

Component Based Software Engineering Examples

The 2010 Symposium on Component-Based Software Engineering (CBSE 2010) was the 13th in a series of successful events that have grown into the main forum for industrial and academic experts to discuss component technology. CBSE is concerned with the development of software-intensive systems from independently developed software-building blocks (components), the development of components, and system maintenance and improvement by means of component replacement and customization. The aim of the conference is to promote a science and technology foundation for achieving predictable quality in software systems through the use of software component technology and its associated software engineering practices. In line with a broad interest, CBSE 2010 received 48 submissions. From these submissions, 14 were accepted after a careful peer-review process followed by an online program committee discussion. This resulted in an acceptance rate of 29%. The selected technical papers are published in this volume. For the fourth time, CBSE 2010 was held as part of the conference series: Federated Events on Component-Based Software Engineering and Software Architecture (COMPARCH). The federated events were: the 13th International Symposium on Component-Based Software Engineering (CBSE 2010), the 6th International Conference on the Quality of Software Architectures (QoSA 2010), and the 1st International Symposium on Architecting Critical Systems (ISARCS 2010). Together with COMPARCH's Industrial Experience Report Track and the co-located Workshop on Component-Oriented Programming (WCOP 2010), COMPARCH provided a broad spectrum of events related to components and architectures.

Software components and component-based software development (CBSD) are acknowledged as the best approach for constructing quality software at reasonable cost. Composing Software Components: A Software-testing Perspective describes a 10-year investigation into the underlying principles of CBSD. By restricting attention to the simplest cases, startling results are obtained:

- Components are tested using only executable code. Their behavior is recorded and presented graphically.
- Functional and non-functional behavior of systems synthesized from components are calculated from component tests alone. No access to components themselves is required.
- Fast, accurate tools support every aspect of CBSD from design through debugging. Case studies of CBSD also illuminate software testing in general, particularly an expanded role for unit testing and the treatment of non-functional software properties. This unique book:
- Contains more than a dozen case studies of fully worked-out component synthesis, with revealing insights into fundamental testing issues.
- Presents an original, fundamental theory of component composition that includes persistent state and concurrency, based on functional software testing rather than proof-of-programs.
- Comes with free supporting software with tutorial examples and data for replication of examples. The Perl software has been tested on Linux, Macintosh, and Windows platforms. Full documentation is provided.
- Includes anecdotes and insights from the author's 50-year career in computing as systems programmer, manager, researcher, and teacher.

Composing Software Components: A Software-testing Perspective will help software researchers and practitioners to understand the underlying principles of component testing. Advanced students in computer science, engineering, and mathematics can also benefit from the book as a supplemental text and reference.

On behalf of the Organizing Committee I am pleased to present the proceedings of the 2005 Symposium on Component-Based Software Engineering (CBSE). CBSE is concerned with the development of software-intensive systems from reusable parts (components), the development of reusable parts, and system maintenance and improvement by means of component replacement and customization. CBSE 2005, "Software Components at Work," was the eighth in a series of events that promote a science and technology foundation for achieving predictable quality in software systems through the use of software component technology and its associated software engineering practices. We were fortunate to have a dedicated Program Committee comprised of 30 internationally recognized researchers and industrial practitioners. We received 91 submissions and each paper was reviewed by at least three Program Committee members (four for papers with an author on the Program Committee). The entire reviewing process was supported by CyberChair Pro, the Web-based paper submission and reviews system developed and supported by Richard van de Stadt of Borbala Online Conference Services. After a two-day virtual Program Committee meeting, 21 submissions were accepted as long papers and 2 submissions were accepted as short papers. This is the refereed proceedings of the 9th International Symposium on Component-Based Software Engineering, CBSE 2006, held in Västerås, Sweden in June/July 2006. The 22 revised full papers and 9 revised short papers presented cover issues concerned with the development of software-intensive systems from reusable parts, the development of reusable parts, and system maintenance and improvement by means of component replacement and customization.

