SAFETY-CRITICAL COMPUTER SYSTEMS



Neil Storey

ADDISON-WESLEY

Safety Critical Computer Systems

David J. Smith, Kenneth G. L. Simpson

Safety Critical Computer Systems:

Safety-critical Computer Systems Neil Storey,1996 Increasingly microcomputers are being used in applications where their correct operation is vital to ensure the safety of the public and the environment from anti-lock braking systems in automobiles to fly by wire aircraft to shut down systems at nuclear power plants. It is therefore vital that engineers be aware of the safety implications of the systems they develop. This book is an introduction to the field of safety critical computer systems written for any engineer who uses microcomputers within real time embedded systems. It assumes no prior knowledge of safety or of any specific computer hardware or programming language. This text is intended for both engineering and computer science students and for practising engineers within computer related industries. The approach taken is equally suited to engineers who consider computers from a hardware software or systems viewpoint.

Safety-critical Computer Systems Neil Storey, 1996 **Development of Safety-Critical Systems** Gopinath Karmakar, Amol Wakankar, Ashutosh Kabra, Paritosh Pandya, 2023-10-09 This book provides professionals and students with practical guidance for the development of safety critical computer based systems It covers important aspects ranging from complying with standards and quidelines to the necessary software development process and tools and also techniques pertaining to model based application development platforms as well as qualified programmable controllers After a general introduction to the book s topic in chapter 1 chapter 2 discusses dependability aspects of safety systems and how architectural design at the system level helps deal with failures and yet achieves the targeted dependability attributes Chapter 3 presents the software development process which includes verification and validation at every stage essential to the development of software for systems performing safety functions It also explains how the process helps in developing a safety case that can be independently verified and validated The subsequent chapter 4 presents some important standards and guidelines which apply to different industries and in different countries Chapter 5 then discusses the steps towards complying with the standards at every phase of development It offers a guided tour traversing the path of software qualification by exploring the necessary steps towards achieving the goal with the help of case studies Chapter 6 highlights the application of formal methods for the development of safety systems software and introduces some available notations and tools which assist the process Finally chapter 7 presents a detailed discussion on the importance and the advantages of qualified platforms for safety systems application development including programmable controller PLC and formal model based development platforms Each chapter includes case studies illustrating the subject matter The book is aimed at both practitioners and students interested in the art and science of developing computer based systems for safety critical applications Both audiences will get insights into the tools and techniques along with the latest developments in the design analysis and qualification which are constrained by the regulatory and compliance requirements mandated by the applicable guides and standards It also addresses the needs of professionals and young graduates who specialize in the development of

necessary tools and qualified platforms Dependability of Critical Computer Systems F.J. Redmill, 1989-11-30 M CARPENTIER Director General DG XIII Telecommunications Information Industries and Innovation of the Commission of the European Communities It is with great pleasure that I introduce and recommend this collection of guidelines produced by EWICS TC7 This Technical Committee has consistently attracted technical experts of high quality from all over Europe and the standard of the Committee's work has reflected this The Committee has been sponsored by the Commission of the European Communities since 1978 During this period there has been the opportunity to observe the enthusiasm and dedication in the activities of the group the expertise and effort invested in its work the discipline in meeting objectives and the quality of the resulting guidelines It is no surprise that these guidelines have influenced the work of international standardisation bodies Now the first six of EWICS TCTs guidelines are being made available as a book I am convinced that all computer system developers who use them will greatly enhance their chances of achieving quality systems v Acknowledgements In the preparation of this book the editoLisgrateful to P Bishop G Covington II C Goring and W Quirk for their help in editing the guidelines In addition he would like to thank S Bologna W Ehrenberger M Ould J Rata L Sintonen Safety Critical Systems Handbook David and I Zalewski for reviewing the chapters and providing additional material J. Smith, Kenneth G. L. Simpson, 2010-11-11 Safety Critical Systems Handbook A Straightfoward Guide to Functional Safety IEC 61508 2010 Edition and Related Standards Including Process IEC 61511 and Machinery IEC 62061 AND ISO 13849 Third Edition offers a practical guide to the functional safety standard IEC 61508 The book is organized into three parts Part A discusses the concept of functional safety and the need to express targets by means of safety integrity levels It places functional safety in context along with risk assessment likelihood of fatality and the cost of conformance It also explains the life cycle approach together with the basic outline of IEC 61508 known as BS EN 61508 in the UK Part B discusses functional safety standards for the process oil and gas industries the machinery sector and other industries such as rail automotive avionics and medical electrical equipment Part C presents case studies in the form of exercises and examples These studies cover SIL targeting for a pressure let down system burner control system assessment SIL targeting a hypothetical proposal for a rail train braking system and hydroelectric dam and tidal gates The only comprehensive guide to IEC 61508 updated to cover the 2010 amendments that will ensure engineers are compliant with the latest process safety systems design and operation standards Helps readers understand the process required to apply safety critical systems standards Real world approach helps users to interpret the standard with case studies and best practice design examples throughout

