FORMAL METHODS FOR INDUSTRIAL CRITICAL SYSTEMS

A Survey of Applications

STEFANIA GNEST + TIZIANA MARGARIA







Formal Methods For Industrial Applications

Manuel Núñez, Matthias Güdemann

Formal Methods For Industrial Applications:

Formal Methods for Industrial Applications Jean-Raymond Abrial, Egon Börger, Hans Langmaack, 1996-10-30 This book with the CD ROM included is the documentation of a unique collaborative effort in evaluating formal methods for usage under industrial constraints the major techniques for formally supported specification design and verification of large programs and complex systems are applied to a non trivial and non academic problem which is typical for industrial informal requirements specifications The 21 papers included in the book together with an introduction and competition report were selected from 33 candidate solutions This book comes with a CD ROM containing besides the printed papers executable code full definitions of all parts of the specifications and detailed descriptions of foundational matters where appropriate

Formal Methods for Industrial Critical Systems Stefania Gnesi, Tiziana Margaria, 2012-11-27 Today formal methods are widely recognized as an essential step in the design process of industrial safety critical systems In its more general definition the term formal methods encompasses all notations having a precise mathematical semantics together with their associated analysis methods that allow description and reasoning about the behavior of a system in a formal manner Growing out of more than a decade of award winning collaborative work within the European Research Consortium for Informatics and Mathematics Formal Methods for Industrial Critical Systems A Survey of Applications presents a number of mainstream formal methods currently used for designing industrial critical systems with a focus on model checking The purpose of the book is threefold to reduce the effort required to learn formal methods which has been a major drawback for their industrial dissemination to help designers to adopt the formal methods which are most appropriate for their systems and to offer a panel of state of the art techniques and tools for analyzing critical systems Formal Methods for Industrial Critical Systems Darren Cofer, Alessandro Fantechi, 2009-07-27 The aim of the FMICS workshop series is to provide a forum for researchers who are interested in the development and application of formal methods in industry In particular these workshops are intended to bring together scientists and practitioners who are active in the area of formal methods and interested in exchanging their experiences in the industrial usage of these methods These workshopsalso striveto promoteresearchand development for the improvement of formal methods and tools for industrial applications. The topics for which contributions to FMICS 2008 were solicited included but were not restricted to the following Design speci cation code generation and testing based on formal methods Veri cation and validation of complex distributed real time systems and embedded systems Veri cation and validation methods that address shortcomings of existing methods with respect to their industrial applicability e q scalability and usability issues Tools for the development of formal design descriptions Case studies and experience reports on industrial applications of formal methods focusing on lessons learned or identi cation of new research rections Impact of the adoption of formal methods on the development process and associated costs Application of formal methods in standardization and industrial forums The workshop included six sessions of regular

contributions in the areas of model checking testing software veri cation real time performance and ind trial case studies There were also three invited presentations given by Steven Miller Rance Cleaveland and Werner Damm covering the application of formal methods in the avionics and automotive industries Formal Methods for Industrial Critical Systems María Alpuente, Byron Cook, Christophe Joubert, 2009-10-26 This book constitutes the proceedings of the 14th International Workshop on Formal Methods for Industrial Critical Systems FMICS 2009 held in Eindhoven The Netherlands in November 2009 The 10 papers presented were carefully reviewed and selected from 25 submissions. The volume also contains with 4 invited papers and 6 posters The aim of the FMICS workshop series is to provide a forum for researchers who are interested in the development and application of formal methods in industry It also strives to promote research and development for the improvement of formal methods and tools for industrial applications **Formal Methods** Jean-Louis Boulanger, 2013-05-10 Although formal analysis programming techniques may be quite old the introduction of formal methods only dates from the 1980s These techniques enable us to analyze the behavior of a software application described in a programming language It took until the end of the 1990s before formal methods or the B method could be implemented in industrial applications or be usable in an industrial setting Current literature only gives students and researchers very general overviews of formal methods The purpose of this book is to present feedback from experience on the use of formal methods such as proof and model checking in industrial examples within the transportation domain This book is based on the experience of people who are currently involved in the creation and evaluation of safety critical system software. The involvement of people from within the industry allows us to avoid the usual problems of confidentiality which could arise and thus enables us to supply new useful information photos architecture plans real examples etc Topics covered by the chapters of this book include SAET METEOR the B method and B tools model based design using Simulink the Simulink design verifier proof tool the implementation and applications of SCADE Safety Critical Application Development Environment GATeL A V V Platform for Industrial Applications of Formal Methods to Model, Design and Analyze SCADE models and ControlBuild **Computer Systems** Dan Craigen, Susan Gerhart, 2012-12-02 Formal methods are mathematically based techniques often supported by reasoning tools that can offer a rigorous and effective way to model design and analyze computer systems The purpose of this study is to evaluate international industrial experience in using formal methods The cases selected are representative of industrial grade projects and span a variety of application domains The study had three main objectives To better inform deliberations within industry and government on standards and regulations To provide an authoritative record on the practical experience of formal methods to date and To suggest areas where future research and technology development are needed This study was undertaken by three experts in formal methods and software engineering Dan Craigen of ORA Canada Susan Gerhart of Applied Formal Methods and Ted Ralston of Ralston Research Associates Robin Bloomfield of Adelard was involved with the Darlington Nuclear Generating Station Shutdown System case Support for this