The Development of Component-based Information Systems

Case Studies

8th International Symposium, CBSE 2005, St. Louis, MO, USA, May 14-15, 2005

Component-Based Software Testing with UML

10th International Symposium, CBSE 2007, Medford, MA, USA, July 9-11, 2007, Proceedings

The book provides a comprehensive coverage of the widely accepted desiderata of component-based software development, as well as the foundations that these desiderata necessitate. Its unique focus is on component models, the cornerstone of component-based software development. In addition, it presents and analyses existing approaches according to these desiderata.

This compendium is an indispensable textbook for an advance undergraduate or postgraduate course unit. Researchers will also find this volume an essential reference material. Business Component-Based Software Engineering, an edited volume, aims to complement some other reputable books on CBSE, by stressing how components are built for large-scale applications, within dedicated development processes and for easy and direct combination. This book will emphasize these three facets and will offer a complete overview of some recent progresses. Projects and works explained herein will prompt graduate students, academics, software engineers, project managers and developers to adopt and to apply new component development methods gained from and validated by the authors. The authors of Business Component-Based Software Engineering are academic and professionals, experts in the field, who will introduce the state of the art on CBSE from their shared experience by working on the same projects. Business Component-Based Software Engineering is designed to meet the needs of practitioners and researchers in industry, and graduate-level students in Computer Science and Engineering.

Component-based software development, CBSD, is no longer just one more new paradigm in software engineering, but is effectively used in development and practice. So far, however, most of the efforts from the software engineering community have concentrated on the functional aspects of CBSD, leaving aside the treatment of the quality issues and extra-functional properties of software components and component-based systems. This book is the first one focusing on quality issues of components and component-based systems. The 16 revised chapters presented were carefully reviewed and selected for inclusion in the book; together with an introductory survey, they give a coherent and competent survey of the state of the art in the area. The book is organized in topical parts on COTS selection, testing and certification, software component quality models, formal models to quality assessment, and CBSD management.

- First book of its kind (case studies in CBD) - Covers different kinds of components - Covers different component models/technologies - Includes a wide scope of CBD topics - Covers both theoretical and practical work - Includes both formal and informal approaches - Provides a snapshot of current concerns and pointers to future trends

Generative and Component-Based Software Engineering

An Overview of Current Research Trends

Putting the Pieces Together

Component-Based Software Development for Embedded Systems

Methods and Metrics

Here's a complete guide to building reliable component-based software systems. Written by world-renowned experts in the component-based software engineering field, this unique resource helps you manage complex software through the development, evaluation and integration of software components. You quickly develop a keen awareness of the benefits and risks to be considered when developing reliable systems using components. A strong software engineering perspective helps you gain a better understanding of software component design, to build systems with stronger requirements, and avoid typical errors throughout the process, leading to improved quality and time to market. From component definition, standards, objects and frameworks, to organizational development and support of the component-based life cycle, the book describes aspects of systems development using components and component development. It focuses on dependable and real-time systems, employing case studies from the process automation industry, software production, electronic consumer equipment and office software development.

Introducing the reuse-driven software engineering business; Architectural style; Processes; Organizing a reuse business.

Embedded systems are ubiquitous. They appear in cell phones, microwave ovens, refrigerators, consumer electronics, cars, and jets. Some of these embedded systems are safety- or security-critical such as in medical equipment, nuclear plants, and X-by-wire control systems in naval, ground and aerospace transportation vehicles. With the continuing shift from hardware to software, embedded systems are increasingly dominated by embedded software. Embedded software is complex. Its engineering inherently involves a multi-disciplinary interplay with the physics of the embedding system or environment. Embedded software also comes in ever larger quantity and diversity. The next generation of premium automobiles will carry around one gigabyte of binary code. The proposed US DDX submarine is effectively a floating embedded software system, comprising 30 billion lines of code written in over 100 programming languages. Embedded software is expensive. Cost estimates are quoted at around US\$15– 30 per line (from commencement to shipping). In the defense realm, costs can range up to \$100, while for highly critical applications, such as the Space Shuttle, the cost per line approximates \$1,000. In view of the exponential increase in complexity, the projected costs of future embedded software are staggering.

