

# Architecting Software Intensive Systems A Practitioners Guide

Managing the Development of Software-Intensive Systems  
Project Management of Large Software-Intensive Systems  
Summary of a Workshop on Software-Intensive Systems and Uncertainty at Scale  
Reliability of Software Intensive Systems  
Software-Intensive Systems and New Computing Paradigms  
Designing Software-Intensive Systems: Methods and Principles  
Software Quality Assurance  
Summary of a Workshop on Software-Intensive Systems and Uncertainty at Scale  
Reliability of Software Intensive Systems  
Complex, Intelligent, and Software Intensive Systems  
Regelen, die de zusters van de Congregatie van den H. Joseph moeten onderhouden  
Complex, Intelligent, and Software Intensive Systems  
Architecting Software Intensive Systems  
Software-Intensive Systems Productivity: A Vision and Roadmap (v 0.1).  
Complex, Intelligent and Software Intensive Systems  
Complex, Intelligent and Software Intensive Systems  
Complex, Intelligent, and Software Intensive Systems  
Estimating Software-Intensive Systems  
Reliability, Quality and Safety of Software-Intensive Systems  
James McDonald Marvin Gechman National Research Council  
Phuong Y. Tran Martin Wirsing Tiako, Pierre F. Ivan Mistrik  
National Research Council Michael A. Friedman Leonard Barolli  
Leonard Barolli Anthony J. Lattanze Leonard Barolli Leonard Barolli  
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Dimitris Gritzalis

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managing the development of software intensive systems provides both an introduction to project management for beginner software and hardware developers as well as unique advanced materials for experienced users this beneficial resource presents realistic case studies for planning and managing verification and validation for large software projects complex software and hardware systems as well as inspection results and testing metrics to monitor project status industrial practitioners and students will learn ways to improve how they manage and develop their project management applications and techniques to establish large software applications and systems

the book describes how to manage and successfully deliver large complex and expensive systems that can be composed of millions of line of software code being developed by numerous groups throughout the globe that interface with many hardware items being developed by geographically dispersed companies where the system also includes people policies constraints regulations and a myriad of other factors it focuses on how to seamlessly integrate systems satisfy the customer s requirements and deliver within the budget and on time the guide is essentially a shopping list of all the activities that could be conducted with tailoring guidelines to meet the needs of each project

the growing scale and complexity of software intensive systems are

introducing fundamental new challenges of uncertainty and scale that are particularly demanding for defense systems to assist in meeting these challenges the department of defense asked the nrc to assess the nature of u s national investment in software research as part of this study a workshop was held to examine uncertainty at scale in current and future software intensive systems this report presents a summary of the workshop discussions that centered on process architecture and the grand scale dod software challenges for future systems agility at scale quality and assurance with scale and uncertainty and enterprise scale and beyond the report also offers a summary of key themes emerging from the workshop architectural challenges in large scale systems the need for software engineering capability and open questions and research opportunities

reliability of software intensive systems

this volume presents results of three workshops of the interlink working group setup by the eu to look at software intensive systems and novel computing paradigms it covers ensemble engineering theory and formal methods and novel computing paradigms

this book addresses the complex issues associated with software engineering environment capabilities for designing real time embedded software systems provided by publisher

software quality assurance in large scale and complex software intensive systems presents novel and high quality research related approaches that relate the quality of software architecture to system requirements system architecture and enterprise architecture or software testing modern software has become complex and adaptable due to the emergence of globalization and new software technologies devices and networks these changes challenge both traditional software quality assurance techniques and software engineers to ensure software quality when building today and tomorrow s adaptive context sensitive and highly diverse applications this edited volume presents state of the art techniques methodologies tools best practices and guidelines for software quality assurance and offers guidance for future software engineering research and practice each contributed chapter

considers the practical application of the topic through case studies experiments empirical validation or systematic comparisons with other approaches already in practice topics of interest include but are not limited to quality attributes of system software architectures aligning enterprise system and software architecture from the point of view of total quality design decisions and their influence on the quality of system software architecture methods and processes for evaluating architecture quality quality assessment of legacy systems and third party applications lessons learned and empirical validation of theories and frameworks on architectural quality empirical validation and testing for assessing architecture quality focused on quality assurance at all levels of software design and development covers domain specific software quality assurance issues e g for cloud mobile security context sensitive mash up and autonomic systems explains likely trade offs from design decisions in the context of complex software system engineering and quality assurance includes practical case studies of software quality assurance for complex adaptive and context critical systems

