in symmetric asymmetric and authenticated encryption systems this is followed by extensive coverage of countermeasure techniques and fault tolerant architectures that attempt to thwart such vulnerabilities lastly it presents a case study of a comprehensive fpga based fault tolerant architecture for aes 128 which brings together of a number of the fault tolerance techniques presented it concludes with a discussion on how fault tolerance can be combined with side channel security to achieve protection against implementation based attacks the text is supported by illustrative diagrams algorithms tables and diagrams presenting real world experimental results

this book presents recent advances in fault diagnosis and fault tolerant control of dynamic processes its impetus derives from the need for an overview of the challenges of the fault diagnosis technique and sustainable control especially for those demanding systems that require reliability availability maintainability and safety to ensure efficient operations moreover the need for a high degree of tolerance with respect to possible faults represents a further key point primarily for complex systems as modeling and control are inherently challenging and maintenance is both expensive and safety critical diagnosis and fault tolerant control 2 also presents and compares different fault diagnosis and fault tolerant schemes using well established innovative strategies for modeling the behavior of the dynamic process under investigation an updated treatise of diagnosis and fault tolerant control is addressed with the use of essential and advanced methods including signal based model based and data driven techniques another key feature is the application of these methods for dealing with robustness and reliability

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