This book, first published in 1997, covers the most important topics in Componentware(TM) technology, based in large part on the first Component Users Conference.

A Software-testing Perspective

Architecture Process and Organization for Business Success

Automating Component-based Software Development

9th International Symposium, CBSE 2006, Västerås, Sweden, June 29 - July 1, 2006, Proceedings

Component-Based Software Engineering

Providing all the latest on a topic of extreme commercial relevance, this book contains the refereed proceedings of the 10th International ACM SIGSOFT Symposium on Component-Based Software Engineering, held in Medford, MA, USA in July 2007. The 19 revised full papers presented were carefully reviewed and selected from 89 submissions. The papers feature new trends

in global software services and distributed systems architectures to push the limits of established and tested component-based methods, tools and platforms.

In the past two years, the Smalltalk and Java in Industry and Education Conference (STJA) featured a special track on generative programming, which was organized by the working group "Generative and Component-Based Software Engineering" of the "Gesellschaft für Informatik" FG 2.1.9 "Object-Oriented Software Engineering." This track covered a wide range of related topics from domain analysis, software system family engineering, and software product lines, to extendible compilers and active libraries. The talks and keynotes directed towards this new software engineering paradigm received much attention and interest from the STJA audience. Hence the STJA organizers suggested enlarging this track, making it more visible and open to wider, international participation. This is how the GCSE symposium was born. The first GCSE symposium attracted 39 submissions from all over the world. This impressive number demonstrates the international interest in generative programming and related fields. After a careful review by the program committee, fifteen papers were selected for presentation. We are very grateful to the members of the program committee, all of them renowned experts, for their dedication in preparing thorough reviews of the submissions. Special thanks go to Elke Pulvermüller and Andreas Speck, who proposed and organized a special conference event, the Young Researchers Workshop (YRW). This workshop provided a unique opportunity for young scientists and Ph.D.

Businesses today are faced with a highly competitive market and fast-changing technologies. In order to meet demanding customers' needs, they rely on high quality software. A new field of study, soft computing techniques, is needed to estimate the efforts invested in component-based software. *Component-Based Systems: Estimating Efforts Using Soft Computing Techniques* is an important resource that uses computer-based models for estimating efforts of software. It provides an overview of component-based software engineering, while addressing uncertainty involved in effort estimation and expert opinions. This book will also instruct the reader how to develop mathematical models. This book is an excellent source of information for students and researchers to learn soft computing models, their applications in software management, and will help software developers, managers, and those in the industry to apply soft computing techniques to estimate efforts.

A cutting-edge, UML-based approach to software development and maintenance that integrates component-based and product-line engineering methods. - ripe market: development of component-based technologies is a major growth area - CBD viewed as a faster, more flexible way of building systems that can easily be adapted to meet rapidly-changing business needs and integrate legacy and new applications (e.g. Forrester report in June 1998 predicted that by 2001 "half of packaged apps vendors will deliver component-based apps"; e.g. Butler Group Management Briefing (2000): "Butler Group is now advising that all new-build and significant modification activity should be based on component architectures...Butler Group believes that Component-Based Development is one of the most important events in the evolution of information technology" e.g. Gartner Group estimates that "by 2003, 70% of new applications will be deployed as a combination of pre-assembled and newly created components integrated to form complex business-systems. The book defines, describes and shows how to use a method for component-based product-line engineering, supported by UML. This method aims to dramatically increase the level of reuse in software development by integrating the strengths of both of these approaches. UML is used to describe components during the analysis, design & implementation stages and capture their characteristics and relationships. This method includes two new kinds of extensions to the UML: new stereotypes to capture Kobra-specific concepts and new metamodel elements to capture variabilities. The method makes components the focus of the entire software development process, not just the implementation and deployment phases. The method has grown out of work by two companies in industry (Softlab & Psipenta) and two research organizations (GMD FIRST & Fraunhofer IESE) called the Kobra project. It is influenced by a number of successful existing methods e.g. Fusion method, Cleanroom method, Catalysis & Rational Unified Process, integrated with new ideas in an innovative way. Benefits for the reader: - gain a clear understanding of the product-line and component-based approaches to software development - learn how to use UML to describe components in analysis, design and implementation of components - learn how to develop and apply component-based frameworks in product-lines - learn how to build new systems from pre-existing components and ensure that components are of a high quality The book also includes: - case studies: library system example running throughout the chapters; ERP/business software system as appendix or separate chapter - bibliography - glossary - appendices covering: UML profiles, concise process description in the form of UML activity diagrams, refinement/translation patterns AUDIENCE Software engineers, architects & project managers. Software engineers working in the area of distributed/enterprise systems who want a method for applying a component-based or product-line engineering approach in practice.