study was provided by organizations in Canada and the United States The Atomic Energy Control Board of Canada AECB provided support for Dan Craigen and for the technical editing provided by Karen Summerskill The U S Naval Research Laboratories NRL Washington DC provided support for all three authors The U S National Institute of Standards and Technology NIST provided support for Ted Ralston **Formal Methods for Industrial Critical Systems** Gwen Salaün, Bernhard Schätz, 2011-09-19 This book constitutes the proceedings of the 16th International Workshop on Formal Methods for Industrial Critical Systems FMICS 2011 held in Trento Italy in August 2011 The 16 papers presented together with 2 invited talks were carefully reviewed and selected from 39 submissions The aim of the FMICS workshop series is to provide a forum for researchers who are interested in the development and application of formal methods in industry It also strives to promote research and development for the improvement of formal methods and tools for industrial applications

Formal Methods for Industrial Critical Systems Mariëlle Stoelinga, Ralf Pinger, 2012-08-22 This book constitutes the proceedings of the 17th International Workshop on Formal Methods for Industrial Critical Systems FMICS 2012 held in Paris France in August 2012 The 14 papers presented were carefully reviewed and selected from 37 submissions The aim of the FMICS workshop series is to provide a forum for researchers who are interested in the development and application of formal methods in industry It also strives to promote research and development for the improvement of formal methods and tools for industrial applications Formal Methods for Industrial Critical Systems Michael Dierkes, Charles Pecheur, 2013-09-16 This book constitutes the thoroughly refereed conference proceedings of the 18th International Workshop on Formal Methods for Industrial Critical Systems FMICS 2013 held in Madrid Spain in September 2013 The 13 papers presented were carefully selected from 25 submissions and cover topics such as design specification code generation and testing based on formal methods methods techniques and tools to support automated analysis certification debugging learning optimization and transformation of complex distributed dependable real time systems and embedded systems verification and validation methods tools for the development of formal design descriptions case studies and experience reports on industrial applications of formal methods impact of the adoption of formal methods on the development process and associated costs application of formal methods in standardization and industrial forums Formal Methods for Industrial Critical Systems Maurice H. ter Beek, Dejan Ničković, 2020-08-28 This book constitutes the proceedings of the 25th International Workshop on Formal Methods for Industrial Critical Systems FMICS 2020 which was held during September 2 3 2020 The conference was planned to take place in Vienna Austria Due to the COVID 19 pandemic it changed to a virtual event The 11 full papers presented in this volume were carefully reviewed and selected from 26 submissions The papers are organized in topical sections as follows Quantitative Analysis and Cyber Physical Systems Formal Verification of Industrial Systems Temporal Logic and Model Checking The book also contains a lengthy report on a Formal Methods Survey conducted on occasion of the 25th edition of the conference Formal Methods for Industrial Critical Systems Stefan