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reliability of software intensive systems

this book provides a platform of scientific interaction between the three challenging and closely linked areas of ict enabled

application research and development software intensive systems complex systems and intelligent systems software intensive systems strongly interact with other systems sensors actuators devices other software systems and users more and more domains are using software intensive systems e g automotive and telecommunication systems embedded systems in general industrial automation systems and business applications moreover web services offer a new platform for enabling software intensive systems complex systems research is focused on the overall understanding of systems rather than their components complex systems are characterized by the changing environments in which they interact they evolve and adapt through internal and external dynamic interactions the development of intelligent systems and agents which are increasingly characterized by their use of ontologies and their logical foundations offer impulses for both software intensive systems and complex systems recent research in the field of intelligent systems robotics neuroscience artificial intelligence and cognitive sciences are vital for the future development and innovation of software intensive and complex systems

this book presents scientific interactions between the three interwoven and challenging areas of research and development of future ict enabled applications software complex systems and intelligent systems software intensive systems heavily interact with other systems sensors actuators and devices as well as other software systems and users more and more domains involve software intensive systems e g automotive telecommunication systems embedded systems in general industrial automation systems and business applications moreover web services offer a new platform for enabling software intensive systems complex systems research focuses on understanding overall systems rather than their components such systems are characterized by the changing environments in which they act and they evolve and adapt through internal and external dynamic interactions the development of intelligent systems and agents features the use of ontologies and their logical foundations provide a fruitful impulse for both software intensive systems and complex systems research in the field of intelligent systems robotics neuroscience artificial intelligence and cognitive sciences is a vital factor in the future development and innovation of software intensive and

complex systems

architectural design is a crucial first step in developing complex software intensive systems early design decisions establish the structures necessary for achieving broad systemic properties however today s organizations lack synergy between software their development processes and technological methodologies providing a thorough treatment of

a software intensive systems producibility initiative sei cmu edu sispi has been proposed to foster a program of technology research and transition that will improve producibility in the acquisition development and sustainment evolution of software intensive systems sis this document is a draft in progress of a technology vision and roadmap to improve the ability of the dod and industry to deliver needed sis capability in a timely cost effective and predictable manner the goal at this stage is to establish the general concepts and approach for a producibility initiative and to stimulate discussion of these ideas and the research and transition efforts needed to achieve enhanced producibility in practice the roadmap is meant to serve as a coherent evolving framework for defining and prioritizing potential research investments and technology transition efforts related to producibility a roadmap has three elements a representation of the current situation a vision that characterizes an improved situation and a plan of action for transitioning from the current to the improved situation this roadmap identifies five research themes two transition themes and an approach to measuring effectiveness for an initiative focused on achieving a vision of enhanced sis producibility

software intensive systems are systems which heavily interact with other systems sensors actuators devices other software systems and users more and more domains are involved with software intensive systems e g automotive telecommunication systems embedded systems in general industrial automation systems and business applications moreover the outcome of web services delivers a new platform for enabling software intensive systems complex systems research is focused on the overall understanding of systems rather than its components complex systems are very much characterized by the

changing environments in which they act by their multiple internal and external interactions they evolve and adapt through internal and external dynamic interactions the development of intelligent systems and agents which is each time more characterized by the use of ontologies and their logical foundations builds a fruitful impulse for both software intensive systems and complex systems recent research in the field of intelligent systems robotics neuroscience artificial intelligence and cognitive sciences is a very important factor for the future development and innovation of software intensive and complex systems the aim of the book complex intelligent and software intensive systems is to deliver a platform of scientific interaction between the three interwoven challenging areas of research and development of future ict enabled applications software intensive systems complex systems and intelligent systems