Software Engineering

Methods and Techniques

Component-Based Systems

7th International Symposium, CBSE 2004, Edinburgh, UK, May 24-25, 2004, Proceedings

An Introduction To Component-based Software Development

Component Oriented Programming offers a unique programming-centered approach to component-based software development that delivers the well-developed training and practices you need to successfully apply this cost-effective method. Following an overview of basic theories and methodologies, the authors provide a unified component infrastructure for building component software using JavaBeans, EJB, OSGi, CORBA, CCM, .NET, and Web services. You'll learn how to develop reusable software components; build a software system of pre-built software components; design and implement a component-based software system using various component-based approaches. Clear organization and self-testing features make Component Oriented Programming an ideal textbook for graduate and undergraduate courses in computer science, software engineering, or information technology as well as a valuable reference for industry professionals.

A principal source of risk in component-based software design, say Wallnau and two other technicians at the institute, Scott A. Hissam and Robert C. Seacord, is a lack of knowledge about how components should be integrated and how they behave when integrated. To mitigate that risk, they introduce several concepts, among them the component ensemble as a design abstraction, blackboards as a fundamental design notation, and a process for exposing design risk. They speak to practicing and student software engineers. c. Book News Inc.

Component-based software engineering (CBSE) is concerned with the development of software-intensive systems from reusable parts (components), the development of such reusable parts, and the maintenance and improvement of systems by means of component replacement and customization. Although it holds considerable promise, there are still many challenges facing both researchers and practitioners in establishing CBSE as an efficient and proven engineering discipline. Six CBSE workshops have been held consecutively at the most recent six International Conferences on Software Engineering (ICSE). The premise of the last three CBSE workshops was that the long-term success of component-based development depends on the viability of an established science and technology foundation for achieving predictable quality in component-based systems. The intent of the CBSE 2004 symposium was to build on this premise, and to provide a forum for more in-depth and substantive treatment of topics pertaining to predictability, to help establish cross-discipline insights, and to improve cooperation and mutual understanding. The goal of the CBSE 2004 symposium was to discuss and present more complete and mature works, and consequently collect the technical papers in published proceedings. The response to the Call for Papers was beyond expectations: 82 papers were submitted. Of those 25 (12 long and 13 short) were accepted for publication. In all 25 cases, the papers were reviewed by three to four independent reviewers. The symposium brought together researchers and practitioners from a variety of disciplines related to CBSE. This book constitutes the thoroughly refereed post-proceedings of the Second International Symposium on Generative and Component-Based Software Engineering, GCSE 2000, held in Erfurt, Germany in October 2000. The twelve revised full papers presented with two invited keynote papers were carefully reviewed and selected from 29 submissions. The book offers topical sections on aspects and patterns, models and paradigms, components and architectures, and Mixin-based composition and metaprogramming.