Technology and Assessment of Safety-Critical Systems Felix Redmill, Tom Anderson, 2012-12-06 The programme for the Second Safety critical Systems Symposium was planned to examine the various aspects of technology currently employed in the design of safety critical systems as well as to emphasise the importance of safety and risk management in their design and operation assessment There is an even balance of contributions from academia and industry Thus industry is given the

which are currently under development and which if successful will be available in the medium term future In the field of technology a subject whose importance is increasingly being recognised is human factors and there are papers on this from the University of Hertfordshire and Rolls Royce Increasingly PLCs are being employed in safety critical applications and this domain is represented by contributions from Nuclear Electric and August Computers Then there are papers on maintainability Ada reverse engineering social issues formal methods and medical systems all in the context of safety And of course it is not possible to keep the new technologies out of the safety critical domain there are papers on neural networks from the University of Exeter and knowledge based systems from ERA Technology **The Safety Critical Systems** Handbook David J. Smith, Kenneth G. L. Simpson, 2016-08-04 The Safety Critical Systems Handbook A Straightforward Guide to Functional Safety IEC 61508 2010 Edition IEC 61511 2016 Edition Related Guidance Fourth Edition presents the latest on the electrical electronic and programmable electronic systems that provide safety functions that guard workers and the public against injury or death and the environment against pollution The international functional safety standard IEC 61508 was revised in 2010 and authors David Smith and Kenneth Simpson provide a comprehensive guide to the revised standard as well as the revised IEC 61511 2016 The book enables engineers to determine if a proposed or existing piece of equipment meets the safety integrity levels SIL required by the various standards and guidance and also describes the requirements for the new alternative route 2H introduced in 2010 A number of other areas have been updated by Smith and Simpson in this new edition including the estimation of common cause failure calculation of PFDs and failure rates for redundant configurations societal risk and additional second tier guidance documents As functional safety is applicable to many industries this book will have a wide readership beyond the chemical and process sector including oil and gas machinery power generation nuclear aircraft and automotive industries plus project instrumentation design and control engineers Provides the only comprehensive guide to IEC 61508 updated to cover the 2010 amendments that will ensure engineers are compliant with the latest process safety systems design and operation standards Addresses the 2016 updates to IEC 61511 to helps readers understand the processes required to apply safety critical systems standards and guidance Presents a real world approach that helps users interpret new standards with case studies and best practice design examples throughout

opportunity to express its views of the safety critical domain and at the same time offered a glimpse of the technologies

Directions in Safety-Critical Systems Felix Redmill, Tom Anderson, 2012-12-06 0 e This is the proceedings of the first annual symposium of the Safety critical Systems Club The Watershed Media Centre Bristol 9 11 February 1993 which provided a forum for exploring and discussing ways of achieving safety in computer systems to be used in safety critical industrial applications. The book is divided into three parts which correspond with the themes of the three days of the symposium. The first Experience from Around Europe brings together information on developments in safety critical systems outside the UK. The second Current Research consists of papers on large projects within the UK which involve collaboration.

between academia and industry providing techniques and methods to enhance safety The final part Achieving and Evaluating Safety explores how methods already in use in other domains may be applied to safety and examines the relationships between safety and other attributes such as quality and security The papers identify the current problems and issues of interest in the field of safety critical software based systems and provide valuable up to date material for those in both academia and industry The academic will benefit from information about current research complimentary to his own and the industrialist will learn of the technologies which will soon be available and where to find them **Mission-Critical and** Safety-Critical Systems Handbook Kim Fowler, 2009-11-19 This handbook provides a consolidated comprehensive information resource for engineers working with mission and safety critical systems Principles regulations and processes common to all critical design projects are introduced in the opening chapters Expert contributors then offer development models process templates and documentation guidelines from their own core critical applications fields medical aerospace and military Readers will gain in depth knowledge of how to avoid common pitfalls and meet even the strictest certification standards Particular emphasis is placed on best practices design tradeoffs and testing procedures Comprehensive coverage of all key concerns for designers of critical systems including standards compliance verification and validation and design tradeoffs Real world case studies contained within these pages provide insight from experience **Practical Design of** Safety-critical Computer Systems William R. Dunn, 2002

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