Kowalewski, Marco Roveri, 2010-09-09 This book constitutes the proceedings of the 15th International Workshop on Formal Methods for Industrial Critical Systems FMICS 2010 held in Antwerp Belgium in September 2010 co located with ASE 2010 the 25th IEEE ACM International Conference on Automated Software Engineering The 14 papers presented were carefully reviewed and selected from 33 submissions The aim of the FMICS workshop series is to provide a forum for researchers who are interested in the development and application of formal methods in industry It also strives to promote research and development for the improvement of formal methods and tools for industrial applications Formal Methods for Industrial Critical Systems María Alpuente, Byron Cook, Christophe Joubert, 2009-11-03 This book constitutes the proceedings of the 14th International Workshop on Formal Methods for Industrial Critical Systems FMICS 2009 held in Eindhoven The Netherlands in November 2009 The 10 papers presented were carefully reviewed and selected from 25 submissions The volume also contains with 4 invited papers and 6 posters The aim of the FMICS workshop series is to provide a forum for researchers who are interested in the development and application of formal methods in industry It also strives to promote research and development for the improvement of formal methods and tools for industrial applications for Industrial Critical Systems Frédéric Lang, Francesco Flammini, 2014-09-01 This book constitutes the proceedings of the 19th International Conference on Formal Methods for Industrial Critical Systems FMICS 2014 held in Florence Italy in September 2014 The 13 papers presented in this volume were carefully reviewed and selected from 26 submissions They are organized in topical sections named cyber physical systems computer networks railway control systems verification methods and hardware and software testing Formal Methods for Industrial Critical Systems Falk Howar, Jiří Barnat, 2018-08-29 This book constitutes the proceedings of the 23rd International Conference on Formal Methods for Industrial Critical Systems FMICS 2018 held in Maynooth Ireland in September 2018 The 9 regular papers presented in this volume were carefully reviewed and selected from 17 submissions The book also contains two invited talks in full paper length In addition there are 8 invited contributions in honor of Susanne Graf Director of Research at VERIMAG Grenoble France on the occasion of her 60th birthday The aim of the FMICS conference series is to provide a forum for researchers who are interested in the development and application of formal methods in industry In particular FMICS brings together scientists and engineers who are active in the area of formal methods and interested in exchanging their experiences in the industrial usage of these methods The FMICS conference series also strives to promote research and development for the improvement of formal methods and tools for industrial applications Formal Methods for Industrial Critical Systems Manuel Núñez, Matthias Güdemann, 2015-05-11 This book constitutes the proceedings of the 20th International Workshop on Formal Methods for Industrial Critical Systems FMICS 2015 Oslo Norway in June 2015 The 12 papers presented in this volume were carefully reviewed and selected from 20 submissions. They are organized in topical sections applications protocols specification and analysis verification Formal Methods for Industrial Critical Systems Kim Guldstrand

Larsen,Tim Willemse,2019-08-23 This book constitutes the proceedings of the 24th International Conference on Formal Methods for Industrial Critical Systems FMICS 2019 held in Amsterdam The Netherlands in August 2019 The 9 regular papers presented in this volume were carefully reviewed and selected from 15 submissions The conference also featured invited talks by Jaco van de Pol Aarhus University and Twente University jointly with CONCUR and Holger Hermanns Universit t des Saarlandes and a special session on commercial formal methods in industry The aim of the FMICS conference series is to provide a forum for researchers who are interested in the development and application of formal methods in industry In particular FMICS brings together scientists and engineers who are active in the area of formal methods and interested in exchanging their experiences in the industrial usage of these methods The FMICS conference series also strives to promote research and development for the improvement of formal methods and tools for industrial applications

Formal Methods for Industrial Critical Systems Stefan Leue, Pedro Merino, 2008-05-08 This book constitutes the thoroughly refereed post workshop proceedings of the 12th International Workshop on Formal Methods for Industrial Critical Systems FMICS 2007 held in Berlin Germany in July 2007 colocated with CAV 2007 the 19th International Conference on Computer Aided Verification The 15 revised full papers presented together with the abstracts of 2 invited lectures were carefully selected during two rounds of reviewing and improvement from 31 initial submissions. The papers strive to promote research and development for the improvement of formal methods and tools for industrial applications and they are organized in topical sections on control systems scheduling and time verification software and testing Formal Methods Jean-Louis Boulanger, 2013-05-10 At present the literature gives students and researchers of the very general books on the formal technics The purpose of this book is to present in a single book a return of experience on the used of the formal technics such proof and model checking on industrial examples for the transportation domain This book is based on the experience of people which are completely involved in the realization and the evaluation of safety critical system software based The implication of the industrialists allows to raise the problems of confidentiality which could appear and so allow to supply new useful information photos plan of architecture real example Formal Methods for Industrial Applications Jean-Raymond Abrial, Egon Borger, Hans Langmaack, 2014-01-15 Leveraging Applications of Formal Methods, Verification and Validation. Industrial Practice Tiziana Margaria, Bernhard Steffen, 2018-10-29 The four volume set LNCS 11244 11245 11246 and 11247 constitutes the refereed proceedings of the 8th International Symposium on Leveraging Applications of Formal Methods Verification and Validation ISoLA 2018 held in Limassol Cyprus in October November 2018 The papers presented were carefully reviewed and selected for inclusion in the proceedings Each volume focusses on an individual topic with topical section headings within the volume Part I Modeling Towards a unified view of modeling and programming X by construction STRESS 2018 Part II Verification A broader view on verification from static to runtime and back evaluating tools for software verification statistical model checking RERS 2018 doctoral symposium Part III Distributed Systems rigorous engineering of collective adaptive systems verification and validation of distributed systems and cyber physical systems engineering Part IV Industrial Practice runtime verification from the theory to the industry practice formal methods in industrial practice bridging the gap reliable smart contracts state of the art applications challenges and future directions and industrial day

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