First International Symposium, GCSE '99, Erfurt, Germany, September 28-30, 1999. Revised Papers

Business Component-Based Software Engineering

Component-Based Software Quality

Estimating Efforts Using Soft Computing Techniques

Component-based Software Engineering

This book focuses on a specialized branch of the vast domain of software engineering: component-based software engineering (CBSE). *Component-Based Software Engineering: Methods and Metrics* enhances the basic understanding of components by defining categories, characteristics, repository, interaction, complexity, and composition. It divides the research domain of CBSE into three major sub-domains: (1) reusability issues, (2) interaction and integration issues, and (3) testing and reliability issues. This book covers the state-of-the-art literature survey of at least 20 years in the domain of reusability, interaction and integration complexities, and testing and reliability issues of component-based software engineering. The aim of this book is not only to review and analyze the previous works conducted by eminent researchers, academicians, and organizations in the context of CBSE, but also suggests innovative, efficient, and better solutions. A rigorous and critical survey of traditional and advanced paradigms of software engineering is provided in the book. Features: In-interactions and Out-Interactions both are covered to assess the complexity. In the context of CBSE both white-box and black-box testing methods and their metrics are described. This work covers reliability estimation using reusability which is an innovative method. Case studies and real-life software examples are used to explore the problems and their solutions. Students, research scholars, software developers, and software designers or individuals interested in software engineering, especially in component-based software engineering, can refer to this book to understand the concepts from scratch. These measures and metrics can be used to estimate the software before the actual coding commences.

The 2009 Symposium on Component-Based Software Engineering (CBSE 2009) was the 12th in a series of successful events that have grown into the main forum for industrial and academic experts to discuss component technology. Component-based software engineering (CBSE) has emerged as the underlying technology for the assembly of flexible software systems. In essence, CBSE is about composing computational building blocks to construct larger building blocks that fulfill client needs. Most software engineers are involved in some form of component-based development. Nonetheless, the implications of CBSE adoption are wide-reaching and its challenges grow in tandem with its uptake, continuing to inspire our scientific speculation. Component-based development necessarily involves elements of software architecture, modular software design, software verification, testing, configuration and deployment. This year's submissions represent a cross-section of CBSE research that touches upon all these aspects. The theoretical foundations of component specification, composition, analysis, and verification continue to pose research challenges. What exactly constitutes an adequate semantics for communication and composition so that bigger things can be built from smaller things? How can formal approaches facilitate predictable assembly through better analysis? We have grouped the proceedings into two sub-themes that deal with these issues: component models and communication and composition. At the same time, the world is changing.

Annotation The instruction put forth in this new book is all related to successfully using Select Perspective, a process conceived and marketed by Select Business solutions, a division of Aonix. Select Perspective is a pragmatic, component-based software development process that can be implemented by all roles in software development, and includes the business people that specify, accept, verify and use software solutions. Every individual who is involved in the specification, acceptance, construction, testing, delivery or budgetary control of software solutions will benefit from this book. The authors have helped organizations realize the benefit of component-based development with Select Perspective, and this book shows how it can be done, taking into account varying team sizes, uneven skill levels, and different industries. The book uses the UML for expression of designs, and will allow the reader to meet the demands of web services.

From the basics to the most advanced quality of service (QoS) concepts, this all encompassing, first-of-its-kind book offers an in-depth understanding of the latest technical issues raised by the emergence of new types, classes and qualities of Internet services. The book provides end-to-end QoS guidance for real time multimedia communications over the Internet. It offers you a multiplicity of hands-on examples and simulation script support, and shows you where and when it is preferable to use these techniques for QoS support in networks and Internet traffic with widely varying characteristics and demand profiles. This practical resource discusses key standards and protocols, including real-time transport, resource reservation, and integrated and

differentiated service models, policy based management, and mobile/wireless QoS. The book features numerous examples, simulation results and graphs that illustrate important concepts, and pseudo codes are used to explain algorithms. Case studies, based on freely available Linux/FreeBSD systems, are presented to show you how to build networks supporting Quality of Service. Online support material including presentation foils, lab exercises and additional exercises are available to text adopters.

Component-Oriented Programming

Component-based Software Development

Composing Software Components

Software Reuse

Service- and Component-based Development Using Select Perspective and UML

Component-Based Software Engineering (CBSE) is the way to produce software fast. This book presents the concepts in CBSE. While detailing both the advantages and the limitations of CBSE, it covers every aspect of component engineering, from software engineering practices to the design of software component infrastructure, technologies, and system.