this book explores three interwoven and challenging areas of research and development for future ict enabled applications software intensive systems complex systems and intelligent systems software intensive systems are systems that extensively interact with other systems sensors actuators devices and users more and more domains are now employing software intensive systems e g the automotive sector telecommunication systems embedded systems in general industrial automation systems and business applications moreover the outcome of web services offers a new platform for enabling software intensive systems complex systems research is focused on the overall understanding of systems rather than their components complex systems are very much characterized by the changing environments in which they operate through their multiple internal and external interactions they evolve and adapt through internal and external dynamic interactions the development of intelligent systems and agents which is increasingly characterized by the use of ontologies can be beneficial for software intensive systems and complex systems alike accordingly recent research in the areas of intelligent systems robotics neuroscience artificial intelligence and the cognitive sciences is essential to the future development of software intensive and complex systems

this book aims to deliver a platform of scientific interaction between the three interwoven challenging areas of research and

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this book gathers the proceedings of the 11th international conference on complex intelligent and software intensive systems cisis 2017 held on june 28 june 30 2017 in torino italy software intensive systems are characterized by their intensive interaction with other systems sensors actuators devices and users further they are now being used in more and more domains e g the automotive sector telecommunication systems embedded systems in general industrial automation systems and business applications moreover the outcome of web services delivers a new platform for enabling software intensive systems complex systems research is focused on the understanding of a system as a whole rather than its components complex systems are very much shaped by the changing environments in which they operate and by their multiple internal and external interactions they evolve and adapt through internal and external dynamic interactions the development of intelligent systems and agents which invariably involves the use of ontologies and their logical foundations offers a fruitful impulse for both software intensive systems and complex systems



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many software projects fail because their leaders don t know how to estimate schedule or measure them accurately fortunately proven tools and techniques exist for every facet of software estimation estimating software intensive systems brings them together in a real world guidebook that will help software managers engineers and customers immediately improve their estimates and drive continuing improvements over time dick stutzke presents here a disciplined and repeatable process that can produce accurate and complete estimates for any project product or process no matter how new or unusual stutzke doesn t just describe formal techniques he offers simple easy to use templates spreadsheets and tools you can start using today to identify and estimate product size performance and quality as well as project cost schedule and risk reserves stutzke shows how to quickly get your arms around users problems and requirements the structure of a solution and the process needed to deliver it you ll learn how to choose the most appropriate estimating techniques and tools collect accurate data track progress and update estimates and recalibrate estimating models to improve estimation accuracy stutzke s techniques apply whether you re creating custom in house business software purchasing or customizing off the shelf technology or constructing complex one of a kind military industrial or commercial systems these techniques apply to small and large projects and to all project life cycles from agile to plan driven this book will help you plan estimate budget schedule purchase design build test deploy operate and maintain software intensive systems it explains how to size software identify all cost components calculate the associated costs and set a competitive price a separate section covers topics of interest for large projects designing an appropriate work breakdown structure collecting data from cost

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it is indeed widely acceptable today that nowhere is it more important to focus on the improvement of software quality than in the case of systems with requirements in the areas of safety and reliability especially for distributed real time and embedded systems thus much research work is under progress in these fields since software process improvement impinges directly on achieved levels of quality and many application experiments aim to show quantitative results demonstrating the efficacy of particular approaches requirements for safety and reliability like other so called non functional requirements for computer based systems are often stated in imprecise and ambiguous terms or not at all specifications focus on functional and technical aspects with issues like safety covered only implicitly or not addressed directly because they are felt to be obvious unfortunately what is obvious to an end user or system user is progressively less so to others to the extent that a software developer may not even be aware that safety is an issue therefore there is a growing evidence for encouraging greater understanding of safety and reliability requirements issues right across the spectrum from end user to software developer not just in traditional safety critical areas e g nuclear aerospace but also acknowledging the need for such things as heart pacemakers and other medical and robotic systems to be highly dependable

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