Component-based software development regards software construction in terms of conventional engineering disciplines where the assembly of systems from readily-available prefabricated parts is the norm. Because both component-based systems themselves and the stakeholders in component-based development projects are different from traditional software systems, component-based testing also needs to deviate from traditional software testing approaches. Gross first describes the specific challenges related to component-based testing like the lack of internal knowledge of a component or the usage of a component in diverse contexts. He argues that only built-in contract testing, a test organization for component-based applications founded on building test artifacts directly into components, can prevent catastrophic failures like the one that caused the now famous ARIANE 5 crash in 1996. Since building testing into components has implications for component development, built-in contract testing is integrated with and made to complement a model-driven development method. Here UML models are used to derive the testing architecture for an application, the testing interfaces and the component testers. The method also provides a process and guidelines for modeling and developing these artifacts. This book is the first comprehensive treatment of the intricacies of testing component-based software systems. With its strong modeling background, it appeals to researchers and graduate students specializing in component-based software engineering.

Professionals architecting and developing component-based systems will profit from the UML-based methodology and the implementation hints based on the XUnit and JUnit frameworks.

On behalf of the Organizing Committee we are pleased to present the proceedings of the 2008 Symposium on Component-Based Software Engineering (CBSE). CBSE is concerned with the development of software-intensivesystems from independently developed software-building blocks (components), the development of components, and system maintenance and improvement by means of component replacement and customization. CBSE 2008 was the 11th in a series of events that promote a science and technology foundation for achieving predictable quality in software systems through the use of software component technology and its associated software engineering practices. Wewerefortunateto haveadedicatedProgramCommitteecomprisingmany internationallyrecognizedresearchersandindustrialpractitioners.Wewouldlike to thank the members of the Program Committee and associated reviewers for their contribution in making this conference a success. We received 70 submissions and each paper was reviewed by at least three Program Committee members (four for papers with an author on the Program Committee). The entire reviewing process was supported by the Conference Management Toolkit provided by Microsoft. In total, 20 submissions were accepted as full papers and 3 submissions were accepted as short papers.

The size, complexity, and integration level of software systems is increasing constantly. Companies in all domains identify that software defines the competitive edge of their products. These developments require us to constantly search for new approaches to increase the productivity and quality of our software development and to decrease the cost of software maintenance. Generative and component-based technologies hold considerable promise with respect to achieving these goals. GCSE 2001 constituted another important step forward and provided a platform for academic and industrial researchers to exchange ideas. These proceedings represent the third conference on generative and component-based software engineering. The conference originated as a special track on generative programming from the Smalltalk and Java in Industry and Education Conference (STJA), organized by the working group "Generative and Component-Based Software Engineering" of the "Gesellschaft fur Informatik" FG 2.1.9 "Object-Oriented Software Engineering." However, the conference has evolved substantially since then, with its own, independent stature, invited speakers, and, most importantly, a stable and growing community. This year's conference attracted 43 submissions from all over the world, indicating the broad, international interest in the research field. Based on careful review by the program committee, 14 papers were selected for presentation. I would like to thank the members of the program committee, all renowned experts, for their dedication in preparing thorough reviews of the submissions.

Third International Conference, GCSE 2001, Erfurt, Germany, September 9-13, 2001, Proceedings

12th International Symposium, CBSE 2009 East Stroudsburg, PA, USA, June 24-26, 2009 Proceedings

Component-based Product Line Engineering with UML

11th International Symposium, CBSE 2008, Karlsruhe, Germany, October 14-17, 2008, Proceedings

Testing and Quality Assurance for Component-based Software

This book constitutes the refereed proceedings of the Third International Conference on Generative and Component-Based Software Engineering, GCSE 2001, held in Erfurt, Germany, in September 2001.

The 14 revised full papers presented together with one invited paper were carefully reviewed and selected from 43 submissions. The papers are organized in topical sections on software product lines, aspects, generic and generative approaches, and components and architectures.

Here's a complete guide to building reliable component-based software systems. Written by world-renowned experts in the component-based software engineering field, this unique resource helps you manage complex software through the development, evaluation and integration of software components. You quickly develop a keen awareness of the benefits and risks to be considered when developing reliable systems using components. A strong software engineering perspective helps you gain a better understanding of software component design, to build systems with stronger requirements, and avoid typical errors throughout the process, leading to improved quality and time to market.

This work provides a comprehensive overview of research and practical issues relating to component-based development information systems (CBIS). Spanning the organizational, developmental, and technical aspects of the subject, the original research included here provides fresh insights into successful CBIS technology and application. Part I covers component-based development methodologies and system architectures. Part II analyzes different aspects of managing component-based development. Part III investigates component-based development versus commercial off-the-shelf products (COTS), including the selection and trading of COTS products.

Annotation This work provides a comprehensive overview of research and practical issues relating to component-based information systems (CBIS). Spanning the organizational, developmental, and technical aspects of the subject, the original research included here provides fresh insights into successful CBIS technology and application, including the selection and trading of commercial off-the shelf products (COTS).

Building Systems from Commercial Components

Building Reliable Component-based Software Systems

13th International Symposium, CBSE 2010, Prague, Czech Republic, June 23-25, 2010, Proceedings

Development of Component-based Information Systems

Second International Symposium, GCSE 2000, Erfurt, Germany, October 9-12, 2000. Revised Papers

This book constitutes the refereed proceedings of the 11th International ACM SIGSOFT Symposium on Component-Based Software Engineering, CBSE 2008, held in Karlsruhe, Germany in October 2008. The 20 revised full papers and 3 short papers presented were carefully reviewed and selected from 70 submissions. The papers feature new trends in global software services and distributed systems architectures to push the limits of established and tested component-based methods, tools and platforms. The papers are organized in topical sections on performance engineering; extra-functional properties: security and energy; formal methods and model checking; verification techniques; run-time infrastructures; methods of design and development; component models.

Our new Indian original book on software engineering covers conventional as well as current methodologies of software development to explain core concepts, with a number of case studies and worked-out examples interspersed among the chapters. Current industry practices followed in development, such as computer aided software engineering, have also been included, as are important topics like 'Widget based GUI' and 'Windows Management System'. The book also has coverage on interdisciplinary topics in software engineering that will be useful for software professionals, such as 'quality management', 'project management', 'metrics' and 'quality standards'. Features Covers both function oriented as well as object oriented (OO) approach Emphasis on emerging areas such as 'Web engineering', 'software maintenance' and 'component based software engineering' A number of line diagrams and examples Case Studies on the ATM system and milk dispenser Includes multiple-choice, objective-type questions and frequently asked questions with answers.

This report discusses issues related to the methods and tools required to support the development and evolution of future generations of Command Control Communications Intelligence and Information Warfare (C3I/IW) systems. It focusses on concepts and approaches defined as part of the Takari programme and considers issues related to tool support for the development of Takari Capability and Technology Demonstrators (CTDs) such as the proposed Experimental C3I Technology Environment (EXC3ITE). A Component-Based Software Engineering (CBSE) lifecycle, which includes both Domain Engineering and Product Engineering, is proposed as a possible development strategy. A tool categorisation framework is defined to help define tool requirements. An initial survey of CBSE tools provides examples of currently available tools which could be considered for each of the tool categories.

This book provides a good opportunity for software engineering practitioners and researchers to get in sync with the current state-of-the-art and future trends in component-based embedded software research. The book is based on a selective compilation of papers that cover the complete component-based embedded software spectrum, ranging from methodology to tools. Methodology aspects covered by the book include functional and non-functional specification, validation, verification, and component architecture. As tools are a critical success factor in the transfer from academia-generated knowledge to industry-ready technology, an important part of the book is devoted to tools. This state-of-the-art survey contains 16 carefully selected papers organised in topical sections on specification and verification, component compatibility, component architectures, implementation and tool support, as well as non-functional properties.

Supporting a Component-based Software Engineering Approach for the Development of Takari Products and Future Command and Control Systems